CWR-22
EVENT RECORDER

USER MANUAL

MICRO-AIDE

Rail Signal Products

EVENT RECORDERS   ALARM REPORTERS   DATA LOGGERS
CLOCK SYNCHRONIZERS   CURRENT SENSORS   VOLTAGE MONITORS
BATTERY MONITORS   LIGHT OUT DETECTORS   CUSTOM ENGINEERING

MICRO-AIDE

www.micro-aide.com

RAIL SIGNAL PRODUCTS

CWR-22
EVENT RECORDER
USER MANUAL

MICRO-AIDE CORPORATION   Tel: 626-915-5502   Fax: 626-331-9484   E-mail: support@micro-aide.com
685 Arrow Grand Circle   Covina, CA   91722

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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 significantly in capacity, size and features. The MICRO-AIDE Crossing and Wayside Recorder Model 22, hereinafter referred to as the CWR-22, provides its user with the most comprehensive set of features of any recorder presently available. It is ideally suited for use at grade crossing, wayside and small interlocking facilities. Its compact size belies its many capabilities.

Along with eighteen optically isolated digital inputs the CWR-22 is equipped with four general purpose analog inputs. Unlike other systems, the use of analog inputs does not reduce the number of available digital inputs. The analog inputs may be used to monitor both DC and AC signals such as relay coil voltages, battery voltages or commercial power levels. Analog DC and AC currents can be monitored by using the CWR-CS Current Sensor.

Four Virtual Inputs allow the user to "create" Event Records based upon a specific logical association of several physical inputs (both analog and digital). 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.

Every CWR-22 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 does support applications that require local hard copy printing of Event Records. An RS-232 port is provided that may be used to drive a keyboard equipped printer. The printer's keyboard may also be used to facilitate setup of the unit. The same RS-232 port may be used with a video display terminal or personal computer. An optional 14,400 Baud internal modem may be installed that 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 may also be used to provide dial-out alarm reporting to a maintenance facility.

The CWR-22 Event Recorder is designed to be easy to use and maintain. Its design is based upon the premise that value and reliability start with attention to detail and a concern for usability rather than needless complexity.

Features and Benefits

Listed below are just a few of the features and benefits included with every CWR-22 Event Recorder.

- 13,852 Event Record memory (expandable as an option to 57,543).

- Memory is non-volatile. Event Records are retained even if power is removed.

- Broad range circuit monitoring. Any signal within a 5 to 30 VDC range can be sensed by a Digital Input.

- Both positive and negative voltages can be sensed by Digital Inputs.

- Every Event Record lists a measurement for each of four Analog Inputs.

- Analog Inputs have a 0 to 12.8 V and 0 to 128 V scale (DC or AC).

- Analog Inputs are tested against separate Upper and Lower Limits that are assigned by the user. Crossing either limit will create an Event Record.

- Analog DC and AC currents in the range of 0 to 32 Amps can be monitored by using the optional CWR-CS.

- 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 1 millisecond (.001 seconds) to capture fast electronically generated control signals.

- Events satisfying the Detection Time criteria are date and time stamped to the nearest millisecond (.001 seconds).

- Flashing signal events are detected.

- Attachment of the recorder to an event generating circuit is completely non-intrusive to the circuit. This is ensured by the high input resistance nature of the design. Each Digital Input utilizes opto-isolation technology to provide ground isolation of at least 3800 VDC.

- Installation is quite simple. Input wiring is made to snap-off, screw-down terminals. Wire sizes as large as 12 AWG can be used.

- Power consumption is typically less than 3 watts. A standard 12 VDC power source will power the recorder.

- Lightweight (4 lb.) chassis construction and small physical size allow the recorder to be used in portable applications.

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

- An improved user interface provides full cursor control when using a video display terminal or PC.

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

- Year 2000 compliant.

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-22 Event Recorder. Wherever possible, step-by-step instructions have been prepared. A Quick Reference is provided that may be helpful to the user when assistance is needed on a specific task. The Quick Reference can be found in the Table of Contents section. Several figures and tables have been included in the manual as an additional aid to the reader.

In the event the user has questions about any of the described procedures the user should contact MICRO-AIDE for assistance.

MICRO-AIDE
Customer Service
TEL: 626-915-5502   FAX: 626-331-9484

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

Revision Level

This document refers to Version 1.02 of the CWR-22 firmware. The sample data and command details depicted were prepared using a Version 1.02 recorder. Furthermore, several of the drawings refer to Revision D of the CWR-22 printed circuit board. Version 1.02 and Revision D changes include the following:

- A Local Alarm test command has been added to the diagnostics command menu.
- A second set of positive and negative input power terminals have been added.
- Filtering of the Analog Input signals can now be set to either a fast (DC) or slow (AC) setting.
- The Analog Input impedance has been increased to 10 million ohms.
- A four-position DIP switch on the pcb enables or disables current sensing via the CWR-22.
- A pair of shelf mounting brackets are shipped with every CWR-22.
- Every CWR-22 shipment includes several insertion bridges. The bridges can be used to short alternating inputs (e.g., common inputs) quickly and easily.

Users who require information that concerns earlier versions of the CWR-22 should contact MICRO-AIDE for assistance.

User Notes

Chapter 2
Setup

Introduction

This chapter describes how to properly unpack, install and set up the CWR-22 prior to operation. It is advisable to review the Unpacking, Initial Check-out and Installation sections before actually performing the procedures described in this chapter.

Unpacking

Each CWR-22 is packed in an individual container that is properly sized for the unit. Abundant packing materials are provided to minimize mechanical shock to the contents. Before opening the shipping carton inspect the carton for damage. Damage to the container should be noted. Carefully remove the unit. It is advisable to save all packing materials in the event the unit ever needs to be returned to MICRO-AIDE.

Inspect the unit for any visual damage. The unit should not be scratched, dented or deformed in any way. If it appears that the unit 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

Before the CWR-22 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, preferably red and black, for power and testing inputs (approx. 12 ft., 16 AWG).
- Wire strippers and small, flat-head screwdriver.
- PC equipped with a communications program (e.g., Procomm®) or a Video Display Terminal (VDT). Either one must be set for 19,200 Baud.
- Digital Voltmeter (DVM).

Perform the following steps in the sequence listed. A Trouble-shooting Guide is available on page 73. It may be of assistance in the event the user experiences a problem. Refer to Figures 1 and 2 for front, side and end views of the CWR-22.

- Verify that the power is off at the power source.
- Connect the power source ground to one of the screw terminals at the left end of the unit labeled "N". Connect the positive voltage of the power source to one of the screw terminals at the left end of the unit labeled "B".
- Connect the PC or VDT to the DB-9 male connector labeled "Terminal". It is located on the right end panel of the unit. Use the cable provided by MICRO-AIDE or a DB-9 to DB-9 "straight-through" cable. Figure 5 illustrates the proper wiring for two types of peripheral cables.
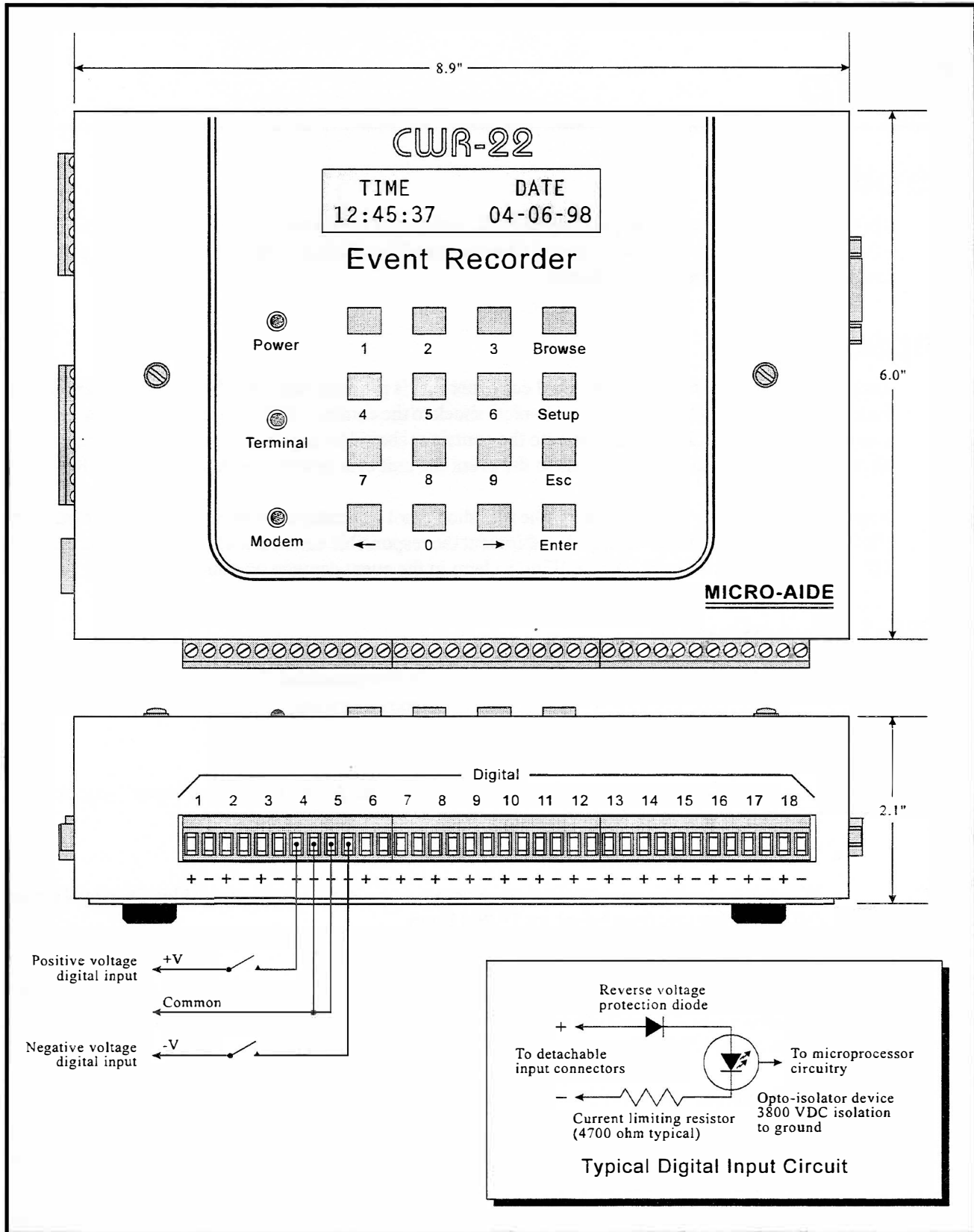
Figure 1
CWR-22 typical installation, front and side views

Left End View

Pwr   Rly

Analog
19 20 21 22

Current
Sensor

B B N N NO C NC

To power source
10 to 40 VDC

To alarm
indicator

To optional CWR-CS
Current Sensor

Analog input voltage
DC or AC (0 to 128 V)

Right End View

Terminal   Line

To phone line for
optional internal modem

PC, VDT or Printer
1200, 2400, 4800, 9600,
19200, 38400 Baud
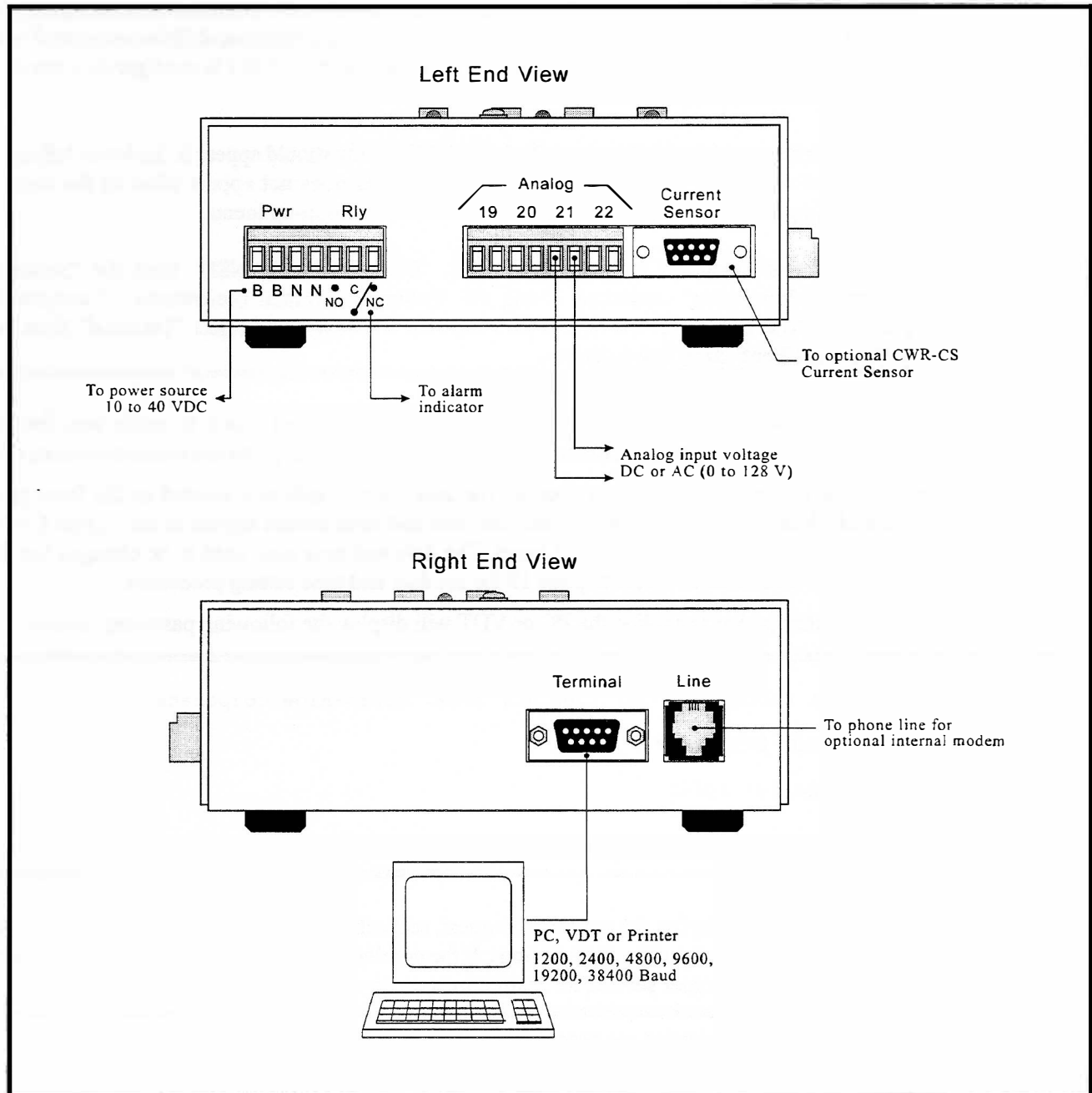
Figure 2
CWR-22 typical installation, end views

☞   **Caution**: Do not attempt to connect the PC or VDT to the female DB-9 connector labeled "Current Sensor". Damage to the recorder may result!

The factory default setting for the Terminal Port is 19200 Baud. Refer to the procedure entitled "Change Terminal Port Baud Rate" described on page 13 for details on changing the Baud rate.

The CWR-22 requires no parity, 8 data bits and 1 stop bit (i.e., **N-8-1**).

☞ | The CWR-22 is designed to take advantage of the unique graphics capabilities associated with PCs and VDTs. To utilize this feature make sure that the PC or VDT is configured to emulate an "ANSI" terminal.

If a PC is being used with **Procomm**® the "ANSI" setting should appear in the lower left-hand corner of the Procomm window. If the correct setting does not appear click on the current setting (e.g., "VT-52") and then select "ANSI" from the pop-up menu.

If **Windows Terminal** is being used select "DEC VT-100 (ANSI)" from the "Settings, Terminal Emulation" command. Using the "Settings, Terminal Preferences ..." command; deselect "Use Function, Arrow, and Ctrl Keys for Windows" and select "Terminal" from the "Terminal Font" drop down list box.

- Turn the power on to the PC or VDT. If a PC is being used check to make sure that the communications program is set for a "direct connection" to the appropriate communications port.

- Turn the power on at the power source. The green power indicator located on the front panel should illuminate. After a few seconds the date and time should appear at the Liquid Crystal Display (LCD) located on the front panel. The date and time may need to be changed but this can be performed later. Refer to page 19 for the date and time setting procedure.

- Shortly after power is applied the PC or VDT will display the following password request.

```
Model CWR-22 Event Recorder.   Ver 1.02 (C) 1996, Micro-Aide Corporation.

Site name: ***** NOT SET *****

Event storage capacity: 13852

Enter password:
```

- If the unit fails to display the password request, recheck the power and peripheral connections and Baud rate and communications settings. If the problem can be isolated to the CWR-22 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.

The remainder of the Initial Check-out Procedure presumes that the recorder is configured to operate with the factory default settings and that no events have been recorded in memory. If this is not the case the user may wish to perform a reset of the recorder. Refer to the section entitled "Reset to Factory Defaults" on page 17 for details.

- From the PC or VDT keyboard type "PASSWORD" in **upper-case** letters. This is the default password. Complete the entry by pressing the "ENTER" key.

- The Main Menu, shown below, will be displayed.

```
        C W R - 2 2    A D M I N I S T R A T I V E    M E N U   (V1.02)

                  A   Toggle Terminal/Printer mode
                  B   Browse event records
                  D   System diagnostics
                  E   Erase event records
                  F   Toggle full/half duplex
                  G   Global input parameters
                  I   Individual input parameters
                  L   Assign site name
                  M   Assign modem parameters
                  N   Assign virtual inputs
                  O   Change terminal port baud rate
                  P   Change passwords
                  S   Display real-time input status
                  T   Change current date and time
                  U   Upload/dnload setup parameters
                  V   View real-time records
                  W   Write event records to file
                  X   Log off system
```

- Using a short pair of stripped jumper wires place +12VDC and ground to Digital Input Number 1. As viewed from the front side of the recorder, Digital Input Number 1 is located at the extreme left end. +12 VDC should be placed on the terminal to the left and ground on the right. Refer to the silkscreening located below the input terminals. The voltage **must be held for at least three seconds** before proceeding.

- Using the same procedure as described in the previous paragraph, test Digital Inputs 2 through 18.

- Perform a Browse of the Event Records by pressing "B" followed by pressing "ENTER" twice at the PC or VDT keyboard. Refer to the section entitled "Browse Event Records" on page 43 for additional details and an explanation of the Event Record format.

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

- Press the "ESC" key once and then press the "S" key. The CWR-22 will now display the real-time status of Digital and Analog Inputs.

- Connect the 12 VDC test leads to the two inputs of Analog Input Number 19. The test leads can be connected in either polarity since the CWR-22 will convert negative analog voltages into positive voltages.

- Verify that the Analog Input reading for A19 is within 1 V of the correct reading.

- Repeat the previous two steps for the remaining three Analog Inputs.

