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MODEL 24D/48D EVENT RECORDER

USER MANUAL

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*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

MODEL 24D/48D EVENT RECORDER

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GENERAL DESCRIPTION

Introduction

The MICRO-AIDE Model 24D and 48D Event Recorders are designed to meet the demanding needs of today's rail industry. Both models are versatile, rugged and easy to use. Their unique, flexible designs make them ideal solutions in a broad range of event recording applications, particularly those associated with crossing, control point and small interlocker facilities. Each are engineered to ensure that the operation of the monitored circuits is not affected in any way.

Each Event Recorder is equipped with a built-in keypad and display screen located on the front panel. This allows the user to operate the recorder without the need for additional peripheral devices or systems. The recorder does, however, support applications that require local hard copy printing of Event Records. An RS-232 port is provided that can be used to drive a keyboard-equipped printer. The same printer can also be used to facilitate setup of the unit. A second RS-232 port is provided for use with a personal computer. An optional 14,400 Baud internal modem may be ordered that allows the user to remotely access and operate the recorder. A common phone line connection allows the user to gather critical Event Records from any location, however distant.

The Model 24D and 48D Event Recorders are designed to be easy to use and maintain. Their designs are based upon the premise that value and reliability begin with attention to detail and a concern for usability rather than needless complexity.

Key Features

Listed below are a few of the features included with every Model 24D and 48D Event Recorder.

- The standard storage capacity is 27,844 Event Records (expandable to a maximum of 478,404).
- Event Records for thirty different days can be stored.
- The memory is non-volatile. Event Records are retained even if power is removed.
- Relay signals in the range from 5 to 36 Vdc can be sensed. Optional AC voltage monitoring is available.
- Both positive and negative voltages can be sensed.

- Event Detection Times can be set by the user on an input-by-input basis. Default values are provided as an aid to the user.
- Events satisfying the Detection Time criteria are time stamped to the nearest tenth of a second.
- The real-time clock used by the recorder can be synchronized to an external signal.
- Flashing signal events are detected.
- Installation is quite simple. Input wires are terminated in detachable, screw-down terminals. Wire sizes as large as 12AWG can be used.
- Attaching the recorder to an event generating circuit is completely non-intrusive to the circuit. This is ensured by the high input resistance nature of the design. Each input utilizes opto-isolation technology to provide ground isolation of at least 3800Vdc.
- Power consumption is typically less than 3W. A 10 to 36Vdc power source can be used to power the recorder.
- Setup data and Event Record data can be easily and quickly transferred to a PC file.
- Three levels of password security provide protection against unauthorized access.
- Diagnostic commands allow users to perform an online test of the recorder's memory and keypad operation.
- The recorder is Y2K compliant.

Revision Level

This document refers to Version 3.07 of the Model 24D and 48D firmware. The sample data and command details listed were prepared using a Version 3.07 recorder. The differences between Version 2.X and Version 3.07 firmware are described below.

- A backdoor password has been added providing for compatibility with the GCS products.
- The internal clock can be synchronized to an external source.
- Three separate diagnostic commands have been added.
- Single-line and comma separated Event Record formatting has been added.
- Event Records displayed with the Dump and Query commands include a checksum value to distinguish the record data.
- The standard event memory capacity has been changed to 27,844 records.
- RS-232 and modem data transfer rates have been dramatically improved.
- Several bugs pertaining to the retrieval of record data have been corrected.

- Year 2000 compliance has been added.

Note Users presently operating recorders with Version 1.X or 2.X firmware are urged to contact MICRO-AIDE so that their recorders may be upgraded to Version 3.07 (or later). Upgrades are offered at no charge to the user.

About this Manual

The Model 24D and 48D recorders are virtually identical in every detail except one. The Model 24D has an input capacity of 24, while the Model 48D has an input capacity of 48. Aside from this specification the units are indistinguishable. The firmware and printed circuit boards are, in fact, interchangeable. Physically the units are identical and share the same option, accessory and specification details. This document describes both models. Where a model reference is cited the term Model 24D/48D will be used. In those rare cases where a description applies to only one model the terms Model 24D or Model 48D will be used.

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 Model 24D/48D Event Recorder. Wherever possible, step-by-step instructions are listed. 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 Model 24D/48D 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 Model 24D/48D is packed in an individual container that is properly sized for the unit. Abundant packing materials are provided to minimize mechanical shock to the contents. Before opening the shipping carton inspect the carton for damage. Damage to the container should be noted. Carefully remove the unit. It is advisable to save all packing materials in the event the unit ever needs to be returned to MICRO-AIDE.

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

Initial Check-out Procedure

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

- 12Vdc power source.
- Common hook-up wire for power and testing inputs (12 to 22 AWG).
- Wire strippers and small, flat-head screwdriver.
- PC equipped with a communications program (e.g., Procomm Plus® or HyperTerminal®) set to operate at 9600 Baud.
- Digital Voltmeter (DVM), optional.

Perform the following steps in the sequence listed. Refer to the section entitled “Trouble-shooting Guide” on page 63. It may be of assistance in the event the user experiences a problem. The front panel of the Model 24D/48D is illustrated in Figure 1 on page 6.

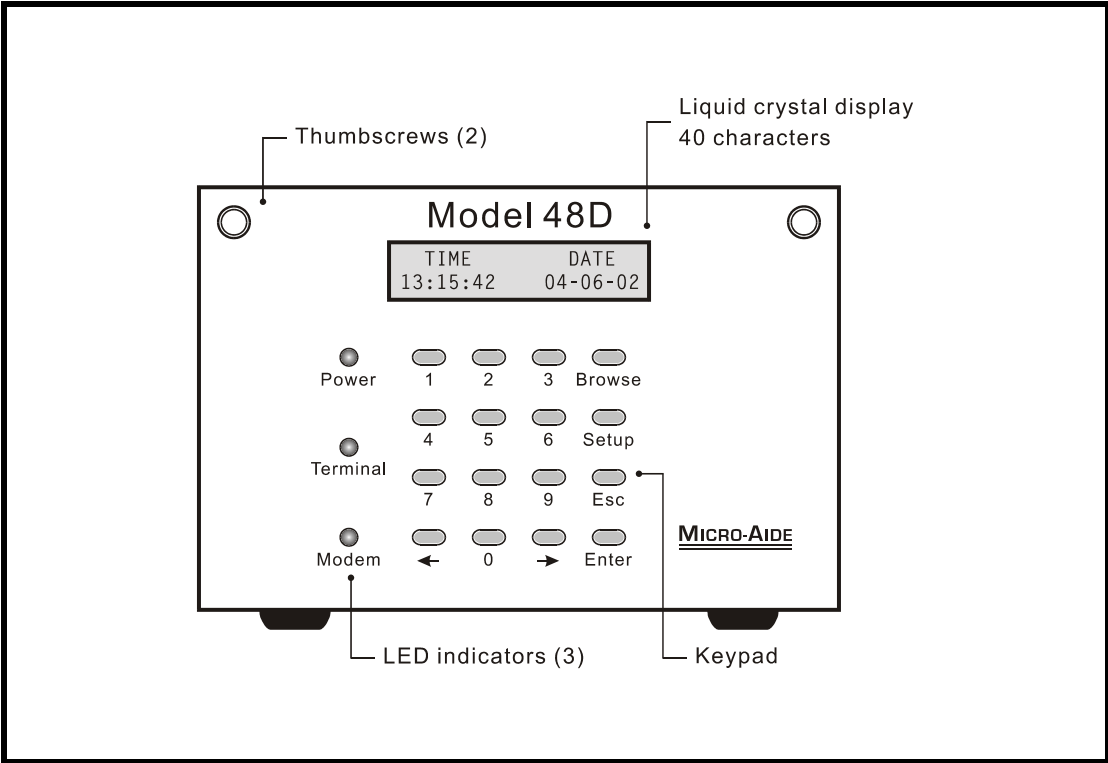


Figure 1 - Front Panel

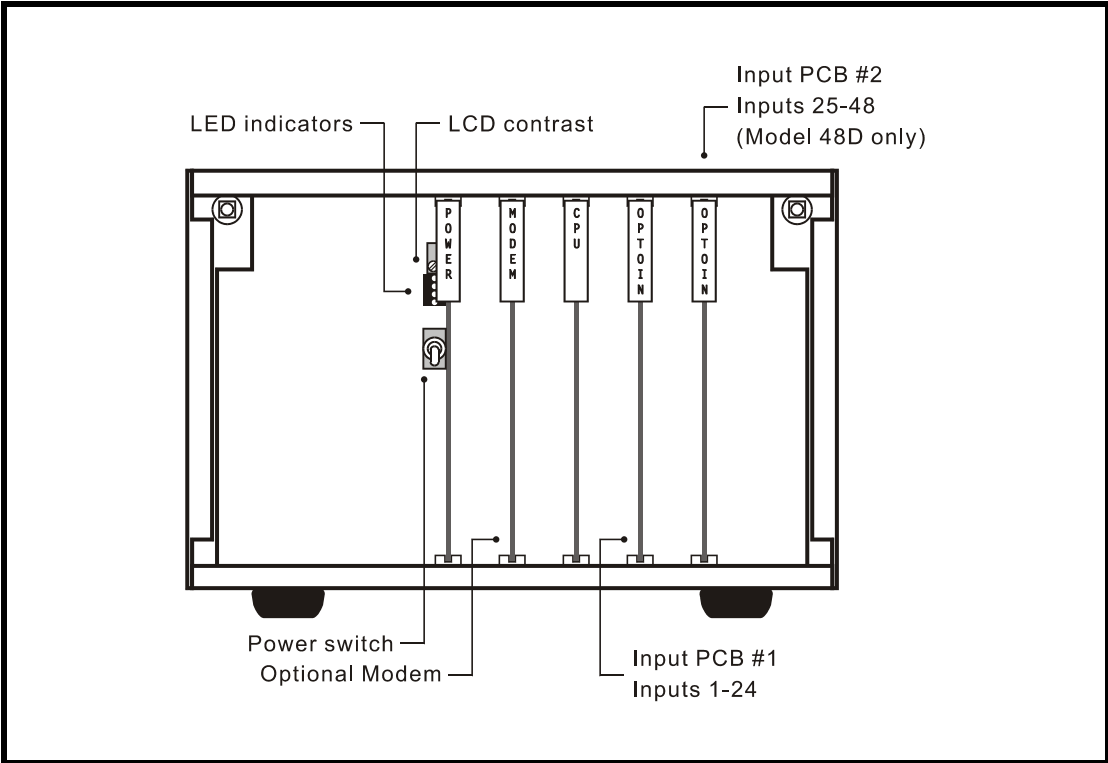


Figure 2 - PCB Positions

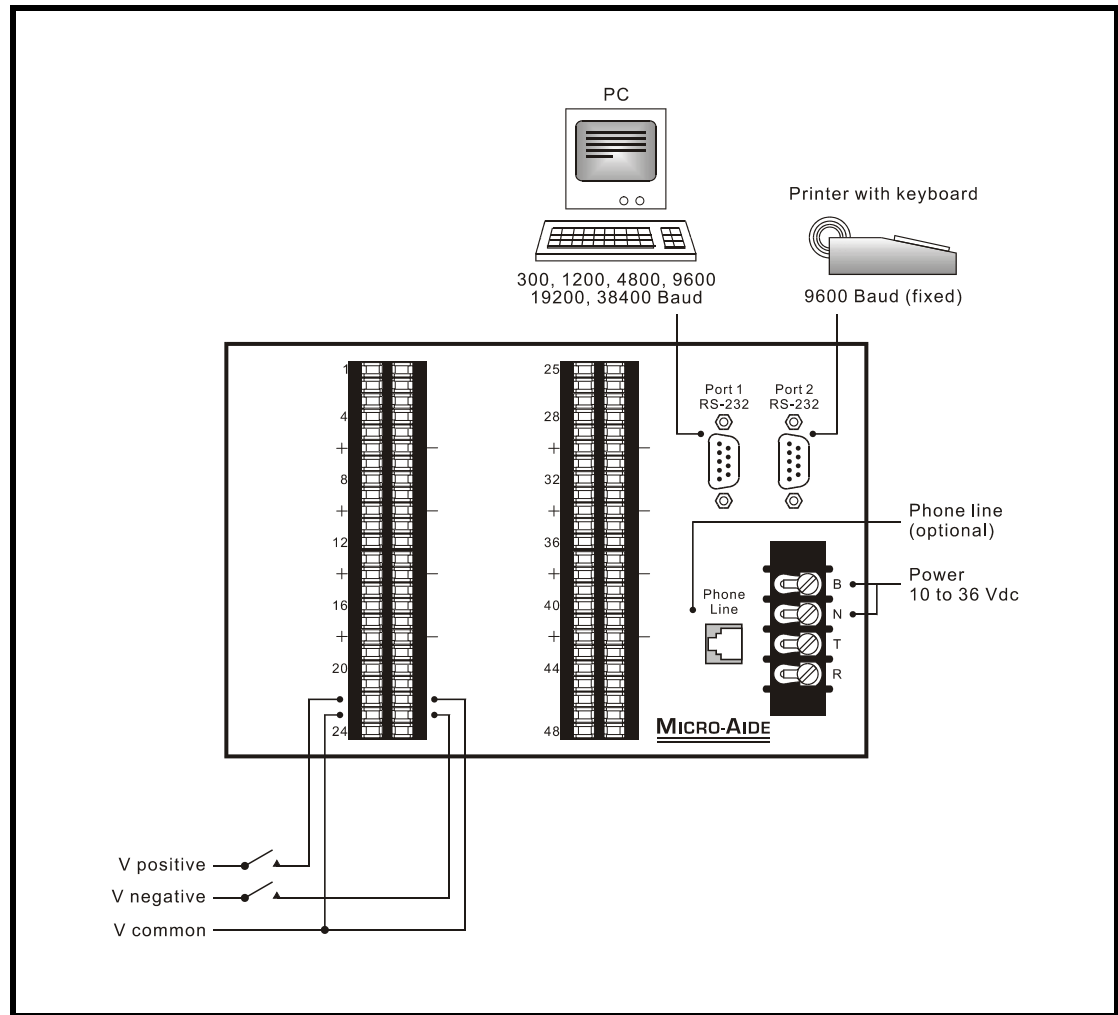


Figure 3 - Typical Installation - Rear Panel View

1. Open the hinged, front cover of the unit by rotating the two thumbscrew fasteners.
2. Ensure that the power switch is in the off or down position. It is located towards the left side of the unit on the printed circuit board (PCB) labeled “POWER”. Figure 2 on page 6 illustrates the location of the power switch and PCBs.
3. Connect the positive and negative voltages of the power source to the screw terminals at the rear of the unit labeled “B” and “N”, respectively. Typical power, cabling and peripheral connections are illustrated in Figure 3.
4. Connect the PC to the port at the rear of the unit labeled “Port 1” or “Port 2”. Use the cable provided by MICRO-AIDE or a DB-9 to DB-9 straight-through cable. The Model 24D/48D cable end must be female. The factory default setting for Ports 1 and 2 is 9600 Baud. Refer to “Set Port 1 Baud Rate” on page 12 for additional information.

