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# **PSM**

## **PORTABLE SPEED MONITOR**

**USER MANUAL**

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**MICRO-AIDE**

EVENT RECORDERS SPEED MONITORS CURRENT SENSORS  
ISOLATED MODEMS BATTERY MONITORS VOLTAGE MONITORS  
LIGHT OUT DETECTORS CLOCK SYNCHRONIZERS WHISTLE DETECTORS LOCAL CONTROL PANELS

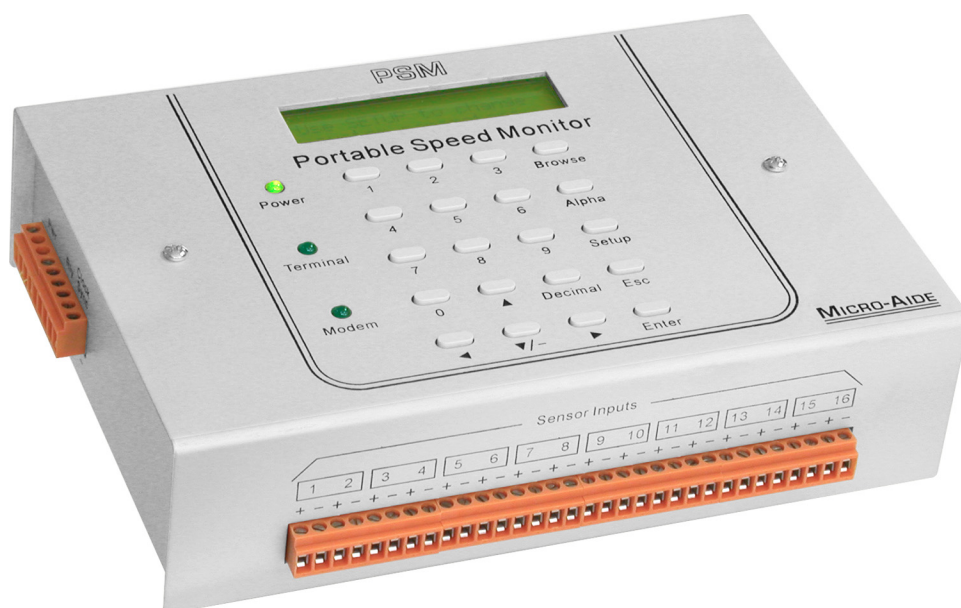


# MICRO-AIDE



USER MANUAL

## PSM PORTABLE SPEED MONITOR



Revised: June 16, 2009

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# TABLE OF CONTENTS

## CHAPTER 1 GENERAL DESCRIPTION

Introduction . . . . .	1
Key Features . . . . .	2
Dual Sensor versus Single Sensor Modes . . . . .	3
About this Manual . . . . .	4

## CHAPTER 2 INSTALLATION AND SETUP

Introduction . . . . .	5
Unpacking . . . . .	5
Initial Check-out Procedure . . . . .	5
Installation Procedure . . . . .	10
Location . . . . .	10
Mounting . . . . .	10
Site Preparation . . . . .	11
Peripheral Equipment . . . . .	11
Cabling . . . . .	11
Power . . . . .	11
Peripherals . . . . .	12
Input Circuits . . . . .	12
Applying Power . . . . .	13
Setup Procedure . . . . .	13
User Interface Conventions . . . . .	13
Logging On . . . . .	13
Commands and Fields . . . . .	14
Data Flow Control . . . . .	15
Main Menu . . . . .	15
Setup (S) . . . . .	16
Time/Date (T) . . . . .	16
Reset System (R) . . . . .	16
System Parameters (S) . . . . .	18
Measure Speed (M) . . . . .	20
Network (N) . . . . .	24
Print Setup Data (P) . . . . .	25
Transfer Files (T) . . . . .	26
Saving the Setup Database (D) . . . . .	26
Restoring the Setup Database (U) . . . . .	28
Log Off (X) . . . . .	29
Synchronizing the PSM Clock . . . . .	30

## CHAPTER 3 OPERATION

Introduction . . . . .	31
------------------------	----

Multi-User Operation . . . . .	31
Remote Operation . . . . .	31
Establishing a Modem Connection . . . . .	31
Establishing an Ethernet Connection . . . . .	32
Entering the Password . . . . .	32
How to Operate the PSM . . . . .	33
Query Events (Q) . . . . .	33
Start Time . . . . .	34
End Time . . . . .	34
Reverse Order . . . . .	34
Report Type . . . . .	35
Inputs . . . . .	36
View Events (V) . . . . .	37
Event Record Format . . . . .	37

## **CHAPTER 4 DISPLAY AND KEYPAD**

Introduction . . . . .	39
Front Panel Description . . . . .	39
Liquid Crystal Display . . . . .	39
Keypad . . . . .	39
How to Use the Keypad . . . . .	40
Idle Mode . . . . .	40
Event Record Format . . . . .	40
Browse Mode . . . . .	41
Setup Mode . . . . .	43
Alphanumeric Editing Procedure . . . . .	44
Clock . . . . .	45
UName . . . . .	45
Speed . . . . .	46
PCode . . . . .	47
Modem - optional . . . . .	47
Baud . . . . .	48
Diag . . . . .	48
RESET . . . . .	50

## **CHAPTER 5 MAINTENANCE**

Introduction . . . . .	51
Working Inside the Monitor . . . . .	51
Adjusting the LCD Contrast . . . . .	52
Replacing the Fuses . . . . .	52
Reconnecting the Internal Cables . . . . .	52
Installing the Optional Modem . . . . .	52
Installing the Optional Ethernet Port . . . . .	53
Diagnostic Testing . . . . .	54
Checksum Test Program Memory (C) . . . . .	55
Flash Memory Test (F) . . . . .	55
Modem Test (M) . . . . .	55
Keypad Test (K) . . . . .	56
Input Test (I) . . . . .	56
System Events . . . . .	57

Upgrading the Firmware . . . . .	.58
HyperTerminal . . . . .	.59
Procomm Plus . . . . .	.60
Trouble-shooting Guide . . . . .	.61
 <b>APPENDIX A TECHNICAL DATA</b>	
Specifications . . . . .	.63
Recommended Sensor Distances . . . . .	.65
Terminal Port Cable . . . . .	.66
 <b>APPENDIX B OPTIONS AND ACCESSORIES</b>	
 <b>APPENDIX C BILLS OF MATERIAL</b>	
PSM Bill of Material . . . . .	.69
PSM Subassemblies . . . . .	.70
PA85-0113/00 Processor PCB . . . . .	.70
PA85-0063/00 Keypad PCB . . . . .	.72
PA85-0106/00 Modem PCB . . . . .	.72
PA85-0111/00 Ethernet Port PCB . . . . .	.74





# GENERAL DESCRIPTION

## Introduction

Since 1988 MICRO-AIDE has provided the rail signal industry with a broad range of data logging, event detection and monitoring devices. MICRO-AIDE's Portable Speed Monitor, hereinafter referred to as the PSM, is derived directly from our CWR-22XL Event Recorder. The PSM and CWR-22XL share a great deal in common. Their microprocessor circuitry, memory, major firmware components and physical size are, in fact, identical. The principal difference that distinguishes one product from the other pertains to their input circuit design. The Wheel Sensor Inputs of the PSM utilize high impedance voltage circuitry. The CWR-22XL utilizes opto-isolation devices in the design of its Digital Inputs. The Sensor Inputs of the PSM are not unlike the Analog Inputs of the CWR-22XL. In short, every detail of the PSM design has benefitted from years of research in developing the MICRO-AIDE CWR family of Event Recorders.

Although the PSM can be used in a variety of speed reporting applications it is ideally suited to applications involving classification yards. The PSM speed measuring algorithm was developed by analyzing the data from tens-of-thousands of actual wheel events. Wheel motion in a gravity controlled classification yard tends to be highly erratic. Freight cars are frequently pushed forward, pulled back, stopped, coupled and uncoupled. Developing the PSM to suit this operating environment has resulted in a very robust and accurate speed measuring algorithm. The small physical size and flexibility of the PSM also makes it ideal as a portable study device.

The PSM has the unique ability to operate in either of two modes. The Dual Sensor Mode allows pairs of Wheel Sensor Inputs to be used in tandem to precisely measure and report speeds for individual axles. In Dual Sensor Mode, the direction of motion is reported. In Single Sensor Mode, speeds are reported on the basis of an assumed wheel-to-wheel dimension (e.g., 72.0"). The speed of sequential axles (i.e., truck) is reported in Single Sensor Mode. The direction of motion is not reported.

The PSM includes sixteen high impedance Wheel Sensor Inputs. Each pair of Sensor Inputs can be configured for Dual or Single Sensor operation. Accordingly, if all sixteen inputs are configured for Dual Sensor operation then a maximum of eight speed sensors can be employed. A maximum of sixteen speed sensors are employed if all inputs are configured for Single Sensor operation. A mixture of Dual and Single Sensor Inputs is permitted.

The Sensor Inputs can be used with a variety of wheel sensing devices. Sensors manufactured by Honeywell, Tranergy and Tiefenbach have been successfully tested with the PSM. The wide operating range of the Sensor Inputs (0 to 36 Vdc) and the user-assigned Voltage Level parameter provide for the broadest possible operating performance. The Voltage Level parameter can be

uniquely assigned for each input regardless of its operating mode. Furthermore, it can be assigned to match the output specifications of the wheel sensor.

The Speed Threshold feature allows the user to define an excessive speed parameter for each Sensor Input, regardless of its operating mode. The Speed Threshold range is 0.00 to 99.99 mph. Axle or truck speeds that exceed the threshold value are reported as an Event Record and saved in the PSM's non-volatile memory. A Speed Threshold value of 0.00 mph allows the PSM to log every measured speed.

The PSM comes equipped with a built-in keypad and display screen located on the front panel. This allows the user to effectively operate the monitor without additional peripheral devices. However, the PSM will support applications that require file storage of Event Records. An RS-232 port is provided that can be connected to the communications port of any personal computer. The PC is then used to retrieve, store and review Event Record data of interest to the user. The PC can also be used to set up the monitor.

An optional 33,600 Baud internal modem can be installed that allows the user to remotely access and operate the monitor. A standard phone line connection allows the user to gather critical Event Records from any location, however distant.

The PSM can also be equipped with an optional 10/100 Base-T Ethernet Port. It allows a remote user to communicate with the monitor via an Ethernet-based LAN. TCP/IP and Telnet protocols are fully supported by the Ethernet option.

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

## Key Features

Listed below are just a few of the many features included with every PSM.

- The storage capacity is 196,432 Event Records (expandable to 429,392).
- Event Records can be logged for 128 distinct days.
- Event Records are stored in Flash Memory devices that do not require a battery power source. Records are retained even if power is removed.
- Setup data and Event Record data can be easily and quickly transferred to a PC file.
- Wheel sensor signals in the range from 0 to 36Vdc can be sensed by the Sensor Inputs.
- Both positive and negative voltages can be sensed.
- Attaching the monitor to the output of a wheel detector amplifier is completely non-intrusive to the device. This is ensured by the 10MOhm specification of the design.

- Each Sensor Input can be assigned a unique Voltage Level parameter in the range from 1 to 24Vdc in multiples of 1Vdc.
- Only positive transitions that exceed the Voltage Level parameter with a duration greater than 8msec. are considered valid wheel events.
- Each Sensor Input can be assigned a unique Speed Threshold ranging from 0.00 to 99.99mph.
- A maximum speed of 99.99mph is reported.
- Speeds are reported and measured with a resolution of .01 mph.
- The Dual Sensor Mode accuracy is rated at  $\pm 2\%$  (using the recommended minimum sensor distances). Refer to the table entitled “Required Sensor Distance vs. Speed” on page 65.
- Sensor Distances in the range from 4.0" to 600.0" can be assigned in multiples of .1". Each Sensor Input can be assigned a unique Sensor Distance.
- Speeds related to irregular wheel motion such as forward-reverse transitions, slow, stopped, stopped on sensor, high acceleration and high deceleration are accurately detected in Dual Sensor Mode.
- Event Records are logged to memory whenever a speed is measured that exceeds the assigned Speed Threshold.
- Event Records are date and time stamped to the nearest thousandth of a second.
- The real-time clock used by the monitor can be synchronized to an external signal.
- Installation is quite simple. Input wires are terminated in detachable, screw-down terminals. Wire sizes as large as 12AWG can be used.
- Power consumption is typically less than 3W. A 10 to 36Vdc power source can be used to power the monitor.
- The user interface provides full cursor control when using a PC.
- Three distinct levels of password security provide protection against unauthorized access.
- Several diagnostic commands can be executed to verify important system operations.
- Firmware updates can be downloaded to the monitor directly from the MICRO-AIDE factory when the PSM is equipped with the optional internal modem.

## Dual Sensor versus Single Sensor Modes

The Dual Sensor Mode of operation provides several benefits to the user of the PSM. The advantages of using Dual Sensor Mode as opposed to Single Sensor Mode are summarized below.

- **Improved Accuracy:** Single Sensor Mode forces the PSM to assume that the wheel-to-wheel dimensions for all trucks are identical. In practice, these dimensions can vary by several inches.

A discrepancy of 3" as compared to a nominal 72" assignment results in an error of 4%. This error cannot be overcome.

- **Improved Performance:** The more irregular the wheel motion the better the Dual Sensor Mode performs by comparison. Using two sensors to report speed is inherently more accurate because fewer assumptions have to be made as to the wheel motion involved. Each speed calculation is based upon a greater amount of wheel event data.
- **Direction of Motion:** For any given car the wheels of each truck are separated by the same distance. Because of this symmetrical property a single sensor can never be used to determine direction of motion.

**Tip** For the reasons cited above, MICRO-AIDE recommends that users of the PSM select the Dual Sensor Mode of operation whenever possible.

The only advantage to using the Single Sensor Mode of operation concerns the input capacity of the monitor. The input capacity doubles if only Single Sensor Inputs are used.

## 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 PSM. This document refers to Version 1.01 of the PSM firmware. Specifically, the sample data and command details depicted were prepared using a Version 1.01 monitor. Wherever possible, step-by-step instructions have been included. In the event the user has questions about any of the described procedures the user should contact MICRO-AIDE for assistance. Additional copies of this manual are available upon request.

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

# INSTALLATION AND SETUP

## Introduction

This chapter describes how to properly unpack, install and set up the PSM 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 PSM is packed in a shipping carton that is properly sized for the monitor. Abundant packing materials are provided to minimize mechanical shock to the contents. Before opening the carton inspect it for damage. Damage to the carton should be noted. Carefully remove the monitor. It is advisable to save all packing materials in the event the monitor ever needs to be returned to MICRO-AIDE.

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

## Initial Check-out Procedure

Before the PSM is installed at a signal facility it is recommended that an operational check of the monitor be performed. The following materials are required as a part of this procedure.

- 12Vdc power source.
- Common hook-up wire for power (12 to 22 AWG).
- Wire strippers and small, flat-head screwdriver.
- PC equipped with a communications program (e.g., HyperTerminal® or Procomm Plus®) set to operate at 38,400 Baud.
- Digital Voltmeter (DVM).

Perform each step in the sequence listed below. If a problem arises, refer to the section entitled “Trouble-shooting Guide” on page 61. Figure 1 on page 6 and Figure 2 on page 7 illustrate a typical PSM installation.