- Before completing the Initial Check-out Procedure verify that the LCD is providing acceptable contrast. If it needs to be improved adjust the potentiometer mounted on the internal printed circuit board. Refer to the section entitled "Adjusting the LCD Contrast" on page 69 for details.

This concludes the Initial Check-out Procedure. Power can now be removed from the recorder. Connections to the peripheral device should also be removed.

☞ | In the event a failure occurs during any part of the previous procedure please contact MICRO-AIDE customer service. Instructions on how to proceed will be offered. The Material Return and Limited Warranty policies are described on the inside back cover of this manual.

The Initial Check-out Procedure may be used at any time to verify that the CWR-22 is operating properly.

Installation

Installation of the CWR-22 is very straightforward. The following sections describe the recommended Installation Procedure. Figures 1 and 2 illustrate elements that are common to most installations. Additionally, the diagrams depict the location of each connector required by the installation.

Location

The physical location where the recorder is to be installed should comply with a few simple requirements. The ambient temperature near the unit should be in the range of -20°C to +72°C. The surrounding environment should be relatively dust and vibration free.

Mounting

The CWR-22 may be mounted on top of a suitable shelf or secured to a back board. Each recorder comes equipped with non-slip, rubber feet. Precautions should, however, be taken to prevent the unit from dropping off the edge of the shelf or desktop. The shelf mounting brackets provided with the recorder can be used for this purpose. If a PC or VDT device is to be used at the equipment site it must be similarly secured. Alternatively, the recorder may be mounted in a standard 19" or 23" equipment rack.

☞ | Contact MICRO-AIDE in the event rack mounting brackets are required. Refer to Appendix B for ordering details.

To install the rack or wall mounting bracket(s) remove the four rubber feet from the bottom of the recorder. Attach the appropriate bracket(s) using the screws and mounting holes vacated by the rubber feet.

Site Preparation

The equipment location must have access to a stable 10 to 40 VDC power source. A pair of wires must be run from the the power source to the location where the recorder will be mounted. The CWR-22 wire ends must be stripped approximately 1/4". The stripped ends will be secured by screw-down terminals located at the left end panel of the recorder. 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 screw-down terminals will accept wire sizes as large as 12 AWG. The two wires must be properly secured to prevent damage. The wires must not be run adjacent to electrical equipment such as motors that may generate large electrical disturbances.

The Digital and Analog Inputs use the same screw-down terminals as those required by the power connections. Each wire should be tagged with its circuit identity. Each input cable or wire bundle should be secured to prevent damage to the connections at either end.

The CWR-22 can be programmed to issue an alarm indication signal. A Form C relay with a normally closed and normally open set of contacts is available at the connector where power is brought to the recorder. Each set of contacts is rated for 120 V and 1 Amp. The relay can be used to control an external light or warning device.

Peripheral Equipment

If a PC or VDT is to be co-located with the CWR-22 an appropriate AC power source must be available. The RS-232 cable from the peripheral device to the recorder should be kept to a minimum distance, preferably less than 20 feet.

MICRO-AIDE provides, as a standard feature, an RS-232 DB-9 to DB-9 cable. This cable is suitable for use with most PCs. In the event a DB-9 to DB-25 cable is needed either contact MICRO-AIDE or purchase a DB-9 to DB-25 converter at any electronics supply store.

If the CWR-22 is equipped with an optional internal modem a standard telephone line must be attached to the unit. 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.

Cabling

Several cables must be attached to the recorder. Follow the steps listed below to complete the cabling installation.

Power

- Ensure that the power is off at the power source.
- The two wires from the power source must be secured to either pair of screw-down terminals labeled "B" and "N", respectively. The correct terminals are part of a seven-position, detachable connector.

☞ | The power, input and alarm relay wires all terminate in screw-down connectors that are detachable. The cable installation can be performed more easily if the female connectors are first detached from their male halves that remain secured to the CWR-22 circuit board.

- Connect AC power to the PC or VDT devices.

Alarm Relay

- Wire the alarm indicating device or external circuit to the appropriate relay terminals labeled "C", "NO" or "NC" (i.e., common, normally open or normally closed). The relay terminals are part of the same seven-position connector that is also used for power.

Peripherals

- Attach the peripheral cable to the DB-9 male connector labeled "Terminal".
- Connect the optional telephone line to the RJ-11 connector labeled "Line".

Digital and Analog Input Circuits

Events can only be recorded if the input circuits are wired properly. In the case of Digital Inputs this means that the polarity of each circuit must be correctly identified and wired to the appropriate input connector.

Input circuits are typically wired to twelve-position, detachable connectors. Individual pairs are wired to adjacent terminals of the same connector. 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 "-".

Both positive and negative voltage events can be monitored by a Digital Input, even if they occur from the same circuit (e.g., a polarity changing searchlight coil). In such cases the circuit is wired to two inputs of the CWR-22, one for each polarity. Refer to Figure 1 for details on how to connect to negative voltage circuits.

Analog Inputs are wired somewhat differently than Digital Inputs. The four Analog Inputs terminate in a separate, eight-position connector located at the left end panel of the recorder. They are labeled as inputs 19 through 22. The connector that is used is detachable and also uses a screw-down terminal method for anchoring the wire.

☞ Each Analog Input signal passes through a full wave rectifier circuit in the CWR-22. It changes negative DC and AC voltages into positive only voltages. Consequently, Analog Inputs can be wired without regard to polarity.

Refer to page 72 for details on how to properly set the Analog Filter Switches.

Insertion Bridges and Jumper Combs

As an aid to the installer each CWR-22 is provided with several Insertion Bridges (a.k.a. Jumper Combs). Each bridge allows ten adjacent inputs to be connected together. By removing every other bridge point the bridge can be used to connect several inputs to a common lead. Unwanted bridge points may be removed by cutting them or bending them away from the detachable connector.

The user may wish to verify the proper operation of each input. The Initial Check-out Procedure starting on page 5 should be used to identify any faulty input wiring.

CWR-CS Current Sensor

The optional CWR-CS Current Sensor is an accessory that can be used to monitor DC and AC current flow through control point and lamp circuits. It is designed to provide a completely passive, non-intrusive interface for the current measurement. As many as four circuits are monitored by the CWR-CS.

The CWR-CS utilizes the Analog Inputs of the recorder. Any combination of voltage and current inputs not exceeding four is permitted. **Accordingly, if an Analog Input is to be used to monitor a current signal then it must be disconnected from a voltage input source** (i.e., input A19, A20, A21 or A22). The disconnection is required to

prevent a possible short between the voltage input and current signal from the CWR-22. The proper procedure for assigning an Analog Input to the CWR-CS involves changing one to four jumper settings on the CWR-22 PCB. Refer to the section entitled "Analog Input Jumpers" on page 72 for additional details.

☞ **Caution**: Never attach the CWR-CS to the CWR-22 without first disconnecting the Analog Inputs. This will prevent placing an interfering signal on the analog circuit that is attached to the CWR-22.

Refer to the CWR-CS User Manual for details on how to install the Current Sensor.

Power On

Once all of the cabling is completed the power can be applied. Shortly after power is turned on the PC or VDT will display the password request. Page 8 contains an example of the password message. The front panel LCD will (after the initialization steps are completed) indicate the time and date as illustrated in Figure 1.

This completes the CWR-22 Installation Procedure. The Setup Procedure can now be started.

Setup Procedure

Before the CWR-22 is ready to be used the recorder must be set up in such a way as to reflect the operation required by the user. It is assumed that the user is accessing the CWR-22 from a local PC, VDT or printer. Succeeding chapters describe how to use the front panel display and keypad, as well as access the recorder via the optional modem.

Baud Rate Selection

The first step in preparing the CWR-22 for use is to select the proper Baud rate for the Terminal Port. The Baud rate may be set to either of six speeds. The Baud rate may be changed by either of two methods. The first method uses one of the Main Menu commands. This method is described on page 15. The alternative method involves using the front panel keypad and LCD. Refer to page 65 for details on how the Baud rate is changed from the front panel.

☞ The Terminal Port Baud rate has a factory default setting of 19200.

Data Flow Control

Several of the setup and operational commands can generate considerable amounts of printed or displayed data. If the user wishes to observe this data on the screen of a PC or VDT it may be helpful to pause the data being sent by the Event 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 or VDT as well as prevent buffer overflow at the printer. Pausing the data flow to the printer will allow the printer to empty its data buffer and thus "catch-up" with the data being sent. If the user experiences missing data or

data gaps at the printer it is very likely caused by an overflowing of the printer's data buffer. The data flow commands should be used to prevent such occurrences.

Another useful command is the Abort command. At any time during a long data printout the remainder of the data can be ignored or "Aborted" by pressing the Escape key, commonly labeled "ESC". The user can issue other commands immediately after the Abort is executed rather than wait until the long data dump is completed.

Terminal Mode Cursor Control

The CWR-22 has two modes by which commands and data are displayed. The Printer Mode is designed to be used with printers attached to the Terminal Port. The Terminal Mode should be used when a PC or VDT is attached. The Terminal Mode allows the user to select and execute commands by simply moving the PC or VDT cursor and then pressing the "ENTER" key. In this way the amount of typing is reduced and fewer mistakes will be made by the user.

The left, right, up and down arrow keys allow the cursor to be moved from one command field to another or within a selected field. In many cases the sub-menu commands allow the user to select from a list of settings (e.g., DC or AC Analog Inputs). The spacebar can be pressed to toggle between the various selections. The "ENTER" and "ESC" keys allow the user to either execute the command based upon the displayed settings or escape from the current command. A brief explanation of the selection keys is provided below each command when it appears on the PC or VDT screen.

☞ | In the remaining sections of this chapter a number of examples are shown to familiarize the user with the command selection process. For the most part, the examples cited assume that Terminal Mode is being used. Bold print text (e.g., "**D**   **System diagnostics**") is used to illustrate the position of the cursor.

Main Menu (?)

The remainder of the Setup Procedure concerns the use of commands that define operational parameters for the system. Each command is listed in the Main Menu. Refer to page 8 for a list of Main Menu commands.

The command syntax is based upon a single character (e.g., "A", "T" and "?"). The Main Menu commands are immediate acting. When the appropriate letter key is pressed a response is initiated. Both upper- and lower-case letters may be used. Alternatively, while in Terminal Mode the up and down arrow keys may be used to position the cursor over the desired command. The "ENTER" key can then be pressed to execute the command. To display a list of Main Menu commands type "?".

Many of the Main Menu commands have sub-menus that provide the user with additional control of the recorder's many features. Executing sub-menu commands is somewhat different than executing Main Menu commands. The differences are detailed in the description that accompanies each sub-menu command.

In the sections that follow each command is listed by name as it appears in the Main Menu. The letter associated with the command is shown in parenthesis. The sequence of commands represents the recommended order of execution.

Change Terminal Port Baud Rate (O)

The Baud rate can be set from the PC or VDT keyboard by using the Change Terminal Port Baud Rate command. After pressing "O" or otherwise selecting the command the following message will be displayed.

```
                          Terminal port setting

                           Baud rate:19200

               Press SPACE to select and ENTER to accept
```

By pressing the spacebar the Baud rate can be toggled to any of the following settings: 300, 1200, 2400, 9600, 19200 or 38400 Baud. Once the correct rate is displayed the "ENTER" key must be pressed to execute the command.

☞ Immediately after the Terminal Port Baud rate is changed the rate used by the PC or VDT must be changed to match the new setting.

Change the PC or VDT Baud rate **after** the "ENTER" key has been pressed, not before.

After the PC or VDT Baud rate has been changed press the "ENTER" key a second time to complete the command. The user will then be returned to the level of the Main Menu.

Toggle Terminal/Printer Mode (A)

Placing the CWR-22 in Terminal Mode presents certain advantages to the user if a PC or VDT is attached to the recorder. The advantages are described in the section entitled "Terminal Mode Cursor Control" on page 14. If a printer is being used or the PC or VDT cannot emulate an "ANSI" terminal, then Printer Mode must be used.

To change the current mode setting press "A". Either of the two following messages will be displayed to indicate the new setting.

```
              CWR-22 is now in ANSI Terminal mode

           Windows Terminal program is recommended
```

```
CWR-22 is now in Printer mode

Press ? for a list of commands
```

☞ If Terminal Mode is selected it is important to have the PC or VDT emulate an "ANSI" terminal. Other terminal emulations may result in unpredictable data being displayed at the terminal. Refer to the documentation for the communications program or VDT for details on how to select the proper terminal emulation.

System Diagnostics (D)

The System Diagnostics command can be used to check on the health of the recorder as well as to reset it to its factory default settings. The following sub-menu will be displayed after selecting the System Diagnostics command.

```
                    System diagnostics

        A   Alarm relay test
        D   Run diagnostic test
        P   System profile
        R   Reset to factory defaults
        X   Exit to main menu
```

Each sub-menu command is described below.

Alarm Relay Test (A)

The CWR-22 is equipped with an internal alarm relay. The form C relay may be used to indicate a variety of fault conditions as defined by the programming of the Virtual Inputs. The Alarm Relay Test command allows the relay to be tested for a brief interval.

To test the relay for five seconds, execute the test command by pressing the "ENTER" key. A message will be displayed to indicate the test is being performed. A second message will indicate the automatic completion of the test. Press the "ENTER" key a second time to return to the System Diagnostics command menu.

Run Diagnostic Test (D)

The Run Diagnostic Test command can be performed at any time. It will test the non-volatile memory, firmware memory, optional modem and LCD of the CWR-22. The test takes several seconds to complete. It will not destroy any data saved in the recorder's memory. After completing the diagnostic test a message similar to the following should be displayed.

```
                    System diagnostics

        Testing memory...OK
        Firmware test....OK
        Modem test.......N/A
        LCD display......OK

        Press ENTER to return
```

In the example cited the modem was not installed so its status is shown as "N/A". If the modem was installed, but in use, the modem test would be bypassed. If a fault was found, "BAD" would identify the failed item.

☞ The failure of any item in the Run Diagnostic Test command should be reported to MICRO-AIDE. Repair and return policies are described on the inside back cover of this manual. Telephone and fax numbers are also listed.

To return to the System Diagnostics sub-menu press "ENTER".

System Profile (P)

As an aid to maintenance and record keeping the System Profile command will provide the user with details on the recorder's current hardware and firmware configurations. A sample profile is shown below.

```
                        System Profile

              Firmware Version: 1.02
                 Event capacity: 57543
                 Capacity filled:   0%
                Modem baud rate: 14400
                 Term baud rate: 19200

                Press ENTER to return
```

In the example cited the firmware version is shown as "1.02". The larger Event Record capacity is listed and the optional internal modem has been installed. The Terminal Port Baud rate is set to 19,200. The "Capacity Filled" indication can be very useful in estimating how many Event Records are being generated at the site.

Reset to Factory Defaults (R)

The Reset to Factory Defaults command can be used to clear the entire Event Record memory and reset the recorder to its default settings. The following message will warn the user of the consequences of the reset command.

```
         About to perform a very DESTRUCTIVE function.
   Event records and programmable settings will be destroyed.

                Do you want to proceed (Y/N) ?
```

To abort the reset process press "N". To perform the reset enter an upper-case "Y". The CWR-22 will then reinitialize the recorder. A test of the non-volatile and firmware memories will also be performed. After completing the tests the password request will be displayed. The password request message is shown on page 8. The "Event storage capacity" is listed as a part of the password request message. It should not be less than 13,852 events. If additional memory has been introduced to the CWR-22 the storage capacity must be greater than 13,852 events. Contact MICRO-AIDE in the event the capacity is not correctly listed.

After a reset is performed all of the system parameters are returned to their factory default values. Table 1 lists the various default settings.

List of Default Values	
Parameter	Default Value
Terminal Port Baud Rate	19,200
Modem Baud Rate	14,400 (fixed)
Display Mode	Terminal
Duplex	Full
Site Name	***** NOT SET *****
Digital Input Names	Digital Input #01, Digital Input #02, etc.
Analog Input Names	Analog Input #19, Analog Input #20, etc.
Virtual Input Names	Virtual Input #23, Virtual Input #24, etc.
Digital Input Identifiers	DInput01, DInput02, etc.
Analog Input Identifiers	AInput19, AInput20, etc.
Virtual Input Identifiers	VInput23, VInput24, etc.
Digital Input Active Event Name	---ON---
Digital Input Inactive Event Name	—OFF--
Analog Input Active Event Name	--OVER--
Analog Input Inactive Event Name	--UNDER-
Virtual Input Active Event Name	--TRUE--
Virtual Input Inactive Event Name	--FALSE-
Digital Input Detection Time	3.000 seconds
Digital Input Flashing Status	Disabled
Analog Input Type	DC-Voltage
Analog Input Range	High
Analog Input Upper Limit	64 V
Analog Input Lower Limit	64 V
Virtual Input Alarm Status	Local: No, Remote: No
Virtual Input Logic Equations	***Disabled***
Administrative Access Password	PASSWORD
Restricted Access Password	LOOKWORD
Passcode	12345678
Modem Access Prefix	
Modem Access Code	
Modem Primary Number	
Modem Secondary Number	
Modem Dial-out Method	Tone
Modem Redial Delay	30 seconds
Modem Dial-out Alarm Status	Enable
Modem Answer Ring Delay	02

Table 1
Factory default settings

Exit to Main Menu (X)

To exit the System Diagnostics sub-menu and return to the Main Menu press "X".

Toggle Full/Half Duplex (F)

It may be necessary to have the recorder "echo" back to the peripheral device characters entered by the user. Echoing back ensures that the key pressed by the user will appear at the PC, VDT or printer. Additionally, if the peripheral device is displaying double characters the CWR-22 duplex setting must be changed.

To toggle between "Half" and "Full" duplex operation simply press the "F" key. The recorder will issue one of the following confirmation messages. Generally, the correct setting is to have both the peripheral device and the recorder set to full duplex. The messages shown below are used to indicate the current duplex setting.

```
                 CWR-22 is now in half-duplex mode
```

```
                 CWR-22 is now in full-duplex mode
```

Change Current Date and Time (T)

The CWR-22 time stamps all Event Records. The correct time and date must, therefore, 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 prolonged periods. An internal battery will maintain the operation of the real-time clock.

☞   The CWR-22 is Year 2000 compliant.

To set the correct time and date press "T". The recorder will respond with a message similar to the following.

```
                        Real-Time Clock

                   Time        Date
                 12:40:08    04-06-98

           Press ENTER to set or ESC to exit
```

The clock will continue to advance as it is displayed. If the time and date are correct press the "ESC" key. If the clock needs to be changed (e.g., to allow for daylight savings time) press the "ENTER" key. The cursor will then be positioned over the hour setting and the following message will be displayed below the clock data.

```
          <- -> to move between fields, ENTER to exit

       Remember to enter the time in military format
```

As the message indicates the left and right arrow keys may be used to advance the cursor to the desired clock field. Alternatively, the spacebar may be used to advance the cursor. The time must be set in "military-style" (e.g., 4:00 p.m. must be entered as 16-00-00). Leading zeroes must precede all single-digit entries. The colon and dash characters are not entered by the user.