Note The Model 24D/48D requires no parity, 8 data bits and 1 stop bit (i.e., N-8-1).

5. Turn the power on to the PC. If a PC is being used check to make sure that the communications program is set for a direct connection to the appropriate communications port.
6. Turn the power on to the Model 24D/48D by placing the power switch in the up position. The green power indicator located on the front panel should be illuminated.
7. Shortly after power is applied the recorder will request that a password be entered. If the recorder fails to display the password request, recheck the power and peripheral connections and Baud rate and communications settings. If the problem can be isolated to the Model 24D/48D contact MICRO-AIDE customer service for instructions on how to proceed. A typical password request is shown below.

```
Model 48D Event Recorder. Ver 3.07 (C) 1998 Micro-Aide Inc.  
***** NOT SET *****  
Event storage capacity: 27844  
Enter password:
```

Password Request

Note Material Return and Limited Warranty policies are described on the inside back cover of this manual.

8. From the PC 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.

```
This is a System Administrative session.  
  
A Toggle Display Mode  
B Browse events by date  
C System check-up  
D Selective dump of events  
E Erase oldest events  
F Set Flashing inputs  
H Toggle Full/Half duplex  
K Set input detect times  
L Set location name  
M Set modem ring delay  
N Set input names  
P Print password  
Q Query inputs  
R Retrieve database by XMODEM  
S Print live status of inputs  
T Print the current date and time  
U Upload/Download setup parameters  
V Print incoming events  
X Log off system  
  
Select a command:
```

Main Menu

9. Using a short pair of stripped jumper wires place ground and +12Vdc to Input Number 1. As viewed from the rear of the unit, Input Number 1 is located in the upper left-hand corner. Ground should be placed on the terminal to the right and +12Vdc on the left. The voltage must be held for at least three seconds before proceeding.

10. Using the same procedure as described in the previous paragraph, test the remaining inputs of the recorder.
11. Perform a Dump of the Event Records by pressing **D** then **Enter** four times at the PC keyboard. Refer to the section entitled “Selective Dump of Events (D)” on page 32.
12. Verify that the Dump includes an Event Record for each input tested. Note any inputs not listed and retest the inputs again, being careful to hold the voltage for at least three seconds. A second Dump should verify the retested inputs.
13. Before completing the Initial Check-out Procedure verify that the Liquid Crystal Display (LCD) is providing acceptable contrast. If it needs to be adjusted rotate the potentiometer on the Power Supply PCB. Refer to Figure 2 on page 6.

The input verification procedure described in the above can be used at any time to test proper circuit operation. This concludes the Initial Check-out Procedure. Power can now be removed from the recorder and the cover closed. The peripheral device should also be disconnected.

Tip In the event that a failure occurs during any part of this procedure a series of diagnostic tests should be performed. Refer to the section entitled “Diagnostic Tests” on page 60. The user may wish to contact MICRO-AIDE customer service. Instructions on how to proceed will be offered.

Installation Procedure

Installation of the Model 24D/48D is very straightforward. The following sections describe the recommended installation procedure. Figure 3 on page 7 illustrates the rear panel of the Model 24D/48D. The illustration also depicts the location of each connector and screw terminal.

Location

The physical location where the recorder is to be installed should comply with a few simple requirements. Most importantly, the ambient temperature near the unit should be in the range of -40°C to $+72^{\circ}\text{C}$. Access to the rear of the recorder is a requirement.

Mounting

The most common method of installation is to place the unit on top of a suitable shelf. The Model 24D/48D comes equipped with non-slip, rubber feet. However, precautions should be taken to prevent the recorder from dropping off the edge of the shelf or desktop. If a PC is to be used at the equipment site it should be similarly secured.

Tip Contact MICRO-AIDE in the event mounting brackets are required. Wall, shelf, 19" and 23" rack mounting hardware can be provided. Refer to “Appendix B” on page 67 for ordering details.

Site Preparation

The equipment location must have access to a stable 10 to 36Vdc power source. A pair of wires should be run from the power source to the location where the recorder will be mounted. One wire should be used for the positive voltage and the other wire should be attached to the return of the power source. The Model 24D/48D end of the pair should be crimped to standard No. 6 spade lugs. The power cables should be properly secured to prevent damage. They should not be run adjacent to electrical equipment such as motors that may generate large electrical disturbances.

Wire sizes ranging from 12 to 22AWG can be used for the input cables. The Model 24D/48D end should be stripped approximately 1/4" from the end. The stripped end will be secured by a screw-down connection located at the rear panel of the unit. Each wire should be tagged with its circuit identity. Each input cable or wire bundle should be anchored to prevent damage to the connections at either end.

Peripheral Equipment

If a PC is to be collocated with the Model 24D/48D an appropriate AC power source must be available. The RS-232 cable from the peripheral device to the recorder should be kept to a minimum distance, preferably less than 20'.

MICRO-AIDE provides, as a standard feature, an RS-232 DB-9 to DB-9 cable. This cable is suitable for use with most PCs. In the event a DB-9 to DB-25 cable is needed either contact MICRO-AIDE or purchase a DB-9 to DB-25 converter at any computer supply store. Figure 9 on page 66 illustrates the wiring of both cable types.

If the recorder is equipped with the optional internal modem a standard telephone line must be attached to the unit. The telephone line can be terminated with an RJ-11 connector like those commonly used in residential telephone service. A telephone line terminated in a pair of No. 6 spade lugs is also acceptable. Test the telephone line first to ensure that a dial tone is available.

Cabling

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

Power

1. Open the front cover of the unit by rotating the front cover thumbscrews. Ensure that the power switch is in the off or down position.
2. The two conductors connected to the power source should be secured to the screw-down terminals labeled "B" and "N", respectively.
3. Connect AC power to the PC.

Peripherals

1. Attach the peripheral cable to the appropriate RS-232 port labeled “Port 1” or “Port 2”. Refer to “Set Port 1 Baud Rate” on page 12 if the Port 1 Baud rate needs to be changed. It is not recommended that the Baud rate for Port 2 be changed from its default setting of 9600.
2. Connect the optional telephone cord to the connector labeled “Phone Line” or screw terminals labeled “T” and “R”.

Input Circuits

Events can only be recorded if the input circuits are wired properly. The polarity of each circuit must be correctly identified and appropriately wired to the input connectors.

Input circuits are wired to twelve-position, detachable terminals. Individual pairs are wired to adjacent sides of two different terminals. The positive lead of the circuit to be monitored must be connected to the left side terminal labeled “+”. The common, or return, lead must be connected to the right side terminal labeled “-”.

Input wiring is simplified if the female connectors are first removed from the male connectors secured to the chassis. Using a small, flat-head screwdriver simply insert the wire end into the terminal strip and secure the wire by tightening the screw at the side. Repeat this process for the remaining eleven positions. Reattach the connector to the male connector. Wire the remaining positive and common leads in the same manner. Care should be taken to ensure that positive and common leads are attached to the correct terminal position as well as the correct male connector.

Tip If many of the input connections are made to a common point (e.g., negative battery) a multi-position terminal strip can be used to simplify the wiring. A ten-position Jumper Comb (Weidmuller part number 147250) can be used.

Both positive and negative voltage events can be monitored, even if they occur from the same circuit (e.g., a polarity changing searchlight coil). In such cases the circuit is wired to two inputs of the Model 24D/48D, one for each polarity.

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

Power On

After all of the cabling is completed the power can be applied. Shortly after power is turned on the PC will display the password request. Refer to the sample data entitled “Password Request” on page 8. The front panel LCD will indicate the time and date as depicted in Figure 1 on page 6.

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

Setup Procedure

Before the Model 24D/48D is ready to be used it must be set up in such a way as 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 recorder via a PC. Succeeding chapters describe how to use the front panel display and keypad, as well as access the unit via the optional modem.

Set Port 1 Baud Rate

The Baud rate for Port 1 may be set to one of six speeds. The procedure for changing the Baud rate involves using the front panel keypad and LCD. Refer to “SPort - Set Port 1 Baud Rate” on page 53 for further details on how the Baud rate is changed.

Note The Port 2 Baud rate is factory set to 9600. It is not recommended that it be changed.

Main Menu (?)

Commands

The remainder of the Setup Procedure concerns the use of commands that define the operational parameters of the recorder. Each command is listed in the Main Menu. Refer to sample data entitled “Main Menu” on page 8 for details. The commands consist of a single character (e.g., **A** and **T**). The commands are immediate acting in that when a key is pressed a response is initiated. The **Enter** key does not need to be pressed. A few cases notwithstanding, both upper- and lower-case letters may be used. The complete Main Menu can be displayed by pressing the **?** key.

In the descriptions that follow each command is listed by name. The command letter is shown in parenthesis. The sequence of commands represents the recommended order of execution.

Data Flow Control

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

To Pause the data being sent press the **Ctrl** and **S** keys simultaneously. The data flow will be stopped indefinitely. To Resume data flow press the **Ctrl** and **Q** keys simultaneously. This technique can be used to freeze the data at the PC as well as prevent buffer overflow at the printer. Pausing the data flow to the printer will allow the printer to empty its data buffer and thus catch-up with the data being sent. If the user experiences missing data or data gaps at the printer it is very likely caused by an overflowing of the printer’s data buffer. The data flow commands should be used to prevent such occurrences.

The Abort command is also very useful. During a long data printout the remainder of the data can be ignored by pressing the **Esc** key. The user can issue other commands immediately after the Abort is executed rather than wait until a lengthy data Dump or other report is completed.

System Check-up (C)

After the peripheral device (e.g., PC or printer) has been connected and is operating properly it is advisable to perform a System Check-up operation. The System Check-up performs an internal diagnostic of the Model 24D/48D. Memory is tested and the recorder is reset (i.e., all data is cleared). The System Check-up procedure is described in the following steps.

Caution A System Check-up will clear all Event Records and setup data!

1. Press the **C** key. The Model 24D/48D will respond with the following precautionary message:

```
About to perform a very DESTRUCTIVE system test.
Event database and programmable settings will be destroyed.

Are you sure you want to proceed (Y/N)?
```

2. To abort the check-up press **N**. To proceed with the test press the upper-case **Y**. If yes is selected the unit will immediately proceed with the test. After a few seconds the recorder will issue the password request. Refer to the sample data entitled “Password Request” on page 8.
3. The event storage capacity should not be less than 27,844 events. If additional memory has been installed the storage capacity must be greater. Contact MICRO-AIDE in the event the capacity is not correctly listed.

This completes the System Check-up procedure. After a System Check-up is performed all system parameters are returned to their factory set default values as listed in Table 1.

Parameter	Default Value
Clock Sync Input	None
Duplex setting	Full
Location Name	***** NOT SET *****
Input Names	I. Name #1, I. Name #2, etc.
Detection Times	3.0 seconds
Flashing Inputs	Disable
Password, Administrative	PASSWORD
Password, Restricted	LOOKWORD
Passcode	12345678
Ring Delay	2
Display Mode	Full screen, TVI-910

Table 1 - Default Parameters

Toggle Full/Half Duplex (H)

Depending upon the nature of the peripheral device being used it may be necessary to have the Model 24D/48D echo back to the peripheral device characters entered by the user. Echoing back ensures that the key pressed by the user will appear at the PC. Additionally, if the peripheral is displaying double characters the recorder's duplex setting must be changed.

To toggle between half and full duplex operation press the **H** key. After a System Check-up is performed the recorder defaults to full duplex operation. The recorder will issue one of the following confirmation messages in response to a selection of half or full duplex.

```
Duplex mode is HALF
Duplex mode is FULL
```

Tip Generally, the correct setting is to have the PC and recorder set to full duplex.

Print the Current Date and Time (T)

All Event Records are time stamped. Consequently, the date and time must be set correctly. To set the date and time press **T**. The recorder will respond with a message similar to the following.

```
The current time and date is 15:10:48.90 04-06-2002
Is it correct (Y/N)?
```

Press the **Y** or **Enter** keys if the date and time are correct. Press **N** if either setting needs to be changed. If **N** is selected it is imperative that the user follow the syntax as specified by the displayed messages. Leading zeros are not required. Hyphens (-) must be entered in the date field. Colons (:) must be entered in the time field. The number of seconds must be entered.

The recorder will respond to the **N** entry as follows.

```
Enter current date (MM-DD-YY):
```

The last digit in either the date or time entry must be followed by the **Enter** key. Provided the date is set correctly the recorder will request that the time be set by issuing the following message.

```
Enter current time in military format (HH:MM:SS):
```

Note The Model 24D/48D uses a 24-hour, military-style clock. As an example, 3:00PM must be entered as 15:00:00.

An incorrect date or time entry will result in an error message being issued. After the date and time are set a message similar to the following will be displayed.

```
Clock Sync Input (enter to keep current value of 0, 0=none):
```

Synchronizing the Clock

The Model 24D/48D is equipped with a real-time clock that allows the recorder to time stamp Event Records to the nearest tenth of a second. With any clock a small amount of drift can be expected. The Model 24D/48D will drift approximately one minute per month. The clock-sync feature allows an external signal to set the recorder's clock to the nearest fifteen minute mark.