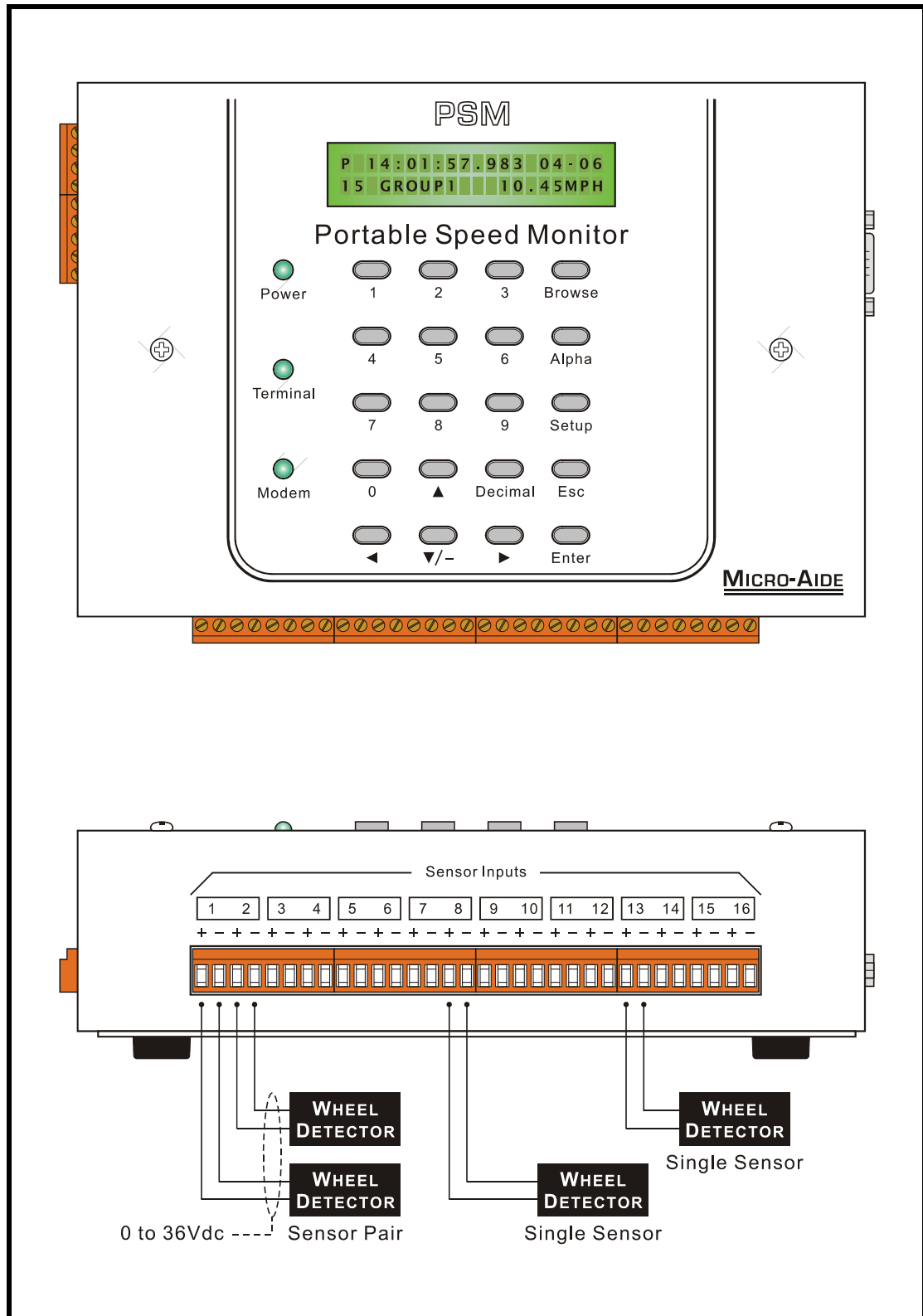


Figure 1 - Typical Installation - Top and Front Panel Views

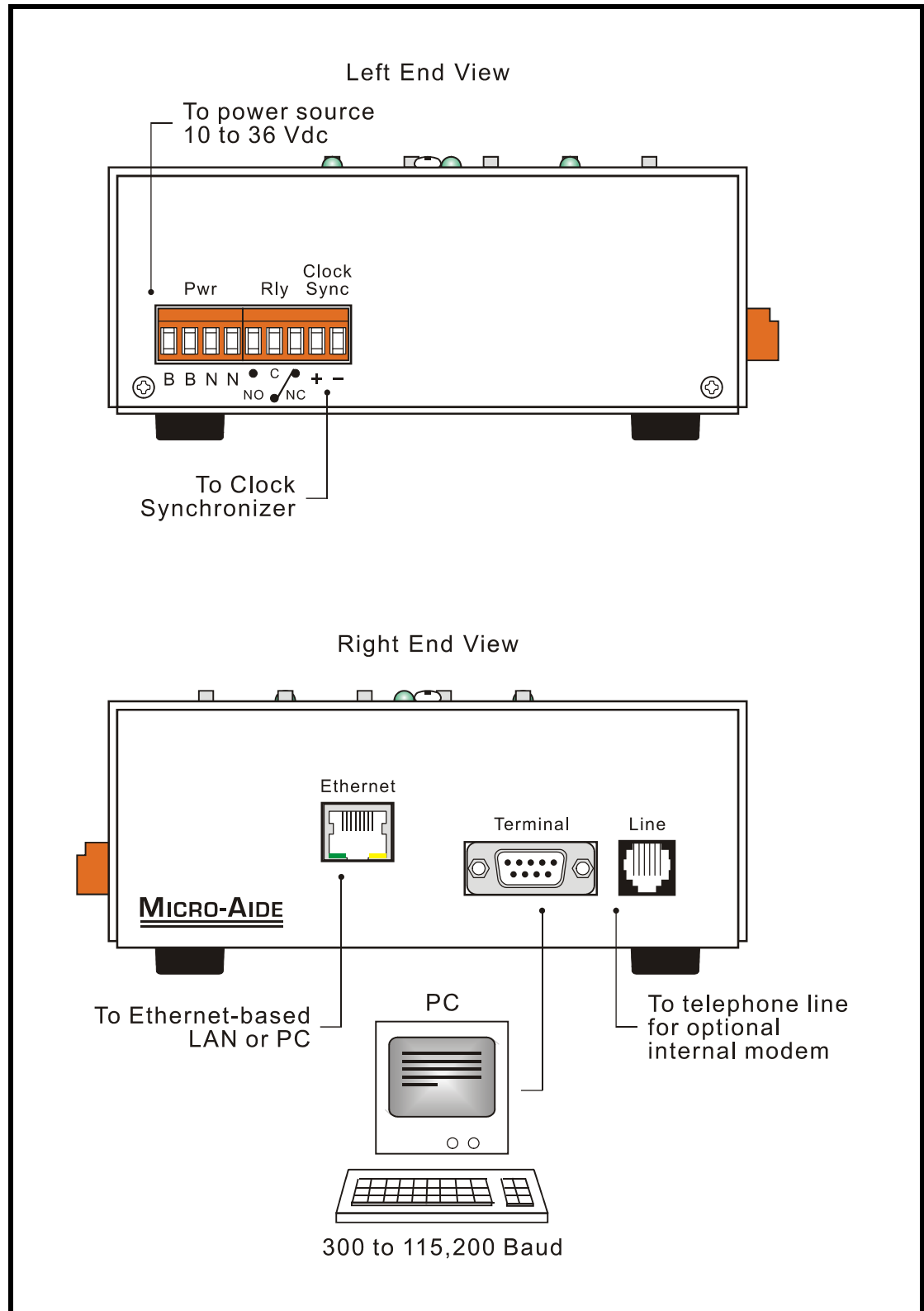


Figure 2 - Typical Installation - End Panel Views

1. With the power off, connect the power source positive and negative conductors to either pair of screw terminals labeled “B” and “N”, respectively. They are located along the left end panel of the monitor.
2. Connect the PC to the DE-9 male connector labeled “Terminal”. Use the cable provided by MICRO-AIDE or a DE-9 to DE-9 straight-through cable. Figure 6 on page 66 illustrates the proper wiring of the cable.

**Note** The factory default setting for the Terminal Port is 38,400 Baud. Refer to the procedure entitled “Terminal Port Baud Rate” on page 19 for details on changing the Baud rate.

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

3. Set the PC to emulate an ANSI terminal by doing one of the following:
  - If HyperTerminal is being used click on the File, Properties command. Select the Settings tab. Enable Terminal keys. Select ANSI from the Emulation drop-down list box.
  - If Procomm Plus is being used the ANSI BBS setting should appear in the lower left-hand corner of the Procomm Plus window. If the correct setting does not appear click on the current setting, then select ANSI BBS from the pop-up menu.
4. Apply power to the PC. Ensure that the communications program is set for a direct connection to the appropriate communications port.
5. Apply power to the PSM. The LED labeled “Power” located on the front panel should illuminate. After a few seconds the date and time should appear on the Liquid Crystal Display (LCD). The date and time may need to be changed. The procedure for changing the date and time is described in the section entitled “Time/Date (T)” on page 16.
6. Shortly after power is applied the PC will display the following message.

```
Micro-Aide CWR-22x1 Flash Boot Loader
Press ESC for boot loader
```

**Caution** The preceding message should be ignored. Do not press the **Esc** key. The user must wait several seconds for the PSM program to load into executable memory.

7. After the program is loaded the following password challenge will be displayed.

```
PSM Portable Speed Monitor. Ver 1.01 (C) 2005 MICRO-AIDE INC.
***** NOT SET *****
Event storage capacity: 196432
Enter password:
```

*Password Request*



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

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

9. The remainder of the Initial Check-out Procedure presumes the PSM is configured to operate with the factory default settings. If this is not the case the user may wish to reset the monitor. Refer to the section entitled “Reset System (R)” on page 16 for details.
10. From the PC’s keyboard type **PASSWORD** in upper-case letters. This is the default password. Complete the entry by pressing the **Enter** key. The Main Menu, shown below, will be displayed.

```

MICRO-AIDE PSM Speed Monitor

S Setup
Q Query Events
V View Events
T Transfer Files
D Diagnostics
X Log Off
  
```

*Main Menu*

11. Press the **D** key at the PC keyboard. The diagnostic menu of commands will be displayed. Select the Input Test command by pressing **I**. The following menu of commands will be displayed. Refer to the section entitled “Input Test (I)” on page 56 for additional details.

```

Input Test Options

5 Input test using 5V Voltage Level
P Input test using programmed Voltage Levels
  
```

12. Press the **5** key to temporarily change the Voltage Level parameter for each Sensor Input to 5Vdc. This will allow the PSM to detect the nominal 12Vdc test voltage that is used in this procedure. The Input Test screen will be displayed.
13. Using a pair of test wires place +12Vdc and negative to Sensor Input number 1. Refer to the silkscreened labels located near the input terminals. Positive voltage should be placed on the terminal to the left and negative voltage on the right. The voltage needs to be applied for only a moment. Data similar to the following should be displayed.

```

Input test, press ESC to cancel
P01 at 142935
  
```

14. Use the same procedure described in the previous paragraph to test the remaining Sensor Inputs. As each new input is tested the Sensor Input Number (e.g., P02, P03, etc.) should be

listed. The digit field to the right of the input number is a count of time tick intervals. Each count represents a multiple of .125msec.

15. After all of the Sensor Inputs have been successfully tested press the **Esc** key three times to return to the Main Menu. Each of the Voltage Level parameters will be returned automatically to their pre-test values.
16. Before completing the Initial Check-out Procedure verify 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 52.

This concludes the Initial Check-out Procedure. This procedure may be used at any time to verify that the PSM is operating properly. The Input Test diagnostic command can be used at any time to verify that the Sensor Inputs are properly detecting signals from the wheel detectors. Power can now be removed from the monitor. Connections to the PC should also be removed.

**Note** In the event that a failure occurs during any part of this procedure a series of additional diagnostic tests should be performed. Refer to the section entitled “Diagnostic Testing” on page 54. Alternatively, the user may wish to contact MICRO-AIDE customer service. Instructions on how to proceed will be offered. Material Return and Limited Warranty policies are described on the inside back cover of this manual.

## Installation Procedure

The following sections describe the recommended Installation Procedure. Figure 1 on page 6 and Figure 2 on page 7 illustrate elements that are common to most installations. The illustrations also depict the location of each connector used in the installation.

### Location

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

### Mounting

The PSM can be mounted on top of a suitable shelf or secured to a back board. Each monitor is equipped with non-slip, rubber feet. Precautions should, however, be taken to prevent the monitor from dropping off the edge of the shelf or desktop. The shelf mounting brackets provided with the monitor can be used for this purpose. To attach the shelf mounting brackets remove the four rubber feet. The screws and threaded holes vacated by the rubber feet are used to install the brackets. If a PC is to be used it must be properly secured.

**Note** Contact MICRO-AIDE in the event 19" rack mounting brackets are required. Refer to Appendix B for ordering details.

## Site Preparation

The equipment location must have access to a stable 10 to 36Vdc power source. A pair of wires must be run from the power source to the location where the monitor will be mounted. The monitor wire ends must be stripped approximately 1/4". The stripped ends will be secured by screw-down terminals located along the left end panel of the monitor. 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 12AWG. The two wires must be properly secured to prevent damage. It is preferable not to run the wires adjacent to electrical equipment such as motors that may generate large electrical disturbances.

The Sensor Inputs use the same screw-down terminals as those required by the power leads. 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.

## Peripheral Equipment

If a PC is to be co-located with the PSM an appropriate AC power source must be available. The Terminal Port cable should be kept to a minimum distance, preferably less than 20'.

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

**Caution** Each monitor is shipped with a MICRO-AIDE recommended RS-232 cable. The recommended cable ensures that the connector bodies are not electrically attached. **The shield wire is not attached.** The cable is constructed in such a way that the PSM chassis and peripheral device are electrically isolated. This further improves the isolation properties of the system.

The optional Ethernet Port may be used to connect the PSM to a LAN or PC. A standard CAT-5 Ethernet cable is used to connect to the LAN via a hub or switcher. A crossover CAT-5 cable is used to connect the PC directly. The length of either cable must be limited to 50'.

If the PSM is equipped with the optional internal modem a standard telephone line must be attached to the monitor. 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

Follow the steps listed below to complete the cabling installation.

### Power

1. Ensure that the power is off at the power source.
2. The two wires from the power source must be secured to either pair of screw-down terminals labeled "B" and "N", respectively.

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

**Tip** The power and input 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 PSM circuit board.

## Peripherals

1. Attach the peripheral cable to the DE-9 male connector labeled “Terminal”. Optionally, connect a crossover CAT-5 cable to the connector labeled “Ethernet” and the Ethernet Port of the PC. If an Ethernet-based LAN is to be used, connect a standard Ethernet cable to the connector labeled “Ethernet” and the appropriate hub or switcher.
2. Connect the optional telephone line to the RJ-11 connector labeled “Line”.

## Input Circuits

Speed measurements will only be recorded if the input circuits are wired properly to the PSM. The correct polarity of each Sensor Input must be identified.

The output of each wheel detector is wired to an eight-position, detachable connector. Individual pairs are wired horizontally to adjacent terminals. The positive lead of the detector circuit to be monitored must be connected to the left side terminal labeled “+”. The common, or return, lead of the detector circuit must be connected to the right side terminal labeled “-”.

The Dual Sensor Mode of operation is highly recommended by MICRO-AIDE. The reasons for this recommendation are cited in the section entitled “Dual Sensor versus Single Sensor Modes” on page 3. If a pair of wheel detectors are to be connected to the PSM it is important that they be wired to specific, adjacent inputs of the PSM. Each of the eight paired Sensor Inputs are depicted by silkscreening along the front face of the PSM. The Sensor Input numbers of paired inputs are contained within a rectangular box. Refer to Figure 1 on page 8.

Sensor Inputs that will be used in Single Sensor Mode have no similar restrictions. They can be connected without regard to location.

**Note** The Sensor Inputs of the PSM respond to applied voltage, not current flow. They have a very high impedance specification (greater than 10M $\Omega$ ) and an operating range of 0 to 36 Vdc. The Voltage Level parameter for each input can be assigned individually in the range from 1 to 24 Vdc.

**Tip** The Sensor Inputs have been tested with wheel detectors manufactured by Honeywell, Tranergy and Tiefenbach. MICRO-AIDE recommends that each Sensor Input be connected to the amplifier output side of the wheel detector circuit. The un-amplified output of the wheel detector is in some cases an analog signal. Connecting to the amplifier output further enhances the isolation properties of the system as a whole.

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

### Jumper Combs

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

## Applying Power

Once the cabling is installed the power can be applied. Shortly after power is applied the PC will display the password request. Refer to the sample data labeled “Password Request” on page 8. After the initialization sequence is completed the front panel LCD will indicate the time and date.

This completes the PSM Installation Procedure. The Setup Procedure can now be started.

## Setup Procedure

Before the PSM is ready for use the monitor must be configured to reflect the operation required by the user. The following steps should be performed in the sequence listed. It is assumed that the user is accessing the PSM via a PC. Succeeding chapters describe how to use the front panel display and keypad, as well as access the monitor via the optional internal modem. It is further assumed that the user has not previously altered any of the factory default settings and that the PC is connected to the Terminal Port of the PSM.

**Note** The Terminal Port default settings are 38,400 Baud, no parity, 8 data bits, 1 stop bit (i.e., N-8-1).

The Setup Procedure involves several steps that permit the user to program a variety of parameters that will best suit the user’s monitoring requirements. Each step involves the selection and execution of a particular command. Before the actual programming is performed the user should be aware of several conventions employed by the PSM user interface.