Once the time and date fields are correct press the "ENTER" key. The user will be returned to the level of the Main Menu. The new time and date will be used by the recorder immediately after the "ENTER" key terminates the command.

☞   MICRO-AIDE recommends that the CWR-22 clock be set by the user **once a week**. This ensures that Event Records will be time stamped within 15 seconds of the exact time.

Assign Site Name (L)

After the correct time and date are set the recorder's Site Name should be entered. The Site Name serves as a comprehensive system ID. The name is included in data fields as a part of a header message. Data from several CWR-22 systems can be easily distinguished by providing each system with a unique, descriptive name. To assign or modify the Site Name press "L". The following message will be displayed.

```
                          Edit site name

         Line 1: ***** NOT SET *****
         Line 2:

     Alphanumeric characters accepted. <- -> BS and DEL to edit field.
UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

In the above example the Site Name is set to the factory default value. The Site Name can consist of up to eighty alphanumeric characters. The first forty characters are shown on "Line 1" and the remaining forty are shown on "Line 2". The cursor can be moved in any direction by using the arrow keys. Editing of the existing name can be performed by backspacing, deleting or overwriting any character(s).

Once the Site Name is correctly defined press the "ENTER" key. The user will be returned to the level of the Main Menu.

Global Input Parameters (G)

As a convenience to the user and the intended recording application, the CWR-22 provides a variety of parameters that can be assigned individually by input or to all inputs. If the user wishes to assign parameters that apply to all Digital, Analog or Virtual Inputs the Global Input Parameters command should be used. Additionally, the various input parameters can be quickly reviewed by using the global command.

After selecting the global command the following sub-menu is displayed.

```
                    Assign global input parameters

             A  Assign analog  parameters
             D  Assign digital parameters
             V  Assign virtual parameters
             P  Display input parameters
             X  Exit to main menu
```

As the menu indicates, separate commands are used to assign analog, digital and virtual parameters. Each command is described below.

Assign Analog Parameters (A)

The Assign Analog Parameters command allows the user to establish five distinct parameters for Analog Inputs. Each of the parameters is described in the following sections. The sub-menu for the command is shown below.

```
                    Global analog parameters

             Active event name: --OVER--
           Inactive event name: --UNDER-
                   Analog type: DC-Voltage
                  Analog range: High
                   Upper limit: 64
                   Lower limit: 64

     Alphanumeric characters accepted. <- -> BS and DEL to edit field.
   UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

The standard methods for selecting and editing fields apply to the command.

Event Names

The four Analog Inputs of the CWR-22 can be configured in a variety of ways. The events associated with Analog Inputs can be assigned any eight character name that is meaningful to the application and the user. Instead of creating Event Records with fixed Event Names like "HIGH" and "LOW" the CWR-22 allows the user to assign names like "Gate up" and "Reverse". The global command allows the user to assign Event Names that will be common to all four Analog Inputs.

☞ Do not confuse Event Names with Input Names. An Event Name is used to identify the state of the input when the event was detected. Instead of using simple on/off or high/low nomenclature the Event Name can add a more meaningful description to the Event Record.

In the example cited above the Event Names are at their default settings (i.e., "--OVER--" and "--UNDER-").

Type

The Analog Type can be assigned as "DC-Voltage", "AC-Voltage", "DC-Current" or "AC-Current". To select the proper type setting simply press the spacebar until the desired type appears.

☞ | Refer to page 72 for details on how to properly set the Analog Filter Switches.

Range

Once the Analog Type is assigned the Analog Range must be selected. The range setting applies only to voltage settings. There are two range settings, "High" and "Low". The High Range will measure analog voltages from 0 to 128 V for DC signals and 0 to 142 V for AC signals, each in multiples of 1V. The Low Range will measure analog voltages from 0 to 12.8 V for DC signals and 0 to 14.2 V for AC signals, each in multiples of .1 V. Current measurements always use the Low Range which is defined as 0 to 32 Amps in multiples of .5 Amps.

Upper and Lower Limits

The CWR-22 can also create Event Records when an Analog Input signal falls outside a defined set of limits. Both an Upper Limit and a Lower Limit can be defined. Any variation of the Analog Input either above the Upper Limit or below the Lower Limit will create an Event Record.

☞ | The two limits do not have to be assigned equal values. Assigning an Upper Limit that is greater than the Lower Limit allows the CWR-22 to incorporate a property referred to as hysteresis into its measurements. Hysteresis is frequently used in electronic instruments to reject noise that is commonly found in signals that are being monitored.

Limits can be set from 0 to 12.7 V or 0 to 127 V for DC signals, 0 to 14.1 V or 0 to 141 V for AC signals or 0 to 32 Amps for DC and AC currents. Table 2 summarizes the Analog Input parameters that are allowed by the CWR-22.

Type	Setting	Range Measurement	Multiples of	Limits
DC-Voltage	High	0 to 128 VDC	1 VDC	0 to 127 VDC
	Low	0.0 to 12.8 VDC	.1 VDC	0.0 to 12.7 VDC
AC-Voltage	High	0 to 142 VAC	1 VAC	0 to 141 VAC
	Low	0.0 to 14.2 VAC	.1 VAC	0.0 to 14.1 VAC
DC-Current	Low	0.0 to 32.0 Amps	.5 Amps	0.0 to 32.0 Amps
AC-Current	Low	0.0 to 32.0 Amps	.5 Amps	0.0 to 32.0 Amps

Table 2
List of Analog Input parameter settings

Press the "ENTER" key after the correct Analog Input parameters are selected. The new settings will be applied immediately to all four Analog Inputs.

Assign Digital Parameters (D)

The Assign Digital Parameters command allows the user to establish common settings among the eighteen Digital Inputs. The common settings include the Event Names, Detection Time and Flashing Input status. The sub-menu that accompanies the Assign Digital Parameters command is shown below.

```
                    Global digital parameters

            Active event name:  ---ON---
          Inactive event name:  ---OFF--
                  Detect time:  3.000
                     Flashing:  Disabled

    Alphanumeric characters accepted. <- -> BS and DEL to edit field.
 UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

The standard cursor control methods for selecting and editing fields apply to the four parameters listed in the menu.

Event Names

Like their Analog Input counterparts, Digital Inputs can be assigned descriptive Event Names to identify the state of the input when the event was detected. The Event Names can be given any label consisting of up to eight alphanumeric characters. The Event Names for Digital Inputs can be different than those assigned to Analog Inputs. Both the active and inactive states must be assigned unique names to avoid confusion in the Event Record.

Detection Time

The Detection Time setting must be assigned with care. The CWR-22 has the ability to detect events as short as .001 seconds (1 milli-second). The fast detect time of the CWR-22 makes it possible to detect electronic (as opposed to relay) based signals. However, if the Detection Time is assigned a small value and a relay based signal is being monitored, the CWR-22 may record noise induced transient signals as legitimate events. Generally, relay based signals should be assigned values of .1 seconds or greater.

The range of valid Detection Times is .001 to 32.000 seconds. The user does not have to enter the decimal point in the number since the CWR-22 will interpret the numerical entry as a five-digit value.

☞ Setting the Detection Time to 00.000 will disable recording for Digital Input(s) assigned this value.

Digital Inputs may also be used to report Event Records from flashing circuits. The Detection Time assigned to Flashing Inputs is a special case that requires additional attention. The correct method for assigning the Detection Time for flashing circuits is described in the following section.

Flashing Inputs

The CWR-22 is able to report flashing events. A typical flashing event is created by the operation of a flashing light circuit. Each time the light flashes a new pulse is seen at the Digital Input. However, the recorder should log only the start and end events, not an event for each pulse. Assigning the proper Detection Time to the input and identifying the input as a Flashing Input solves the problem of multiple flash events when only a single pair of events is actually required. Figure 3 illustrates the algorithm used to detect flashing events.
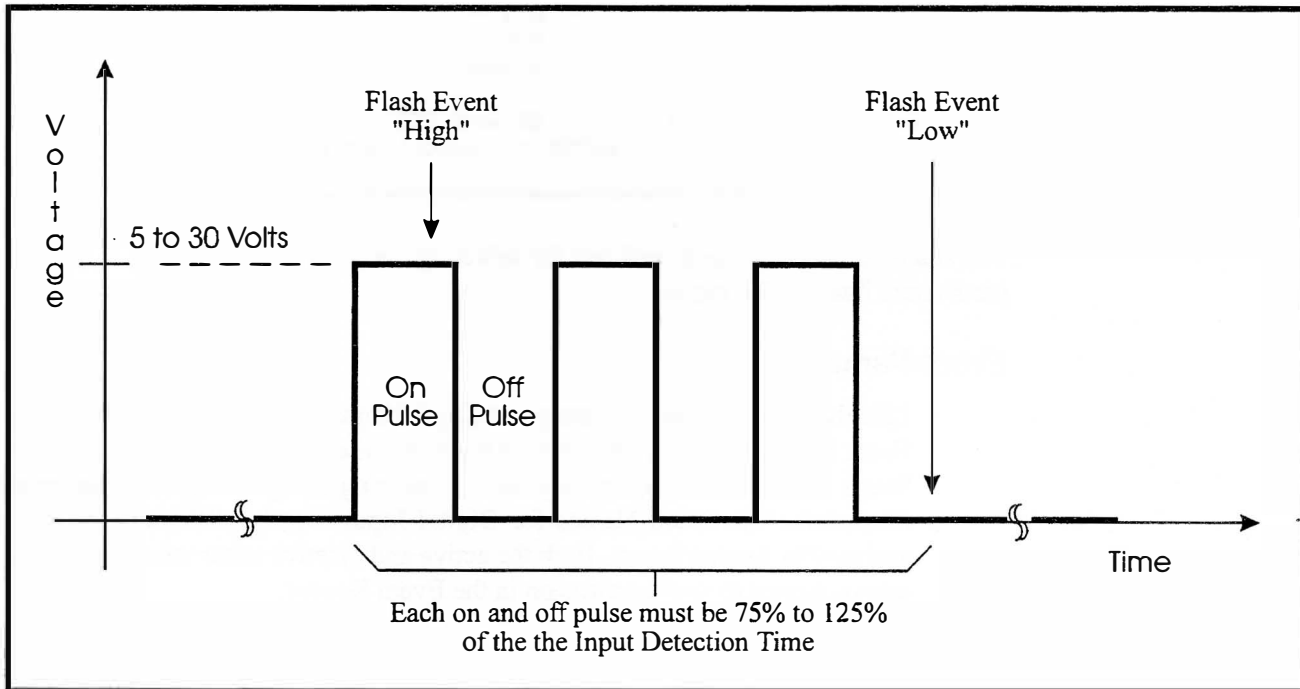
Figure 3
Typical sequence of flashing pulses

The Detection Time must be set to the nominal duration of the expected pulses. The pulses are also expected to be "on" and "off" for the same duration (i.e., symmetrical). The CWR-22 is designed to allow for some variation in the duration of each pulse. As noted by Figure 3, each "on" and "off" pulse must have a duration in the range of 75% to 125% of the assigned Detection Time. The following formula can be used to determine the correct Detection Time for inputs that have **non-varying** flash rates.

☞ The Detection Time (measured in seconds) for Flashing Inputs should be equal to 30 divided by the number of flashes per minute.

To assign all eighteen Digital Inputs as Flashing Inputs press the spacebar until the "ENABLED" message appears. To assign each input to non-Flashing Status select "DISABLED".

Press "ENTER" after the correct parameters are selected. The new settings will be applied immediately to all eighteen Digital Inputs.

Assign Virtual Parameters (V)

Virtual Inputs may be assigned a common set of Event Names by using the Assign Virtual Parameters command. An example of the command is shown below.

```
                    Global virtual parameters

                 Active event name: --TRUE--
                 Inactive event name: --FALSE-

     Alphanumeric characters accepted. <- -> BS and DEL to edit field.
  UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

Event Names

Virtual Inputs can also be assigned descriptive Event Names to identify the state of the input when the event was detected. The Event Names can be given any label consisting of up to eight alphanumeric characters. The active and inactive states must be assigned unique names.

Display Input Parameters (P)

The Display Input Parameters command is used to list all of the input parameters. After pressing "P" a list similar to the following will be displayed.

```
                    Digital Input Parameters

Input           Name           Identifier   Event Name        Detect Time    Flash
   1   Digital Input #01       DInput01   ---ON---/---OFF--     3.000 S        NO
   2   Digital Input #02       DInput02   ---ON---/---OFF--     3.000 S        NO
   3   Digital Input #03       DInput03   ---ON---/---OFF--     3.000 S        NO

                    Press ENTER to continue
```

In the above example only the first three Digital Inputs are listed. To display the remaining parameters press the "ENTER" key. A list similar to the following will appear.

```
                Analog and Virtual Input parameters

Input           Name           Identifier   Event Name      Limits     Range      Type
  19   Analog  Input #19        AInput19   --OVER--/--UNDER-  64 / 64 V High DC-Voltage
  20   Analog  Input #20        AInput20   --OVER--/--UNDER-  64 / 64 V High DC-Voltage
  21   Analog  Input #21        AInput21   --OVER--/--UNDER-  64 / 64 V High DC-Voltage
  22   Analog  Input #22        AInput22   --OVER--/--UNDER-  64 / 64 V High DC-Voltage

  23   Virtual Input #23        VInput23   --TRUE--/--FALSE-
  24   Virtual Input #24        VInput24   --TRUE--/--FALSE-
  25   Virtual Input #25        VInput25   --TRUE--/--FALSE-
  26   Virtual Input #26        VInput26   --TRUE--/--FALSE-

                    Press ENTER to return
```

In the example cited above the input parameters are set to their factory default values.

Exit to Main Menu (X)

To exit the Global Input Parameters sub-menu and return to the Main Menu press "X".

Individual Input Parameters (I)

The Individual Input Parameters command is a companion to the Global Input Parameters command. They share several features and one major difference. The Global Input Parameters command allows the user to establish parameters that all inputs of a common type will share. The Individual Input Parameters command is used to assign parameters to a single input.

Enter the assignments that apply to one input **after** the common assignments have been completed. The parameters that can be assigned using the Individual Input Parameters command vary with the type of input selected. In the sections that follow each type is described separately.

With one important exception, the standard cursor control methods for selecting and editing fields apply to all of the parameters listed in the menu. Press the "ESC" key at any time to jump to another input. An Input Number can then be entered. If the "ESC" key is pressed a second time, an exit will be performed and the user will be returned to the level of the Main Menu.

If the user modifies the parameters for an input but fails to press the "ENTER" key before jumping to another input the following message will be displayed.

```
            Save changes made to the record (Y/N) ?
```

Any changes that may have been inadvertently typed can be ignored by pressing "N".

☞   Reminder: Inputs 1 to 18 are digital, 19 to 22 are analog and 23 to 26 are virtual.

Digital Inputs

The following menu will be displayed after selecting the Individual Input Parameters command.

```
                    Edit input parameters

                    Digital input #  1

                 Name: Digital Input #01
           Identifier: DInput01
    Active event name: ---ON---
  Inactive event name: ---OFF--
          Detect time:  3.000
             Flashing: Disabled

   Alphanumeric characters accepted. <- -> BS and DEL to edit field.
UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

Input Number 1 is always the first input listed. Press the "ESC" key to jump to another input. Six parameters can be defined for Digital Inputs. They are described below.

Input Name

Each input can be assigned a unique name or mnemonic. The Input Name can be any combination of characters not exceeding twenty total. In the example cited above the Input Name has the factory default value of "Digital Input #01". The Input Name will appear in Event Records that are not directed to the LCD.

Input Identifier

The length of the Input Name does not leave many characters for displaying Event Records at the LCD. As a solution to this problem the shorter Input Identifier is used within each LCD record. The Input Identifier is also used when assigning equations to Virtual Inputs. The Input Identifier may be any combination of characters not exceeding eight total.

Event Names

Event Names are described in the section entitled "Event Names" under the Global Input Parameters command. Refer to page 21.

Detection Time

Detection Time is described in the section entitled "Detection Time" under the Global Input Parameters command. Refer to page 23.

Flashing Inputs

Flashing Inputs are described in the section entitled "Flashing Inputs" under the Global Input Parameters command. Refer to page 24.

Analog Inputs

The following menu will be displayed whenever an Analog Input is selected.

```
                    Edit input parameters

                    Analog input # 19

                    Name: Analog   Input #19
               Identifier: AInput19
        Active event name: --OVER--
      Inactive event name: --UNDER-
              Analog type: DC-Voltage
             Analog range: High
              Upper limit:  64
              Lower limit:  64

   Alphanumeric characters accepted. <- -> BS and DEL to edit field.
  UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

Eight parameters can be established for Analog Inputs. They are described below.

Input Name

The procedure for assigning Input Names to Analog and Digital Inputs is the same. Refer to page 27 for details.

Input Identifier

The procedure for assigning Input Identifiers to Analog and Digital Inputs is the same. Refer to page 27 for details.

Event Names

Event Names are described in the section entitled "Event Names" under the Global Input Parameters command. Refer to page 21.

Type

The Analog Type assignment is described in the section entitled "Type" under the Global Input Parameters command. Refer to page 22.

Range

The Analog Range setting is described in the section entitled "Range" under the Global Input Parameters command. Refer to page 22.

Upper and Lower Limits

Analog Upper and Lower Limits are described in the section entitled "Upper and Lower Limits" under the Global Input Parameters command. Refer to page 22.

Virtual Inputs

The Virtual Input feature can provide the user with a powerful tool in detecting fault conditions within the signaling system. Digital and Analog Inputs are used to monitor changes in state for a single input. A Virtual Input, however, can be used to create an Event Record when a combination of signal conditions occurs. In other words, a Virtual Input can be assigned to detect a specific set of Digital and Analog Input states. If the proper input states are satisfied a Virtual Input Event Record will be saved in memory.

A fault condition that is defined by a specific logical combination of input states and signals will be detected by a properly assigned Virtual Input. Additionally, when the conditions for a Virtual Input are satisfied the recorder's alarm relay (if enabled) will operate for the duration of the satisfied condition. If the CWR-22 is equipped with an internal modem a dial-out message consisting of an Event Record for the Virtual Input may be transmitted. The alarm message can be selectively enabled and disabled.

Several steps are involved in assigning a Virtual Input. It is important to keep in mind that a Virtual Input is not a physical input. A Virtual Input defines a logical association among several physical inputs. The logical association of inputs can take several forms. The selection of the correct logical association is very important to the operation of each Virtual Input. Refer to the descriptions that accompany the Assign Virtual Inputs command on page 29 for details on how to select the desired logical association.