To synchronize the Model 24D/48D clock to an external input enter any valid Input Number in response to the request listed above. Leading zeros are not required. To disable the clock-sync feature enter a value of zero.

The Clock Sync Input is treated like any other Digital Input. Changes in state of the Clock Sync Input will create Event Records. When the input transitions to an active state (i.e., voltage is applied) the clock will be rounded to the nearest fifteen minute value. Accordingly, the count of seconds will be cleared to 00.0. As an example, if the time is 12:16:03.9 the clock-sync feature will set the clock to 12:15:00.0. If the time is 12:44:20.2 the clock will be set to 12:45:00.0.

Caution The assigned Clock Sync Input will normally be connected to the output of a PLC. The time between successive PLC output pulses must be a whole multiple of 15 minutes. Otherwise the recorder's clock will indicate a significant error.

The Detection Time setting for the Clock Sync Input must be less than the duration of the synchronizing pulse. Refer to "Set Input Detect Times (K)" on page 17 for additional information.

Tip The clock should be set by the user at least once a week if the clock-sync feature is not used.

Set Location Name (L)

After the date and time are set the recorder's Location Name should be entered. The Location Name serves as a comprehensive ID. The name is included in data fields as a part of a header message. Data from several recorders can be easily distinguished by providing each unit with a unique, descriptive name. To set or change the Location Name press L. The following message will be displayed.

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

Would you like to change the location name (Y/N)?
```

In the above example the Location Name was not previously set. Press **N** if the name is correct, press **Y** to change the name. The yes response is listed below.

```
Please enter location name of up to 80 characters
```

As many as eighty upper- and lower-case letters, numbers and symbols may be entered.

Set Input Names (N)

The Model 24D/48D allows the user to assign names to circuits that are being monitored. This allows the user to easily differentiate events from several circuits. As many as twenty characters may be used to provide descriptive identities. As a convenience to the user default Input Names are assigned to each input. This allows the user to save time and bypass the Set Input Names procedure. Shown below are examples of the default name assignments.

Press **N** to either view or change the Input Names. The following message will be issued.

```
P Print input names
S Set input names
X Exit
Select Command:
```

The user can select any of three Input Name commands. Each command is described separately in the following paragraphs.

Print Input Names (P)

Press **P** to print a list of the assigned Input Names. In the example cited below only the first five lines at the top of the list are shown. In practice all 24/48 inputs will be listed in two columns. The names listed are the factory set default names.

```
Current Input Names
```

INPUT	NAME	INPUT	NAME
1	I. Name #1	25	I. Name #25
2	I. Name #2	26	I. Name #26
3	I. Name #3	27	I. Name #27
4	I. Name #4	28	I. Name #28
5	I. Name #5	29	I. Name #29

Set Input Names (S)

In the event the default or previously assigned Input Names need to be changed, press **S**. The following prompt message will be displayed.

```
Enter name of up to 20 characters for input # 1
or press ESC key to end or jump to another input.
```

The user can enter the name to be assigned to Input Number 1 or press the **ESC** key to jump to another input. In the example that follows Input Number 1 is assigned the name “Xflash A-1”. Input Number 3 is then given the name “Xflash A-2”.

```
Enter name of up to 20 characters for input # 1
or press ESC key to end or jump to another input.
Xflash A-1
Enter name of up to 20 characters for input # 2
or press ESC key to end or jump to another input.

Press ESC to quit or enter an input number to jump to.
3
Enter name of up to 20 characters for input # 3
or press ESC key to end or jump to another input.
Xflash A-2
Enter name of up to 20 characters for input # 4
or press ESC key to end or jump to another input.
```

In the above example the user-entered data is shown in bold type face. As a convenience to the user the Model 24D/48D automatically advances to the next sequential input after a name is entered. Pressing the **ESC** key twice will return the user to the Set Input Names sub-menu.

Exit (X)

To exit the Set Input Names sub-menu and return to the Main Menu press **X**.

Set Input Detect Times (K)

This command allows the user to inspect and program Detection Times associated with each input assigned to the recorder. Detection Times are used by the Model 24D/48D to qualify input signals as valid events. When a change in the state of an input occurs the recorder will track the duration of the new state. If the new state persists longer than the Detection Time applicable to that input, an event is declared and recorded in memory. The change in state is ignored if the duration fails to meet the Detection Time setting. This process prevents the unit from recording false events that may be the result of transient voltages or noise.

As a convenience to the user the Model 24D/48D is pre-programmed to provide a default Detection Time setting of 3.0 seconds. This value will be quite satisfactory in most applications.

Note The Detection Time setting for inputs assigned as Flashing requires additional explanation. Refer to “Set Flashing Inputs (F)” on page 20 for additional information.

Press **K** to select the Set Input Detect Time command. The following sub-menu will be issued.

```
P Print input signal durations
A Set all input signal durations
I Set individual input signal durations
X Exit

Select Command:
```

Each of the commands listed in the above are described in the following paragraphs.

Print Input Signal Durations (P)

Press **P** to display a list of all Detection Time values. In the example below only the first five lines are shown. The Detection Times listed are each set to the default value of 3.0 seconds.

Current Input Signal Durations					
INPUT	NAME	THRESHOLD	INPUT	NAME	THRESHOLD
1	I. Name #1	0.1 Sec.	25	I. Name #25	0.1 Sec.
2	I. Name #2	0.1 Sec.	26	I. Name #26	0.1 Sec.
3	I. Name #3	0.1 Sec.	27	I. Name #27	0.1 Sec.
4	I. Name #4	0.1 Sec.	28	I. Name #28	0.1 Sec.
5	I. Name #5	0.1 Sec.	29	I. Name #29	0.1 Sec.

Set All Input Signal Durations (A)

If the Detection Time for every input needs to be set to a common value different from the default or previously assigned value, press **A**. The following prompt message will be displayed.

```
Input signal durations are in units of 0.1 Seconds,
i.e. 01 for 0.1 sec. or 15000 for 1500.0 seconds.
Only values between 1 and 15000 will be accepted.

Please enter a signal duration
```

The user must enter a value in the range from 1 to 15,000 and then press **Enter**. The value entered is considered by the recorder to be a multiple of .1 seconds. Accordingly, a setting of 25 corresponds to a Detection Time of 2.5 seconds.

Tip A setting of zero is permitted. Setting the Detection Time to zero disables event recording from the input(s) so assigned.

Set Individual Input Signal Durations (I)

Press **I** to set specific Detection Time values to selected inputs. This command can be very useful in detecting events on inputs that have unique timing characteristics. The following message will be displayed after pressing **I**.

```
Input signal durations are in units of 0.1 Seconds,  
i.e. 01 for 0.1 sec. or 15000 for 1500.0 seconds.  
Only values between 1 and 15000 will be accepted.  
  
Please enter a signal duration for input # 1  
Enter 00 to inhibit the input or press ESC key to exit.
```

In the example that follows several contiguous and non-contiguous inputs have been assigned.

```
Input signal durations are in units of 0.1 Seconds,  
i.e. 01 for 0.1 sec. or 15000 for 1500.0 seconds.  
Only values between 1 and 15000 will be accepted.  
  
Please enter a signal duration for input # 1  
Enter 00 to inhibit the input or press ESC key to exit.  
25  
Please enter a signal duration for input # 2  
Enter 00 to inhibit the input or press ESC key to exit.  
35  
Please enter a signal duration for input # 3  
Enter 00 to inhibit the input or press ESC key to exit.  
0  
Please enter a signal duration for input # 4  
Enter 00 to inhibit the input or press ESC key to exit.  
  
Press ESC to quit or enter an input number to jump to.  
10  
Please enter a signal duration for input # 10  
Enter 00 to inhibit the input or press ESC key to exit.  
30  
Please enter a signal duration for input # 11  
Enter 00 to inhibit the input or press ESC key to exit.  
  
Press ESC to quit or enter an input number to jump to.
```

Input Number 1 is set to 2.5 seconds. Input Number 2 is set to 3.5 seconds. Input Number 3 has been disabled (note the 0 entry). The user then jumped to input 10 by pressing **ESC** and then entering the value 10. Input 10 is set to 3.0 seconds. The command was then terminated by pressing **ESC** twice. The user-entered data in the above example is shown in bold type face. The **ESC** characters do not appear since they are non-printing characters. At the completion of the Set Individual Input Signal Durations command the sub-menu is displayed.

Exit (X)

To exit the Set Input Detect Times sub-menu and return to the Main Menu press **X**.

Set Flashing Inputs (F)

The Model 24D/48D will report flashing events. A flashing event is typically created by a series of voltage pulses from a flashing light circuit. Each time the light flashes a new pulse is seen at the input. However, the recorder must log only the start and end events, not an event for each pulse. Assigning the proper Detection Time to the input and identifying the input as a Flashing Input solves the problem of multiple flash events when only a single (high and low) pair of events is actually required. Figure 4 illustrates the method used to detect flashing events.

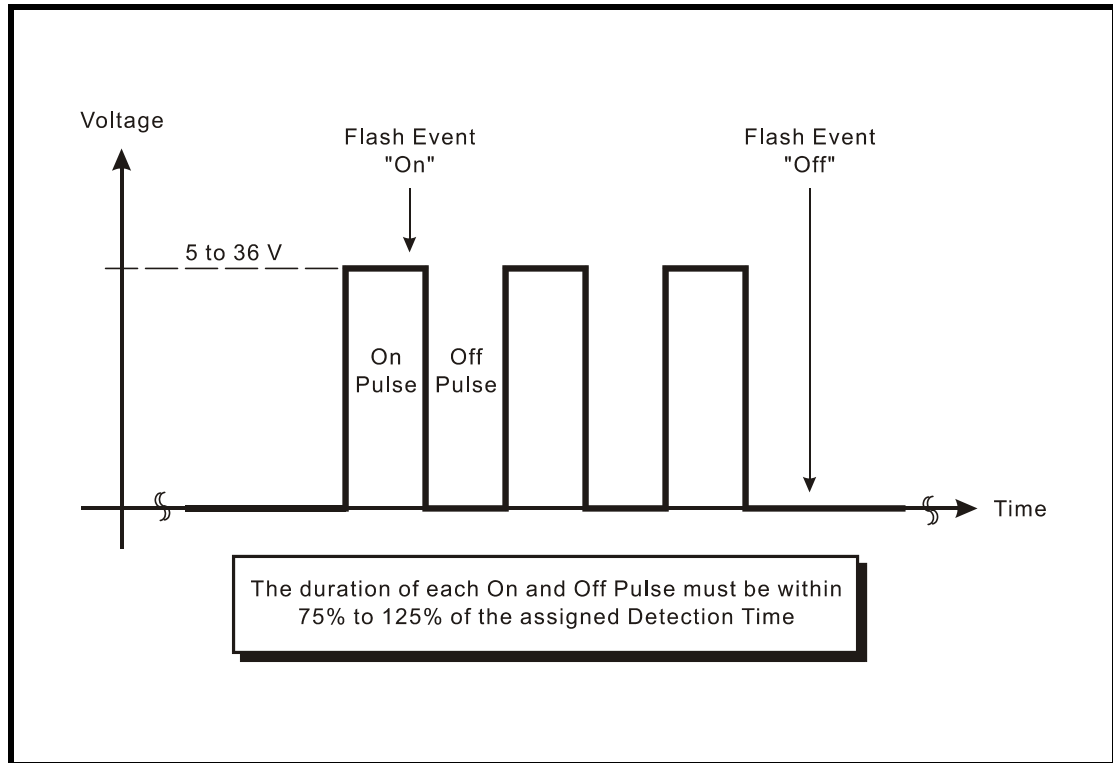


Figure 4 - Typical Flashing Pulse Sequence

The Detection Time must be set to the nominal duration of the expected pulses. The pulses are also expected to be on and off for the same duration (i.e., symmetrical). The Model 24D/48D is designed to allow for some variation in the duration of each pulse. As noted by Figure 4, each on and off pulse must have a duration that is 75% to 125% of the assigned Detection Time.

Tip The Detection Time for inputs with non-varying flash rates must be equal to 30 divided by the number of flashes per minute.

To set Flashing Inputs press **F**. The following sub-menu of choices will be displayed. Each command is described in the following paragraphs.

```
C Clear all flashing inputs
P Print flashing inputs
S Set flashing inputs
X Exit
Select Command:
```

Clear All Flashing Inputs (C)

Press **C** to return each input, previously assigned as flashing, to non-flashing status. The clear command acts immediately. After the command is executed the sub-menu is once again displayed.

Print Flashing Inputs (P)

Press **P** to list the assigned flashing status of each input. A partial printout is shown below.

Current Flashing Inputs					
INPUT	FLASHING	INPUT	FLASHING	INPUT	FLASHING
1	ENABLE	17	DISABLE	33	DISABLE
2	DISABLE	18	DISABLE	34	DISABLE
3	DISABLE	19	ENABLE	35	DISABLE
4	ENABLE	20	DISABLE	36	DISABLE
5	DISABLE	21	DISABLE	37	ENABLE

Set Flashing Inputs (S)

To assign Flashing Inputs press **S**. The following message will be issued.

```
Respond with a Y to enable or an N to disable flashing inputs.
Or press the ESC key to jump to another input.