## User Interface Conventions

### Logging On

User sessions are initiated only after the log-on procedure is completed. To log on the user must enter the correct password in response to the password challenge. A typical password challenge message is shown in the sample data labeled “Password Request” on page 8.

**Note** The factory default password is **PASSWORD** in upper-case letters.

Complete the password entry by pressing the **Enter** key. The Main Menu will be displayed after the correct password has been entered. The user is allowed three password attempts.

## Commands and Fields

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

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

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

### Working with Fields

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

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

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

Upper- and lower-case letters may be used. Numeric values that exceed the range of the field are automatically set to the maximum or minimum value (as appropriate) permitted by the range.

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

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

## Completing Commands

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

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

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

## Data Flow Control

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

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

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

## Main Menu

The Main Menu of commands will be displayed immediately after logging on. Refer to the sample data labeled “Main Menu” on page 9. The Setup Procedure described in this chapter will familiarize the user with the Setup, Transfer Files and Log Off commands listed in the Main Menu.

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

## Setup (S)

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

```
Setup Menu
T Time/Date
M Measure Speed
N Network
S System Parameters
P Print Setup Data
R Reset System
```

### Time/Date (T)

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

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

```
Time/Date
HH:MM:SS
Time: 11:45:24
MM-DD-YY
Date: 04-06-05 Wednesday
```

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

The clock of the PSM can be synchronized to an external source that is connected to the input labeled "Clock Sync". Refer to the section entitled "Synchronizing the PSM Clock" on page 30.

**Tip** If the clock cannot be synchronized to an external source MICRO-AIDE recommends that the clock be set at least once per week.

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

### Reset System (R)

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



**Note** The time and date settings are not affected by the Reset System command.

The following menu will be displayed after executing the Reset System command.

```

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

```

Each command is described in the sections that follow.

### Reset Setup Data (S)

The PSM utilizes two non-volatile memories. The first is referred to as the Setup Database. The Setup Database contains all of the programmed parameters established by the user. These parameters can be restored to their factory default values by executing the Reset Setup Data command.

Table 1 lists the default values for each of the programmable parameters.

Parameter	Default Value
Unit Name	***** NOT SET *****
Terminal Port Baud Rate	38,400
Administrative Password	PASSWORD
Restricted Password	LOOKWORD
Passcode	12345678
Ring Count	2
Sensor Input Names	Speed Input 1, Speed Input 2, etc.
Sensor Input Identifiers	Speed1, Speed2, etc.
Sensor Distance	36"
Speed Threshold	0.00mph
Voltage Level	12Vdc
Sensor Mode	Dual
Ethernet settings	As set by factory or user

Table 1 - Factory Default Settings

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

```

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

```

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

**Note** The Reset Setup Data command will return the Terminal Port Baud rate to its default setting of 38,400 Baud. The PC Baud rate may have to be adjusted.

### Reset Event Memory (E)

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

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

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

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

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

**Caution** It is important that the user not turn off the power while the PSM is clearing the Event Record memory.

### Reset Both (B)

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

## System Parameters (S)

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

```

                                System Parameters
                                -----
Unit Name
***** NOT SET *****
Terminal Port Baud Rate  38400
Administrative Password  PASSWORD
Restricted Password      LOOKWORD
Passcode                 12345678
Ring Count               2
```

### Unit Name

The Unit Name serves as a comprehensive monitor and site ID. Data from several PSM monitors can be easily distinguished by providing each unit with a unique and descriptive name. A total of eighty alphanumeric characters can be used to define the Unit Name. It may include city, mile-

post, street and DOT designation data. It is assigned using standard Edit Field techniques described in “Working with Fields” on page 14.

### Terminal Port Baud Rate

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

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

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

The user must change the Baud rate of the PC to match the new setting assigned to the PSM.

### Administrative and Restricted Passwords

Access to the PSM via the Terminal Port, Ethernet Port and optional modem is protected by a dual level password system. Administrative Access permits unrestricted access to all monitor functions. Administrative Access allows the Setup Database to be altered and the Event Record memory to be cleared. The Administrative Password should be known to a limited number of users with a genuine need to know.

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

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

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

### Passcode

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

### Ring Count

The Ring Count parameter determines the number of ring cycles that must occur before the modem will answer an incoming call. Setting the Ring Count to a sufficiently large value will allow an on-site maintainer to answer a voice call prior to the PSM answering. The Ring Count can be

set in the range from 0 to 99. A setting of 0 will disable the modem's auto-answer feature (i.e., incoming calls will not be answered by the modem).

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

Modem is NOT installed

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

## Measure Speed (M)

The PSM can be configured to operate in either of two modes. They are referred to as Dual Sensor Mode and Single Sensor Mode. As the name implies, Dual Sensor Mode utilizes a pair of wheel sensors to monitor individual axle speed. Single Sensor Mode measures truck speed on the basis of one sensor. Of necessity, Single Sensor Mode makes an assumption as to the wheel-to-wheel dimensions of each truck. Dual Sensor Mode is inherently more accurate. For this reason MICRO-AIDE recommends its use. Refer to the section entitled "Dual Sensor versus Single Sensor Modes" on page 3 for additional details.

The Measure Speed command is used to configure the PSM for use in either mode. An array of fields similar to the following will be displayed after selecting the command. The display shown below lists the initial factory settings of the PSM.

Speed#	Name	Measure Speed ID	Parameters Distance	Threshold	V	Level	Mode
P01	Speed Input 1	Speed1	36.0 Inches	0.00 MPH	12	VDC	Dual
P02					12	VDC	"
P03	Speed Input 3	Speed3	36.0 Inches	0.00 MPH	12	VDC	Dual
P04					12	VDC	"
P05	Speed Input 5	Speed5	36.0 Inches	0.00 MPH	12	VDC	Dual
P06					12	VDC	"
P07	Speed Input 7	Speed7	36.0 Inches	0.00 MPH	12	VDC	Dual
P08					12	VDC	"
P09	Speed Input 9	Speed9	36.0 Inches	0.00 MPH	12	VDC	Dual
P10					12	VDC	"
P11	Speed Input 11	Speed11	36.0 Inches	0.00 MPH	12	VDC	Dual
P12					12	VDC	"
P13	Speed Input 13	Speed13	36.0 Inches	0.00 MPH	12	VDC	Dual
P14					12	VDC	"
P15	Speed Input 15	Speed15	36.0 Inches	0.00 MPH	12	VDC	Dual
P16					12	VDC	"

The Measure Speed command includes a set of seven data fields, six of which can be assigned by the user. A brief description of each field, taken from left to right, is listed below.

- **Sensor Input Number:** The sixteen Sensor Inputs are labeled as "P01" through "P16". If a pair of inputs is configured for Dual Sensor Mode the lower numbered (i.e., odd) input is used

to identify the pair (e.g., P01 in the first example cited above). The Sensor Input Number field cannot be changed by the user.

- **Name:** The Input Name allows the user to assign a unique name to the Sensor Input.
- **ID:** The Input Identifier allows the user to assign an additional, abbreviated name to the Sensor Input.
- **Distance:** In Dual Sensor Mode the Sensor Distance field is determined by the physical separation between paired wheel detectors. In Single Sensor Mode it is the wheel-to-wheel dimension of a typical truck.
- **Threshold:** The Speed Threshold is the limit, when exceeded, that will generate an Event Record to memory. Refer to the section entitled “Event Record Format” on page 37.
- **V Level:** The Voltage Level field establishes a unique limit value for each wheel detector. The field can be matched to the detector’s output characteristics.
- **Mode:** This field selects either of the two operating modes.

Figure 3 illustrates a typical installation that utilizes two wheel detectors connected to Sensor Inputs P01 and P02. The pair of inputs are configured for Dual Sensor Mode.

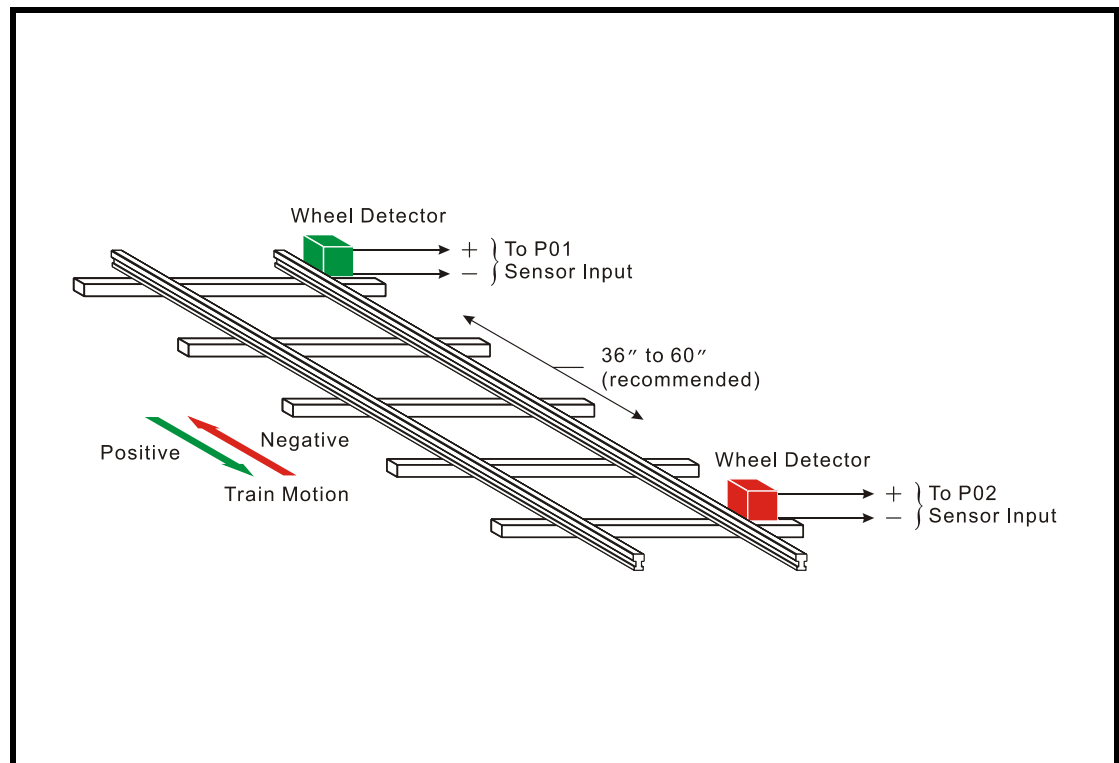


Figure 3 - Typical Installation - Dual Sensor Mode

The use of each of the six user-assigned fields is described below.

**Note** The even-numbered input of a pair of inputs configured for Dual Sensor Mode cannot be assigned a unique Input Name, Input Identifier, Sensor Distance, Speed Threshold or Mode parameter. These parameters are only associated with the odd-numbered input of the pair.

### Input Name

The Input Name can be any combination of alphanumeric characters not exceeding twenty total. The Input Name appears in each Event Record created by the input in question. It is the primary means by which inputs are distinguished.

### Input Identifier

The Input Identifier can be thought of as an abbreviated name. It is limited in length to eight alphanumeric characters. It too appears in the Event Record. It is primarily used to distinguish Event Records displayed on the LCD panel of the monitor.

### Sensor Distance

The Sensor Distance is always measured in inches. The field provides for settings as precise as .1". The value must be in the range from 4.0" to 600.0".

**Tip** MICRO-AIDE recommends that the Dual Sensor Mode of operation be used whenever possible. It further recommends that a Sensor Distance in the range of 36" to 60" be used with this mode. The table entitled "Required Sensor Distance vs. Speed" on page 65 details specific recommendations for Sensor Distance based upon the range of speeds the Sensor Inputs will be monitoring. **The table should be reviewed prior to assigning the Sensor Distance parameter.**

### Speed Threshold

The Speed Threshold is always measured in miles per hour. The field provides for settings as precise as .01 mph. The value must be in the range from 0.00 mph to 99.99 mph.

**Tip** Set the Speed Threshold to 0.00 mph to log an Event Record for every speed measurement regardless of the selected operating mode or assigned Sensor Distance.

### Voltage Level

At any given installation a variety of wheel detectors may be deployed. Furthermore, the wheel detectors will likely have different output characteristics. The Voltage Level field allows the user to assign an optimum limit value for each Sensor Input. Both inputs of a Dual Sensor pair can be assigned different Voltage Level parameters.

The PSM validates a wheel detector signal according to the following rules.

1. The signal must exceed the value of the Voltage Level parameter.
2. The duration of the signal while exceeding the Voltage Level parameter must be a minimum of 8msec.
3. Either positive going or negative going signal pulses are acceptable. The PSM only reacts to the positive going transition of each pulse.

Refer to the following figure for additional details on assigning the Voltage Level parameter. The figure also illustrates the wheel detector signal requirements and how (in highly simplified form) the axle speed is determined in Dual Sensor Mode. Positive motion is depicted for Dual Sensor Pair P01 and P02.

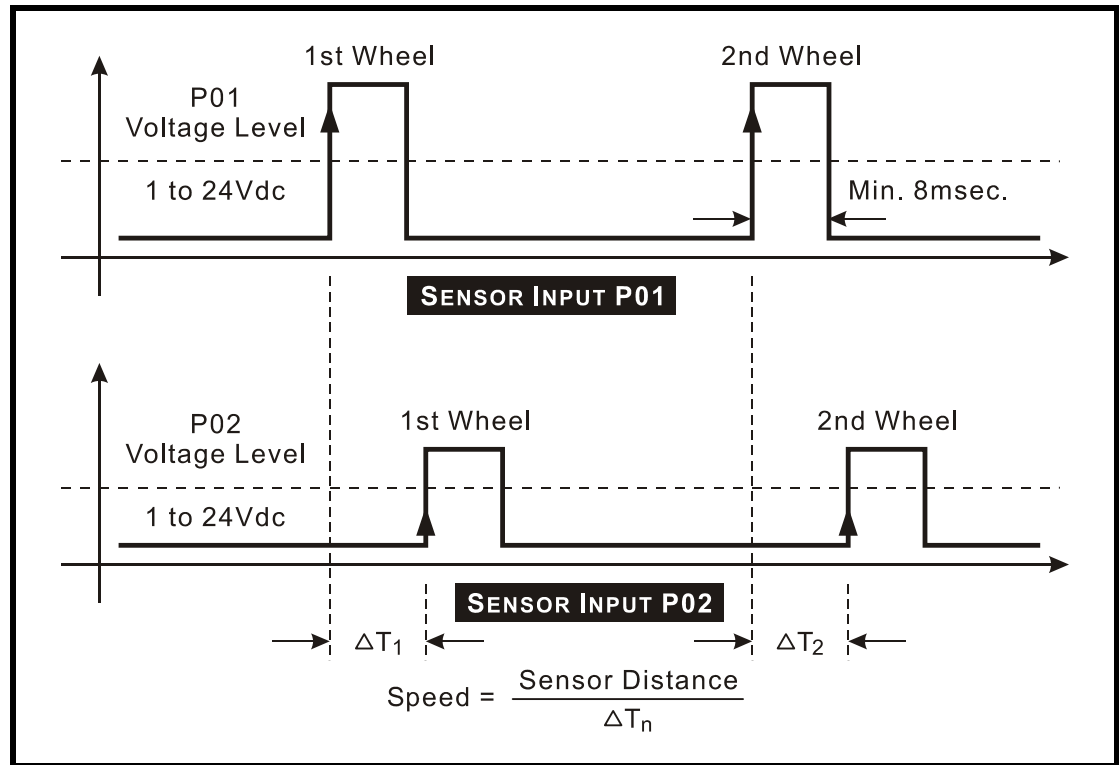


Figure 4 - Sensor Input Signal Requirements

### Mode

The Mode can be assigned as either Dual or Single. Press the **Spacebar** to change the setting. The Mode setting for the even-numbered input of a Dual Sensor pair will be identified by a ditto (") mark.

In the sample data shown below Sensor Inputs P01 and P03 are operating in Dual Sensor Mode. Inputs P05, P06, P07 and P09 are operating in Single Sensor Mode. All measured speeds will be logged for the P01 input. P02 utilizes two wheel detectors that require dissimilar Voltage Level parameters. All other inputs are not used and have, therefore, retained their factory assignments.