The Individual Input Parameters command, as it applies to Virtual Inputs, is very similar to the command that is used for Analog and Digital Inputs. Shown below is the menu that is used to assign Virtual Input parameters.

```
                        Edit input parameters

                        Virtual input # 23
        ***************  D I S A B L E D  *****************

                          Name: Virtual Input #23
                    Identifier: VInput23
             Active Event Name: --TRUE--
           Inactive Event Name: --FALSE-

     Alphanumeric characters accepted. <- -> BS and DEL to edit field.
  UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

In the example cited above, the logical association for Virtual Input 23 has not been assigned. Each of the parameters are described in the following sections.

Input Name

The procedure for assigning Input Names to Virtual Inputs is the same as it is for Analog and Digital Inputs. Refer to page 27 for details.

Input Identifier

The procedure for assigning Input Identifiers to Virtual Inputs is the same as it is for Analog and Digital Inputs. Refer to page 27 for details.

Event Names

The procedure for assigning Event Names to Virtual Inputs is the same as it is for Analog and Digital Inputs. Refer to page 21 for details.

Assign Virtual Inputs (N)

The CWR-22 provides the user with four Virtual Inputs. They are numbered as inputs 23 through 26. The Assign Virtual Inputs command is used to enable or disable the local and remote alarm reporting feature associated with each Virtual Input. The logical association among physical inputs is also selected with this command.

After selecting the Assign Virtual Inputs command the following menu will be displayed.

```
                    Assign virtual input parameters

                A   Assign virtual alarms
                E   Assign virtual equations
                X   Exit to main menu
```

The three commands are described in the following sections.

Assign Virtual Alarms (A)

The following table will be displayed after the Assign Virtual Alarms command is selected.

```
                  Assign virtual input alarms

                              Local          Remote

         Virtual Input 23:      NO             NO

         Virtual Input 24:      NO             NO

         Virtual Input 25:      NO             NO

         Virtual Input 26:      NO             NO

     Press SPACE to toggle settings, ENTER to accept or ESC to abort
```

The default setting for each Virtual Input is shown above. To enable a particular alarm use the arrow keys to position the cursor in the correct field and then press the spacebar. The spacebar will toggle the setting between "NO" and "YES". The "Local" setting allows the alarm to be directed to the recorder's alarm relay. The relay will operate as long as the conditions that satisfy an enabled Virtual Input are met. The "Remote" setting allows the alarm to be directed to the modem (provided the optional modem is installed). The "Remote" settings cannot be changed if a modem is not installed.

The Assign Virtual Alarms command can also be used to terminate persistent alarms. Assigning the Virtual Input to "NO" will immediately terminate an active alarm.

Assign Virtual Equations (E)

Selecting the desired logical association among physical inputs is accomplished with the Assign Virtual Equations command. After selecting the command the following message will be displayed. In the example cited below each Virtual Input is disabled.

```
                  Assign Virtual Input Equations

   Virtual Input 23: ****************  D I S A B L E D  ****************

   Virtual Input 24: ****************  D I S A B L E D  ****************

   Virtual Input 25: ****************  D I S A B L E D  ****************

   Virtual Input 26: ****************  D I S A B L E D  ****************

       Press SPACE to select equations, <- and -> for input variables
```

Several steps are involved in assigning equations to Virtual Inputs. Each step is described below. They must be performed in the order listed. A round bullet marks the specific steps to be performed.

Selecting the Virtual Input

- Use the up and down arrow keys to select Virtual Input 23, 24, 25 or 26.

Selecting the Equation

The logical association of physical inputs is controlled by selecting an appropriate equation from a prepared list of formulas. The list consists of eleven entries. Each equation is listed below as it would appear at the PC or VDT. The number shown at the extreme right is not displayed. The user may wish to use it as a reference number for an equation that will be used later.

```
*************** D I S A B L E D ****************

NO_INPUT AND  NO_INPUT AND  NO_INPUT AND  NO_INPUT      1

NO_INPUT OR  NO_INPUT AND  NO_INPUT AND  NO_INPUT      2

NO_INPUT AND  NO_INPUT OR  NO_INPUT AND  NO_INPUT      3

NO_INPUT OR  NO_INPUT OR  NO_INPUT AND  NO_INPUT      4

NO_INPUT OR  NO_INPUT OR  NO_INPUT OR  NO_INPUT      5

NO_INPUT OR  NO_INPUT AND  NO_INPUT OR  NO_INPUT      6

(NO_INPUT AND  NO_INPUT OR  NO_INPUT) AND  NO_INPUT    7

NO_INPUT AND (NO_INPUT OR  NO_INPUT AND  NO_INPUT)    8

NO_INPUT AND (NO_INPUT OR  NO_INPUT) AND  NO_INPUT    9

(NO_INPUT OR  NO_INPUT OR  NO_INPUT) AND  NO_INPUT   10
```

As many as four terms (i.e., physical inputs) can be logically associated within one equation. **Equations with fewer than four terms can also be defined.** The procedure for doing so is described in the next section entitled "Selecting the Inputs". The "NO_INPUT" references in each equation can be ignored at this point. Inputs will be assigned to these fields in later steps.

☞ | Generally, equations are evaluated from **left to right** just as they are written. However, terms that are contained within parenthesis are evaluated first.

As an example of the use of a Virtual Input equation, take a case where the states of three relay signals define a fault condition. For the sake of simplicity the relay signals are referred to as A, B and C. The fault condition is defined as relay signal A is active at the same time as either relay signal B or relay signal C is active. The equation can be thought of as A **AND** (B **OR** C). The B **OR** C term is evaluated first. The same equation can be rearranged and written as B **OR** C **AND** A, because the B **OR** C term is evaluated first (left to right rule applies). This form of the equation is represented by formula number 6. "NO_INPUT" terms are always ignored when evaluating an equation (refer to the next section).

- Press the spacebar repeatedly until the correct formula appears.

Selecting the Inputs

After the Virtual Input and equation are selected the physical inputs must be assigned to the equation. Physical inputs are defined as any of the eighteen Digital Inputs or any of the four Analog Inputs. Inputs assigned to equations are identified by their Input Identifier which consists of one to eight characters. Input Identifiers are described on page 27.

A "NO_INPUT" term implies that no physical input has been assigned to that term in the equation. Accordingly, they will be treated as "don't care" terms for the purposes of evaluating the equation.

It may be necessary in some cases to create a formula that is based upon an input that is inactive. As an example, perhaps a fault condition is defined as the combination of two relay signals that are "ORed" but one signal is active and the other is inactive. The CWR-22 allows physical inputs to be assigned to equations based upon either their active or inactive states.

☞
> Active inputs are referred to by their Input Identifier. Inactive inputs are referred to by their Input Identifier preceded by a "/" character.
>
> **Virtual Input Definitions**:
> An active Digital Input is an input whose voltage is greater than 5 VDC for a duration greater than the assigned Detection Time parameter or .1 seconds, whichever is longer.
>
> An inactive Digital Input is an input whose voltage is less than 3 VDC for a duration greater than the assigned Detection Time parameter or .1 seconds, whichever is longer.
>
> An active Analog Input is an input whose voltage or current is greater than the assigned Upper Limit parameter for a duration that exceeds .1 seconds.
>
> An inactive Analog Input is an input whose voltage or current is less than the assigned Lower Limit parameter for a duration that exceeds .1 seconds.

- Using the left and right arrow keys move the cursor to the desired Input Identifier or "NO_INPUT" term within the equation.

- Press the spacebar repeatedly until the desired Input Identifier appears. Active states are followed by inactive states. Digital Inputs precede Analog Inputs. Alternatively, enter a one- or two-digit Input Number (i.e., 1 to 22 with no leading zero). Enter zero to select the "NO_INPUT setting. Press the "/" key to toggle between the true and false states of the selected input.

- Repeat the previous two steps until each required term is assigned a physical input. If fewer than four physical inputs are required in the equation, assign the extra terms as "NO_INPUT".

This completes the procedure for defining an equation. Use the up and down arrow keys to select another Virtual Input. When the Virtual Inputs are fully assigned press the "ENTER" key to complete the command.

Exit to Main Menu (X)

To exit the Assign Virtual Inputs sub-menu and return to the Main Menu press "X".

Change Passwords (P)

The Password feature incorporates three distinct levels of protection against unwanted system intrusions. Access via the Terminal Port or the optional modem is permitted only after a proper password is entered. Two types of access are permitted from the Terminal Port and modem. The first type is referred to as Administrative Access, the second is referred to as Restricted Access. The third level of password protection involves the use of the Passcode feature. The Passcode protects the Setup Database from unwanted changes via the front panel. Pressing the front panel "SETUP" key challenges the user to enter the proper Passcode.

Pressing "P" will display the following menu. The standard methods for selecting and editing fields apply to the command.

```
                         Edit system passwords

                   Administrative: PASSWORD
                       Restricted: LOOKWORD
                   Keypad Passcode: 12345678

      Alphanumeric characters accepted. <- -> BS and DEL to edit field.
   UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.

                    WARNING: Passwords are case sensitive.
```

☞ The factory default settings for the Administrative, Restricted and Passcode passwords are "PASSWORD", "LOOKWORD" and "12345678", respectively.

Passwords are case sensitive. Upper- and lower-case letters must be entered correctly.

Each parameter is described in the following sections.

Administrative Password

Administrative Access allows the user to select all of the commands that the recorder utilizes. The Administrative Password can be assigned as any combination of characters not exceeding ten total.

Restricted Password

Restricted Access permits the user to select only those commands that provide Event Record viewing. Under Restricted Access the user cannot change any settings employed by the recorder. In a Restricted Access session the Main Menu will contain the following abbreviated list of commands.

```
       C W R - 2 2    R E S T R I C T E D    M E N U   (V1.02)

              B   Browse event records
              S   Display real-time input status
              V   View real-time records
              W   Write event records to file
              X   Log off system
```

The Restricted Password can be assigned as any combination of characters not exceeding ten total.

Passcode

The Passcode is limited to eight numbers (i.e., non-numeric characters are not accepted). It must be entered when the user presses the "Setup" button located on the front panel of the CWR-22.

Disabling the Passwords

If the user wishes to disable the password or Passcode feature a "null" password can be defined. To assign a "null" password or Passcode perform the procedure listed below.

- Use the delete or backspace keys to erase all of the characters that comprise the present password or Passcode.

☞ Once the "null" password is accepted each user session can be initiated by simply pressing the "ENTER" key when the system requests a password entry.

Once the correct passwords are assigned the user should press the "ENTER" key. The new passwords will apply to all subsequent user sessions.

Assign Modem Parameters (M) - optional

The CWR-22 can be equipped with a 14,400 Baud internal modem. The modem provides error correction and data compression capabilities. It is designed to operate in both auto-answer and dial-out modes. Before the modem can be used it must be set up. The menu for the Assign Modem Parameters command is shown below.

```
                    Edit modem parameters

           Access prefix:
             Access code:
          Primary number:
        Secondary number:
         Dial-out method: Tone
            Redial delay:  30
         Dial-out alarms: Enable
       Answer ring delay: 02

    Alphanumeric characters accepted. <- -> BS and DEL to edit field.
   UP DOWN arrow to move between fields. ENTER to accept or ESC to abort.
```

The factory default settings are listed in the example cited above. Each of the parameters is described in the sections that follow. The standard cursor control methods for selecting and editing fields apply to all of the parameters listed in the menu.

The Access Prefix, Access Code and Primary and Secondary Numbers will generally contain numeric values. An exception to this rule is that parentheses, hyphens and space characters can be placed into a field for clarity. These characters will be ignored by the modem. Additionally, the comma character can be placed anywhere in a field to create an arbitrary two-second delay.

☞
> The CWR-22 modem is programmed to accept only "reliable" connections. Consequently, the far end modem must be able to establish connections that take advantage of standard error correction protocols such as V.42 LAPM and MNP 2-4.

Access Prefix

The Access Prefix is the sequence of numbers required by the long distance service provider. The Access Prefix applies to both Primary and Secondary Numbers. It can be assigned any combination of numeric, "*" and "#" characters not exceeding twenty total. If an Access Prefix is not required it should be left vacant (i.e., no characters in the field). An Access Prefix is not required by intra-LATA calls.

Access Code

The Access Code is the sequence of numbers required by the long distance service provider to identify the user. The Access Code is unique to each user of the long distance service. If an Access Prefix is not assigned, an Access Code is not required.

The Access Code can be assigned any combination of numeric, "*" and "#" characters not exceeding twenty total. If an Access Code is not required it should be left vacant (i.e., no characters in the field).

Primary Number

The Primary Number is the preferred number to be dialed when reporting alarms. It must contain a leading "1" if a direct dialed long distance number is to be entered. Any prefixes required by the telephone system to access a long distance line must also be included. An example would be to dial "9" before making an outside call. If a second dial tone is required one or more commas must be entered. This will allow the modem to wait for a second dial tone. The Primary Number can consist of up to fifteen characters.

☞
> If the Primary Number cannot be reached the Secondary Number will be dialed. If the Secondary Number cannot be reached the Primary Number is redialed. The process of alternating between Primary and Secondary Numbers will continue until a successful connection is established or ten calls have been made to each number.

Secondary Number

Same as for Primary Number (see above).

Dial-out Method

Use the spacebar to toggle between the "Tone" and "Pulse" settings. The setting applies to both Primary and Secondary Numbers.

Redial Delay

The time between successive dial-out attempts is controlled by the Redial Delay parameter. The range of valid settings is 30 to 240 seconds. This parameter will be used whenever a busy or "no connect" condition is encountered.

Dial-out Alarms

Use the spacebar to toggle between "Enable" and "Disable" settings. The "Disable" setting will over-ride the four Virtual Input alarm settings.

Answer Ring Delay

The Answer Ring Delay parameter controls how quickly the modem will answer an incoming call. The permitted range of settings is 00 to 99. A setting of 00 will prevent the modem from answering any calls, thus disabling the auto-answer feature.

After the correct parameters are selected press the "ENTER" key to complete the command. A delay of several seconds may occur while the processor reconfigures the modem. The user will then be returned to the level of the Main Menu.

Upload/Download Setup Parameters (U)

A CWR-22 will require a considerable amount of data entry if every input is to be assigned an Input Name, Detection Time, etc., that differs from the factory default values. In the event of an accidental loss of data memory (e.g., a reset performed by mistake) each Input Name and Detection Time will need to be re-entered. The upload/download commands provide the user with a quick and simple data exchange alternative to re-entering the Setup Database by hand.

The Download Setup Parameters command is used to transmit the entire Setup Database to a data storage system. A PC running a communications program like Procomm for Windows or Terminal under Windows makes an ideal storage system. A file containing the list of various parameters can be permanently saved on the hard disk or a diskette for later retrieval via the Upload Setup Parameters command.

☞ Before proceeding, the user should check to insure that the communications application being used is set up in accordance with the reqirements listed on page 8.

The Upload/Download Setup Parameters command will display the following sub-menu.

```
            Transfer setup parameters

      D   Download setup parameters (CWR to PC)
      U   Upload setup parameters (PC to CWR)
      X   Exit to main menu
```

Saving the Setup Database (D)

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 Terminal Port is being used select "Direct connect - Com1" or "Direct connect - Com2" (whichever is available at the PC). If the modem is being used the remote modem must be logged on with the recorder.
- Baud rate: as required by the Terminal Port, set to N-8-1.

☞ 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 Parameters command. The following message will be displayed.

```
XMODEM sending parameters... (Ctrl-X to stop)
```

The steps necessary to complete the download depend upon which communications application is being used. The following paragraphs describe in detail the Procomm and Windows Terminal methods, respectively. Procomm for Windows version 2.0 and Windows version 3.1 are referenced in the following procedures. Later versions of these programs may be somewhat different. However, the basic approach will remain valid.

Procomm for Windows

- With the mouse click once on the "Receive File" icon near the top center of the Procomm Window. The icon appears as a downward pointing arrow. The Procomm for Windows "Receiving File using Xmodem" dialog box will open.
- Select the proper disk drive and directory. Enter a file name (e.g., "setup_10.xmd"). If the settings are correct click on the "OK" button.
- An information box labeled "Xmodem" will appear. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the information box will close and the PC may beep several times to indicate that the transfer is complete. Approximately 2048 bytes will be transferred.
- If the transfer is successful a message similar to "Transfer complete - SETUP_10.XMD" will appear in the lower left-hand corner of the Procomm window. The CWR-22 will issue the following message.

```
            Transfer complete

          Press ENTER to return
```

- Press "ENTER" to complete the command.

Windows Terminal

- Click on the "Transfers" command, then the "Receive Binary File ..." command. The "Receive Binary File" dialog box will open.

- Select the proper disk drive and directory. Enter a file name (e.g., "setup_11.bin"). The three-character file extension must be defined. If the various settings are correct click on the "OK" button.

- A status bar will appear at the bottom of the Terminal window. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the status bar will disappear automatically to indicate a successful transfer.

- To regain access to the recorder press the "ESC" key.

Once the transfer is completed the Upload/Download Setup Parameters sub-menu will be displayed. If the user fails to open the receive file within several minutes after initiating the download the following message will be displayed.

```
Timed out waiting for ACK
```

The user can then attempt a second download.

Restoring the Setup Database (U)

Before the Setup Database can be restored to the recorder it must have been previously saved. Refer to the procedure entitled "Saving the Setup Database" on page 37. The PC and communications program must be properly configured before the database can be restored. The following list describes the correct configuration.

- Transfer protocol: "XMODEM"

- Connection: if the Terminal Port is being used select "Direct connect - Com1" or "Direct connect - Com2" (whichever is available at the PC). If the modem is being used the remote modem must be logged on with the recorder.

- Baud rate: as required by the Terminal Port, set to N-8-1.

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

Caution: Restoring the Setup Database procedure will temporarily suspend all Event Record gathering for the duration of the upload. Since it is likely that new setup parameters will be loaded, the system will stop detecting and recording new events. At the conclusion of the upload the recorder will automatically return to normal operation using the new parameters.

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

```
XMODEM receiving parameters... (Ctrl-X to stop)
```

A string of "C" characters is used to indicate that the recorder is awaiting the Xmodem file. The steps necessary to complete the upload depend upon which communications application is being used. The following paragraphs describe in detail the Procomm and Windows Terminal methods, respectively. Procomm for Windows version 2.0 and Windows version 3.1 were used in the following procedures. Later versions of these programs may be somewhat different. However, the basic approach will remain valid.

Procomm for Windows

- With the mouse click once on the "Send File" icon near the top center of the Procomm Window. The icon appears as an upward pointing arrow. The Procomm for Windows "Send File using - Xmodem" dialog box will open.

- Select the proper disk drive and directory. Select the correct file name (e.g., "setup_10.xmd"). If the settings are correct click on the "QK" button.

- An information box labeled "Xmodem" will appear. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the information box will close and the PC may beep several times to indicate that the transfer is complete. Approximately 2048 bytes will be transferred.

- If the transfer is successful a message similar to "Transfer complete - SETUP_10.XMD" will appear in the lower left-hand corner of the Procomm window. The CWR-22 will issue the following message.