Enable flashing input # 1 (Y/N)?
```

If the user presses **N** the input will be assigned as non-flashing. Pressing **Y** assigns the input as flashing. In either case the recorder advances to the next consecutive input, prompting the user with the same message.

The user can jump to another input out of the sequence by pressing **Esc**. The user is then requested to enter a new Input Number. The process of assigning Flashing Inputs then continues as described in the above. Press **Esc** twice, consecutively, to return to the sub-menu.

Exit (X)

To exit the Set Flashing Inputs sub-menu and return to the Main Menu press **X**.

Print Password (P)

The Password feature embodies three distinct levels of protection against unwanted intrusions. Access via the RS-232 ports and the optional modem is permitted only after a proper password is entered. Two types of access are permitted from the RS-232 and modem ports. The first is referred to as Administrative Access, the second is referred to as Restricted Access. Administrative Access allows the user to select all of the commands that the recorder utilizes. Restricted Access allows the user to select only those commands that provide for Event Record viewing. Under Restricted Access the user cannot change any settings employed by the recorder.

The third level of password protection involves the use of the Passcode feature. The Passcode protects the Setup Database from unwanted changes via the front panel. Pressing the front panel **Setup** key forces the user to enter the proper Passcode.

Note The factory default settings for the Administrative, Restricted and Passcode passwords are **PASSWORD**, **LOOKWORD** and **12345678**, respectively. Passwords are case sensitive. Upper- and lower-case letters must be entered correctly.

In a Restricted Access session the Main Menu lists the following abbreviated set of commands.

```
This is a Restricted session.

B  Browse events by date
D  Selective dump of events
N  Set input names
Q  Query inputs
R  Retrieve database by XMODEM
S  Print live status of inputs
V  Print incoming events
X  Log off system

Select a command:
```

Main Menu - Restricted Access

Information similar to the following will be displayed after selecting the Password command.

```
Administrative password: PASSWORD
Restricted password: LOOKWORD
Keypad Passcode: 12345678

Which password would you like to change,
Administrative/Restricted/Passcode/None (A/R/P/N)?
```

Pressing the **A** or **R** key will issue the following request.

```
Enter new password (up to 10 characters):
```

If the **P** key is pressed the following Passcode request is displayed.

```
Enter new keypad passcode (up to 8 digits):
```

Any combination of characters not exceeding ten total may be used for the Administrative or Restricted Access passwords. The Passcode is limited to eight numbers (i.e., non-numeric characters are not accepted). Corrections may be made by backspacing over characters. Before a password or Passcode is accepted it must be re-entered exactly as it was originally keyed.

Tip If the user wishes to disable the password protection a null-password can be defined. To set a null-password press the **Enter** key in response to the request for a new password. Confirm the password with a second **Enter**. Once the null-password is accepted each user session can be initiated by simply pressing **Enter** when the recorder requests a password. A null-Passcode can be similarly defined.

Upload/Download Setup Parameters (U)

A Model 24D/48D will require a considerable amount of data entry if every input is to be assigned an Input Name, Detection Time, etc. that differs from the default values. In the event of an accidental loss of data memory (e.g., System Check-up performed by mistake) each Input Name and Detection Time must be re-entered. The upload and download commands provide 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 Procomm Plus® or HyperTerminal® makes an ideal storage system. A file containing all of 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 press **U**. The following sub-menu will be displayed. Both procedures are described in the following sections.

```
U Upload setup data (from PC)
D Download setup data (to PC)
X Exit
Select Command:
```

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 recorder's RS-232 ports are being used select Direct connect-Com1 or Direct connect-Com2 (whichever is available). If the modem is being used the host modem must be logged-on with the recorder.
- **Baud rate:** as required by the recorder 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 the Download command is used. Press **D** to display the following message.

```
Sending setup data by 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 Procomm Plus and HyperTerminal methods, respectively. Windows 98 was used in the following procedures. Later versions of these programs may be slightly different. However, the fundamental approach will remain valid.

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_10.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 5760 bytes will be transferred.
4. If the transfer is successful a message similar to “Transfer complete - setup_10.xmd” will appear in the lower left-hand corner of the Procomm Plus window. The Model 24D/48D will issue the following message.

```
Transfer complete
```

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_11.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.

The Upload/Download sub-menu will be displayed after the file transfer is completed. The following message will be issued if the file is not promptly opened after initiating the download.

```
Transfer error
```

The user can then attempt a second download by once again pressing D.

Restoring the Setup Database (U)

Before the Setup Database can be restored to the recorder it must have been previously saved. Refer to the procedure entitled “Saving the Setup Database (D)” on page 23. The PC and communications program must be properly configured before the database can be restored. The following list describes the correct configuration.

- **Transfer protocol:** Xmodem.
- **Connection:** If the recorder’s RS-232 ports are being used select Direct connect-Com1 or Direct connect-Com2 (whichever is available). If the modem is being used the host modem must be logged-on with the recorder.
- **Baud rate:** as required by the recorder 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 recorder from a PC file the Upload command is used. Press **U** to display the following message.

```
XMODEM receiving data... (Ctrl-X to stop)  
CCCC
```

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

The steps necessary to complete the upload depend upon which communications application is being used. The following paragraphs describe the Procomm Plus and HyperTerminal methods, respectively. Windows 98 was used in the following procedures. Later versions of these programs may be slightly different. However, the fundamental approach will remain valid.

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_10.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 5760 bytes will be transferred.
4. If the transfer is successful a message similar to "Transfer complete - setup_10.xmd" will appear in the lower left-hand corner of the Procomm Plus window. The Model 24D/48D will issue the following message.

```
Upload completed
```

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_11.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.

The Upload/Download sub-menu will be displayed after the file transfer is completed. The following message will be issued if the file is not promptly sent after initiating the upload.

```
Transfer error
```

The user can then attempt a second download by once again pressing **U**.

Exit (X)

To exit the Upload/Download Setup Parameters sub-menu and return to the Main Menu press **X**.

Log Off System (X)

The Log Off System command is applicable to both Administrative and Restricted Access sessions initiated via the RS-232 ports or modem. If the previous user properly logs off of the recorder, access can be regained only by entering the correct Administrative or Restricted Access password. If the previous session is not terminated with the Log Off System command then a second user will be allowed access without having to enter a correct password.

Tip To ensure security all sessions should be terminated by executing the Log Off System command.

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

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

Enter an upper-case **Y** to log off.

Note The Setup Procedure includes an optional step that applies only to those recorders equipped with a MICRO-AIDE modem. The modem allows the user to access the Model 24D/48D from any modem equipped system such as a PC. If the recorder being set up does not have a modem the following command can be ignored.

Set Modem Ring Delay (M)

The Model 24D/48D optional modem is designed to operate in auto-answer mode, that is it will automatically answer calls made to the telephone line. The user can set the number of rings required before the modem answers. This is referred to as ring delay.

To set the Modem Ring Delay press **M**. The following message will be issued.

```
The current ring delay is 02  
Would you like to change it (Y/N)?
```

The current ring delay is always displayed on the first line. To change the setting press **Y**. Enter a one- or two-digit number followed by the **Enter** key.

Tip To disable the auto-answer feature of the modem enter zero as the Modem Ring Delay. This will prevent incoming calls from being answered by the modem.

This completes the Setup Procedure for the Model 24D/48D. The recorder will now be able to gather Event Records in accordance with the setup performed by the user. Since the installation and setup of the recorder are critical to how the unit will perform, it is advisable to review the steps taken earlier.

The next chapter describes how to operate the recorder.

OPERATION

Introduction

This chapter describes how to operate the Model 24D/48D from either a printer or PC running a suitable communications program. Local (i.e., on-site) as well as remote methods of operating the Event Recorder are described. Before the recorder can be operated it must be properly installed and set up. A PC or printer must be online with the recorder. The use of the LCD panel and keypad are described in the next chapter.

Multi-User Operation

A unique feature of all MICRO-AIDE recorders is their support of multiple user activity via the modem, RS-232 ports or front panel keypad. This multi-user capability eliminates the annoying practice in some recorders of one user effectively locking-out a second or third user.

Remote Operation

The setup and operational features of the Model 24D/48D can be exercised remotely provided the recorder is equipped with a MICRO-AIDE internal modem. A PC equipped with a modem and a communications program makes an ideal remote access system. Event Records and setup data from several remote recorders can be gathered and saved to either a hard disk or diskette file.

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

Establishing a Modem Connection

A standard telephone line must be attached to the modem of the Model 24D/48D. To access the Event Recorder the host system must dial the telephone number of the Model 24D/48D and wait for an answer. The distant modem will answer after a predetermined number of rings. Refer to the section entitled "Set Modem Ring Delay (M)" on page 27. The modems at both ends 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 Model 24D/48D will only permit reliable connections to be established. The host modem should be programmed for LAPM, V.42bis or MNP 2-4 operation.

Entering the Password

The Model 24D/48D will issue the following password request after a connection is established.

```
Model 48D Event Recorder. Ver 3.07 (C) 1998 Micro-Aide Inc.  
***** NOT SET *****  
Event storage capacity: 27844  
Enter password:
```

The host system must issue the correct password followed by an **Enter**. Passwords are defined in accordance with the procedure entitled “Print Password (P)” on page 22.

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

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

After the password is entered the user will be able to operate the recorder in a manner identical to that specified by local operation. Accordingly, the Model 24D/48D will display either the Administrative Access Menu or Restricted Access Menu. Refer to the sample data entitled “Main Menu” on page 8 and “Main Menu - Restricted Access” on page 22, respectively.

How to Operate the Model 24D/48D

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, select a different sequence of commands. An explanation of each operational command is included in the remaining sections of this chapter. Each command is listed by its name followed by its command code in parenthesis.

Toggle Display Mode (A)

The Model 24D/48D is designed to take advantage of the unique data presentation characteristics associated with PCs that perform terminal emulations. Unlike printers, a terminal emulation can be used to display new data on a single screen as it occurs. The Toggle Display Mode command allows the user to select either line or full screen operation. Line Mode is typically used with printing devices. Full Screen Mode is the recommended mode for PCs emulating terminals.

Tip Full Screen Mode is compatible with ANSI and Televideo TVI 910 terminals. If a PC is being used the communications program should be set to emulate one of these terminal types.

Line Mode may be used with terminals but the Full Screen data presentation is much easier to use. The sample data shown for the Print Live Status of Inputs command illustrates the difference in data presentation. Refer to “Print Live Status of Inputs (S)” on page 36. To switch between Line

and Full Screen Modes press **A** repeatedly until the desired mode is selected. The unit will indicate the current mode setting with one of the following messages.

```
Unit is now in Line Mode
Unit is now in Full Screen ANSI Mode
Unit is now in Full Screen TVI 910 Mode
```

Browse Events by Date (B)

The Browse Events by Date command allows users to inspect a group of ten consecutive Event Records. It can be used in Full Screen and Line Modes. The Event Records to be Browsed are specified by the starting date and time selected by the user. Additional groups of records that precede and succeed the initial group can be easily displayed. The Browse Events by Date command displays records in a simplified format.

Press **B** to Browse Event Records. A message similar to the following will be issued.

```

                                Event Active Dates
1 04-05-02      2 04-06-02      3 04-07-02      4 04-08-02      5 04-09-02
There are 7114 events in 5 day(s).
Select a starting date (RETURN for all):
```

In the example cited above, the second line of text identifies those dates for which events were recorded. The number to the left of the date is used as an identifier for the date listed. Date Identifiers range from 1 to 30. The Date Identifiers are labeled “1”, “2”, “3”, “4” and “5” for the example shown above. If the user presses **Enter**, events starting at 00:00:00 for the first date listed (i.e., Date Identifier 1) will be displayed.

Note The Model 24D/48D will store Event Records for thirty days, regardless of the total number of events stored. Records for the thirty-first day will over-write the records for day one.

Records for a specific date may be displayed by simply typing the appropriate Date Identifier. An additional message similar to the following will then be issued.

```
Entry number 2 04-06-02 has been selected.
Available events are from 00:12:25 to 23:58:54
Enter the starting time in HH:MM:SS:
```

The second line of text in the message indicates the time span during which events were recorded. The last line of text specifies that the starting time must be entered in HH:MM:SS format. Each field must be separated by a colon character. Military time is used by the Model 24D/48D. Accordingly, 12:00:01 AM and 11:59:59 PM must be entered as 00:00:01 and 23:59:59, respectively. The start time specifies the time after which Event Records will be reviewed. If records are to be reviewed starting at midnight the user can simply press **Enter**.

A report similar to the following will be displayed (for convenience only two records are listed in the example cited). The date, time and Input Number for the Event Record are listed in the first three fields. The event for the Input Number specified is indicated as H for high, and L for low. The status of the other 23/47 inputs is indicated by an X or . (period). An X indicates that the input was high. A . (period) indicates that the input was low.

```
Event Browse Screen
04-06-02  18:53:30.8  22 .....X. .... .H..... .....X
04-06-02  18:53:32.5  48 .....X. .... .X..... .....L
Use  A - scroll up, Z - scroll down, S - search database or ESC to exit:
```

As indicated by the message at the bottom of the screen the **A** and **Z** keys may be used to scroll up and down the list of records. Press **Z** to display the next ten records and **A** to list ten earlier records. If the user scrolls to the very top or bottom of the record set a message will be issued indicating that the boundary of the record set has been reached.

To display records from a single input press **S**. The following message will be displayed.

```
Enter a list of up to 20 input numbers,
separated by spaces, you wish to query
(Invalid input numbers will be ignored).
```

As the message above indicates as many as twenty inputs may be reviewed. This provides the user with a simple way to review Event Records for a specific date and set of inputs. The Input Numbers may be entered in any sequence but a space must separate each number. After the numbers are selected press **Enter**. The Event Records will be listed in chronological order using the same format as the example cited earlier. The records will start from the time and date position the Browse command last referenced.

If no Event Records are stored the following message will be displayed immediately after the Browse command is selected.

```
There is no event recorded in the database
```

To exit the Browse Events by Date command press **Esc**.

Selective Dump of Events (D)

The Selective Dump of Events command is the most versatile and descriptive method by which Event Records may be printed and displayed. The Browse and Query functions are generally used to augment the Dump feature. The Dump report utilizes three different formatting options. It may contain forward or reverse chronologically ordered Event Records. The assigned Input Name, type of event and optionally the status of adjacent inputs at the time the event was

recorded are included in each Dump record. Despite its compact format the Dump report provides a very comprehensive view of important event data.