Speed#	Name	Measure Speed ID	Parameters Distance	Threshold	V	Level	Mode
P01	Crest	Crest	30.0 Inches	0.00 MPH	12	VDC	Dual
P02					12	VDC	"
P03	Master Retarder	Master	41.5 Inches	7.50 MPH	15	VDC	Dual
P04					10	VDC	"
P05	Group #1	Grp_1	72.0 Inches	6.00 MPH	12	VDC	Single
P06	Group #2	Grp_2	72.0 Inches	6.00 MPH	12	VDC	"
P07	Group #3	Grp_3	72.0 Inches	6.00 MPH	12	VDC	Single
P08	Speed Input 8	Speed8	36.0 Inches	0.00 MPH	12	VDC	"
P09	Group #4	Grp_4	72.0 Inches	6.00 MPH	12	VDC	Single
P10	Speed Input 10	Speed10	36.0 Inches	0.00 MPH	12	VDC	"
P11	Speed Input 11	Speed11	36.0 Inches	0.00 MPH	12	VDC	Dual
P12					12	VDC	"
P13	Speed Input 13	Speed13	36.0 Inches	0.00 MPH	12	VDC	Dual
P14					12	VDC	"
P15	Speed Input 15	Speed15	36.0 Inches	0.00 MPH	12	VDC	Dual
P16							

## Network (N)

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

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

A description of each field follows.

### IP Address

The IP Address must be set in accordance with the requirements of the LAN or the same as the address used by the TCP/IP connection of the PC. The initial setting is either 192-168-0-100 or 255-255-255-255.

### Subnet Mask

The Subnet Mask must also be set in accordance with the requirements of the LAN. A value of 255-255-255-0 should be acceptable for a directly connected PC. The initial setting is either 255-255-255-0 or 255-255-255-255.

### Gateway

If a Gateway is being used by the LAN it too must be set in accordance with the LAN requirements. A setting of 0-0-0-0 is acceptable for a directly connected PC or a LAN when communications through a Gateway are not required. The initial setting is 0-0-0-0.



### Ethernet MAC Address

The first three numbers that comprise the MAC Address must be 00-08-DC. They must not be changed as they are uniquely associated with the Ethernet module used by the PSM. The remaining three numbers must not be shared by any other Ethernet device on the LAN. The initial setting is 00-08-DC-aa-bb-cc (or FF-FF-FF-FF-FF-FF), where aa-bb-cc is the serial number assigned by MICRO-AIDE to the monitor. By way of example, a PSM with a serial number of 10142 will have a factory assigned MAC Address of 00-08-DC-00-01-01-42. This address is guaranteed to be unique.

### Port

The Port assignment must also be selected in accordance with the requirements of the LAN. For a directly connected PC any value greater than 1024 is acceptable. The initial setting is either 5000 or 65535.

### TCP/IP Mode

A Selection Field is used to assign the TCP/IP Mode setting. Press the **Spacebar** to select either Raw TCP/IP or Telnet. Generally, the Raw TCP/IP setting is acceptable. However, the Telnet setting must be used when the Setup Database is being uploaded or downloaded. These data transfers rely upon the Xmodem protocol. Xmodem is data transparent over TCP/IP only when the Telnet setting is selected. Raw TCP/IP is the initial setting.

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

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

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

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

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

### Print Setup Data (P)

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

Print Setup Data

P Print All  
M Print Measure Speed Parameters  
N Print Network Settings  
S Print System Parameters

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

**Tip** The Print All command will issue a lengthy stream of data that will exceed the viewing capacity of a single terminal screen. The user may wish to temporarily pause the data for better viewing. Refer to the procedure entitled “Data Flow Control” on page 15.

## Transfer Files (T)

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

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

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

Xmodem File Transfer

D Download Setup Data PSM to PC  
U Upload Setup Data PC to PSM

## 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 monitor's Terminal Port is being used select Direct connect-Com1 or Direct connect-Com2 (whichever is available). If the Ethernet Port is being used select a TCP/IP connection. If the modem is being used the host modem must be logged-on with the monitor.

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

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

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

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

The steps necessary to complete the download depend upon which communications application is being used. The following sections describe the HyperTerminal and Procomm Plus methods, respectively. Windows XP was used in the following procedures. Later versions of these programs may be slightly different. However, the fundamental approach will remain valid.

### HyperTerminal

1. With the mouse, click on the Transfers command, then the Receive File ... command. The Receive File dialog box will open. Verify that the Xmodem protocol is selected.
2. Select the correct disk drive and folder. Click the Receive button. The Receive Filename dialog box will open.
3. Enter a filename (e.g., setup\_10.bin). The three-character file extension must be defined. If the various settings are correct click on the OK button.
4. An information box will automatically open. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the information box will close automatically to indicate a successful transfer.

### Procomm Plus

1. With the mouse, click once on the Receive File icon near the top center of the Procomm Plus window. The icon appears as a downward pointing arrow. The Procomm Plus Receiving File using Xmodem dialog box will open.
2. Select the correct disk drive, folder and filename (e.g., setup\_11.xmd). If the various settings are correct click on the Save button.
3. 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 to indicate that the transfer is complete. A total of 768bytes will be transferred.
4. If the transfer is successful a message similar to "Transfer complete - setup\_11.xmd" will appear in the lower left-hand corner of the Procomm Plus window.

After the successful completion of the transfer the PSM will issue the following message.

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

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

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

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

## Restoring the Setup Database (U)

Before the Setup Database can be restored to the monitor it must have been previously saved. Refer to the procedure entitled “Saving the Setup Database (D)” on page 26. The PC and communications program must be properly configured before the Setup Database can be restored. The following list describes the correct configuration.

- **Transfer protocol:** Xmodem.
- **Connection:** If the monitor's Terminal Port is being used select Direct connect-Com1 or Direct connect-Com2 (whichever is available). If the Ethernet Port is being used select a TCP/IP connection. If the modem is being used the host modem must be logged-on with the monitor.
- **Baud rate:** as required by the Terminal Port, set to N-8-1.

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

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

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

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

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

The sequence of C characters indicates the monitor is awaiting the Xmodem file.

The steps necessary to complete the upload depend upon which communications application is being used. The following paragraphs describe the HyperTerminal and Procomm Plus methods,

respectively. Windows XP was used in the following procedures. Later versions of these programs may be slightly different. However, the fundamental approach will remain valid.

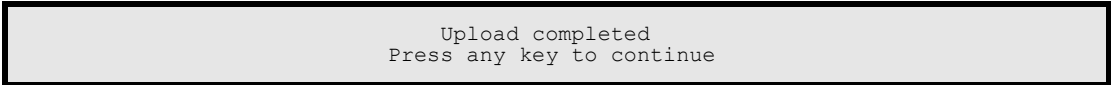
### HyperTerminal

1. With the mouse, click on the Transfers command, then the Send File ... command. The Send File dialog box will open. Verify that the Xmodem protocol is selected.
2. Select the correct disk drive, folder and filename (e.g., setup\_10.bin). If the various settings are correct click the Send button.
3. An information box will automatically open. It will indicate the progress of the transfer. After a few seconds (depending upon the Baud rate) the information box will close automatically to indicate a successful transfer.

### Procomm Plus

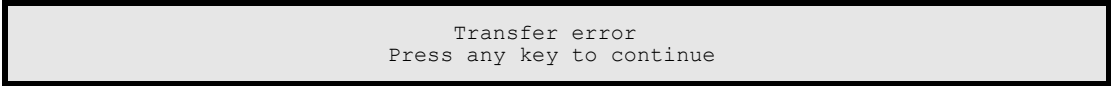
1. With the mouse, click once on the Send File icon near the top center of the Procomm Plus window. The icon appears as an upward pointing arrow. The Procomm Plus Send File using-Xmodem dialog box will open.
2. Select the correct disk drive, folder and filename (e.g., setup\_11.xmd). If the various settings are correct click on the Open button.
3. An information box labeled Xmodem will appear. It will indicate the progress of the transfer. After several seconds and a pause (depending upon the Baud rate) the information box will close and the PC may beep several times to indicate that the transfer is complete. A total of 768bytes will be transferred.
4. If the transfer is successful a message similar to "Transfer complete - setup\_11.xmd" will appear in the lower left-hand corner of the Procomm Plus window.

After the successful completion of the transfer the PSM will issue the following message.



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

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



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

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

## Log Off (X)

The Log Off command is used to terminate Administrative and Restricted Access sessions. If the previous user logs off of the monitor, access can be regained only by entering the correct pass-

word. If the previous user fails to log off, a second user will be allowed access without entering a correct password.

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

To log off of the monitor press the **X** key. The following message will be displayed.

About to Log Off, are you sure?  
No Yes

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

## Synchronizing the PSM Clock

The PSM contains a real-time clock that allows the monitor to time stamp Event Records to the nearest thousandth of a second. With any clock a small amount of drift can be expected. The PSM clock will drift approximately one minute per month. The clock sync feature allows an external signal to set the monitor's clock to the nearest fifteen-minute mark.

There is no command for synchronizing the PSM clock. Nevertheless, maintaining the long-term accuracy of the real-time clock is an important aspect of the Setup Procedure. Accordingly, this procedure is included herein.

To synchronize the PSM clock to an external source the Clock Sync Input of the PSM must be presented with an appropriate signal. The source must apply a voltage in the range from 5 to 36 Vdc. It must be active for a minimum of 40msec. The signal must be applied at whole-number intervals of 15minutes (e.g., 15, 30, 45 or 60minutes).

When the Clock Sync Input transitions to an active state (i.e., voltage applied) the clock will be rounded to the nearest fifteen-minute value. Accordingly, the count of seconds will be cleared to 00.000. As an example, if the time is 12:16:03.951 the clock sync feature will set the clock to 12:15:00.000. If the time is 12:44:20.263 the clock sync feature will set the clock to 12:45:00.000.

Each time the real-time clock of the PSM is synchronized an Event Record will be logged to memory. The Event Record is identified as a System Event with an Input Name of Clock Sync and an Input Number of S02. System Events are described in the section entitled "System Events" on page 57.

**Caution** The Clock Sync Input will normally be connected to the output of a PLC or MICRO-AIDE External Recorder Clock (ERC). The time between successive sync pulses must be a whole multiple of 15minutes. Otherwise the monitor clock will indicate a significant error.

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

The next chapter describes how to operate the PSM.

# OPERATION

## Introduction

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

## Multi-User Operation

A unique feature of the PSM is its ability to handle simultaneous operation from multiple users via Terminal Port, Ethernet Port, modem or front panel keypad. This multi-user capability eliminates the annoying practice in some devices of one user effectively locking-out a second or third user.

## Remote Operation

The setup procedures and operational capabilities of the PSM can be exercised remotely provided the monitor is equipped with the optional internal modem or Ethernet Port. The modem will operate at speeds up to 33,600 Baud. It provides industry standard error correction and data compression features. A modem or Ethernet equipped PC running a communications program (e.g., HyperTerminal or Procomm) makes an ideal remote access system. Event Records and other data from several remote PSMs can be easily gathered and saved to either a hard disk or diskette file.

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

## Establishing a Modem Connection

A standard telephone line must be attached to the modem of the PSM. To access the monitor the host system must dial the telephone number of the PSM and wait for an answer. The monitor's modem will answer after a predetermined number of rings. Refer to the section entitled "Ring Count" on page 19. The modems will then handshake. The handshake ensures that the modems can communicate with each other at an appropriate speed. A connection is established upon the successful completion of the handshake.

**Note** The PSM will only permit reliable connections to be established. The host modem should be programmed for MNP 2-4 or LAP-M operation.

## Establishing an Ethernet Connection

Before an Ethernet connection can be established the monitor's Ethernet Port must be properly configured. An IP Address and Port Number must be assigned. The correct procedure for doing so is described in the section entitled "Network (N)" on page 38.

After the monitor's Ethernet Port is configured perform the following steps to establish an Ethernet connection.

1. Connect the PSM and PC using a CAT-5 crossover cable.
2. Configure the communications application (e.g., HyperTerminal) to connect using a TCP/IP port.
3. Within the communications application enter the PSM's IP Address and Port Number as the target IP Address and associated Port Number. HyperTerminal refers to the target device as a host.
4. Click the icon or execute the command that initiates the connection.

**Note** The procedure is slightly different if the PC is not directly connected to the monitor, but is rather assigned to a port on a LAN. Typically the monitor and PC will be connected to the LAN via a hub or switcher. A normal CAT-5 cable is used in this case. The IP Addresses and Port assignments must be selected in accordance with the requirements of the LAN.

A successful connection is indicated by a log-on password request regardless of the interconnection method employed.

## Entering the Password

Immediately after a connection is established the PSM will issue a password request similar to the following.

```
PSM Portable Speed Monitor. Ver 1.01 (C) 2005 MICRO-AIDE INC.  
***** NOT SET *****  
Event storage capacity: 196432  
Enter password:
```

The host system must issue the correct password followed by an **Enter**. Passwords are defined in accordance with the procedure entitled "Administrative and Restricted Passwords" on page 19.

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



The host system is given three attempts to enter the correct password. A third error will result in a disconnect by the monitor. This procedure prevents unwanted users from accessing the monitor.

After the password is entered the user will be able to operate the monitor in a manner identical to that specified by local operation. Accordingly, the PSM will display the Main Menu of commands. Refer to the sample data entitled “Main Menu” on page 9.

## How to Operate the PSM

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

### Query Events (Q)

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

A typical response to the Query Events command is shown below.

```

                                Select Range of Dates
04-06-05 04-07-05 04-08-05 04-09-05 04-10-05 04-11-05 04-12-05 04-13-05
04-14-05 04-15-05 04-16-05 04-17-05 04-18-05 04-19-05 04-20-05 04-21-05
04-22-05 04-23-05 04-24-05 04-25-05 04-26-05 04-27-05 04-28-05 04-29-05
04-30-05 05-01-05 05-03-05

Use arrow keys to move, Space=start selection, Enter=accept, ESC=cancel

```

The data array forms a table of dates in MM-DD-YY format. The table indicates that at least one Event Record was logged in memory for each day listed. Days where no records were logged will not be included in the table (e.g., 05-02-05 in the above). The PSM can store Event Records for 128 different dates provided the event storage capacity is not exceeded.

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

The first step in using the Query Events command is to select the date or range of dates that the user wishes to inspect. To select a single date simply position the highlight to the desired date and press the **Enter** key. To select a range of dates follow the steps listed below.

1. Using the appropriate arrow keys highlight the first date in the range.
2. Press the **Spacebar** to anchor one end of the range to be highlighted.
3. Press the appropriate arrow keys until each date in the desired range is highlighted.
4. Press the **Enter** key to accept the highlighted range of dates.

The **Esc** key can be pressed at any time to cancel the selection. The user will then be returned to the Main Menu. If, however, the selection is accepted an array of Selection and Edit Fields entitled "Query Report" will be displayed. A sample Query Report is shown below.

Query Report	
Start Date:	04-06-05
Start Time:	00:00:00
End Date:	04-06-05
End Time:	23:59:59
Reverse order:	No
Report Type:	Dump
Inputs: (blank=all)	
[F1]=Execute Report, ESC=cancel	

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

## Start Time

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

## End Time

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

## Reverse Order

The Reverse Order option can be set to either No (default setting) or Yes. The default setting will result in the oldest records being issued first. If enabled, the Reverse Order option will issue the

most recent records first. They will be followed by older records. In either case, Event Records are always issued in chronological sequence.

## Report Type

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

### Dump

The Dump option will issue Event Records in a continuous stream. The streaming of records will only cease when the last record is issued or the user executes a Pause or Abort command. Refer to the section entitled "Data Flow Control" on page 15. Generally, the Dump option is used if a large number of records are to be inspected.

**Note** The Dump option is generally used if Event Records need to be captured to a PC file.

### Browse

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

A completely new screen of records can be displayed by pressing the up and down arrow keys. A single new record can be displayed by pressing the left and right arrow keys. The last line of text in each screen explains the use of the arrow keys.

### Comma

The Comma option formats the Event Record data so that it can be easily imported to a spreadsheet or database application such as Excel® or Access®, respectively. This option takes the various data fields that comprise a record and separates them with a comma. Intervening spaces are eliminated. The processing application will place the record fields into cells or fields that satisfy its own processing requirements. This formatting technique is frequently referred to as Comma Separated Values (CSV).

Listed below is a typical response to the Query Events command when the Record Type is set to Comma. In the interest of brevity only two Event Records are listed.

```
18:16:48,04/06/05
"***** NOT SET *****"
14:57:54.699,04/06/05,"Crest",2.31,1
14:59:03.335,04/06/05,"Group #4",7.54,9
```

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

- Line 1 lists the time and date the report was generated.

- Line 2 lists the user-assigned Unit Name. The default name is shown above.