```
                          Transfer complete

                       Press ENTER to return
```

- Press the "ENTER" key to complete the transfer.

Windows Terminal

- Click on the "Transfers" command, then the "Send Binary File ..." command. The "Send Binary File" dialog box will open.

- Select the proper disk drive and directory. Enter a file name (e.g., "setup_11.bin"). If the various settings are correct click on the "OK" button.

- A status bar will appear at the bottom of the Terminal window. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the status bar will disappear automatically to indicate a successful transfer.

- Press the "ENTER" key to complete the transfer.

After the transfer has been completed (using either method) the recorder will resume its normal operation. However, the user will be be advised that the Terminal Port Baud rate may have been changed. The new Baud rate will be displayed. The user may then have to change the terminal device Baud rate to match the new setting. To return to the sub-menu press the "ENTER" key.

Exit to Main Menu (X)

To exit the Upload/Download Setup Parameters sub-menu and return to the level of the Main Menu type "X".

Log Off System (X)

The Log Off System command is applicable to both Administrative and Restricted Access sessions initiated via the Terminal Port or modem.

☞ | To maintain security all sessions must be terminated by executing the Log Off System command.

If the previous user properly logs off of the recorder, access can be regained only by entering the correct Administrative or Restricted Access password. If the previous session is not terminated with the "X" command then a second user will be allowed access without ever having entered a correct password.

To log off of the recorder enter "X". The following message will be displayed.

```
About to log off.  Are you sure (Y/N) ?
```

Enter an **upper-case** "Y" to log off. A message similar to the following will be displayed.

```
Logging off at 22:26:52  04-06-98
```

After the log off is executed the user can regain access to the recorder by pressing any key. The standard password request will then be issued.

This completes the Setup Procedure for the CWR-22 Event Recorder. The CWR-22 is now prepared to log Event Records in accordance with the setup performed by the user. Since the installation and setup of the recorder are critical to how the CWR-22 will perform, it is advisable to review the steps taken earlier. The next chapter describes how to operate the recorder.

Operation

Introduction

This chapter describes how to operate the CWR-22 from either a printer, VDT or PC running a suitable communications program. Both local (i.e., on site) as well as remote methods of operating the Event Recorder are described. Remote operation of the unit is very similar to the local method.

Before the CWR-22 can be operated it must be properly installed and set up. A PC, VDT or printer must be prepared to access the system. The use of the LCD panel and keypad are the subject of the next chapter.

Remote Operation

The setup and operational features of the CWR-22 can be exercised remotely provided the recorder is equipped with a MICRO-AIDE supplied internal modem. The optional modem will operate at speeds up to 14,400 Baud. It provides error correction and data compression features. A PC equipped with a modem and a communications program makes an ideal remote access system. Event Records and other data from several remote CWR-22 recorders can be gathered and saved to either a hard disk or diskette file.

☞ | A unique feature of the CWR-22 is its ability to handle simultaneous operations from multiple users of the system via the modem, Terminal Port or front panel keypad. This "multi-user" feature eliminates the annoying practice in some systems of one user effectively locking-out a second user.

There are two steps the remote user or host system must perform before remote access is possible. Each step is described in the following.

Remote Modem Access

Standard telephone lines must be attached to the modems of the CWR-22 and the host system. To access the Event Recorder the host system must dial the telephone number of the CWR-22 and wait for an answer. The distant modem will answer after a predetermined number of rings. Refer to the section entitled "Answer Ring Delay" on page 36. The modems at both ends will then handshake. The handshake ensures that the modems can communicate with each other at a proper speed. A connection is established upon the successful completion of the handshake.

☞ | The CWR-22 is programmed to accept only "reliable" connections. Consequently, the host system must be able to establish connections that take advantage of standard error correction protocols such as V.42 LAPM and MNP 2-4.

Passwords

After the connection is established the CWR-22 will issue a password request similar to the following.

```
Model CWR-22 Event Recorder.  Ver 1.02 (C) 1996, Micro-Aide Corporation.

Site name: ***** NOT SET *****

Event storage capacity: 13852

Enter password:
```

For the host system to gain access to the recorder it must issue the correct password followed by an "ENTER". Passwords are defined in accordance with the procedure described on page 33.

☞   The default Administrative and Restricted Access passwords are "PASSWORD" and "LOOKWORD", respectively.

Passwords are case sensitive. Upper- and lower-case letters must be entered correctly.

The user or host system is given three attempts to enter the password correctly. A third error will result in a disconnect by the recorder. Prior to the disconnect the following message will be issued.

```
Please call back with the correct password.
```

In this way illegal entry into the system is prevented by unauthorized users or computer systems. Once the password is honored the user will be able to operate the CWR-22 in a manner identical to that required by local operation.

☞   The CWR-22 will attempt to reinitialize the modem every ten minutes. This ensures that the modem will respond properly when a call is made to it from a remote user. While the initialization is being performed there may be a short but noticeable delay from the recorder in responding to users on the Terminal Port or keypad. This is normal and persists for only a few seconds.

Once the Administrative or Restricted Access password is entered the recorder will display the Main Menu or Restricted Menu. The Main Menu and Restricted Menu are shown on pages 8 and 33, respectively.

How to Operate the CWR-22

An explanation of the use of each operational command is included in the remaining sections of this chapter. Commands peculiar to the Setup Procedure are discussed in Chapter 2. 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 followed by its command code in parenthesis.

Selecting Terminal or Printer Modes

The Toggle Terminal/Printer Mode command is described in Chapter 2 on page 15. The advantages of using Terminal Mode are described in the section entitled "Terminal Mode Cursor Control" on page 14.

MICRO-AIDE recommends that the user operate the CWR-22 in Terminal Mode. One exception to this rule concerns the Browse Event Records command. Terminal Mode will present data at the PC or VDT **one screen at a time.** If the user wishes to dump many Event Records to a local or remote peripheral device it is desirable to transmit the data without interruption. This is a requirement when capturing Event Records via Procomm (or Windows Terminal) to a PC file for later analysis. In such cases the CWR-22 must be placed in Printer Mode.

☞
> When capturing many Event Records to a PC file operate the CWR-22 in Printer Mode.
>
> **Reminder:** If the CWR-22 is in Printer Mode set the terminal emulation to "TTY". If the CWR-22 is in Terminal mode set the terminal emulation to "ANSI BBS".

Unless stated otherwise, sample data depicted in this chapter will be shown using Terminal Mode.

Browse Event Records (B)

The Browse Event Records command is the principal means by which events are reviewed. It allows the user to inspect records for a specific time frame and set of inputs. The Terminal and Printer Mode versions of the command are described in the following sections.

Browse Using Terminal Mode

Performing a Browse while in Terminal Mode is useful when events need to be inspected one screen at a time. In this mode a single screen will display eight Event Records. After the command is selected a menu similar to the following will be displayed.

```
                    Starting Event Selection

  04-05-98     04-06-98     04-07-98     04-08-98     04-09-98

  04-10-98     All Events
```

Events were recorded for the days listed. The cursor is initially placed in the "All Events" position. If the "ENTER" key is pressed with the cursor in this position, records starting at 00:00:00 of the first day listed will be displayed. For the example cited above, the first day is "04-05-98". To select another starting day use the left, right, up and down arrow keys to position the cursor elsewhere, then press the "ENTER" key.

☞
> The CWR-22 will store Event Records for thirty days, regardless of the total number of events stored. Records for the thirty-first day will over-write records for day one.

If a specific starting day is defined a message similar to the following will appear below the table of dates.

```
                   Available time: 00:03:57  to  23:53:03

                             00:03:57
```

The first line of text indicates that Event Records were saved during the interval shown. The time listed in the second line of text allows the user to specify a starting time for the day previously selected. The start time specifies the time **after** which Event Records will be reviewed. The start time is initially set to the time the first Event Record was recorded for the day selected. The cursor is initially placed in the hour position. To select a different start time change the time as required.

☞   The CWR-22 uses military time. Accordingly, 12:00:01 a.m. and 11:59:59 p.m. must be entered as 00:00:01 and 23:59:59, respectively.

After the start time is defined press "ENTER". The following message will be displayed.

```
                         Select Query Inputs

     NO INPUT    NO INPUT    NO INPUT    NO INPUT    NO INPUT

     NO INPUT    NO INPUT    NO INPUT    NO INPUT    NO INPUT

  If no inputs are selected, events from all inputs will be displayed
    Use SPACE and numeric keys to select inputs, ENTER to proceed
```

The user may select as many as ten different inputs to review. If every CWR-22 input (for the starting time and day defined) is to be inspected simply press the "ENTER" key.

If a specific set of inputs is required press the spacebar repeatedly until the Input Identifier is displayed for the desired input. Alternatively, enter a one- or two-digit Input Number (i.e., 1 to 26 with no leading zero). Enter a zero to select the "NO INPUT" setting. Digital, Analog and Virtual Inputs can be selected in this way. Input Identifiers are described on page 27. Press the arrow keys to move the cursor to another field. Repeat the process until each of the desired inputs is displayed. Fields that are left as "NO INPUT" are ignored. Press the "ENTER" key after the inputs are fully specified.

The CWR-22 will then display eight Event Records that satisfy the search criteria defined by the user (provided there are records to be found). The up and down arrow keys can be used to inspect additional records. If while inspecting records the boundary limits of the data memory are reached, a beep will be heard and a message will be displayed.

To exit the Browse Event Records command and return to the level of the Main Menu press the "ESC" key at any time.

A sample sequence of three Event Records is shown below. Their format is described in the following section.

```
00:03:57.087  04-06   DInput07  ...X ......X... .......X 11.9V  121V 10.0A   17V
   Digital Input #07   >------Forward------^

00:03:58.088  04-06   DInput07  ...X .......... .......X 11.9V  120V 10.0A   17V
   Digital Input #07   >------Reverse------^

00:04:02.001  04-06   AInput20  ...X .......... .......X 11.8V  103V 10.0A   17V
   Analog  Input #20   >----------------Low_AC----------------^
```

Event Record Format

Event Records contain two lines of data and various symbolic references. The first line is described from left to right as follows.

- Time - The time the event was recorded measured to the nearest thousandth of a second.

- Date - The month followed by the day the event was recorded.

- Input Identifier - The eight-character Input Identifier associated with the input. The factory default values of "DInput07" and "AInput20" are listed above.

- Virtual and Digital Input States - The next twenty-two characters (excluding spaces) symbolize the state of each Virtual and Digital Input **when the new event was recorded**. An "X" indicates an active state; a "." indicates an inactive state. The first four symbols in the sequence represent Virtual Inputs. The remaining eighteen symbols represent Digital Inputs. In the first sample Event Record listed, Virtual Input 26 and Digital Input 18 were both active when the event for Digital Input 7 was recorded.

- Analog Inputs - The next four fields represent the value of each Analog Input when the event was recorded. In the first sample Event Record listed, the values are (from left to right) 11.9 V, 121 V, 10.0 Amps and 17 V. **Each of the four Analog Inputs are measured and logged as a part of every Event Record.** In this way a comprehensive log of variations in critical analog signals can be compiled. In the example cited, Analog Input 20 is assigned to measure current.

The second line is described from left to right as follows.

- Input Name - The twenty-character Input Name. The factory default values are shown in the sample records.

- Event Name - The eight-character Event Name. The first two sample records are from the same input. The first record depicts an active state; the second record depicts an inactive state 1.001 seconds later. Both records are made more understandable by their references to "Forward" and "Reverse" signal states. The third record clearly indicates a "Low_AC" condition. The "^" symbol and dash lines are used to point to the state of the input that generated the record. The "X" and "." characters reference active and inactive states, respectively.

The third sample record is of special significance. **It indicates that an Analog Input can also create an Event Record.** In the example cited, the AC voltage on Analog Input 20 fell below its assigned Lower Limit.

Browse Using Printer Mode

The Browse while in Printer Mode is useful when Event Records need to be captured in a PC file. In this mode it is possible to issue an uninterrupted stream of Event Records.

☞ Reminder: The terminal emulation should be set to "TTY" when performing a Browse in Printer Mode.

After the Browse Event Records command is selected a menu similar to the following will be displayed.

```
                    Event Active Dates

   1   04-05-98     2   04-06-98     3   04-07-98     4   04-08-98     5   04-09-98
   6   04-10-98
There are 10,740 events in  6 day(s).

Select a starting date (RETURN for all):
```

In the example cited above, the second and third lines of text identify those dates for which events were recorded. The number to the left of the date is used as an identifier for the date listed. Date Identifiers can range from 1 to 30. The Date Identifiers are "1" to "6" in the example shown above. If the user presses the "ENTER" key, events starting at 00:00:00 for the first date listed (i.e., Date Identifier 1) will be displayed.

Records for a specific date may be displayed by typing the appropriate Date Identifier number followed by the "ENTER" key. After the Date Identifier is entered an additional message similar to the following will be issued.

```
 Entry number  2   04-06-98 has been selected.

 Available events are from 00:03:57 to 23:53:03

 Enter the starting time in HH:MM:SS :
```

The second line of text in the message specifies the time span during which events were recorded. The last line of text specifies that the starting time must be entered in HH:MM:SS format. Each field must be separated by a colon or space character. The start time specifies the time **after** which Event Records will be reviewed. If records are to be reviewed starting at midnight the user can simply press "ENTER".

☞ The CWR-22 uses military time. Accordingly, 12:00:01 a.m. and 11:59:59 p.m. must be entered as 00:00:01 and 23:59:59, respectively.

After specifying the starting time, the ending date must be selected. Accordingly, the following request will be displayed.

```
                          Event Active Dates

   1  04-05-98     2   04-06-98     3   04-07-98     4  04-08-98     5  04-09-98
   6  04-10-98

Select the ending date:
```

After the ending Date Identifier is selected the ending time must be entered in response
to the following request. Type "ENTER" to review events through midnight.

```
Entry number  3  04-07-98 has been selected.

Available events are from 00:14:16 to 23:58:59

Enter the ending time in HH:MM:SS :
```

After the time period is fully defined the recorder will issue the following request.

```
Enter a list of up to 10 input numbers,
separated by spaces, you wish to query
(Invalid input numbers will be ignored).
```

As the message above indicates, as many as ten inputs may be reviewed. This provides
the user with a simple way to inspect Event Records for a specific time frame and set of
inputs. The Input Numbers may be entered in any sequence but a space must separate
each number. After the numbers are selected press "ENTER". If the user fails to select
any inputs the recorder will display records from all inputs for the identified time period.

☞   Inputs 1 to 18 are digital, 19 to 22 are analog and 23 to 26 are virtual.

The selected start and end dates and times will be displayed along with a request for
ordering of the records. A sample message is shown below.

```
Start at: 04-06-98 12:00:00
  End at: 04-07-98 23:00:00

Will the report be in the reverse chronological order (Y/N) ?
```

Typing a "Y" will order the records in reverse time (i.e., newest records followed by
oldest records). Otherwise, the records will be ordered with the oldest records first. The
records will then be listed as requested. They will stop automatically when the last record
specified is issued. The following message will then be displayed.

```
Press ? for a list of commands
```

The Browse while in Printer Mode will issue Event Records in the same format as those issued while in Terminal Mode. Refer to page 45 for a description of the record format.

☞ It is possible for the Browse Event Records command to dump tens of thousands of records. If the user wishes to pause, restart or abort the dump the following keys should be pressed: "CTRL+S", "CTRL+Q" and "ESC", respectively. Refer to the section entitled "Data Flow Control" on page 13 for details concerning these procedures.

Display Real-time Input Status (S)

The Display Real-time Input Status command provides a quick "snapshot" of the present signal condition of each input. The data is presented differently depending upon which display mode is selected. Both data formats are described below.

Terminal Mode

If the user is accessing the system from a PC or VDT the real-time status report should be presented in Terminal Mode. In Terminal Mode the PC or VDT will provide continuously updated input information.

An example of the Terminal Mode report is shown below. The Input Identifier and status for each input is listed in a convenient, easy-to-read format. For the example cited Digital Inputs 1, 3 and 18 are "HIGH". The other Digital Inputs are "LOW". Analog Inputs 19 and 22 are under their Lower Limit parameters. Analog Inputs 20 and 21 have exceeded their Upper Limit parameters. Additionally, the Analog Input measurements are reported in accordance with their various setup parameters. The logical association that defines Virtual Input 23 has been satisfied. It is shown as "TRUE".

As each input changes state or value the display will be immediately updated to reflect the latest conditions. Press "ESC" in Terminal Mode to exit the real-time report and return to the level of the Main Menu.

```
                        Real-time Input Status

     6                        11:20:09   04-06-98

 DInput01   DInput02   DInput03   DInput04   DInput05   DInput06   DInput07   DInput08
   HIGH       LOW        HIGH       LOW        LOW        LOW        LOW        LOW

 DInput09   DInput10   DInput11   DInput12   DInput13   DInput14   DInput15   DInput16
   LOW        LOW        LOW        LOW        LOW        LOW        LOW        LOW

 DInput17   DInput18
   LOW        HIGH

 AInput19   AInput20   AInput21   AInput22   VInput23   VInput24   VInput25   VInput26
   UNDER      OVER       OVER       UNDER      TRUE       FALSE      FALSE      FALSE
   9.9VDC    121 VAC    18.0A      17 VDC

                          Press ESC to exit
```

Printer mode

A listing of the previous live data presented in Printer Mode appears below. The status of each input is indicated at the moment the report was generated. Each input is referred to by its Input Name. Each input state is referred to by its assigned Event Name. However, Analog Input measurements are not reported and the report is not continuously updated. Instead, it is issued once when the command is executed.

```
INPUT          NAME          STATUS      INPUT          NAME          STATUS

   1   Digital Input #01    ---ON---        10   Digital Input #10    ---OFF--
   2   Digital Input #02    ---OFF--        11   Digital Input #11    ---OFF--
   3   Digital Input #03    ---ON---        12   Digital Input #12    ---OFF--
   4   Digital Input #04    ---OFF--        13   Digital Input #13    ---OFF--
   5   Digital Input #05    ---OFF--        14   Digital Input #14    ---OFF--
   6   Digital Input #06    ---OFF--        15   Digital Input #15    ---OFF--
   7   Digital Input #07    ---OFF--        16   Digital Input #16    ---OFF--
   8   Digital Input #08    ---OFF--        17   Digital Input #17    ---OFF--
   9   Digital Input #09    ---OFF--        18   Digital Input #18    ---ON---


INPUT          NAME          STATUS      INPUT          NAME          STATUS

  19   Analog  Input #19    --UNDER-        21   Analog  Input #21    --OVER--
  20   Analog  Input #20    --OVER--        22   Analog  Input #22    --UNDER-


INPUT          NAME          STATUS      INPUT          NAME          STATUS

  23   Virtual Input #23    --TRUE--        25   Virtual Input #25    --FALSE-
  24   Virtual Input #24    --FALSE-        26   Virtual Input #26    --FALSE-

Press ? for a list of commands
```

After the inputs have been listed the user is returned to the level of the Main Menu.

The Display Real-time Input Status command can be very useful in verifying that inputs are wired correctly. It can be used to quickly determine if inputs are operating properly and if the assigned Detection Times are set in accordance with the characteristics of the monitored circuits.

View Real-time Records (V)

The View Real-time Records command allows the user to display complete Event Records as they occur. Immediately after an event is detected it will appear at the PC or VDT. This command can be very useful in tracking events that are occurring while the user is on-line with the system. It can also be used to perform a check-out of the inputs prior to installation of the recorder.

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

```
Entering Channel View mode.  Press ESC anytime to exit.
```

The system will display Event Records as they occur. A sample Event Record is shown below. It indicates that a low battery potential has been reported.