Press **D** to Dump Event Records. A message similar to the following will be displayed.

```
                                Event Active Dates
    1 04-05-02      2 04-06-02      3 04-07-02      4 04-08-02      5 04-09-02
There are 7114 events in 5 day(s).
Select a starting date (RETURN for all):
```

If the user presses **Enter** recorded events starting from 00:00:00 for the date specified by Date Identifier 1 will be displayed. Prior to Dumping the records the following request will be issued.

```
The entire database has been selected
Use single line record format (Y/N)?
```

The user may wish to display records formatted with only a single line. To do so press **Y**. The single-line record format is described in “Event Record Formats” on page 38. The yes response is shown below.

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

Press **N** or **Enter** to display records formatted with the single-line option listing the oldest records first followed by the newest records. Press **Y** to display records formatted with the single-line option listing the newest records first followed by the oldest records (i.e., reverse order).

The following request will be issued if the response to single-line formatting is no.

```
Use comma delimited record format (Y/N)?
```

The comma-delimited format is useful when records need to be captured and then imported into a spreadsheet application for further analysis. Refer to “Event Record Formats” on page 38 for additional details. Press **Y** to display records using the comma-delimited option. Press **N** or **Enter** to display records using the more detailed two-line format. Regardless of the selection the normal request for record ordering will be issued just prior to the Dump.

The Dump will automatically terminate when the last record in memory is displayed. The user will then be returned to the Main Menu.

Tip It is possible for the Dump command to issue tens of thousands of Event Records. If the user wishes to Pause, Resume or Abort the Dump the following keys should be pressed: **Ctrl+S**, **Ctrl+Q** and **Esc**, respectively. Refer to the section entitled “Data Flow Control” on page 12 for additional details.

A variation of the previously described Dump procedure is used if Event Records for a specific range of dates and times are needed. As a convenience to the reader the message that follows the Dump command is repeated below.

```
                                Event Active Dates
1 04-05-02      2 04-06-02      3 04-07-02      4 04-08-02      5 04-09-02
There are 7114 events in 5 day(s).
Select a starting date (RETURN for all):
```

In the above example, the second line of text lists the dates during which events were recorded. The number to the left of the date is used as an identifier for the date listed. Date Identifiers can range from 1 to 30. In the sample data the Date Identifiers are labeled “1”, “2”, “3”, “4” and “5”.

Note The Model 24D/48D will store Event Records for thirty days, regardless of the total number of events stored. Records from day thirty-one will automatically over-write records from day one.

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

```
Entry number 2 04-06-02 has been selected.
Available events are from 00:12:25 to 23:58:54
Enter the starting time in HH:MM:SS:
```

The second line of text in the message indicates the time span during which events were recorded. The last line of text specifies that the starting time must be entered using the HH:MM:SS format. Each field must be separated by a colon character. Military time is used by the Model 24D/48D. Accordingly, 12:00:01 AM and 11:59:59 PM must be entered as 00:00:01 and 23:59:59, respectively. The start time specifies the time after which Event Records will be reviewed. Press **Enter** to Dump records starting at midnight.

After specifying the starting time the following request for an ending date will be displayed.

```
                                Event Active Dates
1 04-05-02      2 04-06-02      3 04-07-02      4 04-08-02      5 04-09-02
There are 7114 events in 5 day(s).
Select the ending date:
```

After the ending Date Identifier is selected the ending time must be entered in response to the following request. Press **Enter** to Dump records through midnight.

```
Entry number 3 04-07-02 has been selected.
Available events are from 00:20:41 to 23:51:12
Enter the ending time in HH:MM:SS:
```

The selected starting and ending dates and times will be displayed. The normal formatting and ordering requests as previously described will then be displayed. A typical response is listed below.

```
Start at: 04-06-02 18:00:00
End at: 04-07-02 09:00:00
Use single line record format (Y/N)?
```

Query Inputs (Q)

The Query Inputs command is typically used to review a subset of Event Records. Unlike the Selective Dump of Events command it allows the user to list records from specific inputs. Unlike the Browse procedure it outputs records in an uninterrupted sequence from start to finish. The command enhances the process of reviewing records of particular interest to the user. Records can be displayed using any of the three formatting options. Refer to the section entitled “Event Record Formats” on page 38.

To use the Query Inputs command press **Q**. A message similar to the following will be displayed.

```

                                     Event Active Dates
      1 04-05-02      2 04-06-02      3 04-07-02      4 04-08-02      5 04-09-02
There are 7114 events in 5 day(s).
Select a starting date (RETURN for all):
```

The Query Inputs command allows the user to select a start and end date and time period for which Event Records will be displayed. The procedure for selecting the time period and record formatting and ordering options are identical to those used by the Dump command. Refer to “Selective Dump of Events (D)” on page 32.

After the time period is selected the recorder will issue the following request.

```
Enter a list of up to 20 input numbers,
separated by spaces, you wish to query
(Invalid input numbers will be ignored).
```

As the message above indicates as many as twenty inputs at a time may be Queried. The Input Numbers may be entered in any sequence. A **Space** character must separate each number. After the numbers are selected press **Enter**. If the user fails to select any inputs the recorder will display records for all inputs as is the case with the Dump procedure.

A message listing the assigned start and end dates and times will be displayed. Finally, the preferred formatting option and chronological ordering method are selected. The Pause, Resume and Abort commands may be used to control the flow of records. After the last record is displayed the user will be returned to the Main Menu.

Print Live Status of Inputs (S)

The Print Live Status of Inputs command provides a snapshot of the present state of each input. If the user is accessing the recorder via a PC the live status report should be presented in Full Screen Mode. Refer to the section entitled “Toggle Display Mode (A)” on page 30. In Full Screen Mode the status of each input will be constantly updated at the monitor of the PC.

To view live input status press **S**. An example of the Full Screen Mode report for a Model 48D is shown below. The status of all 24/48 inputs is listed in a convenient, easy-to-read format. As each input changes state the display will be immediately updated to reflect the new status. Press **Esc** to terminate the status display.

```

Press ESC key to exit.
                                Live Input Status
                                09:28:33.00  04-06-2002

    1      2      3      4      5      6      7      8
  LOW     HIGH    LOW    LOW    LOW    LOW    LOW    LOW

    9     10     11     12     13     14     15     16
  LOW     LOW    LOW    LOW    LOW    LOW    LOW    LOW

   17     18     19     20     21     22     23     24
  LOW     LOW    LOW    LOW    LOW    LOW    LOW    LOW

   25     26     27     28     29     30     31     32
  LOW     HIGH    LOW    LOW    HIGH    LOW    LOW    LOW

   33     34     35     36     37     38     39     40
  LOW     LOW    LOW    LOW    LOW    LOW    LOW    LOW

   41     42     43     44     45     46     47     48
  LOW     LOW    LOW    LOW    LOW    LOW    LOW    LOW
  
```

A partial listing of the same sample data presented in Line Mode appears below. The status of each input is indicated at the moment the report was generated. Each input is referenced by its assigned Input Name.

INPUT	NAME	STATUS	INPUT	NAME	STATUS
1	I. Name #1	LOW	25	I. Name #25	LOW
2	I. Name #2	HIGH	26	I. Name #26	HIGH
3	I. Name #3	LOW	27	I. Name #27	LOW
4	I. Name #4	LOW	28	I. Name #28	LOW
5	I. Name #5	LOW	29	I. Name #29	HIGH

In Line Mode, the user is returned automatically to the Main Menu after the last input is listed.

The Print Live Status of Inputs command can be very useful in verifying that inputs are wired correctly. It can be used to quickly determine if inputs are operating properly and if the assigned Detection Times are set in accordance with the timing characteristics of the monitored circuits.

Print Incoming Events (V)

The Print Incoming Events command allows the user to display Event Records in real time. Immediately after an event is detected it will appear at the peripheral device. This command can be very useful in tracking events that are occurring while the user is online with the recorder. It can also be used to perform a check of the inputs prior to installation of the unit.

To Print Incoming Events press **V**. The following message will be issued.

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

The recorder will display events as they occur. Two sample records are shown below.

```
04-06-02 19:50:35.7 47 X.X.....X.
I. Name #47 >-----HIGH-----^

04-06-02 19:50:37.6 47 X.X.....X.
I. Name #47 >-----LOW-----^
```

The Print Incoming Events command always formats records using the two-line option. Refer to the section entitled “Event Record Formats” on page 38. Press **ESC** to terminate the report and return to the Main Menu.

Retrieve Database by XMODEM (R)

Xmodem is a communications protocol used by many data gathering systems. It allows data to be exchanged in such a way that transmission errors can be reliably detected and corrected. Most communications applications designed for use with PCs provide Xmodem operation (e.g., Procomm Plus® and HyperTerminal®).

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

Note Contact MICRO-AIDE for information concerning its Graphical Event Analyzer.

Erase Oldest Events (E)

The Model 24D/48D is designed with a circular memory. When the number of stored events exceeds the memory capacity of the recorder the most recent events will over-write the oldest

events. In this way the recorder decides that the oldest events are expendable because it is likely that they were already transmitted or reviewed. Event Records are also over-written if more than thirty days of data are recorded in memory.

The Erase Oldest Events command is very useful in clearing test data that, if left in memory, could prove to be confusing to other users. The Erase Oldest Events command allows the user to take manual control of the freeing-up of memory. The command will only permit the user to erase events from memory for the oldest day during which events were stored. Additionally, the command allows the user to specify a time of day prior to which the erasure will actually occur. In this way partial days may be erased. If more than one day needs to be erased the command must be used again.

Note Only Event Records will be erased. Setup information entered by the user such as Input Names, Detection Times, Location Name, etc., will not be erased.

To erase records from the oldest day press **E**. A message similar to the following will be issued.

```
Only events recorded on 04-05-02 can be deleted.  
Select the target event where the deletion stops:  
Enter the event time in HH:MM:SS:
```

The user may enter a specific time prior to which events will be erased. The time must be entered in military format. Leading zeros are not require. If a partial day is selected the recorder will immediately erase the selected events and then issue a message that lists the number of events erased. A typical message is shown below.

```
There were 1087 removed from the database.
```

If the user wishes to erase the entire day the **Enter** key should be pressed (i.e., no time of day is specified). The following warning will be displayed.

```
Starting event not found. Will delete the entire day.  
Do you want to proceed (Y/N)?
```

The erasure will be performed immediately and the user will then be returned to the Main Menu.

Event Record Formats

The Dump and Query reports, regardless of the formatting option selected by the user, include a standard header that lists the Location Name, date and time the report was generated. Event Records consist of one or two lines of text. Various characters are used to symbolize specific input activity. The three formatting options are described in the following sections.

Single-Line Records

Single-line records include six data fields. Only the status of the input that created the event is reported. A typical single-line record with header is shown below.

```

                                EVENT REPORT GENERATED ON 20:41:12.90 04-06-2002
                                Unit name: ***** NOT SET *****
19:50:35.7 04/06 I. Name #47                HIGH 47

```

From left to right each data field is described below.

- **Time:** when the event was logged, reported to the nearest tenth of a second, in 24-hour format.
- **Date:** when the event was logged, reported in MM/DD format.
- **Input Name:** as assigned by the user, up to twenty characters.
- **State:** the new state of the input, reported as either HIGH (i.e., voltage is present at input terminals) or LOW (i.e., no voltage is present at inputs).
- **Input Number:** from 1 to 24/48.

The single-line format is most useful when only the state of the event generating input is of interest to the user. Records are transmitted more quickly using this option.

Two-Line Records

The two-line formatting option provides additional information as regards other inputs. A typical two-line record is listed below. Both lines of text are described in the following section.

```

04-06-02 19:50:35.7 47 X.X.....X.....X.
I. Name #47 >-----HIGH-----^

```

First Line

The first line of text lists the date, time (to the nearest tenth of a second) and Input Number. A pattern of X and . (period) characters are used to indicate the state of the remaining 23/47 inputs. An X is used to indicate a high state and a . (period) is used to indicate a low state. In the example cited above inputs one and three were high at the time the event for input forty-seven was logged.

Second Line

The second line of text lists the assigned Input Name. The new input state is reported as either HIGH or LOW.

This concludes the description on how to operate the Model 24D/48D locally and remotely. The user should remember to properly log off of the recorder. Refer to “Log Off System (X)” on page 26.

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

DISPLAY AND KEYPAD

Introduction

The Model 24D/48D is designed to provide its user with the greatest degree of versatility and functionality. All MICRO-AIDE Event Recorders come equipped with a front panel mounted Liquid Crystal Display (LCD) and keypad. These features allow the user to perform all of the setup and operational procedures required to effectively use the Model 24D/48D. The advantage to the user is that a PC or printer, although convenient, is not required to operate the recorder.

Setup and operation of the Model 24D/48D 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 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. The display is configured to present two lines of data. Each line can contain twenty alphanumeric characters and symbols. Display characters are large and can be viewed easily from several feet away. The super-twist design of the LCD panel provides a viewing angle of $\pm 20^\circ$ 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 recorder is exposed to very hot or cold temperatures. The potentiometer that controls the contrast level is located on the Power Supply PCB. Refer to Figure 2 on page 6.

Keypad

The keypad consists of sixteen individual keys. Each key is clearly labeled and provides a soft, positive touch. Each key is spaced .75" apart to minimize double hits. A special editing technique allows alphabetic characters to be entered by using the ***Browse***, left (\leftarrow) and right (\rightarrow) arrow keys. The arrow and ***Enter*** keys also provide for quick menu item selection. The left arrow key is used to delete an incorrect numerical entry.

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 Front Panel

The Model 24D/48D will attempt to boot its firmware after power is applied. The LCD will identify this process with a message that reads “Booting System...”. The boot process will complete in a few seconds. If the recorder is booting as the result of a system reset command the RAM will be tested and sized. Refer to “RESET - Perform System Check-up” on page 54. The LCD will display the amount of RAM located on the CPU PCB. The boot process will be terminated if a RAM failure is identified.