Event Records that satisfy the user selected date and time criteria are listed after the header. Records include five data fields separated by a single comma. From left to right the fields always include the time, date, Input Name, measured speed in mph and Input Number.

**Note** By convention, CSVs that may contain a comma character must be enclosed by a pair of quotation marks. Refer to the Unit Name, Input Names and status labels shown above. A name that contains a quotation mark will be indicated by an additional quotation mark.

The Input Number listed in a CSV record is altered to exclude letter prefixes (e.g., P and S). Table 2 lists the translation method employed.

Input Source	CSV Input Number
P01 to P16 (Sensor Inputs)	1 to 16
S01 (System Power)	17
S02 (Clock Sync)	18

*Table 2 - CSV Input Numbers*

## Inputs

The Inputs field allows the user to inspect Event Records from specific inputs. The default setting (Inputs field is blank) will issue records from all inputs. To select specific inputs a valid Input Number must be entered. Sensor Inputs are entered as **Pnn** where nn is a number between 1 and 16. Event Records associated with System Power and Clock Sync are always entered as **S1** and **S2**, respectively. Leading zeros are not required.

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

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

```
Inputs: p1 P5-8 S1
(blank=all)
```

As the example indicates, the input type designator can be entered as an upper- or lower-case letter. Input Numbers can be entered without regard to sequence. Event Records for Sensor Inputs 1, 5, 6, 7, 8 and the System Power will be issued.

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

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

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

## View Events (V)

The View Events command allows the user to display Event Records in real-time. Immediately after an event is detected its corresponding Event Record will be issued to the Terminal Port, Ethernet Port or modem. This command can be very useful in tracking events that are occurring while the user is online with the monitor. It can also be used effectively during the Initial Check-out Procedure to verify that each input is properly cabled.

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

```
View Events Report

Inputs:
(blank=all)

[F1]=Execute Report, ESC=cancel
```

The Event Records of interest to the user can be qualified by the Inputs field listed in the View Events Report. The use of this field is described in “Inputs” on page 36.

After the selection fields are assigned press the **F1** function key to start the report. The monitor will continue to print records as they occur in real-time. Press the **Esc** key to stop the report.

## Event Record Format

Event Records provide the user with information about the status of each input at a specified moment in time. Event Records consist of printable ASCII characters. A single formatting standard is employed by the PSM. It is used by both the Query Events and View Events commands.

Two sample records are listed below. The records are from two Sensor Inputs.

14:57:54.699	04/06/05	Crest	Crest	2.31 MPH P01
14:59.03.335	04/06/05	Group #4	Grp_4	7.54 MPH P09

Event Records are comprised of six data fields. A description of each field is listed below.

- **Time:** The time the event was detected is indicated in military-style HH:MM:SS format. The time is identified to the nearest thousandth of a second.
- **Date:** The date the event was detected is indicated in MM/DD/YY format.
- **Input Name:** The twenty-character Input Name identifies the input. The names Crest and Group #4 are listed in the sample records.
- **Input Identifier:** The eight-character Input Identifier further identifies the input. The identifiers Crest and Grp\_4 are listed in the sample records.
- **Speed / Event Name:** The measured speed in mph is listed in the fifth field. The speed is reported with two decimal places in the form nn.nn. Leading zeros are not included. In the case of System Power events the fifth field lists an Event Name. The Event Name for System Power events is always reported with the labels “ON” or “OFF”.
- **Input Number:** The Input Number is always reported as P01 through P16 for Sensor Inputs, S01 for the System Power or S02 for Clock Sync events.

The next chapter describes the use of the front panel LCD and keypad.

# DISPLAY AND KEYPAD

## Introduction

The PSM is designed to provide its user with the greatest degree of versatility and functionality. Like all MICRO-AIDE Event Recorders, the PSM is 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 monitor. The advantage to the user is that a PC or printer, although helpful, is not required to operate the monitor.

Setup and operation of the PSM from the 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 on page 6 provides an illustration of the LCD panel and keypad.

## Front Panel Description

### Liquid Crystal Display

The LCD panel consists of a display approximately 3.2" by .7" in size. It is configured to present two lines of data. Each line can contain twenty alphanumeric characters and symbols. The LCD characters are large and can be viewed easily from several feet away. The super-twist design of the LCD panel provides a viewing angle of  $\pm 20^\circ$  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 monitor 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 52 for details.

### Keypad

The keypad contains twenty individual keys. Each key consists of a pushbutton switch. They are clearly labeled as to their various functions. The keys are spaced .75" apart to minimize double hits. A special editing technique allows alphabetic characters to be entered via the keypad. The left ( $\leftarrow$ ) and right ( $\rightarrow$ ) 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 key may be used to backspace over characters when an incorrect number has been entered.

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

## How to Use the Keypad

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

```
MICRO-AIDE  
PSM V1.01
```

The reference to firmware version 1.01 may vary. The firmware version number should be recorded and saved in the event service ever needs to be performed on the unit. After the boot-up procedure is completed the monitor will automatically enter Idle Mode. There are three operational modes, each is described in the following sections.

### Idle Mode

Except as noted below, the real-time clock and Unit Name are displayed during Idle Mode. It is the at rest condition of the monitor. An example of the real-time clock display is shown below. The first twenty characters of the Unit Name are listed in the first row. Refer to the section entitled “Unit Name” on page 18 for additional information.

```
***** NOT SET *****  
16:35:52 04-06-05
```

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

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

### Event Record Format

Event Records consist of two lines of text. Sample records for each input type are shown below.

```
P 14:57:54.699 04-06  
01 Crest 2.31MPH
```

*LCD Event Record - Speed*



```
S 10:57:30.000 04-06
01 Power      OFF
```

*LCD Event Record - Power*

```
S 11:45:00.000 04-06
02 Csync     ON
```

*LCD Event Record - Clock Sync*

Each record consists of six fields. The first character is always the input type designator. The letters P and S are used to specify speed and system records, respectively. The first line also includes the time and date the event was logged to memory. The time is specified to the nearest thousandth of a second. The date is formatted as MM-DD.

The start of the second line includes the Input Number (e.g., 01) for the type designator listed. It is followed by the eight-character Input Identifier (e.g., Crest) and either the measured speed (e.g., 2.31 mph) or Event Name in the case of System Events (e.g., OFF).

## Browse Mode

Browse Mode is used to view Event Records via the LCD panel. Event Records may be viewed in either forward or reverse chronological order. Events are selected by date and time and optionally by Input Number.

To access the Browse feature press the **Browse** key. A table of dates similar to the following will be displayed.

```
040605 040705 040805
040905 041005 041105
```

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

```
Browse Event Records
Start Time: 00:00:00
```

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

1. Using the left and right arrow keys position the highlight in the hour, minute or second field.
2. Press the **Enter** key to select the highlighted field.

3. Enter the required hours, minutes or seconds by pressing the appropriate numeric keys. Leading zeros are not required.
4. Press the **Enter** key to complete the entry.
5. Repeat the previous steps to adjust the remaining fields.

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

```
Use ←→↑↓ to scroll,  
Browse to select inp
```

Provided the **Browse** key has not been pressed, the first Event Record meeting the specified date and time criteria will be displayed. Refer to “Event Record Format” on page 40. The left and right arrow keys can be used to review Event Records in forward or reverse chronological order.

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

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

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

### Query by Input Number

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

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

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

1. Press the **Alpha** key repeatedly until the desired input type (i.e., P for speed or S for system) is displayed.
2. Press the appropriate number keys to enter the Input Number. Leading zeros are not required.
3. Press the **Enter** key to display the first Event Record satisfying the date, time and Input Number criteria. Several seconds may be required to locate the first record.
4. Use the arrow keys to inspect additional records for the specified input.

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

## Setup Mode

Setup Mode allows the user to set up the PSM to a specific set of application requirements. The various commands that can be executed from the keypad form a subset of those performed via a peripheral device. Only a few commands are not applicable to the keypad (e.g., Transfer Files, Network). The results from any keypad-performed command are indistinguishable from those performed from a peripheral device. Accordingly, the setup descriptions that are a part of Chapter 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:

**Note** The factory default Passcode is **12345678**.

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

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

Use ←→↑↓ to select  
items and then ENTER

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

Clock	UName	Speed
PCode	Modem	Baud

*Main Menu - LCD*

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

Diag	RESET
------	-------

The Setup Menu consists of eight commands. Table 3 on page 44 provides a brief explanation of each command. To select a command advance the highlight to the desired command and press the **Enter** key. The use of each command is explained in the final sections of this chapter.

Name	Description
Clock	Set date and time
UName	Create Unit Name
Speed	Configure speed monitoring
PCode	Create Passcode
Modem	Assign Ring Count
Baud	Select Terminal Port Baud rate
Diag	Perform system diagnostics
RESET	Erase all Event Records Restore Setup Database to factory default values

*Table 3 - Front Panel Setup Commands*

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

## Alphanumeric Editing Procedure

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

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

ABCDEFGHIJKLMNOPQRST UVWXYZ !"#%&'()*+,-/
--

2. Using the arrow keys reposition the highlight until the desired character is highlighted. The up and down arrow keys can be used to select the following list of additional characters. A total of eighty characters plus ten numbers are available for selection.

abcdefghijklmnopqrst uvwxyz : ; < = > ? @ [ ] ^ _ {   }
--

3. Press the **Enter** key to select the highlighted character. The selected character is placed into the name at the present location of the cursor. The cursor is then automatically moved one position to the right.
4. To enter a number into the name press the appropriate number key. To correct an error reposition the cursor under the character in error and overwrite it with a new character. To insert a space, assuming no characters have been inserted to the right, simply move the cursor to the right. The space characters follow the upper-case Z in the character set.
5. Repeat the previous steps until the name is completed.
6. Press the **Enter** key to accept the newly defined name. Alternatively, press the **Esc** key to retain the previously assigned name or to start again by ignoring all of the character entries.

## Clock

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

```
Time: 16:07:09
Date: 04-06-05 Wed
```

To change the date or time position the highlight in one of the numeric fields. Press the **Enter** key. Enter a valid one- or two-digit number (leading zeros are not required). Press the **Enter** key to accept the new value. Adjust the other fields as required.

**Note** The day of week is automatically calculated by the PSM based upon the day, month and year selected by the user.

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

```
Change the clock now
Yes  No
```

To complete the command press the **Enter** key after selecting the desired option.

## UName

The UName command is used to assign a unique name to each PSM. Refer to the section entitled “Unit Name” on page 18 for additional details. A message similar to the following will be displayed after selecting the UName command.

```
Unit name:
***** NOT SET *****
```

The first twenty characters of the existing Unit Name are displayed in the second line of text. The default Unit Name is displayed in the sample data cited above. To change the name press the **Enter** key. Assign a new name or modify the existing name by using the “Alphanumeric Editing Procedure” on page 44. Press the **Esc** key to complete the command.

**Note** Due to restrictions in the size of the LCD panel the UName command can be used to assign a Unit Name limited in length to twenty characters. Lengthier Unit Names (up to eighty characters) must be assigned by selecting the Unit Name command from the Main Menu.

## Speed

The Speed command allows the user to set the six parameters required by each Sensor Input. Refer to the section entitled “Measure Speed (M)” on page 20 for additional details regarding these parameters.

Data similar to the following will be displayed after selecting the Speed command.

P01	<-	Name	->
Speed	Input	1	

Sensor Input P01 will always be displayed first. To change the selected input press the up or down arrow keys repeatedly. Alternatively, jump to a specific input by pressing the **Browse** key and then the appropriate number keys. Complete the entry by pressing the **Enter** key.

**Note** Only the Voltage Level parameter of the even-numbered input of a Dual Sensor pair can be selected. The other five parameters cannot be selected.

The following six sections describe how each of the parameters can be assigned via the front panel keypad. They are listed in order and by their label as it appears within the Speed command. To select a different parameter press the left or right arrow keys until the desired parameter appears in the first line of text. After the desired parameter is selected press the **Enter** key to alter its displayed setting.

### Name

The Input Name can be any combination of alphanumeric characters not exceeding twenty total. To change the assigned Input Name use the “Alphanumeric Editing Procedure” on page 44.

### ID

The Input Identifier can be any combination of alphanumeric characters not exceeding eight total. To change the assigned Input Identifier use the “Alphanumeric Editing Procedure” on page 44.

### Distance

In Dual Sensor Mode the Distance parameter is specified by the separation between the paired sensors. In Single Sensor Mode it is the wheel-to-wheel dimension of a typical truck. The Distance must be in the range from 4" to 600". The parameter can be entered in increments of .1". Use the **Decimal** key to enter fractional numbers.

**Tip** The accuracy of the PSM is directly related to the assigned Distance parameter. Table 7 on page 65 lists recommended Distance settings as they relate to speed and accuracy.

### Threshold

The Speed Threshold defines the limit beyond which measured speeds will log an Event Record to memory. It can be set in the range from 0.00 to 99.99mph. Use the *Decimal* key to enter fractional numbers.

### VLevel

The Voltage Level parameter must be assigned to match the output characteristics of the wheel detector output. It can be set in whole multiples of 1Vdc in the range from 1 to 24Vdc. The Voltage Level parameter can be uniquely set for both inputs of a Dual Sensor Pair. Figure 4 on page 23 illustrates the use of the Voltage Level parameter.

### Mode

The Mode settings can be assigned as either Dual or Single. Press the *Enter* key to toggle the setting.

### PCode

The Passcode feature prevents unauthorized users from altering the Setup Database via the front panel. Passcodes can contain any combination of numeric values not exceeding eight total.

A message similar to the following will be displayed after selecting the PCode command.

Passcode: 12345678

In the sample data cited above the Passcode is set to its default value. To change the Passcode press the *Enter* key. A blank field with the cursor in the left-most position will be displayed. Assign a new Passcode by pressing the appropriate number keys. To assign a null Passcode press the *Enter* key instead. This will effectively disable the Passcode protection feature. Access to the monitor will be permitted by simply pressing the *Enter* key when the request for Passcode message is displayed.

Accept the new Passcode by pressing *Enter*. Press the *Esc* key to complete the command.

**Tip** If the user forgets the assigned Passcode the System Parameters command should be executed. It will display the current Passcode assignment. Refer to “System Parameters (S)” on page 18.

### Modem - optional

The PSM can be equipped with an optional, internal 33,600 Baud modem. The modem option allows remote users to access the monitor. The Modem command allows the user to set the Ring Count parameter. The Ring Count determines the number of rings that must occur prior to the modem answering an incoming call.

Data similar to the following will be displayed after selecting the Modem command.

```
Rings :
2
```

To change the Ring Count start by pressing the **Enter** key. Enter a number in the range from 0 to 99. Accept the new value by pressing the **Enter** key. A setting of zero will prevent the modem from answering incoming calls.

## Baud

The Baud command allows the user to assign a Baud rate to the Terminal Port. It is likely the following data will be displayed after the Baud command is selected.

```
19200  38400  57600
115200
```

The 38400 setting may be highlighted. It is the default setting used by the monitor. If the up or down arrows keys are pressed the following additional settings will be displayed.

```
300    600    1200
2400   4800   9600
```

To assign a new Baud rate move the highlight to the desired setting by pressing the arrow keys. Press the **Enter** key to accept the new selection. The Baud rate of the peripheral device attached to the Terminal Port must be changed to match the new setting.

## Diag

The Diag command is used to test four critical monitor elements. They include the program memory, Event Record memory, optional modem and Sensor Inputs. Each test can be performed at any time and is completely non-destructive. The contents of the Setup Database and Event Record memories will remain unmodified.

The following data will be displayed after selecting the Diag command.

```
Test Item:  Checksum
Flash      Modem  Inputs
```

The highlight will initially be positioned over the Checksum field. To select a different test, position the highlight in the desired field. Press the **Enter** key to perform the test. Each test is described in the sections that follow.



### Checksum

A checksum will be calculated and displayed after a few seconds. The results of a typical Checksum test are listed below.

```
Checksum=4a00
Hit any key...
```

**Note** The reported checksum value will vary depending upon the version of the installed firmware.

### Flash

The results of a typical Flash test are listed below.

```
Flash Memory:2048K
Hit any key...
```

The Flash test verifies that the microprocessor can properly access the Event Record memory. The reference to 2048K (or 4096K) indicates the size in bytes of the memory device. A value of 0K indicates a failure has been detected.

### Modem

Either of two results should normally be expected from the Modem test. The following response verifies that a modem is installed and that the microprocessor is able to communicate with the modem. A typical test takes a few seconds for the microprocessor to complete.

```
Modem found:H
Hit any key...
```

The “H” reference listed above indicates that the PSM is equipped with a Silicon Labs modem. A “33600” reference indicates that a Conexant modem is installed. A “NONE” reference indicates that the modem has been removed or has failed.