```
13:32:14.837  04-06  AInput19  .... .......... ........   9.9V  121V 10.0A   18V
   Battery voltage>--------------Low Batt---------------^
```

The format of each record is identical to that used by the Browse Event Records command. The Event Record format is described on page 45. The system will continue to display events until the user presses the "ESC" key.

Erase Event Records (E)

The CWR-22 is designed with a "circular" memory. When the number of stored events exceeds the memory capacity of the system the newest or most recent events will over-write the oldest events. In this way the system decides that the oldest events are expendable because it is likely that they were already captured or reviewed. Event Records are also over-written if more than thirty days of data are recorded in memory. The Erase Event Records command is very useful in clearing test data that, if left in memory, could prove to be confusing to other users.

The Erase Event Records command allows the user to take manual control of the "freeing-up" of memory. The command will inquire whether or not the user wishes to erase events from memory for the **oldest day** for which events are stored. Additionally, the system allows the user to select a time for the oldest day **prior** to which the erasure will occur. In this way partial days may be cleared. If more than one day needs to be erased the command must be used again. However, at any given time only the oldest day may be erased.

☞ Only Event Records will be erased. The Setup Database entered by the user which consists of Input Names, Detection Times, Site Name, etc., will not be erased.

After selecting the command a message similar to the following will be issued.

```
                          Event Record Deletion

                              04-05-98

                  Available time: 00:11:45  to  23:57:30

                              23:57:30

     <- -> to move between fields, ESC to abort and ENTER to proceed

           Only records from the oldest date can be deleted.

                  Select the time where deletion stops.
```

The second line of text specifies the oldest day for which records are stored. The third line of text specifies the range of time during which events were stored. The fourth line of text specifies a time of day that initially is set to the time of the last record saved for the oldest day.

The cursor will be initially positioned in the hour field of the time specified by the fourth line of text. The user may wish to modify the time setting. The time must be entered in military format, with two digits each for the hour, minute and second. **Event Records prior to the time specified will be erased.**

To erase records press the "ENTER" key. If the user wishes to erase the entire day's records press the "ENTER" key without altering the time specification. The erasure will be performed immediately. After a short delay the user will be returned to the level of the Main Menu.

Write Event Records to File (W)

MICRO-AIDE has developed a PC based application that provides many enhanced Event Record storage, search and presentation capabilities. The application is referred to as Graphical Event Analyzer (GEA). Among the many benefits of GEA is its "point-and-click", graphical user interface. This allows the user to become very proficient at selecting and reviewing Event Records with minimal knowledge of the command syntax used by the recorder. An additional benefit is that Event Records can be polled using GEA in a fraction of the time required by the Browse command which relies upon ASCII data transmission.

GEA will poll Event Records using the Write Event Records to File command. This command utilizes the Xmodem data protocol. Xmodem refers to a particular communications protocol used by many data gathering systems. It allows data to be exchanged in such a way that transmission errors can be reliably detected and corrected. Most communications applications designed for use with PCs provide Xmodem operation (e.g., Procomm and Windows Terminal).

The use of the Write Event Records to File command is described within the GEA User Manual. The command cannot be used for any purpose other than to support GEA.

☞ Contact the MICRO-AIDE sales department for information concerning its Graphical Event Analyzer.

This concludes the description on how to operate the CWR-22 from the Terminal Port and modem. The user should remember to use the Log Off System command to end the current session. An explanation of the Log Off System command can be found on page 40. The next chapter describes the use of the front panel LCD and keypad.

User Notes

Chapter 4
Display and Keypad

Introduction

The CWR-22 is designed to provide its user with the greatest degree of versatility and functionality. Every CWR-22 recorder comes 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, printer or VDT, although helpful, is not required when operating the recorder.

Setup and operation of the CWR-22 from its front panel is somewhat different than operation via a peripheral device. 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 provides an illustration of the LCD panel and keypad.

Front Panel Description

The front panel of the CWR-22 consists of two hardware elements. Both are described below.

Liquid Crystal Display

The LCD panel consists of a display approximately 3.2" by .75" in size. The display is designed to present two lines of data. Each line can contain twenty alphanumeric characters and symbols. Display 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.

As a convenience to the user 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 potentiometer that controls the contrast level is mounted on the internal PCB. Refer to the section entitled "Adjusting the LCD Contrast" on page 69 for details.

Keypad

The keypad consists of sixteen individual keys. Each key is clearly labeled and provides a soft, positive touch. Keys are spaced .75" apart to minimize "double hits". A special editing technique that uses the left "←" and right "→" arrow keys allows alphabetic characters to be entered. The arrow and "ENTER" keys also provide for quick menu item selection. Except while selecting a command or performing the special editing procedure, the left arrow may be used to backspace over characters when an incorrect number has been entered.

How to Use the Keypad

Unless otherwise stated, letters and names shown in upper-case text contained in quotation marks refer to specific keys on the keypad (e.g., "BROWSE"). This convention will be used throughout this chapter.

Once power is applied to the recorder the CWR-22 will boot the system firmware. The LCD will indicate this state with a message that reads "BOOTING SYSTEM . . .". If a modem is installed it will be initialized. Several cryptic lines of data will mark the modem initialization sequence. A message similar to the following will then be displayed for a few seconds.

```
CWR22 EVENT RECORDER
(c) MICRO-AIDE V1.02
```

The reference to firmware version "V1.02" may vary depending upon the vintage of the recorder. The firmware version number should be recorded and saved somewhere in the event service ever needs to be performed on the unit. After the boot and modem initialization procedures are completed the recorder will automatically enter the Idle Mode of operation. There are three operational modes, each is described in the following sections.

IDLE Mode

The Idle Mode is indicated by the date and time information that can be observed at the LCD. It is the "at rest" condition of the recorder. An example of the date and time display is shown below.

```
   TIME          DATE
19:05:56       04-06-98
```

The CWR-22 uses 24-hour, military time (e.g., 7:00 p.m. is shown as 19:00:00). Every ten minutes the normal LCD date and time message will be interrupted by data used to initialize the modem. This occurs only briefly, and only if the optional MICRO-AIDE modem is installed.

In Idle Mode the date and time display can also be automatically interrupted with new Event Records. Events will be displayed for several seconds. However, newer events will immediately over-write older events. An example of an Event Record is shown below.

```
04-06  19:26:23.449
26 VInput26 XING ALM
```

Event Record Format

Each record consists of five fields. The month and day followed by the time measured to the nearest thousandth of a second is shown on the first line. A two-digit Input Number starts the second line. It is followed by the eight-character Input Identifier assigned to the input. Input Identifiers are described on page 27. The last field contains the Event Name assigned to the input. Event Names are described on page 21.

☞ | Inputs 1 to 18 are digital, 19 to 22 are analog and 23 to 26 are virtual.

Browse Mode

Browse Mode allows the user to quickly view Event Records or the current status of each input. Event Records may be viewed in either forward or reverse chronological order. Events are selected by date and optionally by Input Number. To Browse events or the current state of inputs press the "BROWSE" key. The following message will appear.

```
┌────────────────────────────────┐
│        View Selection          │
│        Events   Inputs         │
└────────────────────────────────┘
```

Events or Inputs may be selected. Both choices are described in the following sections.

Events

After selecting Events the following message will appear.

```
┌────────────────────────────────┐
│  Use ←→  to select a           │
│  DATE, and then ENTER          │
└────────────────────────────────┘
```

If events have been stored the display will indicate as many as thirty dates for which events may be browsed. Dates are listed in MMDDYY format with no separator characters. A typical display of four dates is shown below.

```
┌────────────────────────────────┐
│  040598 040698 040798          │
│  040898                        │
└────────────────────────────────┘
```

A six-character flashing cursor will initially highlight the first date. The arrow keys may be used to select the desired date. When the cursor is over the correct date press "ENTER". A message requesting that a start time be defined will be displayed. The start time specifies the time **after** which events will be displayed.

```
┌────────────────────────────────┐
│  Enter time (HHMMSS):          │
│                                │
└────────────────────────────────┘
```

Using the numbered keys enter a six-digit time in HHMMSS format. Press "ENTER" to complete the entry. If the "ENTER" key is pressed without entering a time, the events for the entire day will be available for browsing. Incorrect time entries will be indicated by an error message. A message indicating that the entire day was selected will, if appropriate, be displayed.

After the start time specification is entered a brief message concerning the arrow keys will be displayed. The display will then indicate the first Event Record meeting the date and time criteria selected by the user. A sample Event Record is depicted and described on page 54. The left and right arrow keys may then be used to review Event Records in forward or reverse chronological order. The limits of the record set will be indicated by a message stating either "--TOP OF DATABASE--" or "--END OF DATABASE--". To exit Browse Mode and return to Idle Mode press the "ESC" key.

Query by Input Number

Event Records may also be queried while browsing events. When an Event Record is being displayed press the "BROWSE" key. The following Input Number request will be displayed.

```
┌────────────────────────────────┐
│  QUERY: Please enter           │
│  an input number:              │
└────────────────────────────────┘
```

After entering a one- or two-digit Input Number followed by the "ENTER" key, the first event meeting the date, time and Input Number criteria will be displayed. The arrow keys may be used to scroll through the specified records. Only events meeting the Input Number specification will be displayed. If no Event Records are found that meet the search specifications the "--END OF DATABASE--" message will be displayed briefly. To exit Query search and return to Idle Mode press "ESC".

Inputs

The Browse Inputs command allows the user to inspect the current state of each input. The state of Digital and Virtual Inputs will be indicated by their assigned Event Names. Voltage and current measurements will be reported for Analog Inputs. The Browse Inputs command can be of great use when setting up the recorder. Without a PC or printer 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 function for Analog Inputs.

After selecting the Browse Inputs command the following message will be displayed.

```
Use ← →  to scroll
 ESC to skip or exit
```

The arrow keys are used to scroll from one input to the next sequential input. Press "ESC" to jump to another input out of sequence. The following message will be displayed.

```
Input number to jump
to (ESC to quit):
```

Any number from 1 to 26 may be entered. The state of the selected input will then be displayed. If the user wishes to exit the command and return to the Idle Mode the "ESC" key should be pressed a second time.

The following simulated data depicts the status of Digital, Analog and Virtual Inputs, respectively. The default Input Identifiers and Event Names are listed in each case. Two inputs are always displayed per selection.

```
01 DInput01 ---ON---
02 DInput02 ---OFF--
```

```
19 AInput19  117 VDC
20 AInput20 13.9 VAC
```

```
25 VInput25 --FALSE-
26 VInput26 --TRUE--
```

The data depicted on the LCD is updated every time the left or right arrow keys are used to display a new pair of inputs. This technique can be used to display the current status of any given input, even if the state or measured value of that input has changed.

Setup Mode

Setup Mode allows the user to set up the CWR-22 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., Toggle Terminal/Printer Mode). 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 2 may be used to provide a more detailed explanation of the keypad commands.

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:
```

☞   The factory default Passcode is "12345678".

Passcodes are assigned numeric only values. The correct sequence of numbers must be entered followed by the "ENTER" key. If the user fails to enter the correct Passcode the following message will be displayed.

```
Incorrect passcode
```

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

```
Passcode verified
```

After a brief explanation of the arrow keys the following list of commands will be displayed.

```
Iparm   Gparm   Vparm
Sname   Modem   Sport
```

If the user advances the cursor past the "Iparm" or "Sport" commands the following additional commands will be displayed.

```
Clock   Pcode   Diags
```

Table 3 provides a brief explanation of each of the LCD commands. To select an LCD command advance the cursor to the desired command and press "ENTER". The use of each command is explained in the final sections of this chapter.

Setup Commands	
Name	Description
Iparm	Assign individual input parameters
Gparm	Assign global input parameters
Vparm	Assign Virtual Input parameters
Sname	Assign Site Name
Modem	Assign modem parameters
Sport	Change Terminal Port Baud rate
Clock	Change date and time
Pcode	Change Passcode
Diags	Perform system diagnostics

Table 3
List of LCD commands

Several of the LCD setup commands allow the user to define names and labels that may contain alphanumeric characters. However, the keypad only contains numeric keys. The CWR-22 incorporates a special editing technique that can be used to enter alphabetic and symbolic characters. The next section describes the editing technique.

Alphanumeric Editing Procedure

The first step in performing an alphanumeric edit from the keypad is to select the parameter that is to be edited. Generally, a flashing multi-character cursor will highlight the parameter that can be edited. Press the "ENTER" button to select the parameter. The following message will advise the user that the special editing technique can be used.

```
BROWSE ← → to select
Press ENTER to exit.
```

The parameter that was selected will then reappear with a cursor located in its left-most character position. The cursor will appear as a flashing underline with the character above the underline also flashing.

The selected parameter can now be edited by performing the following steps.

- Using the left and right arrow keys reposition the cursor as required.
- Press the "BROWSE" button once. The letter "A" will appear.
- Select a new character by pressing an arrow key until the character appears.

☞ The letters "A" through "Z" followed by "a" through "z" can be selected. A space will appear as a flashing underline (i.e., no character). An underscore will appear as a flashing line that is slightly elevated from an underline. To sequence through the character set more rapidly, hold the arrow key down.

- Press the "ENTER" key to accept the new character. The cursor will be automatically advanced one position to the right.

- Repeat the previous four steps until the name or label is fully constructed.
- Press the "ENTER" key to accept the new name or label.

Generally, the flashing multi-character cursor will then reappear highlighting the new name or label. The user can then select another parameter to edit. This completes the description of the Alphanumeric Editing Procedure. It can be used with the Iparm, Gparm, Vparm, Sname and Modem commands.

Iparm - Assign Individual Input Parameters

The Iparm command is used to define Digital, Analog and Virtual Input parameters. After selecting the Iparm command the following two messages will be displayed.

```
Use  ←  →  to scroll
ENTER to modify item
```

```
Press ESC to jump to
another input or end
```

The first message indicates that the arrow keys can be used to select a parameter. An arrow key can also advance the selection to the next Input Number. To jump to another input out of sequence press the "ESC" key. The following message will be displayed.

```
Input number to jump
to (ESC to quit):
```

Any number from 1 to 26 may be entered. The Input Name of the selected input will then be displayed. If the user wishes to exit the command and return to Idle Mode the "ESC" key should be pressed a second time. The choice of parameters that can be defined will vary with the selected input type. Each type is described in the following sections.

Digital Inputs

Pressing the right arrow key will advance the cursor through the following sequence of parameters: Input Name, Input Identifier, Active Event Name, Inactive Event Name, Detection Time and Flashing Status. The Active and Inactive Event Names appear as "On Evname" and "Off Evname", respectively.

The Alphanumeric Editing Procedure can be used to define the Input Name, Input Identifier and Event Name parameters.

The Detection Time can be set in the range of .001 to 32.000 seconds. The decimal place is not entered. The Detection Time for Flashing Inputs must be set carefully. Refer to the section entitled "Flashing Inputs" on page 24.

To enable or disable the Flashing Status simply press the "ENTER" key.

After all of the parameters are properly defined press the "ESC" key to complete the entry process. Another input can then be selected.

Analog Inputs

Pressing the right arrow key will advance the cursor through the following sequence of parameters: Input Name, Input Identifier, Active Event Name, Inactive Event Name, Input Type, Range, Upper Limit and Lower Limit. The Active and Inactive Event Names appear as "On Evname" and "Off Evname", respectively. The Upper and Lower Limits appear as "High Limit" and "Low Limit", respectively.

The Alphanumeric Editing Procedure can be used to define the Input Name, Input Identifier and Event Name parameters.

The Input Type can be assigned as DC or AC voltage or current. Pressing the "ENTER" key allows the parameter to be changed. Refer to page 72 for details on how to set the Analog Filter Switches.

The Range setting can be changed from "High" to "Low" by pressing the "ENTER" key. Only the "Low" setting is permitted when assigning an Input Type as DC or AC current.

The Upper and Lower Limits are set by using the numerical keypad. The decimal place is not entered. Refer to Table 2 for a listing of acceptable limits based on Type and Range settings.

After all of the parameters are properly defined press the "ESC" key to complete the entry process. Another input can then be selected.

Virtual Inputs

Pressing the right arrow key will advance the cursor through the following sequence of parameters: Input Name, Input Identifier, Active Event Name and Inactive Event Name. The Active and Inactive Event Names appear as "On Evname" and "Off Evname", respectively.

The Alphanumeric Editing Procedure can be used to define the Input Name, Input Identifier and Event Name parameters.

After all of the parameters are properly defined press the "ESC" key to complete the entry process. Another input can then be selected.

Gparm - Assign Global Input Parameters

The Gparm and Iparm commands are very similar. The Gparm command, however, will establish settings for each input in a common category. After selecting the Gparm command the following message is displayed.

```
Global parms: Analog
       Digital  Virtual
```

Use the arrow keys to select an input type. Each type is described in the following sections.

Analog Inputs

Pressing the right arrow key will advance the cursor through the following sequence of parameters: Active Event Name, Inactive Event Name, Input Type, Range, Upper Limit and Lower Limit. The Active and Inactive Event Names appear as "On Evname" and "Off Evname", respectively. The Upper and Lower Limits appear as "High Limit" and "Low Limit", respectively.

The Alphanumeric Editing Procedure can be used to define the Event Name parameters.

The Input Type can be assigned as DC or AC voltage or current. Pressing the "ENTER" key allows the parameter to be changed. Refer to page 72 for details on how to set the Analog Filter Switches.

The Range setting can be changed from "High" to "Low" by pressing the "ENTER" key. Only the "Low" setting is permitted when assigning an Input Type as DC or AC current.

The Upper and Lower Limits are set by using the numerical keypad. The decimal place is not entered. Refer to Table 2 for a listing of acceptable limits based on Type and Range settings.

After all of the parameters are properly defined press the "ESC" key to complete the entry process. The user will be returned to Idle Mode.

Digital Inputs

Pressing the right arrow key will advance the cursor through the following sequence of parameters: Active Event Name, Inactive Event Name, Detection Time and Flashing Status. The Active and Inactive Event Names appear as "On Evname" and "Off Evname", respectively.

The Alphanumeric Editing Procedure can be used to define the Event Names.

The Detection Time can be set in the range of .001 to 32.000 seconds by using the numerical keypad. The decimal place is not entered. The Detection Time for Flashing Inputs must be set carefully. Refer to the section entitled "Flashing Inputs" on page 24.

To enable or disable the Flashing Status simply press the "ENTER" key.