After the boot process is completed the recorder will briefly display the information shown below. The 3.07 reference is the revision level of the firmware. The revision level should be noted by the user. It may be requested by MICRO-AIDE technicians should the user require assistance. After the revision level is displayed the recorder automatically enters the Idle Mode of operation. There are three operational modes; each is described in the sections that follow.

```
MicroAide Model 48D  
Event Recorder 3.07
```

IDLE Mode

The current date and time are most often displayed while the recorder is in Idle Mode. It is the at rest condition of the recorder. The Model 24D/48D uses 24-hour, military time (e.g., 7:00PM is reported as 19:00:00). An example of the date and time display is shown below.

```
TIME      DATE  
16:11:25  04-06-02
```

While in Idle Mode the LCD will, once every minute, provide alternating five-second-long messages stating that the Setup and Browse Modes can also be accessed. The date and time display can also be automatically interrupted with new Event Records. Each new event will be displayed only briefly. This process is useful in verifying that the recorder is continuing to detect events. A typical Event Record is shown below.

```
04-06-02 16:11:31.5  
36 I. Name #36 HIGH
```

Event Record - LCD

Event Record Format

Records consists of five fields. The date and time measured to the nearest tenth of a second is shown on the first line. The Input Number starts the second line. It is followed by the first eleven characters of the Input Name. LCD size restrictions prevent the entire twenty possible characters from being displayed. When assigning names it recommended that the first eleven characters be as descriptive as possible. The last field indicates the HIGH or LOW state of the input.

Browse Mode

Browse Mode allows the user to quickly review Event Records in either forward or reverse chronological order. Events are selected by date and optionally by Input Number. To Browse through events press the **Browse** key. The following message will appear briefly.

```
Use < > to select a  
DATE and press ENTER
```

Provided events have been stored, the display will indicate from one to thirty dates for which events may be Browsed. Dates are listed in MMDDYY format with no separator characters. A typical display of four dates is shown below.

```
040502 040602 040702  
040802
```

Initially the first date will be highlighted. The arrow keys can be used to move the highlight to a different date. When the correct date is highlighted press the **Enter** key. A brief message to the user that military time is used will be displayed. It will be followed by a request to enter a start time. The start time specifies the time after which events will be displayed.

```
Enter time (HHMMSS):
```

Using the numbered keys enter a six-digit time in HHMMSS format. Press **Enter** to complete the entry. If the **Enter** key is pressed without specifying a time Event Records for the entire day will be available for Browsing. Incorrect time entries will be indicated by an error message.

After the start time is entered the display will indicate the first record meeting the date and time criteria selected by the user. A brief delay may occur if the selected day contains many Event Records. A typical record is depicted in “Event Record - LCD” on page 44. The left and right arrow keys can be used to review records in forward or reverse chronological order. The limits of the record set will be indicated by a message stating either “BEGINNING OF DATA” or “END OF DATA”. To exit Browse Mode and return to Idle Mode press the **Esc** key.

Query by Input Number

Records can also be Queried while in Browse Mode. While a record is being displayed press the **Browse** key. The following Input Number request will be displayed.

```
QUERY: Please enter  
an input number:
```

To review records for a specific input enter a valid Input Number then press **Enter**. The first record meeting the selected date, time and Input Number criteria will be displayed. The arrow keys can be used to scroll through additional records. However, only records meeting the Input Number specification will be displayed. If no records are found the “EVENT NOT FOUND” message will be displayed briefly. If many records are stored in memory there may be a noticeable delay in displaying the first record. To return to Idle Mode press the **Esc** key.

Setup Mode

Setup Mode allows the user to set up the recorder to a specific set of application requirements. The front panel accessible commands form a subset of those that are performed via a peripheral device. Only a few commands are not applicable to the front panel (e.g, Toggle Display Mode). The results of commands executed via the front panel are indistinguishable from those performed via 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 front panel 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 the following message will be displayed.

Incorrect passcode

Assuming the correct Passcode is entered a brief explanation of the arrow keys will follow. The LCD Main Menu of commands will then be displayed. There are nine commands in total. The last three are displayed in a second screen as noted below.

Clock	DTime	Flash
Iname	Uname	Modem

Main Menu - LCD

PCode	SPort	RESET
-------	-------	-------

The last three commands are accessed by moving the highlight to the left of the Clock command or to the right of the Modem command. To select an LCD command move the highlight to the

desired command and press **Enter**. The various information messages that appear on the LCD can be immediately canceled by pressing an arrow key or any key applicable to the command's syntax. If the user fails to select a command within thirty seconds the recorder will automatically return to the Idle Mode. This prevents a user from inadvertently leaving the recorder accessible to a second user and thus defeating the Passcode security feature.

Table 2 provides a brief description of each command that can be executed via the front panel. The use of each command is explained in the sections that follow.

Name	Description
Clock	Set Date and Time
DTime	Set Detection Times
Flash	Enable Flashing Inputs
Iname	Set Input Names
Uname	Set Location Name
Modem	Set Modem Ring Delay
PCode	Set Passcode
SPort	Set Port 1 Baud rate
RESET	Perform System Check-up

Table 2 - Front Panel Commands

Clock - Set Date and Time

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

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

The date must be entered in the form MMDDYY without any separator characters. Press **Enter** to accept the new entry or present date. The following time request will be displayed.

```
Enter time (HHMMSS):
```

The time must be entered using the 24-hour military time convention. Press **Enter** to accept the new entry or present time. The user can then enable or disable the clock-sync feature. Refer to "Synchronizing the Clock" on page 15. The following message will be displayed.

```
Clock Sync Input:  
( 0, 0=none)
```

The current Clock Sync Input is listed at the start of the second line. To enable the clock-sync feature enter a valid Input Number and then press **Enter**. Enter zero (default setting) to disable the feature. The LCD Main Menu will be displayed after completing the clock-sync setting.

Caution The assigned Clock Sync Input will normally be connected to the output of a PLC. The time between successive PLC output pulses must be a whole multiple of 15 minutes. Otherwise the recorder's clock will indicate a significant error.

DTime - Set Detection Times

Select the DTime command to set or review the Detection Times used by the recorder. The following sub-menu will be displayed.

```
List Set ALL inputs
Set individual input
```

As the sub-menu indicates the user may list Detection Times, or set all or selected inputs. Each of the three choices are explained below.

List

To display the Detection Time settings for all or selected inputs select the List command. The LCD will display information similar to the following.

```
Input 1: 3.0Sec
Input 2: 3.0Sec
```

To advance to the next input press the right arrow key. To scroll back one input press the left arrow key. To jump to a specific input press the **Esc** key. The following request for an Input Number will be displayed.

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

Any valid Input Number can be specified. To exit the List command and return to the LCD Main Menu press **Esc** a second time.

Set All Inputs

The Set All Inputs command allows the user to set a Detection Time common to all inputs. After selecting the command, the following reminder message will be briefly displayed.

```
Signal durations are
in units of 100 msec
```


The user is then requested to enter a Detection Time in response to the following message.

```
Enter a duration  
for all inputs:
```

Valid Detection Times range from 0 to 15,000, which is equivalent to 0 to 1500 seconds. Press the **Enter** key to complete the entry. The user must then confirm the entry by responding to the following request.

```
15 was entered.  
Confirm:ENTER or ESC
```

In the above example a duration of 1.5 seconds was selected. Press **Enter** to change the Detection Time settings or **ESC** to ignore the change.

Tip Enter a value of zero with the Set All Inputs command to temporarily disable all recording.

Set Individual Input

Use the Set Individual Input command to assign a variety of Detection Times by Input Number. After selecting the command the user is reminded that Detection Times are set in multiples of 100 milliseconds (.1 seconds). The following message appears briefly. It indicates that the **ESC** key may be pressed to either jump to a specific Input Number or to quit the command.

```
Press ESC anytime to  
Quit or Skip inputs.
```

The following message is then displayed.

```
Enter a duration for  
input # 1:
```

Any value in the range from 0 to 15,000 may be specified. Complete the entry by pressing the **Enter** key. Provided a valid Detection Time is entered the recorder will then issue a message similar to the above listing the next Input Number. Press Esc to jump to a specific input. To exit the command and return to the LCD Main Menu press the **ESC** key a second time.

Flash - Enable Flashing Inputs

The Model 24D/48D is fully compatible with Flashing Inputs. Refer to “Set Flashing Inputs (F)” on page 20. After selecting the Flash command the following message will be briefly displayed.

```
Use < > to scroll  
ESC to skip or exit
```

The presently assigned state of Input Number 1 will be displayed as shown below.

```
Input # 1 is set to  
NORMAL
```

Press the **Enter** key to toggle the setting from NORMAL to FLASHING or vice versa. Press an arrow key to advance to the next input. Press the **Esc** key to jump to a specific input. The following message will be displayed.

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

Any Input Number ranging from 1 to 24/48 can be entered. To exit the command and return to the LCD Main Menu press the **Esc** key a second time.

Iname - Set Input Names

Individual Input Names are assigned by using the Iname command. The Model 24D/48D assigns a default name to each input. However, the user may wish to identify circuits with names specific to a particular application. The following sub-menu is displayed after selecting the Iname command. Both commands are described in the next section.

```
Naming Inputs  
List name Set name
```

List Name

The following message will be briefly displayed after selecting the List Name command.

```
Use < > to scroll  
Esc to skip or exit
```

The Input Name for Input Number 1 will then be displayed. In the example cited below the default name is displayed. All twenty characters of the Input Name will be displayed.

```
Input 1 is named  
I. Name #1
```

To advance to the next input press the right arrow key. To select an input out of sequence press **Esc**. The following message will be displayed.

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

Any Input Number ranging from 1 to 24/48 can be entered. To exit the command and return to the LCD Main Menu press the **Esc** key a second time.

Set Name

The Set Name command allows the user to assign non-default names to specific inputs. The message shown below will be displayed briefly after selecting the command.

```
Press ESC anytime to  
Quit or Skip inputs.
```

The following message requests the user to enter an Input Name for the specified input.

```
Name of input # 1:  
_
```

Input Names can vary in length from one to twenty characters. To assign Input Names follow the steps listed under “Alphanumeric Editing Procedure” on page 51.

After each new name is assigned the recorder will automatically advance to the next Input Number. Press the **Esc** key to jump to a specific input. Press the **Esc** key a second time to return to the LCD Main Menu.

Alphanumeric Editing Procedure

Names are assigned by selecting characters from a list and then inserting them where the cursor is positioned. The _ (underscore) character is used to identify the cursor. It is initially located in the left-most position of the name.

To assign a name follow the steps listed below.

1. To select a non-numeric character press the **Browse** key repeatedly until the desired character appears. Hold the **Browse** key down to advance quickly through the character set. Upper-case letters are followed by lower-case letters. They are followed by a collection of 32 punctuation marks and various symbols. The space character is the last listed before the list repeats.
2. To assign the selected character to the name press the right arrow key. The cursor will be repositioned one character to the right. Alternatively, if the selected character is the last to be assigned press the **Enter** key to complete the name.
3. To assign a number to the name press the appropriate number on the keypad. The cursor will automatically advance one position to the right. If the number is the last character to be assigned press the **Enter** key to complete the name.
4. To erase previously assigned characters press the left arrow key until only the correct characters appear. Pressing the right arrow key will restore previously erased characters.
5. Repeat the previous steps to assign additional characters as required.

- When the name is correctly displayed press the **Enter** key to accept the new name. Press the **Esc** key to abort the new name.

Uname - Set Location Name

The Location Name (also referred to as the Unit Name) allows the user to identify a particular Model 24D/48D with a descriptive name. The name may be any combination of letters and numbers not exceeding twenty total. It may be used as a site designator or equipment ID number.

Selecting the Uname command will briefly display a message similar to the following.

```
Current unit name:  
***** NOT SET *****
```

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

```
Change? ENTER or ESC  
***** NOT SET *****
```

Press **Esc** to return to the LCD Main Menu or **Enter** to proceed. The following message will then be displayed.

```
Enter new unit name:  
_
```

Use the “Alphanumeric Editing Procedure” on page 51 to change the Location Name.

Note The Location Name can include as many as eighty characters if it is assigned via a peripheral device. The LCD panel, however, can only display the first twenty characters of the name. If the user assigns a Location Name via the front panel the name will be limited to twenty characters.

Modem - Set Modem Ring Delay

The Set Modem Ring Delay command applies only to Model 24D/48D recorders equipped with an internal modem. The modem operates in auto-answer mode at all times. The number of rings that occur prior to the modem answering a call is established by the Modem command. The following message will be displayed in response to selecting the Modem command.

```
Modem Ring Delay: 02  
Enter new Delay :
```

Any value ranging from 0 to 99 can be specified. Leading zeros are not required.

Note To disable the modem set the ring delay to zero.

PCode - Set Passcode

The Set Passcode command allows the user to deny access to the recorder by unauthorized individuals who may attempt to alter the setup parameters via the front panel. Selecting the PCode command will briefly display the following message (assuming that the Passcode has not been changed from its factory default setting).

```
Current passcode:  
12345678
```

It will be followed by the request shown below.

```
Change? ENTER or ESC  
12345678
```

To abort the PCode command and return to the LCD Main Menu press **Esc**. To change the currently assigned Passcode press **Enter**. The following message will be displayed.

```
Enter new passcode:  
_
```

As many as eight numeric characters may be used to define the Passcode. After the new Passcode is entered the user is asked to re-enter the Passcode. If the user correctly re-enters the Passcode the procedure is completed and the user will be returned to the LCD Main Menu. If a mistake is made the procedure for entering a new Passcode will start again.

Tip To bypass the Passcode security feature press **Enter** rather than a number key(s). Do the same for the re-entry request. To access the LCD Main Menu directly the user can then simply press the **Setup** key followed by the **Enter** key.

SPort - Set Port 1 Baud Rate

The Baud rate for Port 1 may be set to one of six values ranging from 300 to 38,400 Baud. The factory default Baud rate is 9600. The user may wish to take advantage of a higher Baud rate when outputting large numbers of Event Records. To change the Port 1 Baud rate select the SPort command. The following two messages will be briefly displayed.

```
Local Port #1  
baud rate setting
```

```
Use < > to pick baud  
rate and then ENTER
```

The Baud rate selection menu will then be displayed as follows.

```
300 1200 4800
9600 19200 38400
```

Use the arrows keys to highlight a new selection. The new Baud rate will take effect immediately after the **Enter** key is pressed.