### Inputs

The following message will be displayed after the Inputs test is selected.

```
Input Test Option:
5V Level  Pgm Level
```

The 5V Level command should be selected if the user intends to test the Sensor Inputs by applying a test voltage in the range from 6 to 36 Vdc. The Pgm Level command should be selected if the inputs are to be tested with actual wheel detector signals. For additional details on how to select the correct Voltage Level refer to the section entitled “Input Test (I)” on page 56.

After the Voltage Level is selected the following message will be displayed.

```
Input Test (ESC=exit)
```

In the sample display cited above, the second line of text will be updated each time an adequate voltage is applied to an input. Any of the sixteen Sensor Inputs, irrespective of their Mode setting, can be tested. They will be identified as P01 through P16. The numeric field to the right is the count of .125msec. clock intervals. Sensor Input 13 was tested in the following example.

```
Input Test(ESC=exit)  
P13 at 17760445
```

**Note** The user may wish to contact MICRO-AIDE customer service if a failure occurs as the result of any diagnostic testing. Instructions on how to proceed will be offered. Material Return and Limited Warranty policies are described on the inside back cover of this manual.

## RESET

The Reset command should be used with caution. It allows the user to selectively restore the entire Setup Database to its factory default values or to clear the Event Record memory. Refer to “Reset System (R)” on page 16 for additional information.

The following message will be displayed after the Reset command is selected.

```
Erase: Setup Data  
Event Memory
```

To restore the entire Setup Database to its default settings highlight the Setup Data field and press the **Enter** key. Select Yes to perform the reset or No to ignore the reset.

To completely erase all of the Event Records from the event memory highlight the Event Memory field and press **Enter**. Select Yes to perform the reset or No to ignore the reset.

**Caution** It is important that the user not turn off power to the PSM for 60 seconds after initiating a reset of the Event Record memory.

This concludes the chapter on how to operate the monitor from the front panel. Since the setup of the monitor is critical to how the PSM will perform, it is advisable to review any changes that may have been made to the Setup Database.

The next chapter describes general maintenance techniques that may benefit the user in case a problem symptom is ever encountered.

# MAINTENANCE

## Introduction

The primary purpose of this chapter is to describe the recommended trouble-shooting methods to be used with the PSM. It should be referred to if ever a questionable symptom arises during the operation of the monitor.

The PSM is designed to provide its user with many years of trouble-free operation. There are no user serviceable parts inside the unit. There are no consumable items or supplies that need to be replaced or replenished. The user may occasionally need to wipe dust away from the external surfaces of the unit. This should be done with a clean, dry cloth. The mechanical design of the chassis provides the internal electronic assemblies with a nearly sealed environment. Due to the low power consumption of the unit ventilation holes are not required. The inside of the monitor should remain clean indefinitely. Additionally, MICRO-AIDE printed circuit boards (PCBs) are sealed with a moisture and fungus resistant conformal coating.

## Working Inside the Monitor

The user may have occasion to work inside the unit to install an optional equipment item. The following sections describe several tasks involving work that may be performed inside the monitor. Observe the steps listed below before attempting any task. Refer to Figure 1 on page 6 and Figure 2 on page 7. They illustrate the front and end views of the monitor, respectively.

1. Remove power from the monitor by detaching the connector labeled "Pwr" located along the left end panel of the monitor.
2. Remove all of the input connectors and peripheral cables.
3. Remove the monitor from the shelf or equipment rack.
4. Remove the two 6-32 1/4" screws from the front of the cover assembly. Move the cover assembly aside, being careful not to pull on the attached ribbon cables.
5. If the task requires that the cover assembly be completely removed, disconnect the cables that connect the Processor PCB to the LCD and Keypad PCB.

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

**Caution** Electrostatic discharges can cause serious damage to electronic components. When handling circuitry inside the monitor 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 extreme variations in ambient temperature. To adjust the contrast level simply adjust the potentiometer labeled “Pot 1” in Figure 5 on page 54.

**Caution** The Processor PCB is equipped with an additional potentiometer this is set and sealed at the factory. Do not attempt to alter its setting.

## Replacing the Fuses

There are two fuses mounted on the Processor PCB. The fuses are designed to protect the input power source and the contacts of the output relay. Each are rated at 1 A and conform to the 2AG size standard. Before replacing a fuse the cause of the blown fuse should be ascertained and cleared if possible.

## Reconnecting the Internal Cables

There are two ribbon cables inside the PSM. The first ribbon cable connects the Processor PCB to the LCD panel. The second ribbon cable connects the Processor PCB to the Keypad PCB. These cables have fourteen and sixteen conductors, respectively. When removing the cover assembly the cables may need to be disconnected. To reconnect the cables simply seat them into their respective connectors. The connector end of each cable is keyed. Do not force the connector end into place. It should fit snugly but easily.

## Installing the Optional Modem

The PSM can be equipped with a 33,600 Baud internal modem. The optional modem provides accessibility to remote users of the monitor. Unlike commercially available external modems, the PSM modem will operate over the entire temperature range applicable to the monitor. It uses the internal power of the PSM rather than commercial AC power.

Generally, the Modem PCB is ordered at the time the monitor is purchased and is pre-installed at the factory. If the modem was not previously ordered the user may wish to install the modem after delivery of the monitor. To install the modem follow the steps listed below.

1. Completely remove the monitor's cover assembly in accordance with the procedure entitled “Working Inside the Monitor” on page 51.
2. Locate the sixteen-pin male connector labeled “J3” near the upper right-hand corner of the Processor PCB. The modem connector is illustrated in Figure 5 on page 54. Temporarily

remove the 6-32 1/4" screw and lock washer secured to the hex stand-off located near the modem connector.

3. Install the Modem PCB, component side up, by mating its sixteen-pin female connector with the Processor PCB connector. Use the 6-32 screw and lock washer to secure the modem to the hex stand-off. Reassemble the monitor.

When the PSM is reinitialized the firmware will automatically detect the modem's presence and configure it for auto-answer operation.

## Installing the Optional Ethernet Port

The PSM can be equipped with a 10/100 Base-T Ethernet Port. The optional Ethernet Port allows remote access to the monitor via a TCP/IP-based Local Area Network (LAN) connection. Like the optional internal modem, it uses the internal power of the PSM rather than commercial AC power.

Generally, the Ethernet Port is ordered at the time the monitor is purchased and is pre-installed at the factory. If the port was not previously ordered the user may wish to install it after delivery of the monitor. To install the Ethernet Port follow the steps listed below.

1. Remove the monitor's cover assembly in accordance with the procedure entitled "Working Inside the Monitor" on page 51.
2. Remove and discard the protective plate that covers the Ethernet Port opening located along the right end panel. A 6-32 1/4" nut secures the protective plate.
3. Locate the 56-pin female socket labeled "U18" along the upper edge of the Processor PCB. The socket is illustrated in Figure 5 on page 54.
4. Carefully align all of the pins on the Ethernet Port module with their socket counterparts. Press firmly on the module to insure it is seated properly and fully into the socket.
5. Reassemble the monitor.

After power is reapplied to the monitor and the firmware is initialized the Ethernet Port must be properly assigned. Refer to the procedure entitled "Network (N)" on page 24.

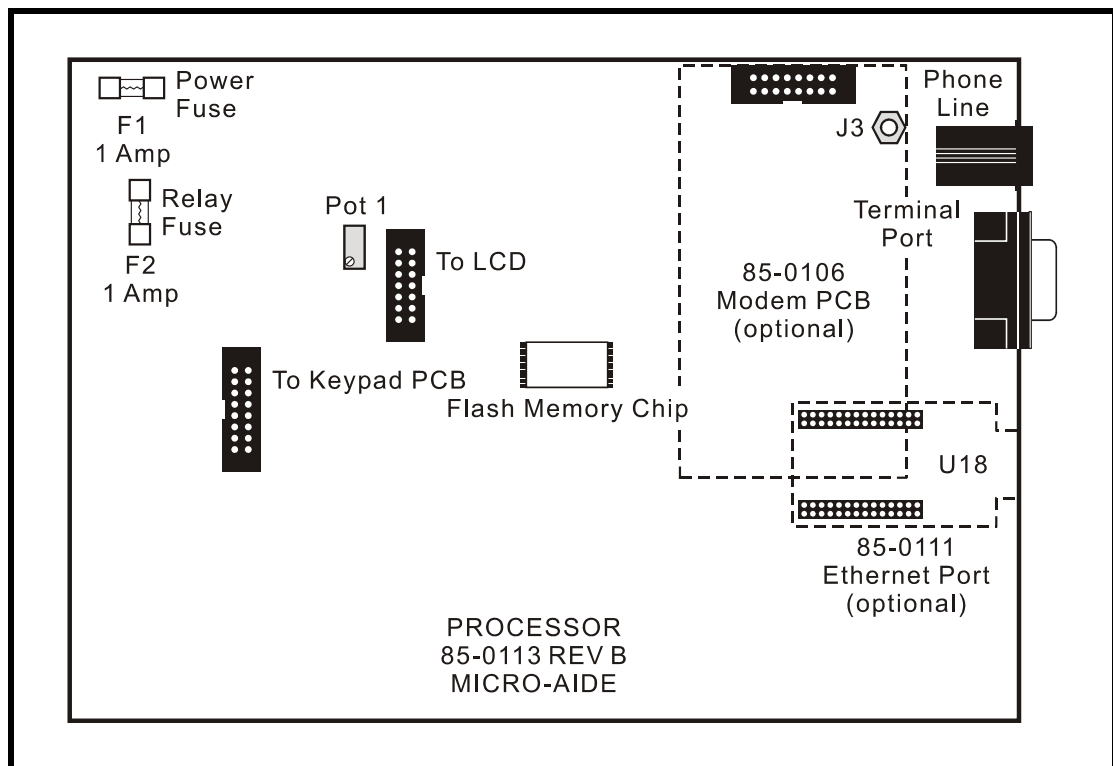
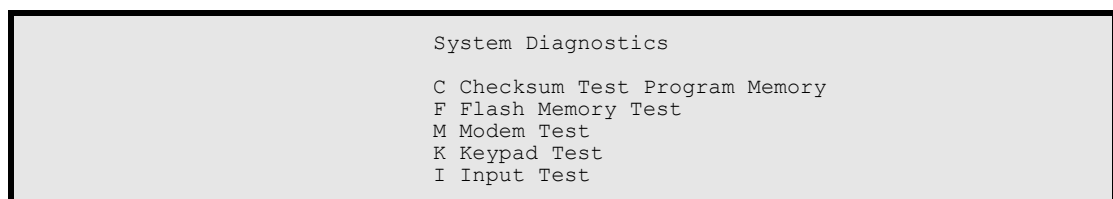


Figure 5 - PSM Processor PCB

## Diagnostic Testing

The Main Menu of commands for the PSM includes the Diagnostics command. Refer to the sample data labeled “Main Menu” on page 9. The Diagnostics command can be used to quickly verify the operational integrity of several hardware elements of the PSM. Each of the five tests can be performed at any time. They are non-destructive and therefore will not alter the Setup Database or Event Record memories.

The following menu of commands will be displayed in response to selecting the Diagnostics command.



Each command performs a specific test. The tests are described in the following sections.

## Checksum Test Program Memory (C)

The Checksum Test reads every memory address location used to store the program code. As part of the reading process a checksum is calculated and displayed at the completion of the test. The same checksum must be calculated each time the test is performed. Any variation in the result is an indication of a problem.

A typical response to the Checksum Test Program Memory command is listed below.

```
Program Memory Checksum=4a00

Test Complete
Press any key to continue
```

The checksum takes only a few seconds to be calculated. The checksum value labeled “4a00” in the above example will vary with the version of the firmware installed in the monitor.

## Flash Memory Test (F)

The Flash Memory Test is performed on the memory chip used to store Event Records. The test verifies that the microprocessor can access the Event Record memory.

A typical response to the Flash Memory Test command is listed below.

```
Flash Memory1: 2048K

Test Complete
Press any key to continue
```

The reference to 2048K may instead read 4096K if a larger capacity Flash Memory chip is used. A value of 0K indicates that a failure has been detected. The readings should be compared to the known memory capacity of the monitor.

## Modem Test (M)

The Modem Test can be performed at any time to verify that the microprocessor can communicate properly with the internal modem. The test can be performed while the modem is idle or while a call is active.

Assuming that a modem is installed and it is operating properly there are two possible responses to the Modem Test command. Both responses are listed below.

```
Modem Test in progress...
Modem found: H
```

```
Test Complete
Press any key to continue
```

```
Modem Test in progress...
Modem found: 33600
```

```
Test Complete
Press any key to continue
```

The H and 33600 responses indicate that a Silicon Labs or Conexant modem is installed, respectively. If a modem is installed but none is indicated a problem has occurred and must be corrected.

## Keypad Test (K)

Each of the twenty keys that comprise the front panel keypad can be checked by using the Keypad test. The following instructions are displayed after selecting the command.

```
Keypad test, press ESC to cancel
```

A single unique character is displayed in response to pressing a key. The correspondence between non-numeric keys and displayed characters is listed in Table 4, below.

Key	Browse	Alpha	Setup	Esc	Enter	Decimal	↑	↓/-	←	→
Displayed	B	A	S	E	N	P	^	v	<	>

*Table 4 - Keypad Test Characters*

To exit the test press the **Esc** key located at the keyboard of the peripheral device that is communicating with the PSM.

## Input Test (I)

The Input Test can be used to verify the proper operation of each Sensor Input. Any voltage applied to an input that exceeds the assigned Voltage Level parameter will be identified.

The following menu will be displayed in response to selecting the Input Test command.



## Input Test Options

5 Input test using 5V Voltage Level  
P Input test using programmed Voltage Levels

Press the **5** key if a test of the inputs needs to be performed while the monitor is not installed. This command allows the user to test the inputs using a voltage of 6 to 36Vdc. If the PSM is already installed press the **P** key. In this mode the user-assigned Voltage Level parameters are used. The Input Test will then report each wheel indication as it actually occurs track-side. This allows the user to verify the wheel detector output characteristics are properly matched to the Sensor Input parameters. Valid signals will be reported for each Sensor Input irrespective of its assigned Mode parameter.

Shown below is a sample test report. The Sensor Input is identified as P01 through P16. The numeric field to the right is a count of the PSM's .125msec. timer.

```
Input test, press ESC to cancel
P01 at 27023025
P02 at 27033030
P03 at 27041470
P04 at 27050236
P05 at 27075192
P16 at 27091099
```

To exit the test press the **Esc** key. The relay will automatically assume an un-energized state.

**Note** The user may wish to contact MICRO-AIDE customer service if a failure occurs as the result of any diagnostic testing. Instructions on how to proceed will be offered. Material Return and Limited Warranty policies are described on the inside back cover of this manual.

## System Events

Event Records are normally created by an excessive speed occurrence. However, records will also be logged to memory whenever power is turned on and off or the real-time clock of the PSM is synchronized. Event Records of this type are classified as System Events. To distinguish them the Input Number always includes an S-prefix (e.g., S01). Additionally, the Input Name, Identifier and Event Name fields within the record are uniquely labeled. They cannot be changed by the user. Table 5 lists the various fields used by the System Event Records.

Input Number	Input Name	Identifier	Event Name Pair
S01	System Power	Power	ON / OFF
S02	Clock Sync	Csync	ON

Table 5 - System Event Records - Field Labels

Record formats are described in the section entitled "Event Record Format" on page 37. Listed below are three sample Event Records as they would appear at the PC.

10:57:30.000	04/06/05	System Power	Power	OFF	S01
10:57:42.328	04/06/05	System Power	Power	ON	S01
11:45:00.000	04/06/05	Clock Sync	Csync	ON	S02

The first two records indicate that power was off to the monitor for approximately 12 seconds. The third record indicates that the clock was synchronized to 11:45:00.00. The first record listed above is also shown below as it would appear at the front panel LCD.

```
S 10:57:30.000 04-06
01 Power      OFF
```

System Events can be Queried and Browsed just like other Event Records. Instead of selecting a P input type designator, select the S type.

**Tip** System Events are always logged to memory in chronological sequence. The power on event will immediately follow the power off event. The time between the two Event Records indicates the period during which no speeds could be measured.