After all of the parameters are properly defined press the "ESC" key to complete the entry process. The user will be returned to Idle Mode.

Virtual Inputs

Pressing the right arrow key will advance the cursor through the following sequence of parameters: Active Event Name and Inactive Event Name. The Active and Inactive Event Names appear as "On Evname" and "Off Evname", respectively.

The Alphanumeric Editing Procedure can be used to define the Event Name parameters.

After all of the parameters are properly defined press the "ESC" key to complete the entry process. The user will be returned to Idle Mode.

Vparm - Assign Virtual Inputs

The Vparm command is used to enable or disable the operation of the local alarm relay and dial-out alarm reporting function. Both alarms are controlled by the active and inactive states of Virtual Inputs. The Vparm command also allows the user to assign the logical associations that define Virtual Inputs.

☞ Before using the Vparm command it is recommended that the user carefully read the sections entitled "Virtual Inputs" and "Assign Virtual Inputs" beginning on page 28.

After selecting the Vparm command the following message is displayed.

```
Virtual Parameters
Alarms    Equations
```

Both command options are described below.

Alarms

Selecting the Alarms option will display the following message after a brief explanation of the arrow, "ENTER" and "ESC" keys.

```
Local Alarms: V23 N
V24 N   V25 N   V26 N
```

The arrow keys can be used to select any Virtual Input setting. Press the "ENTER" key to change an "N" (no/disable) to "Y" (yes/enable).

Advancing the cursor further will allow the user to establish the remote alarm settings (assuming the optional modem is installed). The following message will be displayed.

```
Remote Alarms: V23 N
V24 N   V25 N   V26 N
```

After the local (relay) and remote (modem dial-out) alarms are properly defined press the "ESC" key to return to the Idle Mode.

Equations

Immediately after selecting the Equations option the following message will be briefly displayed.

```
┌─────────────────────────────┐
│  Use ← →  to scroll         │
│  BROWSE, ENTER select       │
└─────────────────────────────┘
```

The next message displayed will be similar to the following.

```
┌─────────────────────────────┐
│    Virtual Input #23        │
│  ***** DISABLED *****       │
└─────────────────────────────┘
```

"***** DISABLED *****" indicates that no equation has been assigned to the input. To select another Virtual Input press one of the arrow keys. To review the list of equations press the "BROWSE" key. Each equation is listed below.

```
┌─────────────────────────────┐
│  ***** DISABLED *****       │
│  A AND B AND C AND D        │
│  A OR B AND C AND D         │
│  A AND B OR C AND D         │
│  A OR B OR C AND D          │
│  A OR B OR C OR D           │
│  A OR B AND C OR D          │
│  (A AND B OR C) AND D       │
│  A AND (B OR C AND D)       │
│  A AND (B OR C) AND D       │
│  (A OR B OR C) AND D        │
└─────────────────────────────┘
```

Equations are based upon logical combinations of one to four variables. A variable can be any physical input. In the list of equations shown above, variables are labeled as "A", "B", "C" and "D". To define the four possible variables press the "ENTER" key after the desired equation is displayed. The following message will be displayed.

```
┌─────────────────────────────┐
│  Variable A:   NO_INPUT     │
│  Variable B:   NO_INPUT     │
└─────────────────────────────┘
```

The cursor will be positioned over the "NO_INPUT" term associated with variable A. To select another variable press the arrow keys as required. Press the "BROWSE" key repeatedly until the correct Input Identifier appears. Digital Inputs precede Analog Inputs in the sequence. If a variable needs to be assigned as the inactive state of an input press the "BROWSE" key until a "/" character precedes the Input Identifier (e.g., /DInput01 defines the opposite state of DInput01). Setting a variable to "NO_INPUT" forces the equation to ignore that variable.

After all of the variables are defined press the "ENTER" key. The LCD will indicate the Input Number and assigned equation. Another Virtual Input can then be selected. When each input is properly assigned press the "ESC" key to complete the command.

Sname - Assign Site Name

The Sname command allows the user to identify a particular CWR-22 with a descriptive Site Name. The name may be any combination of letters and numbers not exceeding twenty total (see below for additional details regarding length). It may be used as an equipment site designator or ID number.

Selecting Sname will briefly display a message similar to the following.

```
┌─────────────────────────────┐
│  Current site name :        │
│  ***** NOT SET *****        │
└─────────────────────────────┘
```

In the example cited the Site Name is set to the factory default value. The following message will then direct the user to either change or accept the name shown.

```
┌─────────────────────────────┐
│  Change? ENTER or ESC       │
│  ***** NOT SET *****        │
└─────────────────────────────┘
```

Pressing the "ESC" key will return the user to Idle Mode. Pressing "ENTER" will display a brief message concerning the use of the "BROWSE", arrow and "ENTER" keys followed by a message similar to the following.

```
┌─────────────────────────────┐
│  Enter new site name:       │
│  ***** NOT SET *****        │
└─────────────────────────────┘
```

The new Site Name must be entered by using the Alphanumeric Editing Procedure. Refer to page 58 for details on this procedure.

☞
> The Site Name may contain as many as eighty characters if it was defined via the Terminal Port or modem by using the Assign Site Name (i.e., "L" command). Because the LCD panel will only display twenty characters per line it will only show the first twenty characters of the name.
>
> If the user elects to create a Site Name via the keypad the name will be limited to twenty characters.

Modem - Assign Modem Parameters

The Modem command is only applicable to those recorders equipped with an optional MICRO-AIDE modem. The modem will operate in dial-out and auto-answer modes. The Access Prefix, Access Code, Primary and Secondary Numbers, Dial-out Method, Redial Delay, Dial-out Alarms Status and Answer Ring Delay settings can be changed with the Modem command. Refer to the section entitled "Assign Modem Parameters" on page 34 for a description of each of these parameters.

After selecting the Modem command the following message will be briefly displayed.

```
┌─────────────────────────────┐
│  Use ← →   to scroll        │
│  ENTER to modify item       │
└─────────────────────────────┘
```

Use the arrow keys to select a parameter. Press the "ENTER" key to edit the selected parameter. The Access Prefix, Access Code, Primary and Secondary Numbers can be defined using the Alphanumeric Editing Procedure.

The Dial-out Method can be toggled between "Tone" and "Pulse" by pressing the "ENTER" key. The Redial Delay can be set in the range of 30 to 240 seconds. The Answer Ring Delay can be set in the range of 0 to 99 seconds.

☞   Setting the Answer Ring Delay to zero seconds will disable the auto-answer feature.

After the parameters are properly defined press the "ESC" key to complete the command.

Sport - Change Terminal Port Baud Rate

The Baud rate for the Terminal Port may be set to any of six values ranging from 300 to 38,400 Baud. The factory default Baud rate is 19,200. The user may wish to take advantage of the higher Baud rates available in the recorder when dumping large numbers of Event Records.

To change the Terminal Port Baud rate select the Sport command. The following two messages will be briefly displayed.

```
     Terminal Port
   baud rate setting
```

```
 Use → to pick baud
 rate and then ENTER
```

Finally, the Baud rate selection menu will be displayed as follows.

```
    300    1200    2400
   9600   19200   38400
```

The right arrow may be used to select a new setting. The new Baud rate will take effect immediately after pressing the "ENTER" key.

Clock - Change Date and Time

To change the present date and time select the Clock command. The following request will be issued.

```
 Enter date (MMDDYY):
```

The date must be entered in the form MMDDYY without any separator characters. Press "ENTER" to accept the date shown. The following time request will be displayed.

```
┌─────────────────────────────────┐
│   Enter time (HHMMSS):           │
│                                  │
└─────────────────────────────────┘
```

The time must be entered in the form HHMMSS without any separator characters. The time must be entered using 24-hour, military time. Press "ENTER" to accept the time shown. If the time is properly defined the CWR-22 will change the date and time and return to Idle Mode. Improper date and time entries are indicated by an error message.

Pcode - Change Passcode

The Pcode command allows the user to restrict access to the system by unauthorized individuals who may attempt to operate the recorder from the front panel.

Selecting the Pcode command will briefly display the following message (assuming that the Passcode has not been changed from its factory default setting of "12345678").

```
┌─────────────────────────────────┐
│   Current passcode :             │
│   12345678                       │
└─────────────────────────────────┘
```

It will be followed by the request shown below.

```
┌─────────────────────────────────┐
│   Change? ENTER or ESC           │
│   12345678                       │
└─────────────────────────────────┘
```

To abort the Pcode command and return to the Idle Mode press "ESC". To change the Passcode press "ENTER". The following message will then be displayed.

```
┌─────────────────────────────────┐
│   Enter new passcode:            │
│                                  │
└─────────────────────────────────┘
```

The Passcode can only contain numeric values. As many as eight numbers may be used to define the Passcode. After the new Passcode is entered the following message will direct the user to re-enter the Passcode.

```
┌─────────────────────────────────┐
│   Re-enter to verify:            │
│                                  │
└─────────────────────────────────┘
```

If the user correctly re-enters the Passcode the procedure is completed and the user will be returned to Idle Mode. If a mistake is made the procedure for entering a new Passcode will start again.

Diags - Perform System Diagnostics

The Diags command will perform several checks of the recorder. A test, profile check and reset of the recorder can be performed. After selecting the command the following message is displayed.

```
       System Diagnostics
    Test   Profile   RESET
```

Each option is described in the following sections.

Test - Run Diagnostic Test

The Test command will test the recorder's memory, optional modem and LCD. After selecting the command and waiting several seconds the recorder should display the following two lines of text.

```
    Testing memory...OK
    Firmware test....OK
```

It should then be followed by a message similar to the following.

```
    Modem test.......N/A
    LCD display......OK
```

In the example cited the modem was not installed so its status is shown as "N/A". If the modem was installed, but in use, the modem test would be bypassed. If a fault was found, "BAD" would identify the failed item.

☞ | The failure of any item in the Test command should be reported to MICRO-AIDE. Repair and return policies are described on the inside back cover of this manual. A telephone and fax number are also listed.

The recorder will automatically return to Idle Mode after completing the test.

Profile - Check System Profile

The Profile command will report the recorder's current configuration. The Profile command will display two messages similar to the following.

```
    Event capacity:57543
    Capacity usage:100%
```

```
       Modem speed:14400
    Term Baud rate:38400
```

The results may vary but the information shown will always be reported. For the example cited the larger memory capacity has been installed. The record memory has been completely filled. Accordingly, new records over-write the oldest records. The optional modem has been installed. The Terminal Port Baud rate is at its highest setting of 38,400. The recorder will automatically return to Idle Mode after completing the check.

RESET - Reset to Factory Defaults

This command will clear all of the Setup Database and Event Record data from the recorder. This command should be performed with great care since the data will be permanently lost.

The RESET command will briefly issue the following two warnings.

```
You've chosen a very
DESTRUCTIVE command.
```

```
It erases ALL events
and user configs.
```

It will be followed by the request shown below.

```
Are you totally sure
(ENTER=Yes ESC=No) ?
```

Pressing "ESC" will return the user to Idle Mode. Pressing "ENTER" will execute the RESET command. The recorder will then proceed to reboot and initialize its operation. The LCD will display several messages that indicate the progress of the initialization. After completing the RESET command the setup parameters of the recorder will be restored to the default values shown in Table 1.

This concludes the chapter on how to use the front panel keypad and display. The next chapter describes general maintenance techniques that may benefit the user in case of problems.

Chapter 5
Maintenance

Introduction

Proper maintenance procedures and trouble-shooting techniques are described in this chapter. They should be referred to if ever a questionable symptom arises during the operation of the CWR-22.

The CWR-22 is designed to provide its user with many years of trouble-free operation. There are **no user serviceable parts** in the system. 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.

Working Inside the Recorder

The user may have occasion to work inside the CWR-22. The following sections describe several tasks involveing work that must be performed inside the recorder. Observe the steps listed below before attempting any task. Figure 1 provides front and side views of the recorder.

- Remove power from the recorder by detaching the power/relay connector located along the left side panel of the recorder.
- Remove all of the Analog and Digital Input connectors.
- Remove the two pan-head 6-32 1/4" screws from the left and right ends of the cover. Remember to save the screws and the plastic washers.
- Remove the cover assembly, being careful not to pull on the internal cables. Refer to Figure 4.
- Disconnect the cables that attach to the LCD and keypad assemblies. The cover assembly can now be set aside.

The task can now be performed safely. After the work is completed reassemble the recorder by reversing the steps listed above.

☞ **Caution**: 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.

Adjusting the LCD Contrast

The contrast level of the LCD panel may occasionally need to be adjusted to compensate for any variations caused by temperature. To adjust the contrast level locate the potentiometer and rotate its setting until the desired contrast is achieved. Refer to Figure 4.

☞ Note: Viewing angle has a considerable effect upon the contrast level. Accordingly, the contrast level should be set for the most commonly used viewing angle.
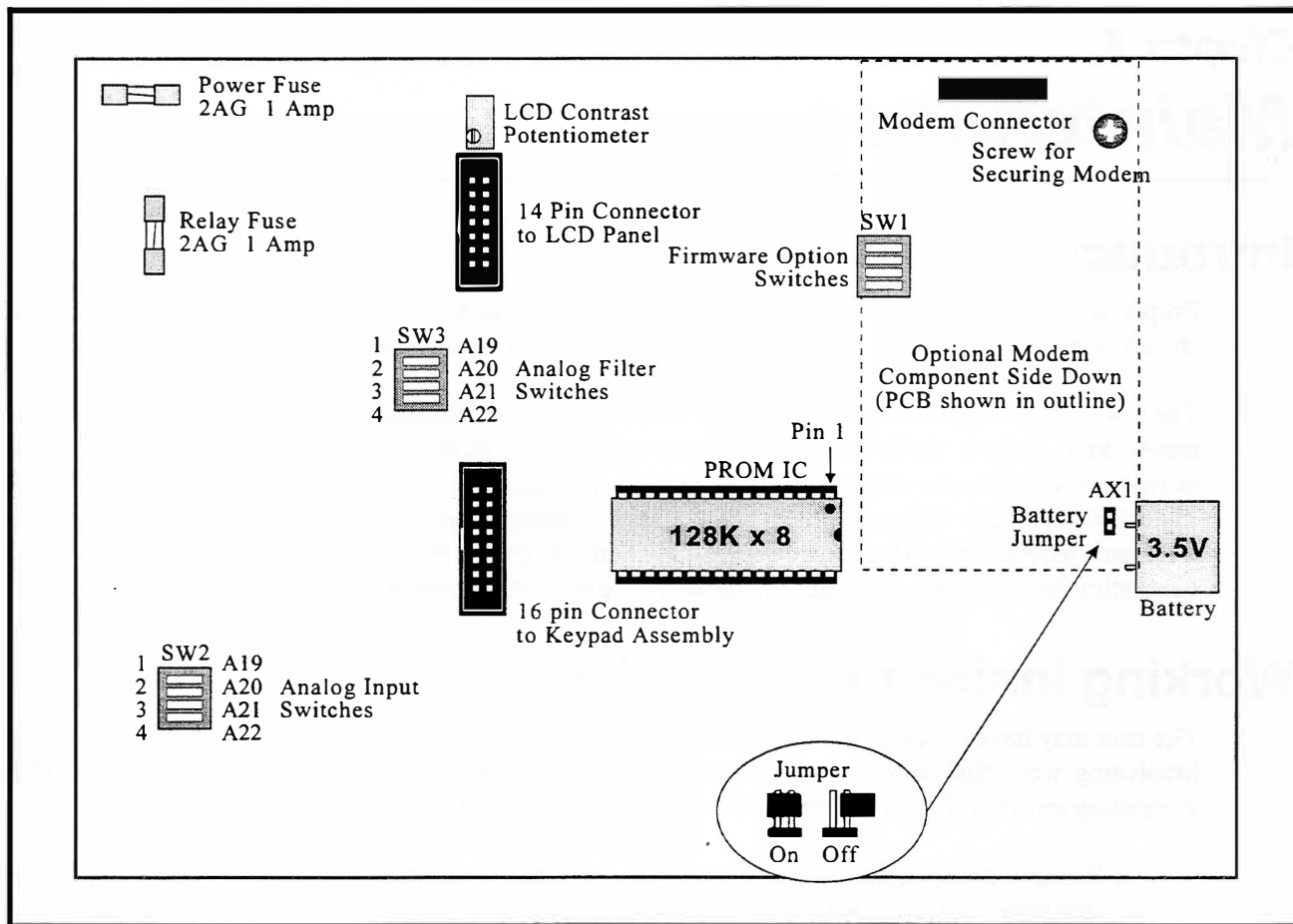
Figure 4
CWR-22 printed circuit board

Installing the Optional Modem

MICRO-AIDE has designed a 14,400 Baud modem that can be used to provide high speed remote access to the CWR-22. Unlike commercially available external modems, the MICRO-AIDE modem will operate over the entire temperature range applicable to the CWR-22. It also uses the internal power of the CWR-22 rather than commercial AC power.

To install the modem first remove the recorder's cover assembly in accordance with the procedure entitled "Working Inside the Recorder" on page 69. Locate the field of sixteen pins near the upper right-hand corner of the PCB. Refer to Figure 4. Install the modem, component side down, by mating its sixteen-pin connector with the field of pins. Use the 6-32 screw and stand-off to secure the modem.

When the recorder is reassembled apply power to the unit. When the CWR-22 powers up it will automatically detect the modem's presence and properly initialize it for operation.

Upgrading the Firmware

Like any microprocessor based product the CWR-22 relies upon the execution of a stored program for its operation. The program, referred to as firmware, is stored in a special Integrated Circuit (IC). The IC is a Programmable Read Only Memory (PROM) device.

MICRO-AIDE will, from time to time, modify the firmware for the CWR-22. Modifications may provide additional features or expanded performance. Customers interested in upgrading their firmware can do so with little or no assistance from MICRO-AIDE. The steps listed below must be followed whenever a firmware upgrade is performed.

- Locate the installed PROM IC. Refer to Figure 4.
- Using a small, flat-head screwdriver remove the existing PROM IC from its socket. If requested to do so, return the removed IC to MICRO-AIDE customer service.
- Insert the new PROM in the vacated socket. The **small indentation** on the IC must be **facing to the right**. Some ICs will indicate Pin 1 with a small dot. In such cases the dot must be oriented towards the **upper right-hand corner** of the PCB.
- Inspect the PROM IC to ensure that its pins are not bent underneath the IC. Ensure that all 32 pins are properly inserted within the socket.

When power is applied, the recorder should reinitialize and begin normal operation. If the recorder fails to reinitialize, review the steps listed above to isolate the problem. It is likely that the PROM IC was not correctly inserted.

☞ After completing the firmware upgrade procedure it may be necessary to execute the RESET command. A RESET should be performed only if recommended by MICRO-AIDE customer service technicians. The RESET command is described on pages 17 and 68.

Setting Jumpers and Switches

There is one jumper setting and three four-position switches on the PCB. Each are described in the following four sections. Refer to Figure 4 to locate the appropriate jumper and switches.