RESET - Perform System Check-up

The Reset command will perform a System check-up. In doing so the Setup Database will be restored to its default values and all Event Records will be erased from memory. This command should be performed with great care since data will be permanently lost. The Reset command will briefly issue the following two precautionary messages.

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

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

They are followed by the request shown below.

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

Press **Esc** to return to the LCD Main Menu. Press **Enter** to execute a System Check-up. The recorder will then proceed to reboot its operation. The LCD will display several messages that indicate the progress of the reboot. After executing the Reset command the setup parameters of the recorder will be restored to the values listed in Table 1 on page 13.

This concludes the description on how to use the front panel keypad and display.

The next chapter describes general maintenance techniques that may benefit the user in case of problems.

MAINTENANCE

Introduction

The primary purpose of this chapter is to describe the recommended trouble-shooting methods to be used with the Model 24D/48D. It should be referred to if ever a questionable symptom arises during the operation of the recorder.

The Model 24D/48D is designed to provide its user with many years of trouble-free operation. There are no user serviceable parts in the recorder. 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 recorder. This should be done with a clean, dry cloth. The mechanical design of the chassis provides the electronic assemblies with a nearly sealed environment. Due to the low power consumption of the recorder ventilation holes are not required. The inside of the chassis should remain clean indefinitely.

PCB Removal and Insertion

The user should rarely have occasion to open the unit. However, if a PCB needs to be inspected or replaced it should be performed in accordance with the following procedure. Refer to Figure 2 on page 6. It illustrates the position of each PCB inside the chassis.

1. Open the front cover. Turn the power off by placing the switch mounted on the Power Supply PCB to the down position.
2. Carefully remove any cables attached to connectors mounted on the PCB. Refer to Figure 5 on page 56 for details on where the various internal cables are attached.
3. Using the PCB ejector as a lever remove the board from the chassis. Care should be taken to prevent electrostatic discharges from damaging the PCB.
4. Inspect or replace the PCB. Refer to the “Opto-Input PCB Switches” on page 57 for special instructions regarding these boards. Opto-Input PCBs are identified by their dark blue ejector.
5. After ensuring that power is off, reinstall the PCB by aligning its edges with the plastic card guides secured to the chassis top and bottom sheet metal. Push the PCB forward into its mating connector. When the PCB is fully seated a slight snap should be felt.
6. Reattach any cables to their respective PCB connectors. Cables are keyed (they can be inserted in only one direction). Do not force a cable into a connector. They should seat easily if they are aligned properly. The cables for Ports 1 and 2 are identical. Check that they are not reversed.

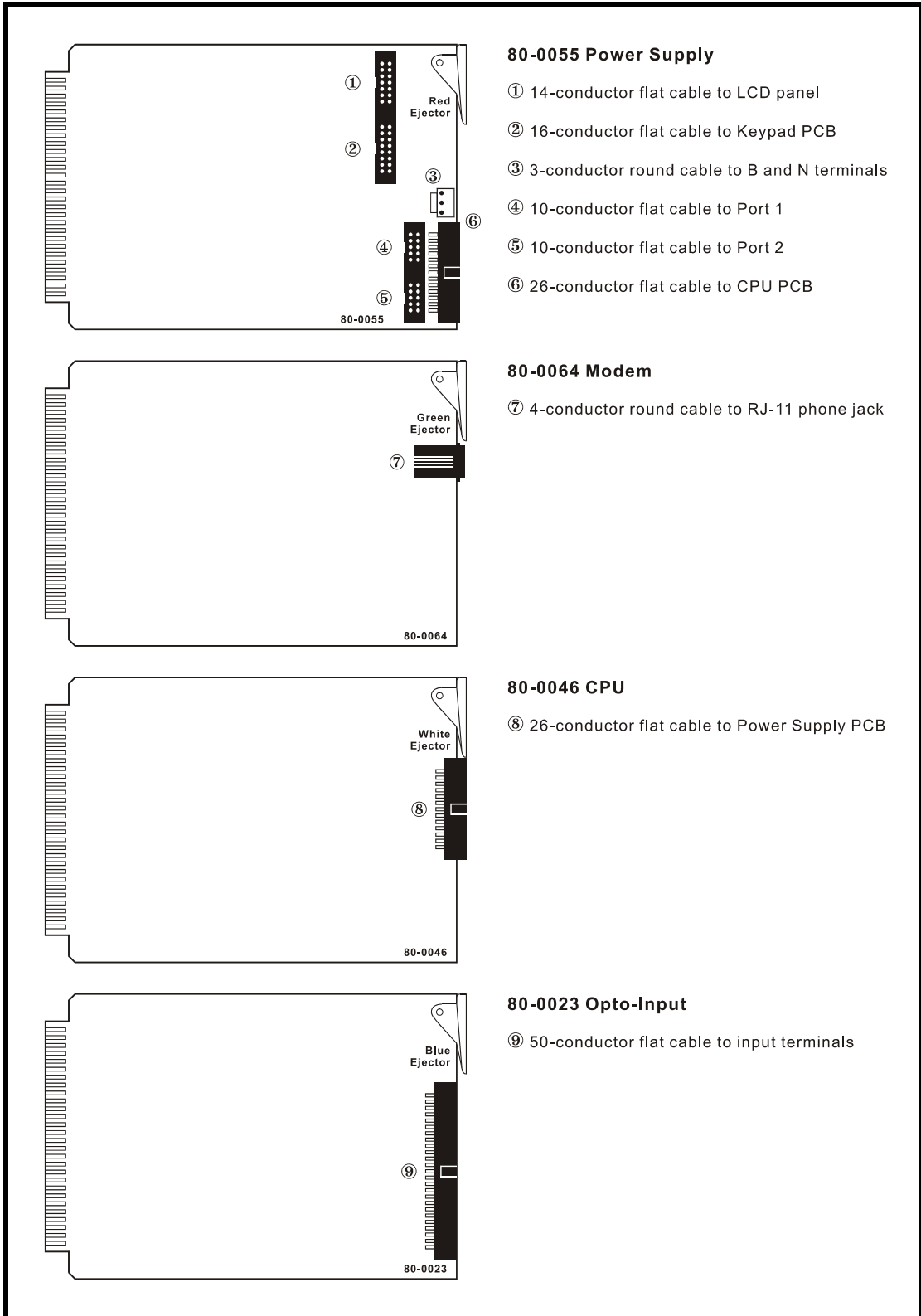


Figure 5 - PCB Cable Terminations

7. Power can now be turned on. Close the front cover.

Caution Never insert a PCB when the power is on. Damage to the PCB may occur.

Tip Electrostatic discharges can cause serious damage to many electronic components. When handling PCBs it is recommended that the user wear a wrist grounding strap.

Opto-Input PCB Switches

The Model 24D and 48D recorders are equipped with one and two Opto-Input PCBs, respectively. The CPU reads information from these PCBs. The Input Number is part of the information that must be read. To ensure that the Input Number is correct several switches must be set properly on each Opto-Input PCB. Table 3 lists the correct switch settings for each PCB position. Figure 6 on page 58 illustrates the location of the switches on the Opto-Input PCB.

PCB Positions	Input Numbers	Switch Number							
		1	2	3	4	5	6	7	8
1 (at left)	1 -24	Off	Off	Off	Off	On	Off	On	On
2 (at right)	25 - 48	Off	Off	Off	Off	On	Off	On	Off

Table 3 - Opto-Input PCB Switch Settings

Switches on the Opto-Input PCB are generally on when pushed to the up position. However, to ensure the correct setting inspect the labeling along the edge of the switch body. Some PCBs may use jumpers instead of switches. An on setting is equivalent to installing the jumper across the appropriate pins. An off setting is equivalent to leaving the jumper off.

Note The user should never change Opto-Input PCB switch settings unless directed to do so by MICRO-AIDE customer service technicians. If a replacement PCB is sent by the factory the user may need to set the switches to match those of the PCB being replaced.

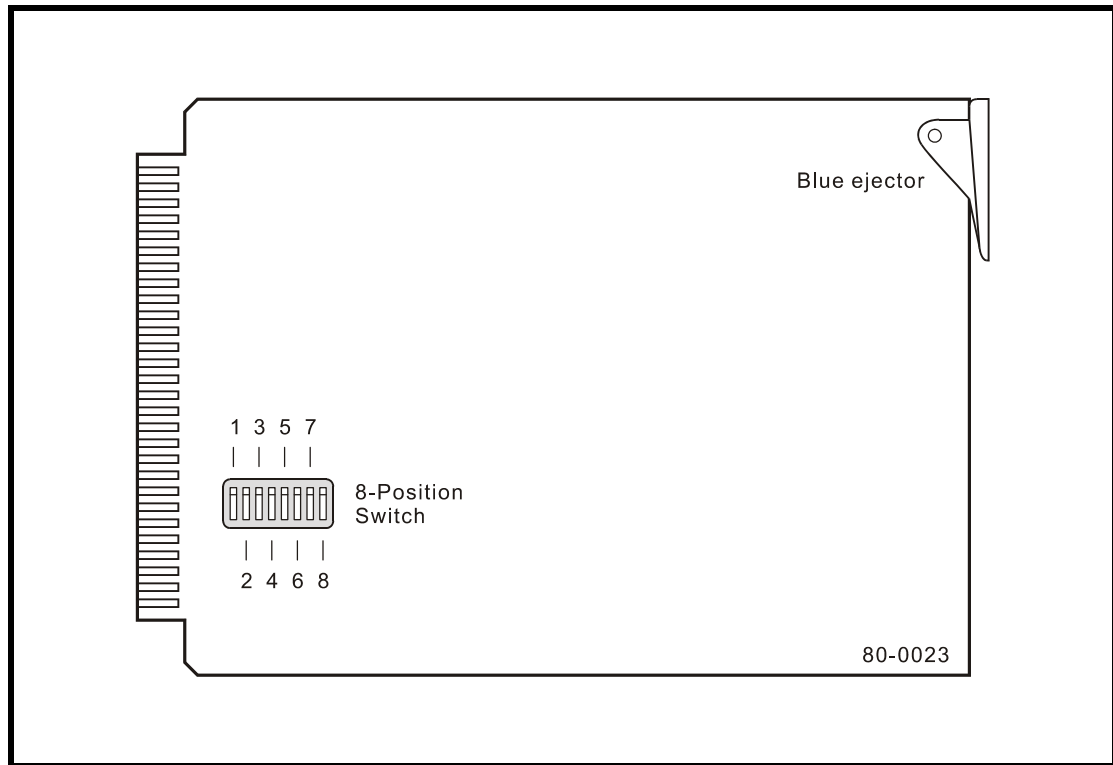


Figure 6 - 80-0023 Opto-Input PCB

Updating the Firmware

Like any microprocessor-based product the Model 24D/48D relies upon the execution of a stored program for its operation. The program, referred to as firmware, is stored in a special Integrated Circuit (IC). The IC is a Programmable Read Only Memory (PROM) device.

MICRO-AIDE will, from time to time, update the firmware for the Model 24D/48D. Updates may provide additional features or expanded performance. Customers interested in updating their firmware can do so with little or no assistance from MICRO-AIDE. The steps listed below must be followed whenever a firmware update is performed. Before proceeding refer to “PCB Removal and Insertion” on page 55.

1. Open the front cover and turn power off to the Model 24D/48D.
2. Carefully disconnect the flat cable from the connector secured to the CPU PCB. The correct cable runs to the Power Supply PCB. Remove the CPU PCB from its card slot.
3. Using a small, flat-head screwdriver remove the existing PROM IC from its socket. Carefully review Figure 7 on page 59 for the location of the correct IC.
4. Insert the new, updated PROM in the vacated socket. The small indentation on the IC must be facing to the right. Some ICs will indicate pin 1 with a small dot. In such cases the dot must be oriented towards the upper right-hand corner of the socket. The two columns of pins at the extreme right edge of the socket must be vacant if the PROM is a twenty-eight pin IC.

5. Inspect the new PROM to ensure that pins are not bent underneath the IC. Ensure that all 28 (or 32) pins are properly inserted within the socket.
6. Reinsert the CPU PCB into the correct card slot. Refer to Figure 2 on page 6. Reconnect the flat cable to the Power Supply PCB. Reapply power to the recorder and close the front cover.
7. If requested to do so, return the removed IC to MICRO-AIDE customer service.

The recorder should reboot and begin normal operation. If the recorder fails to reboot, review the steps listed above to isolate the problem. The PROM may have been incorrectly installed.

Note After completing the firmware update procedure it may be necessary to execute the System Check-up command. A System Check-up should be performed only if recommended by MICRO-AIDE customer service technicians. Refer to “System Check-up (C)” on page 13.