## Upgrading the Firmware

Like any microprocessor-based product the PSM executes a stored memory program. The program, referred to as firmware, is saved in a Flash Memory chip. Flash Memory chips are uniquely characterized by their permanent storage and multiple write properties. Their use allows the PSM firmware to be upgraded to a newer version by simply uploading a new program file. The more common practice of shipping and replacing a Programmable Read Only Memory (PROM) chip does not apply to the PSM. Consequently, there is no need to open the unit to gain access to the Processor PCB.

**Note** The firmware upgrade procedure is normally performed via a PC connected to the Terminal Port of the monitor. It cannot be performed via the front panel keypad. An upgrade can be performed remotely if the monitor is equipped with the optional internal modem. In such cases MICRO-AIDE support personnel can perform the upgrade at the request of the user.

Before the upgrade can be performed the PC communications program (e.g., HyperTerminal® or Procomm Plus®) must be properly configured. The following list describes the correct configuration.

- **Transfer protocol:** Xmodem.
- **Connection:** Typically Direct connect-Com1 or Direct connect-Com2 (whichever is available at the PC).
- **Baud rate:** set to 38,400 and set to N-8-1. The boot loader can only communicate at 38,400 Baud.

Each of the steps required to perform the upgrade are listed below.

1. Turn the power off and then back on to the monitor. After a few seconds the following message will be displayed at the PC.

```
Micro-Aide CWR-22XL Flash Boot Loader
Press ESC for boot loader
```

2. Press the **Esc** key at the keyboard of the PC within five seconds after the boot message is displayed. The following menu of commands will then be displayed.

```
Menu
U Upload new program to Flash memory
D Display sample of uploaded code
F Display flash
R Run main program
Enter Command:
```

3. Press the **U** key followed by the **Enter** key to proceed with the upload. A message similar to the following will be displayed.

```
Flash memory mfg-dev code is 20-ad
For AMD 8/16/32Mbit this should be 01-d5/ad/41
For ST 8/16/32Mbit this should be 20-f1/ad/ac
Hit enter to erase and start upload, any other key to abort
```

4. Before the new firmware can be uploaded the contents of the Flash Memory chip must be erased. To initiate the erase press the **Enter** key. The following message will be displayed.

```
Start XMODEM upload now
CCCC
```

5. The C characters listed in the last line of text are an indication that the monitor is ready to receive the new program file. The next several steps depend upon whether the user is accessing the monitor via HyperTerminal or Procomm Plus. Both procedures are listed below.

## HyperTerminal

1. With the mouse, click on the Transfers command, then the Send File ... command. The Send File dialog box will open. Verify that the Xmodem protocol is selected.
2. Select the correct disk drive, folder and filename (e.g., PSM V100.bin). If the various settings are correct click on the Send button.

3. An information box will automatically open. It will indicate the progress of the transfer. The information box will close automatically to indicate a successful transfer. The following message will be displayed to indicate the completion of the transfer.

```
End of file, transfer completed  
Hit any key to continue
```

4. Press any key to display the following menu of commands.

```
Menu  
U Upload new program to Flash memory  
D Display sample of uploaded code  
F Display flash  
R Run main program  
  
Enter Command:
```

5. Press the **R** key followed by the **Enter** key to run the program just loaded. The request for a password message will be displayed and normal operation of the monitor will commence.

## Procomm Plus

1. With the mouse, click once on the Send File icon near the top center of the Procomm Plus window. The icon appears as an upward pointing arrow. The Procomm Plus Send File using-Xmodem dialog box will open.
2. Select the correct disk drive, folder and filename (e.g., PSM V100.bin). If the various settings are correct click on the Open button.
3. An information box labeled Xmodem will appear. It will indicate the progress of the transfer. The information box will close automatically. The following message will be displayed to indicate the completion of the transfer.

```
End of file, transfer completed  
Hit any key to continue
```

4. Press any key to display the following menu of commands.

```
Menu  
U Upload new program to Flash memory  
D Display sample of uploaded code  
F Display flash  
R Run main program  
  
Enter Command:
```

5. Press the **R** key followed by the **Enter** key to run the program just loaded. The request for a password message will be displayed and normal operation of the monitor will commence.

**Note** After completing the firmware upgrade procedure it may be necessary to execute the Reset System command. A reset should be performed only if recommended by MICRO-AIDE customer service technicians. Refer to “Reset System (R)” on page 16.

## Trouble-shooting Guide

The following guide is provided to assist the user in resolving problems that may occur with the operation of the PSM. It can be especially helpful when attempting to operate the monitor 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 PSM must be carried out in accordance with the procedure entitled “Working Inside the Monitor” on page 51.

If the user is unable to resolve the problem, MICRO-AIDE customer service technicians should be contacted. The user will be asked to state the problem, related symptoms, and indicate any operations or conditions that have a bearing on the problem. If available, the results of any diagnostic tests should be reported. If the monitor has an installed modem it may prove to be helpful in diagnosing the problem from the MICRO-AIDE factory. The user will be asked to provide the appropriate telephone number and correct password.

Symptom or Problem	Resolution
No indication of power	Verify 10 to 36Vdc at B and N power terminals Inspect fuse on Processor PCB
PC does not display data	Check cable connection to Terminal Port Verify cable is assembled per Figure 6 on page 66 Check Baud rate setting Check if Terminal LED on front panel illuminates
Data at PC is garbled	Check Baud rate setting Verify following setting: 8 data bits, 1 start bit, 1 stop bit
Printer connected to Terminal Port is missing data	Use Pause and Resume commands to prevent overflowing data buffer of printer
Highlight cannot be moved at PC	Set the PC for ANSI emulation
PC does not communicate via the Ethernet Port when directly connected	Verify the monitor's IP Address and Port Number are correctly assigned Verify the Ethernet Port in the PC is configured properly Verify PC's communications application is set up for TCP/IP protocol Verify Ethernet cable is a CAT-5 crossover type
Initial Check-out Procedure fails on all inputs	Verify that adequate voltage is being applied
Event Records are not being created on some inputs	Check wiring Verify Voltage Level parameter is set properly

Table 6 - Guide to Trouble-shooting Techniques

Measured speeds are consistently incorrect	Verify assigned Sensor Distance is accurate
Measured speeds vary and are not sufficiently accurate	Increase assigned Sensor Distance
Measured speeds are erratic	Voltage Level parameter may be set too high or too low
Paired Sensor Inputs appear to be reporting two Event Records	Switch to Dual Sensor Mode for the inputs involved
Speed measurements of interest are always negative	Reverse order of paired Sensor Inputs
Upload/Download of Setup Database fails	Verify XMODEM protocol is being used
Modem does not answer	Check phone line connection Verify Modem Ring Count is not set to zero
Modem answers but fails to connect	Check modem Baud rate at host end Verify host modem is compatible with monitor modem Test host modem with another auto-answer system
Visibility of LCD characters is poor	Adjust LCD contrast

*Table 6 - (Continued) Guide to Trouble-shooting Techniques*

This completes the User Manual for the PSM. As an aid to the user three appendices have been provided. They include detailed specifications and options applicable to the PSM. Appendix C includes a complete Bill of Materials for each sub-assembly.

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.

# TECHNICAL DATA

## Specifications

### Physical

#### Size

**Length:** 9.2"

**Height:** 6.3"

**Depth:** 2.4"

#### Weight

2.5lb.

### Environmental

#### Storage

**Temperature:** -50°C to 85°C

**Humidity:** 0 to 95%, non-condensing

#### Operating

**Temperature:** -40°C to 72°C

**Humidity:** 0 to 95%, non-condensing

### Mounting

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

**Optional:** 19" rack mounting brackets available

### Construction

#### Chassis

Fully enclosed, anodized aluminum

Externally accessible keypad, LEDs and connectors

#### Electrical

All components mounted on conformal coated, internal PCBs

### Power

#### Voltage

**Range:** 10 to 36Vdc

#### Consumption

**Typical:** 3W

**Maximum:** 4W (with Modem and Ethernet options)

### Isolation

#### Power

**Minimum:** 3000Vdc from B and N terminals to chassis and inputs

#### Sensor Inputs

**Minimum:** 3000Vdc to any terminal

#### Sensor to Adjacent Input

**Minimum:** 2200Vdc

#### Internal Modem (optional)

Designed to meet FCC part 68 standards

#### Ethernet Port (optional)

**Minimum:** 3000Vdc to any terminal

### Capacities

#### Sensor Inputs

8 Dual or 16 Single Sensor (Dual Sensor Inputs can be configured as two Single Sensor Inputs)

#### Outputs

**Relay:** 1, form C, rated for 2A at 24Vdc or 1A at 125Vac, maximum switching capacity of 125VA or 60W, service life 1 million electrical (typical)

#### Event Storage

**Standard:** 196,432 records, expandable to 429,392 records

**Memory Full:** 129th day overwrites first day, newest data overwrites oldest data

#### RS-232 Port

**Quantity:** 1, for use with a PC

**Emulation:** ANSI

**Baud Rates:** 300, 600, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200

**Bit Format:** N-8-1

#### Ethernet Port (optional)

**Quantity:** 1

**Type:** 10/100 Base-T

### Capacities (continued)

#### Liquid Crystal Display

**Characters:** 40 total on 2 lines

**Character Set:** A-Z upper- and lower-case, 0-9, various symbols

**Viewing Area:** 2.9" by .5"

#### Front Panel Keypad

**Quantity:** 20 keys

**Keys:** 0-9, Browse, Alpha, Setup, Esc, Enter, Decimal, left, right, up, down/-

### Sensor Inputs

#### Input Impedance

**Single Ended:** 10MOhms to isolated common voltage

**Differential:** 100KOhms (across + and - inputs)

#### Range

**Operating:** 0 to 36Vdc

**Limit Value:** 1 to 24Vdc, user-assigned by Sensor Input

#### Validation Times

De-bounce preset to 8msec.

#### Wheel Event Criteria

Positive voltage transition exceeding Limit Value with duration greater than Validation Time

### Clock Sync Input

#### Input Impedance

**Minimum:** 5KOhms, opto-isolated

#### Range

**On:** 5 to 36Vdc

**Off:** 0 to 2Vdc

#### Validation Times

De-bounce preset to 40msec.

Can be used with all MICRO-AIDE clock sync devices

Used to synchronize internal clock to nearest 15-minute mark

---

## Memory

### Type

Non-volatile, Event Records and Setup Database are stored in flash memory chip

### Storage Longevity

Infinite with power off

Rated for 1 million write operations

---

## Speed Reporting

### Operation

**Dual Sensor Mode:** reports excessive speed per axle; direction is reported

**Single Sensor Mode:** reports excessive speed per truck; direction is not reported

Date and time stamped Event Record written to memory if Threshold Limit is exceeded

### Threshold (speed limit)

**Range:** 0.00 to 99.99mph

**Resolution:** multiples of .01 mph  
User-assigned by Sensor Input

### Sensor Distances

**Distance:** 4" to 600"

**Resolution:** multiples of .1"  
User-assigned by Sensor Input

### Accuracy

±.2% (refer to Table 7 on page 65); dependent upon assigned Sensor Distances

.125msec. time stamping of Wheel Events

---

## Connectors

### Sensor Inputs

Detachable, screw-down, 8 terminals each, 12 to 22AWG

### Terminal Port

DE-9 male, configured as DCE

### Power

Detachable, screw-down, 4-position, 12 to 22AWG

Dual B and N terminals

---

## Connectors (continued)

### Alarm Relay and Clock Sync Input

Detachable, screw-down, 5-position, 12 to 22AWG

N.O., N.C. and common for relay, + and - for Clock Sync Input

### Telephone Line

RJ-11 female

### Ethernet Port (optional)

RJ-45 female

---

## Controls

### Keypad

20 keys, located on front panel

### LCD Contrast Adjust

20-turn potentiometer, located on Processor PCB

---

## Indicators

### LCD Panel

Includes LED back lighting for enhanced visibility

Displays numerous command menus for configuring the monitor and retrieving data

### LEDs (3)

**Power:** green

**Terminal:** green, flashes with send/rcv data

**Modem:** green, flashes with send/rcv data and ring-in

---

## Internal Clock

### Accuracy

**Typical:** ±1 minute per month (20ppm)

**Sync:** optically isolated input used to synchronize real-time clock

### Resolution

Event Records are time stamped to nearest .001 seconds

### Operation

Full calendar, auto-adjusted for leap year

Non-volatile with power off

Y2K compliant

---

## Password Protection

### Administrative Level

Access to all functions, limit 8 characters

### Restricted Level

Access to Event Record and Setup Database viewing only, limit 8 characters

### Passcode

Protects against alterations to Setup Database via front panel, limit 8 digits

---

## Internal Modem (optional)

### Type

V.34, 33,600 Baud, data compression and error correction

### Usage

Remote access via auto-answer operation

### Compliance

Designed to meet FCC part 68 standards

---

## Ethernet Port (optional)

### Type

10/100 Base-T

### Usage

Remote access via Ethernet LAN  
Assignable IP Address and Port

### Protocol

TCP/IP, Telnet

### LED Indicators

**Green:** link established

**Yellow:** data activity

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



## Recommended Sensor Distances

Speed Range (mph)	Minimum Sensor Distance	
	Allowable Error .2%	Allowable Error .5%
0 to 5	3"	2"
0 to 10	8"	4"
0 to 20	19"	8"
0 to 30	28"	9"
0 to 40	37"	15"
0 to 50	56"	15"
0 to 60	67"	22"
0 to 70	78"	25"
0 to 80	89"	32"
0 to 90	101"	32"
0 to 100	111"	45"

Table 7 - Required Sensor Distance vs. Speed

**Tip** MICRO-AIDE further recommends that Sensor Distances not exceed 60". This limitation provides for improved performance in reporting irregular wheel motion.

# Terminal Port Cable

The following cable is included with every PSM.

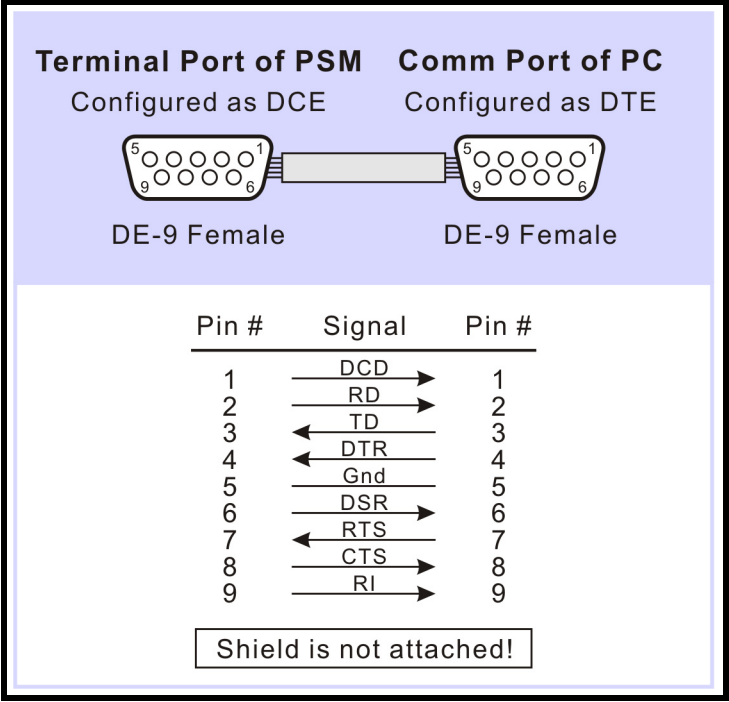


Figure 6 - Terminal Port Cable - Wiring Diagram

# OPTIONS AND ACCESSORIES

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## Options

### Internal Modem

**85-0106:** 33,600 Baud, V.34, V.32bis, V.32, V.22bis, V.22 and V.21, V.42bis and MNP 5 data compression, MNP 2-4 and LAP-M error correction

### Ethernet Port

**85-0111:** 10/100 Base-T, 100Mbps; TCP/IP and Telnet compatible

### Memory Expansion

**40-0216:** 429,392 Speed Records

---

## Accessories

### External Recorder Clock

**ERC:** Used to synchronize the real-time clock of multiple PSMs and Event Recorders. Compatible with all CWR recorders

### Jumper Combs

**147250:** Weidmuller 10-position shorting clip used to connect multiple inputs to a single point (e.g., common return)

### Mounting

**31-0001:** 19" rack mounting brackets

**31-0002:** 23" rack mounting brackets

**31-0003:** Wall mounting brackets

### Cables

DE-9 to DE-9 (included with every PSM)

DE-9 to DB-25

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

## User Notes

[illegible]