Battery Enable/Disable Jumper (AX1)

The CWR-22 comes equipped with non-volatile memory. This allows the recorder to save valuable Event Records and the Setup Database even if power is lost to the recorder. A small, 3.5 V battery is used to save the data and to operate the real-time clock within the CWR-22. If the recorder is not going to be used for a lengthy period of time the battery's normal two-year life expectancy can be prolonged by disconnecting it from the rest of the PCB circuitry.

To disconnect the battery locate and remove the jumper clip connection (labeled "AX1"). Reinsert the clip over both pins prior to placing the recorder back in service.

☞ Each CWR-22 is delivered from the factory with its non-volatile memory enabled. While power is applied to the recorder the battery will not discharge.

Firmware Option Switches (SW1)

Every CWR-22 includes a four-position switch (labeled "SW1") that is used to control various firmware options. Generally, these options will be customer specific in nature. Set the switches in accordance with the documentation that is included with the option.

Analog Input Switches (SW2)

The four-position Analog Input switch (labeled "SW2") is used to configure the CWR-22 for use with the CWR-CS accessory. To assign an Analog Input to the Current Sensor the switch for that input must be closed. To assign the input as a voltage input the switch must be opened. Analog Inputs A19 through A22 use switch positions 1 through 4, respectively. Figure 4 shows the location of the correct four-position switch.

An Analog Input must be assigned as either a voltage input or a Current Sensor input, never both. To ensure this, open the appropriate switch for voltage operation and make sure that nothing is connected to an Analog Input if it is assigned as a current input.

☞ **Caution**: Never connect a Current Sensor input to an Analog Input that has a voltage source connected. Damage to the Current Sensor or improper operation of the voltage source may result!

Analog Filter Switches (SW3)

The CWR-22 Analog Inputs can be used to measure AC and DC signals. AC signals are first rectified to produce a DC voltage that includes a ripple component. Consequently, rectified AC signals must be filtered before they are measured. Generally, an AC source signal requires much more filtering than a DC signal. However, significant filtering of a DC signal (e.g., a relay coil voltage) will prevent the CWR-22 from making quick and accurate measurements. To avoid this contradiction the CWR-22 is equipped with two filter settings. The slow setting is used typically with AC signals. It is the setting assigned by the factory. The fast setting should be used with DC signals or any signal that does not require much smoothing before a measurement can be made.

Each Analog Input is assigned a position in the Analog Filter Switch (labeled "SW3"). Refer to Figure 4. To enable slow filtering close the appropriate switch. To enable fast filtering open the switch.

Replacing a Fuse

There are two fuses mounted on the PCB. The fuse in the extreme upper left-hand corner of the PCB is for protecting the input power source. The fuse directly below the power fuse is for protecting the contacts of the alarm relay. Each fuse is rated for 1 Amp. Before replacing a fuse the cause of the blown fuse must be ascertained and cleared if possible.

☞ **Caution**: Never replace a fuse with power applied to the recorder. Remove the relay connections before replacing the relay fuse.

Contact MICRO-AIDE if the cause of a blown fuse can be identified with the PCB.

Connecting the Internal Cables

There are two cables inside the CWR-22. The first cable connects the PCB to the LCD panel. The second connects the PCB to the keypad assembly. When removing the cover assembly these cables need to be disconnected.

To reconnect the cables simply seat them into their respective male connectors. Each cable end is terminated with a keyed female connector. Do not force the female connector into place. It should fit snugly but easily into its mate.

Trouble-shooting Guide

The following guide is provided to assist the user in resolving problems that may occur with the operation of the CWR-22. 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-22 must be carried out in accordance with the procedures described in this chapter. If the user is unable to resolve the problem the customer service department at MICRO-AIDE should be contacted. The user will be asked to state the problem, related symptoms, and indicate any operations or conditions that may have a bearing on the problem. 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.

Trouble-shooting Guide	
Symptom or Problem	**Resolution**
No indication of power	Measure +12VDC at the B and N power terminals. Inspect fuse on PCB.
Printer or VDT does not display data	Check cable connection to Terminal Port. Verify cable is assembled per Figure 5. Check Baud rate setting. Check if light on front panel labeled "Terminal" illuminates.
Printer is showing long string of odd characters	Set recorder to Printer Mode.
Cursor cannot be moved at terminal	Set recorder to Terminal Mode. Set terminal to ANSI emulation.
Data at printer or VDT is garbled	Check Baud rate setting. Verify the following: 8 data bits, 1 start bit and 1 stop bit.
Printer is missing data or performing odd mechanical motions	Printer data buffer is being overflowed. Use Pause and Resume commands to control data flow to printer.
Characters entered at keyboard do not appear, or appear doubled	Use Toggle Full/Half Duplex command to change setting.
Initial Check-out procedure fails on all inputs	Make sure polarity of digital test voltage is applied correctly. Check Detection Time setting, set to 3.0 seconds or less. Check inputs using Display Real-time Status of Inputs command.
Event Records are not being created on some inputs	Check input wiring, especially polarity of Digital Inputs. Detection Time may be too long for event. Detection Time setting of 00 has disabled Digital Input. Upper and Lower Limits are not set properly.
AC analog measurements are not stable	Set analog filter to slow (close filter switch).
DC analog measurements are not tracking voltage changes	Set analog filter to fast (open filter switch).
Input Numbers do not match input where event occurred	Check input wiring.
Flashing Inputs create multiple Event Records	Inputs are not assigned as Flashing. Detection Time is set too short.
Upload/Download of Setup Database fails	Verify that XMODEM protocol is being used.
Terminal Mode shows incorrect data fields	Verify that VDT or PC emulation is set for ANSI emulation.
Modem does not answer	Check phone line connection. Modem Ring Delay setting must be non-zero.
Modem answers but modems fail to connect	Verify host modem supports error correction protocols. Check for excessive noise on phone line. Test host modem on another auto-answer system.
Modem will not dial out alarms	Check phone line for dial tone. Check Primary and Secondary number. Check if Virtual Inputs are being created.

Table 4
Guide to trouble-shooting techniques

This completes the User Manual for the CWR-22 Event Recorder. As a convenience to the user three appendices have been provided. They list specifications and options that are applicable to the CWR-22. 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.**

Specifications

Size
L: 9.0" W: 6.25" D: 2.5"
L: 23cm W: 16cm D: 6cm

Weight
Less than 4 lbs., 2 Kgs.

Environmental
Storage
Temperature: -40°F to +185°F,
-40°C to 85°C

Humidity: 0 to 95%,
non-condensing

Operating
Temperature: -4°F to +162°F,
-20°C to 72°C

Humidity: 0 to 95%,
non-condensing

Mounting
Standard: shelf or back board
mounting (includes brackets)

Optional: 19" or 23" rack
mounting brackets available

Construction
Housing
Fully enclosed in clear anodized
aluminum

Gauge: top .080", base .060"

Electrical
All components mounted on
internal PCB

Power
Voltage
Nominal: 12 VDC

Range: 10 to 40 VDC

Consumption
Typical: less than 3 watts

Max: less than 4 watts with
internal modem

Input Isolation
Digital Inputs
3800 VDC to any other potential

Analog Inputs
1600 VDC to any other potential

Any Input to Adjacent Input
Digital: 3800 VDC

Analog: 3200 VDC

Internal Modem (optional)
Meets applicable FCC part 68
standards

Capacities
Inputs
Digital: 18, all opto-isolated

Analog: 4, voltage or
current

Virtual: 4, assignable

Event Storage
Standard: 13,852

Optional: 57,543

31st day over-writes oldest day

Newest data over-writes oldest
data

RS-232 Port
Single, suitable for operation
with a PC, VDT or printer

Supports ANSI-BBS emulation in
Terminal Mode

Baud rates: 300, 1200, 2400,
9600, 19200, 38400

Bit format: N-8-1

Liquid Crystal Display
2 lines by 20 characters

Alphanumeric, upper- and
lower-case

Viewing area: 2.9" by .5"

Front Panel Keypad
16 keys, button type, not
membrane

0-9, Setup, Browse, Esc, Enter

Input Circuits
Input Impedance
Digital: 5000 ohms min.

Analog: 10,000,000 ohms min.

Range
Digital: 5 to 30 VDC

Analog DC Voltage: 2 scales
0 to 12.8 V and 0 to 128 V

Analog AC Voltages: 2 scales
0 to 14.2 V and 0 to 142 V

Analog Current: (optional) 0 to
32.0 A, AC or DC

Detection Timing
Digital: .001 to 32.000 seconds,
compatible with non-varying
flashing circuits

Analog: R-C filtering, fast and
slow switch settings

Analog Limits
Voltage: separate high and low
limits, in multiples of .1 V or 1 V

Current: (optional) separate
high and low limits, in multiples
of .5 A

Virtual Inputs
Quantity
4, individually assignable

Definition
An AND/OR/NOT association of
4 physical inputs, digital or
analog

Logical associations are
selected from predefined menu
of equations

Reporting
Creates standard Event Record

Can be used to control local
alarm relay

Can be used to dial out an
alarm via modem (optional)

MICRO-AIDE reserves the right to make changes, at its sole discretion, to the specifications contained herein.

Specifications
(continued)

Internal Clock

Accuracy
+/- 1 minute per month (20 ppm)

Resolution
Event Records are time stamped to nearest .001 second

Operation
Full calendar, auto-adjusted for leap year

Non-volatile with power off

Year 2000 compatible

Memory

Type
Non-volatile, Event Records and Setup Database are saved in battery backed-up memory

Storage Longevity
2 years with power off, min.

Indicators

LCD Panel
Includes LED back lighting for enhanced visibility

Setup and data retrieval commands selected from multiple menus

Power
Green LED

Terminal Port and Modem
1 each, green LEDs, flash with xmt/rcv data

Connectors

Digital and Analog Inputs
Paired "+" and "-" into screw-down, detachable connector

Wire sizes: 12 to 22 AWG

Current Sensor (optional)
Female DE-9 connector

Terminal Port
Male DE-9 connector, configured as DCE

Power and Alarm Relay
Power: B and N pair into screw-down detachable connector

Alarm Relay: N.O., N.C. and common into screw-down connector, common is internally fused at 1 A

Wire sizes: from 12 to 22 AWG

Telephone Line
Female RJ-11

Password Protection

Administrative Level
Access to all commands, 10 characters

Restricted Level
Access to Event Record viewing commands only, 10 characters

Front Panel
Numerical Passcode protects against setup alterations, 8 digits

Internal Modem (optional)

Type
V.32bis, 14400 Baud, data compression and error correction

Usage
Provides auto-answer, remote access

Allows dial-out alarm reporting

Compliance
Designed to meet FCC part 68

Dial-out Alarms (optional)

Calling Procedure
Primary and secondary numbers

Prefix and access codes

Tone or pulse dialing

Data
Issues Event Record for enabled Virtual Input

CWR-CS (optional)

Capacity
4 current paths, each occupies an Analog Input

Configuration
Each current carrying conductor is fed through a non-intrusive circuit equipped with a Hall-effect device

Connects to CWR-22 via 15 ft. cable

Range
0 to 32 A, AC or DC

MICRO-AIDE reserves the right to make changes, at its sole discretion, to the specifications contained herein.

Peripheral Cables
Available from MICRO-AIDE or retail electronic and computer stores.

CWR-22 end
DCE
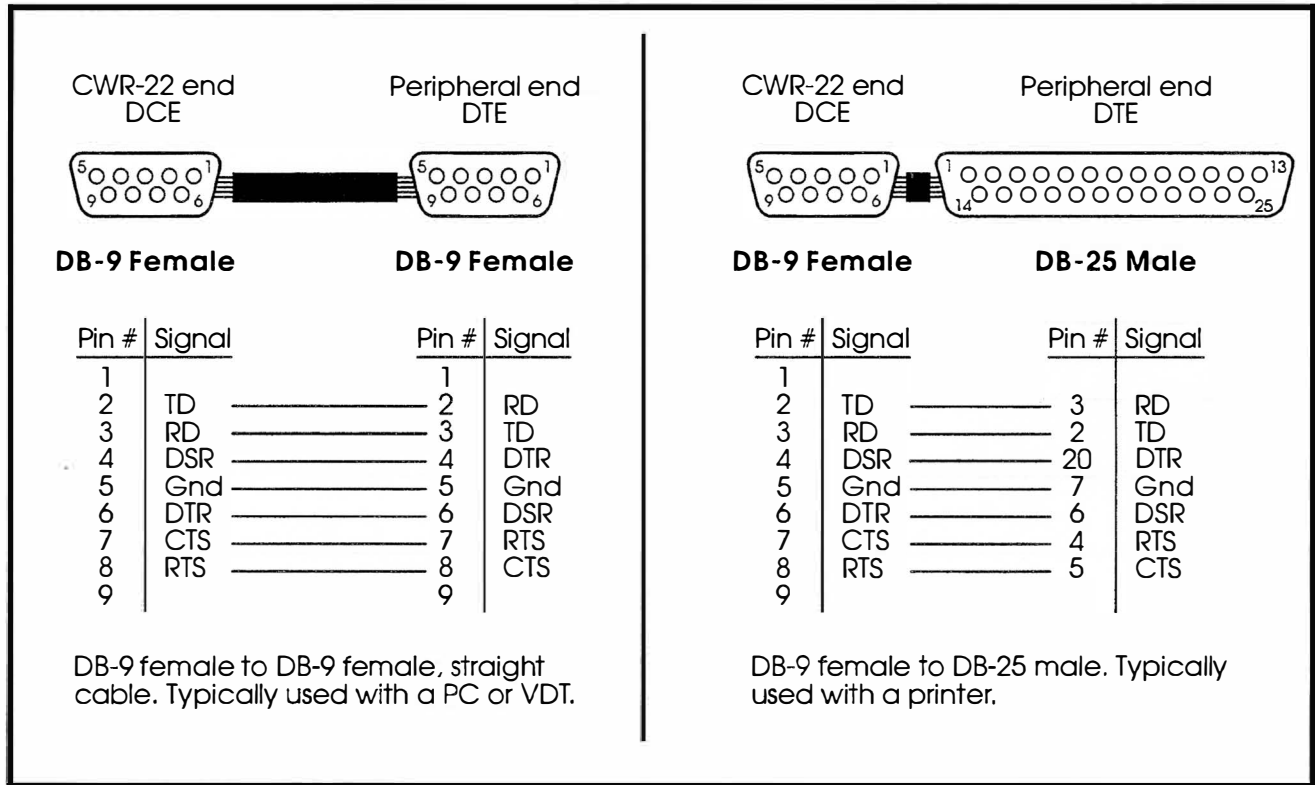
Peripheral end
DTE

DB-9 Female

DB-9 Female

Pin #	Signal		Pin #	Signal
1			1	
2	TD	————	2	RD
3	RD	————	3	TD
4	DSR	————	4	DTR
5	Gnd	————	5	Gnd
6	DTR	————	6	DSR
7	CTS	————	7	RTS
8	RTS	————	8	CTS
9			9	

DB-9 female to DB-9 female, straight cable. Typically used with a PC or VDT.

CWR-22 end
DCE

Peripheral end
DTE

DB-9 Female

DB-25 Male

Pin #	Signal		Pin #	Signal
1				
2	TD	————	3	RD
3	RD	————	2	TD
4	DSR	————	20	DTR
5	Gnd	————	7	Gnd
6	DTR	————	6	DSR
7	CTS	————	4	RTS
8	RTS	————	5	CTS
9				

DB-9 female to DB-25 male. Typically used with a printer.

Figure 5
CWR-22 peripheral cables

User Notes

Options and Accessories

Options

Internal Modem
P/N 85-0039: V.32bis, up to 14,400 Baud, MNP-5 and V.42 error correction and data compression

Memory Expansion
P/N 40-0057: 57,543 Event Records, replaces memory chip on PCB

Accessories

Current Sensor
CWR-CS: Provides analog current measurements for 1 to 4 circuits, 0 to 32 Amps, AC or DC, connects to 1 to 4 Analog Inputs

High Current Sensor
HCS-4: 4 inputs, 0 to 20 Amps, AC or DC, connects to 4 Digital Inputs

Alarms when currents are excessive

Low Battery Detector
LBD-4: 4 inputs, 1 to 32 VDC, connects to 4 Digital Inputs

Alarms when DC input voltages are low

Accessories (continued)

Low Voltage Detector
LVD-4: 1 to 32 VDC, 5 to 25 VAC, connects to 4 Digital Inputs

Alarms when DC or AC input voltages are low

Battery Charger Monitors
CSI-1: 1 input, voltage and current, connects to 1 Digital Input

Alarms when charging voltage and current are low

CSI-4: 4 inputs, voltage and current, connects to 4 Digital Inputs

Alarms when charging voltage and current are low

Mounting
P/N 31-0010: 19" rack mounting brackets

P/N 31-0011: 23" rack mounting brackets

Cables
Standard: DB-9 to DB-9 (1 included)

Optional: DB-9 to DB-25 (upon request)

Contact MICRO-AIDE when ordering any options or accessories. Purchase order may list requested items as described in the above.

User Notes

Emulation Setup

Selecting the Proper Emulation

The CWR-22 may be used in either Terminal or Printer Mode. Generally, MICRO-AIDE recommends that Terminal Mode be used. However, Printer Mode should be used when many Event Records are to be printed or captured to a PC file. Regardless of the mode selected by the user, the peripheral device (e.g., printer, PC or VDT) must be configured properly to work with the CWR-22.

This chapter describes the proper settings for commonly found peripheral devices. It is assumed that in the case of a PC or VDT the device may be configured to perform different terminal emulations. It is further assumed that the PC (if used) is installed with Windows Terminal (version 3.1) and Procomm for Windows (version 2.0).

☞ | In all cases the bit format should be set to N-8-1 and Xon/Xoff should be selected for flow control.

If applicable, the transfer protocol should be set to XMODEM.

Personal Computer

Procomm for Windows

Terminal Mode

- Terminal emulation: ANSI BBS

Printer Mode

- Terminal emulation: TTY

Windows Terminal

Terminal Mode

- Terminal emulation: DEC VT-100 (ANSI)
- Other settings: under the Settings, Terminal Preferences ... command select "Terminal" under Terminal Font and disable "Use Function, Arrow, and Ctrl keys for Windows"

Printer Mode

- Terminal emulation: TTY (Generic)
- Other settings: under the Settings, Terminal Preferences ... command select "Terminal"

Video Display Terminal

Terminal Mode

- Terminal emulation: ANSI or VT-100

Printer Mode

- Terminal emulation: Generic or TTY

Printer

Terminal Mode

- A printer cannot be used when the CWR-22 is in Terminal Mode

Printer Mode

- Terminal emulation: Generic printer or TTY

Additional Information

All peripheral devices allow users to select many different configuration settings. The above guidelines should be considered a brief summary of the principal settings required by the CWR-22. The user documentation for the device or program in question should be consulted for additional information.

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.