# BILLS OF MATERIAL

## PSM Bill of Material

M-A Part No.	Description / MFG Part No.	Qty.
PA85-0113/00	PCB ASSEMBLY, PROCESSOR	1
PA85-0063/00	PCB ASSEMBLY, KEYPAD	1
PA85-0106/00	PCB ASSEMBLY, MODEM	(OPT.) 1
PA85-0111/00	PCB ASSEMBLY, ETHERNET PORT	(OPT.) 1
HB2136/00	BUMPER HH SMITH: 2136	4
HC2402T6/01	CABLE, DB9 TO DB9, FEMALE TO FEMALE CABLE DEPOT: 2402-T-6 FF (MODIFIED)	1
I ACM2002/00	LCD, YELLOW-GREEN, 20 X 2, BACKLIT AMERICAN ZETTLER: ACM2002D-FL-GBS	1
JRIDH14LP/00	CONNECTOR, HEADER, 14-PIN, RIGHT ANGLE OUPIN: 3012-14GRB	1
JRIDS-C14/00	CONNECTOR, 14-PIN, FEMALE F/W AMP: 746285-2	2
JRIDS-C16/00	CONNECTOR, 16-PIN, FEMALE F/W AMP: 746285-3	2
JRSR-14K/00	STRAIN RELIEF, RIBBON, 14-CONDUCTOR AMP: 499252-9	2
JRSR-16K/00	STRAIN RELIEF, RIBBON, 16-CONDUCTOR AMP: 499252-8	2
JW12594.6/00	CONNECTOR, SCREW-DOWN, FEMALE, 5-POSITION WEIDMULLER: 12594.6	1
JW147250/00	JUMPER COMB, 10-POSITION, .2" WEIDMULLER: 147250	4
JW171634/00	CONNECTOR, SCREW-DOWN, FEMALE, 4-POSITION WEIDMULLER: 171634	1
JW171638/00	CONNECTOR, SCREW-DOWN, FEMALE, 8-POSITION WEIDMULLER: 171638	4
M 220211/00	SHEETMETAL, MOUNTING BRACKET	2
M 220410/00	SHEETMETAL, BASE	1
M 220411/00	SHEETMETAL, COVER	1
M 220412/00	SHEETMETAL, END PANEL	1
ZMPSPM	USER MANUAL, PSM	1

## PSM Subassemblies

### PA85-0113/00 Processor PCB

M-A Part No.	Description / MFG Part No.	Qty.
P 85-0113/00	PCB, PROCESSOR, PSM	1
C 470PF/00	CAPACITOR, 470PF, 10%, 6KV XICON: CDR602P9-471K	1
C .1MF/00	CAPACITOR, .1MF, 50V, CERAMIC	31
C .47F/00	CAPACITOR, .47F, 5.5V, SUPER CAP ELNA: DH-5R5D474	1
C 1MF/00	CAPACITOR, 1MF, 50V, CERAMIC	1
CE220MF/00	CAPACITOR, 220MF, 50V, AXIAL, ELECTROLYTIC UCC: SME50VB221M10X16LL	1
CE220MF/01	CAPACITOR, 220MF, 16V, RADIAL, ELECTROLYTIC ELNA: RJ3-16V221MBX	2
CE2200MF/00	CAPACITOR, 2200MF, 6.3V, RADIAL, ELECTROLYTIC ELNA: RJ3-6V222MBX	1
CM47PF/00	CAPACITOR, 47PF, 100V, RADIAL, MICA CORNELL DUBILIER: CM04ED470J03	1
CT4.7MF/00	CAPACITOR, 4.7MF, 25V, RADIAL, TANTALUM	11
CT10MF/00	CAPACITOR, 10MF, 16V, TANTALUM	2
CT33MF/00	CAPACITOR, 33MF, 16V, RADIAL, TANTALUM	3
D 1N4004/00	DIODE, 400V 1N4004	2
D 1N5822/00	DIODE 1N5822	1
D 1N914/00	DIODE 1N914	3
D MBR160/00	DIODE, SCHOTTKY, 60V MOTOROLA: MBR160	1
DZ1N5359B/00	ZENER DIODE, 24V, 5W 1N5359B	1
H TP-101/00	TEST POINT COMPONENTS CORP.: TP-101-10	2
F 225001/00	FUSE, 1 AMP LITTELFUSE: 225001	2
FH111501/00	FUSE CLIP LITTELFUSE: 111501	4
J 833-93/00	SOCKET STRIP, DUAL PIN MILMAX: 833-93-100-10-001000	28
JA555165/00	JACK, PHONE, RJ-11, RIGHT ANGLE AMP: 555165-1	1
JMDE09PL/00	CONNECTOR, MALE, DB9, RIGHT ANGLE ADAM TECH: DE09PL24	1
JRICO-203/00	SOCKET, IC, 20-PIN OUPIN: 8003-20T3	2
JRIDH10LP/01	CONNECTOR, HEADER, 10-PIN, STRAIGHT ANGLE OUPIN: 3012-10GSB	1
JRIDH14LP/01	CONNECTOR, HEADER, 14-PIN, STRAIGHT ANGLE OUPIN: 3012-14GSB	1

M-A Part No.	Description / MFG Part No.	Qty.
JRIDH16LP/01	CONNECTOR, HEADER, 16-PIN, STRAIGHT ANGLE OUPIN: 3012-16GSB	2
JW12354.6/00	CONNECTOR, MALE, 9-POSITION, RIGHT ANGLE WEIDMULLER: 12354.6	1
JW151326/00	CONNECTOR, MALE, 8-POSITION, RIGHT ANGLE WEIDMULLER: 151326	4
K G5V-2/00	RELAY, 5V, DIP OMRON: G5V-2-H1-DC5	1
L WFB-3.0/00	CHOKE, WOUND FERRITE BEAD FAIR-RITE: 294366631	2
Q PN2222A/00	TRANSISTOR, TO-92 PN2222	2
QR1117-3/00	VOLTAGE REGULATOR, 3.3V, SMT BURR BROWN: REG1117-3.3	1
QRLT1171/00	VOLTAGE REGULATOR, SWITCHING, TO-220 LINEAR TECHNOLOGIES: LT1171CT	1
R 18OHM/00	RESISTOR, 18 OHM, 5%, .25W	2
R 390OHM/00	RESISTOR, 390 OHM, 5%, .25W	3
R 470OHM/00	RESISTOR, 470 OHM, 5%, .25W	1
R 1K/00	RESISTOR, 1K, 5%, .25W	2
R 1K/01	RESISTOR, 1K, 5%, .125W	1
R 4.7K/01	RESISTOR, 4.7K, 5%, .25W	1
R 9.76K/00	RESISTOR, 9.76K, 1%, .25W	1
R 10K/00	RESISTOR, 10K, 5%, .25W	4
R 10K/01	RESISTOR, 10.0K, 1%, .125W	2
R 100K/01	RESISTOR, 100K, 1%, .25W	32
R 100K/03	RESISTOR, 100K, 1%, .125W	16
R 10M/01	RESISTOR, 10M, 1%, .25W	32
RA25010/00	ARRESTOR, GAS, 3-TERMINAL CP CLARE: PMT 3(310)25010	1
RN6S10K/00	RESISTOR NETWORK, 6-PIN, SIP, 10K, 2% BI TECHNOLOGIES: L061C103	1
RN9S47K/00	RESISTOR NETWORK, 9-PIN, SIP, 47K, 2% BI TECHNOLOGIES: L091C473	2
RP5K/00	POTENTIOMETER, 5K, 1-TURN, TOP ADJUST BI TECHNOLOGIES: 72PR5K	1
RP10K/01	POTENTIOMETER, 10K, 20-TURN, TOP ADJUST BI TECHNOLOGIES: 67YR10K	1
TFPC40RM8/00	TRANSFORMER, ASSEMBLY, FLYBACK	1
U 74C923/00	IC, KEYBOARD INTERFACE MOTOROLA: MM74C923N	1
U 75C185/00	IC, RS-232 TRANSCEIVER, DIP TI: SN75C185N	1
U 80386EX/00	IC, MICROPROCESSOR, 25MHZ, PQFP INTEL: KU80386EXTC-25	1
U DS1233/00	IC, POWER RESET DALLAS SEMICONDUCTOR: DS1233-10	1
U DS1302/00	IC, CLOCK, DIP DALLAS SEMICONDUCTOR: DS1302	1

<b>M-A Part No.</b>	<b>Description / MFG Part No.</b>	<b>Qty.</b>
U LM2901N/00	IC, QUAD COMPARATOR, DIP ON SEMICONDUCTOR: LM2901N . . . . .	4
U MAX5258/00	IC, 8-CHANNEL D-A CONVERTER, SMT MAXIM: MAX5258EEE . . . . .	2
UF29F016/00	IC, FLASH MEMORY, 16MBIT, TSOP, 85C AMD: AM29F016D-90E4I . . . . .	1
ULOP290GP/00	IC, OP-AMP, DUAL, DIP ANALOG DEVICES: OP290GP . . . . .	1
UO4N33/00	IC, OPTO-COUPLER, SINGLE, DIP FAIRCHILD: 4N33 . . . . .	1
UP18CV8/06	PEEL, 85C, DIP ICT: 18CV8PI-15 . . . . .	1
URK6X4016/00	IC, RAM, 256K X 16, 55NS, TSOP SAMSUNG: K6X4016C3F-TF55 . . . . .	1
USHC14/00	IC, CMOS, INVERTER, DIP TI: SN74HC14N . . . . .	1
USHC541S/00	IC, CMOS, 8-BIT BUS DRIVER, SMT TI: SN74HC541DW . . . . .	2
USHCT245/00	IC, CMOS, OCTAL BUS XRCV, DIP TI: SN74HCT245N . . . . .	1
X 32.768/01	CRYSTAL, 32.768KHZ, 6PF EPSON: C-002RX-32.768KHZE . . . . .	1
XO44.2399/00	OSCILLATOR, 44.2399MHZ, DIP EPSON: SG-8002DC-44.2399MPTMB . . . . .	1

## PA85-0063/00 Keypad PCB

<b>M-A Part No.</b>	<b>Description / MFG Part No.</b>	<b>Qty.</b>
P 85-0063/00	PCB, KEYPAD, CWR-22XT, -22XL, PSM . . . . .	1
DHC-174/00	STANDOFF, LED BIVAR: DHC-174 . . . . .	3
DL3962/00	LED: GREEN, SINGLE HP: HLMP-3962 . . . . .	3
JRIDH16LP/01	CONNECTOR, 16-PIN, RIGHT ANGLE OUPIN: 3012-16GRB . . . . .	1
SP320.04/00	SWITCH, PUSHBUTTON ESWITCH: 320.04 E1-1 GRY . . . . .	20

## PA85-0106/00 Modem PCB

<b>M-A Part No.</b>	<b>Description / MFG Part No.</b>	<b>Qty.</b>
P 85-0106/00	PCB, MODEM, SILICON LABS, ALL CWR EVENT RECORDERS, PSM . . . . .	1
C 560PF/00	CAPACITOR, 560PF, 1KV, CERAMIC, DIP XICON: 140-102P6-561K . . . . .	2
C .001MF/04	CAPACITOR, .001MF, 10%, 3KV, X7R, CERAMIC VISHAY: 30TSD10 . . . . .	2
C .1MF/00	CAPACITOR, .1MF, 50V, CERAMIC . . . . .	2
CT10MF/00	CAPACITOR, 10MF, 16V, TANTALUM . . . . .	2
CX10PF/00	CAPACITOR, 10PF, 10%, 50V, NPO, CERAMIC, 0805 XICON: 140-CC501N100D . . . . .	1
CX150PF/00	CAPACITOR, 150PF, 3KV, X7R, CERAMIC, 1808 JOHANSON: 302R29W151MV4 . . . . .	2



M-A Part No.	Description / MFG Part No.	Qty.
CX1800PF/00	CAPACITOR, 1800PF, 50V, X7R, CERAMIC, 0805 XICON: 140-CC501B182K . . . . .	1
CX.0039MF/00	CAPACITOR, .0039MF, 50V, X7R, CERAMIC, 0805 XICON: 140-CC501B392K . . . . .	2
CX.01MF/00	CAPACITOR, .01MF, 50V, X7R, CERAMIC, 0805 XICON: 140-CC501B103K . . . . .	1
CX.022MF/00	CAPACITOR, .022MF, 630V, X7R, CERAMIC, 1206 PANASONIC: PCC2293CT . . . . .	1
CX.1MF/00	CAPACITOR, .1MF, 50V, X7R, CERAMIC, 0805 XICON: 140-CC501B104K . . . . .	4
CX.22MF/00	CAPACITOR, .22MF, 50V, X7R, CERAMIC, 1206 KEMET: C1206C224K5RACTU . . . . .	4
CXT.1MF/00	CAPACITOR, .1MF, 35V, TANTALUM, 3.2X1.6 KEMET: T491A104K035AS . . . . .	1
CXT1MF/00	CAPACITOR, 1MF, 16V, TANTALUM, 3.2X1.6 KEMET: T491A105K016AS . . . . .	1
D DB105/00	DIODE, BRIDGE, 600V, .8A MICRO SEMI: DB105 . . . . .	1
DXBAV99/00	DIODE, DUAL, SOT-23 FAIRCHILD: BAV99 . . . . .	2
DXZ5232B/00	DIODE, ZENER, 5.6V, SOD-123 FAIRCHILD: MMSZ5232B . . . . .	2
DXZ5248B/00	DIODE, ZENER, 18V, SOD-123 FAIRCHILD: MMSZ5248B . . . . .	1
JFBCS-108/00	CONNECTOR, HEADER, FEMALE, 16-PIN SAMTEC: BCS-108-L-D-TE . . . . .	1
QR1117-3/00	VOLTAGE REGULATOR, 3.3V, SMT BURR BROWN: REG1117-3.3 . . . . .	1
QXBCP56/00	TRANSISTOR, NPN, SOT-223 ON SEMI: BCP56 . . . . .	1
QXMMBT442/00	TRANSISTOR, NPN, SOT-23 FAIRCHILD: MMBT442 . . . . .	2
QXMMBT492/00	TRANSISTOR, PNP, SOT-23 FAIRCHILD: MMBT492 . . . . .	1
RVERZV07D/00	VARISTOR, 175V, 1200A PANASONIC: ERZV07D241 . . . . .	2
RX10 OHM/00	RESISTOR, 10 OHM, 5%, .1W, 0805 XICON: 260-10 . . . . .	2
RX150 OHM/00	RESISTOR, 150 OHM, 5%, .1W, 0805 XICON: 260-150 . . . . .	1
RX402 OHM/00	RESISTOR, 402 OHM, 1%, .1W, 0805 XICON: 292-402 . . . . .	1
RX1.78K/00	RESISTOR, 1.78K, 1%, .1W, 0805 XICON: 292-1.78K . . . . .	2
RX2.2K/00	RESISTOR, 2.2K, 5%, .1W, 0805 XICON: 260-2.2K . . . . .	1
RX9.31K/00	RESISTOR, 9.31K, 1%, .1W, 0805 XICON: 292-9.31K . . . . .	1
RX10K/00	RESISTOR, 10K, 5%, .1W, 0805 XICON: 260-10K . . . . .	2
RX56K/00	RESISTOR, 56K, 5%, .1W, 0805 XICON: 260-56K . . . . .	2

<b>M-A Part No.</b>	<b>Description / MFG Part No.</b>	<b>Qty.</b>
RX100K/01	RESISTOR, 100K, 1%, .1W, 0805 XICON: 292-100K	1
RX120K/00	RESISTOR, 120K, 5%, .1W, 0805 XICON: 260-120K	1
UXMAT2508/00	IC, EEPROM, 2.7V, SOIC-8 ATMEL: AT2508AN-10SI-2.7	1
UXSI2433/00	IC, MODEM, TSSOP-24 SILICON LABS: SI2433-BT	1
UXSI3015/00	IC, MODEM DAA, SOIC-16 SILICON LABS: SI3015-BS	1
XXO4.9152/00	OSCILLATOR, 4.9152MHZ, SMT EPSON: SG-8002JF-4.9152M-PCMB	1

## **PA85-0111/00 Ethernet Port PCB**

<b>M-A Part No.</b>	<b>Description / MFG Part No.</b>	<b>Qty.</b>
U NM7010A/00	IC, ETHERNET PORT MODULE, IINCHIP: NM7010A	1

## **Material Return Policy**

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 from MICRO-AIDE
- Return shipment address
- Name and 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](mailto: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.

**MICRO-AIDE CORPORATION**

685 Arrow Grand Circle

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