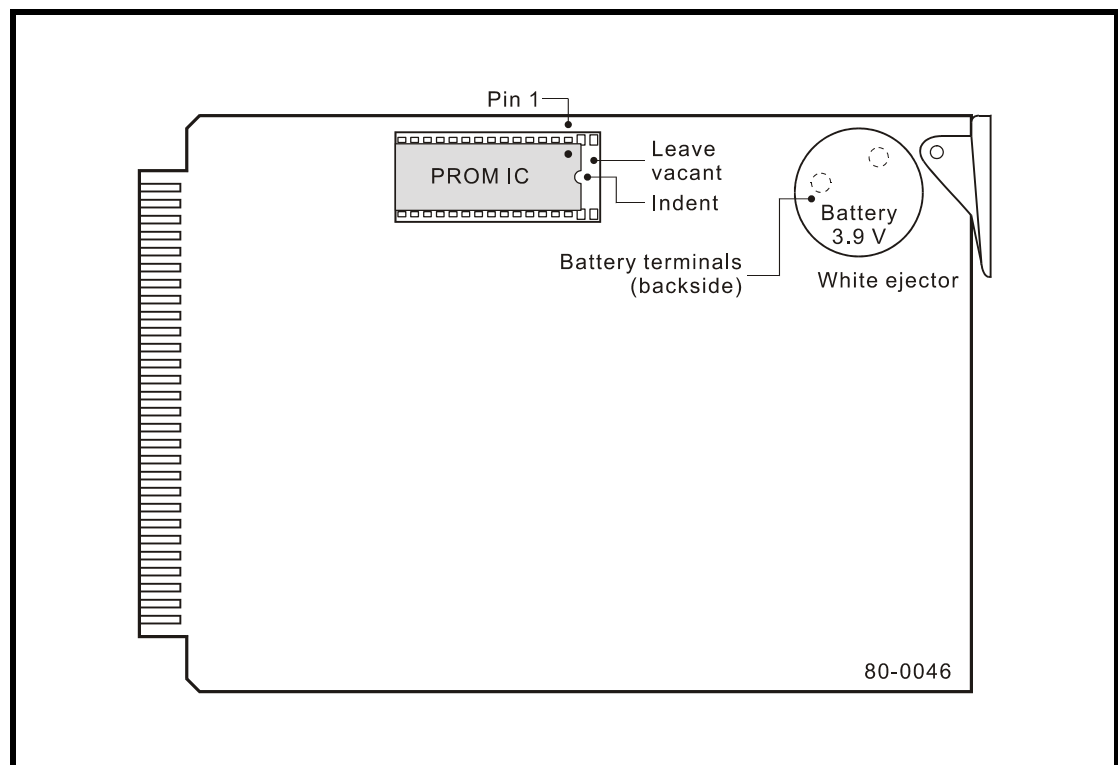


Figure 7 - PROM IC, 80-0046 CPU PCB

Changing the Port 2 Baud Rate

To change the Baud rate for Port 2 jumper settings on the CPU PCB must be changed. Because this procedure involves removing a PCB from inside the recorder the user is advised against changing the Baud rate unless it is absolutely necessary. If the rate must be changed, perform the following steps. Before proceeding refer to “PCB Removal and Insertion” on page 55.

1. Open the front cover and turn the power off to the Model 24D/48D.

2. Carefully disconnect the flat cable from the connector secured to the CPU PCB. The correct cable runs to the Power Supply PCB. Remove the CPU PCB from its card slot.
3. Set the appropriate WP8 jumpers as illustrated in Figure 8.
4. Reinsert the CPU PCB into the correct card slot. Refer to Figure 2 on page 6. Reconnect the flat cable to the Power Supply PCB. Reapply power to the recorder and close the front cover.

The password request should be displayed at the peripheral device connected to Port 2.

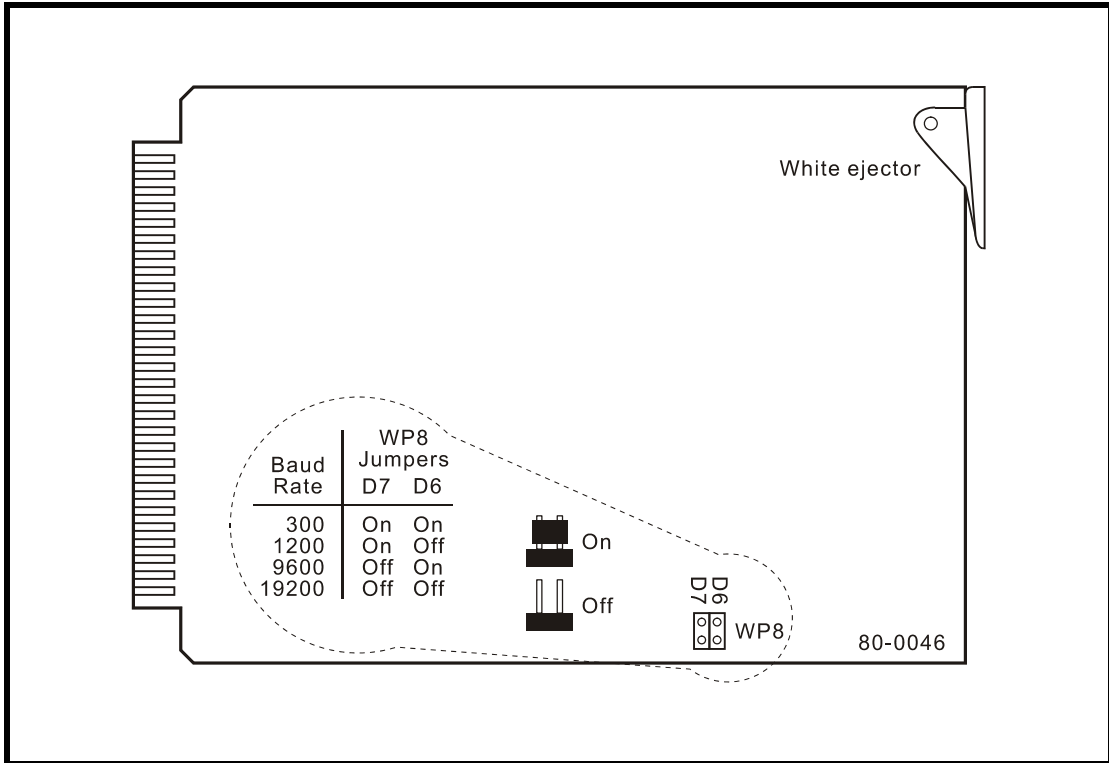


Figure 8 - Port 2 Baud Rate Settings, 80-0046 CPU PCB

Diagnostic Tests

A set of three diagnostic commands are included with Version 3.07 (and later) firmware. The commands allow the user to perform a diagnostic test of the PROM, RAM and front panel keypad. The tests can only be performed from a peripheral device connected to one of the RS-232 ports or via a modem connection. The tests cannot be performed from the front panel.

Before a test can be performed the recorder must be in an Administrative Access session and be prepared to accept a Main Menu command. To perform a diagnostic test press the ~ (tilde) key. The following message will be displayed.

Access Code:

The correct Access Code is **DIAGNOSTICS** followed by **Enter**. The user's keystrokes are hidden by the recorder as it responds with * characters. The Access Code must be entered in upper-case letters. If an incorrect code is entered the user will be returned to the Main Menu. The following message will be displayed after entering the correct code.

```
command:
```

The recorder is now prepared to initiate any one of three tests. To review the diagnostic commands press **?** followed by **Enter**. The following list will be displayed.

```
E (EPROM checksum test)
R (RAM self test)
K (keypad test)
X exit
command:
```

The use of each command is described in the following sections.

PROM Test (E)

The Model 24D/48D firmware stored in the PROM IC can be verified with the PROM Test. To start the PROM Test press **E** followed by **Enter**. The following message will be displayed.

```
EPROM checksum test, continuous (Y/N)?
```

The PROM Test is completely non-destructive to the operation of the recorder. Consequently, it can be performed repeatedly without disturbing the normal operation of the recorder. To initiate a single test press **N**. To run multiple tests press **Y**. A message similar to the following will be displayed if continuous testing is selected.

```
Checksum=7cf0
Pass      3
```

The checksum value labeled "7cf0" in the sample data above applies only to V3.07 firmware. Later versions of the firmware will be identified by a different checksum. The checksum calculated by the PROM Test should be compared to the checksum written on the label of the PROM IC. Discrepancies should be reported to MICRO-AIDE customer service technicians.

The Pass number listed in the sample data applies only to the continuous test option. The number of passes is incremented each time the test completes a checksum calculation. Any calculation that results in a different checksum will be reported in a separate line of text. A single test will be terminated automatically. Press **ESC** at any time to terminate a continuous test.

Tip MICRO-AIDE recommends that three passes of the PROM Test be performed.

RAM Test (R)

The Model 24D/48D stores Event Records and the Setup Database in Random Access Memory (RAM). The RAM Test allows the user to verify the proper operation of the RAM. To start the RAM Test press **R** followed by **Enter**. The following message will be displayed.

```
On line memory test, continuous (Y/N)?
```

The RAM Test is completely non-destructive to the operation of the recorder. Consequently, it can be performed repeatedly without disturbing the normal operation of the recorder. To initiate a single test press **N**. To run multiple tests press **Y**. A message similar to the following will be displayed if continuous testing is selected.

```
Pass 1, 0 errors  
Local bank 0, 108K 4cf0-1ffff  
.....  
Pass 2, 0 errors  
Local bank 0, 108K 4cf0-1ffff  
.....
```

The exact response to the test will vary with the amount of RAM installed in the recorder. However, the test should always report zero errors. A failure in the test should be reported to MICRO-AIDE customer service technicians. A single test will be terminated automatically. The user must terminate a continuous test by pressing the **Esc** key.

Tip MICRO-AIDE recommends that three passes of the RAM Test be performed.

Keypad Test (K)

The Keypad Test allows the user to verify the operation of each key located at the front panel. Press **K** followed by **Enter** to start the test. The test should display the correct number each time a numeric key is pressed. The left and right arrow keys will appear as **<** and **>**, respectively. The **Browse**, **Setup**, **Esc** and **Enter** keys will be displayed as **B**, **S**, **E** and **N**, respectively. To terminate the Keypad Test press the **Esc** key.

Note The Keypad Test should display a single character per keypad stroke. The appearance of spurious or multiple characters is an indication of a faulty keypad.

Exit (X)

To exit the diagnostic command and return to the Main Menu press **X** or **Esc**.

Checking the RAM Battery

The Model 24D/48D stores the entire Setup Database and all of the Event Records in low power CMOS-type RAM devices. A PCB mounted lithium battery is used to insure that data saved in the RAM devices will be retained if power to the recorder is interrupted. The battery provides a very small, but adequate, amount of power to the RAM devices when power is off. There is no drain on the battery when power is applied to the recorder. Consequently, the longevity of the battery will be shortened if the recorder remains powered off for extended periods of time. With normal operation of the recorder the battery should not need to be replaced for ten years.

Tip MICRO-AIDE recommends that the battery be checked once a year. The battery can be found on the 80-0046 CPU board. The location of the battery is illustrated in Figure 7 on page 59. The battery terminals can be accessed on the backside of the PCB. The battery voltage should measure at least 2.5V. If the battery voltage is less than 2.5V contact MICRO-AIDE customer service for instructions on how to proceed.

Trouble-shooting Guide

The following guide is provided to assist the user in resolving problems that may occur with the operation of the Model 24D/48D. It can be especially helpful when attempting to operate the recorder for the first time. Procedures for resolving both local and remote problems are listed. Where multiple steps are indicated it is recommended that they be performed in the order listed. Removal of PCBs must be done in accordance with the procedure entitled “PCB Removal and Insertion” on page 55.

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

Symptom or Problem	Resolution
No indication of power	Verify 10 to 36Vdc at B and N power terminals Inspect fuse on Power Supply PCB
PC or printer does not display data	Check cable connection to RS-232 port Verify cable is assembled per Figure 9 on page 66 Check Baud rate setting Check if Terminal LED on front panel illuminates
Data at PC or printer is garbled	Check Baud rate setting Verify following setting: 8 data bits, 1 start bit, 1 stop bit
Printer is missing data or performing odd mechanical motions	Use Pause and Resume commands to prevent overflowing data buffer of printer
Characters entered at the keyboard do not appear, or appear doubled	Use Toggle Full/Half Duplex command to enable or disable character echoing
Initial Check-out Procedure fails all inputs	Verify polarity of test voltage is applied correctly Verify Detection Times are not set to zero Check inputs using Print Live Status of Inputs command
Event Records are not being created on some inputs	Check wiring, especially polarity Set Detection Times to shorter values Verify Detection Times are not set to zero
Input Numbers do not match input where event occurred	Check input wiring Check switch settings on Opto-Input PCBs
Flashing Inputs create multiple Event Records	Enable flashing status for inputs Set Detection Time to a longer value
Upload/Download of Setup Database fails	Verify XMODEM protocol is being used
Full Screen Mode shows incorrect data fields	Verify that PC emulation is set to ANSI or Teletype 910
Modem does not answer	Check phone line connection Verify Modem Ring Delay is not set to zero
Modem answers but fails to connect	Check modem Baud rate at host end Verify host modem is compatible with recorder modem Test host modem with another auto-answer system

Table 4 - Guide to Trouble-shooting Techniques

This completes the User Manual for the Model 24D/48D Event Recorder. Two appendices have been provided. They list specifications and options applicable to the Model 24D/48D.

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: 8.3"

Width: 10.6"

Height: 5.6"

Weight

7lb.

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 mounting

Optional: 19", 23" rack or wall mounting brackets available

Construction

Chassis

Fully enclosed, anodized aluminum, thumbscrews allow access inside

Externally accessible keypad, LEDs and connectors

Electrical

All components mounted on conformal coated, plug-in PCBs

Power

Voltage

Range: 10 to 36Vdc

Consumption

Typical: 3W

Maximum: 5W (with Modem PCB)

Isolation

Power

Minimum: 3800Vdc from B and N terminals to chassis and inputs

Inputs to Ground

Minimum: 3800Vdc

Input to Adjacent Input

Minimum: 1500Vdc

Internal Modem (optional)

Designed to meet FCC part 68 standards

Capacities

Inputs

Type: all digital, opto-isolated

Model 24D: 24

Model 48D: 48

Event Storage

Standard: 27,844 records

CPU Options: 60,612, 85,188, 126,148, 240,836, 363,716 and 478,404 records

Memory Full: 31st day overwrites first day, newest data overwrites oldest data

RS-232 Ports

Quantity: 2, for PC or printer

Emulation: TTY, TVI-910, ANSI

Port 1 Baud Rates: 300, 1200, 4800, 9600, 19,200, 38,400

Port 2 Baud Rates: 300, 1200, 9600, 19,200

Bit Format: N-8-1

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: 16 keys, pushbutton

Keys: 0-9, Browse, Setup, Esc, Enter, left, right

Inputs

Input Impedance

Minimum: 5KOhms, opto-isolated

Voltage Range

High: 5 to 36Vdc

Low: less than 2Vdc

Event Validation Times

Range: .1 to 1500 seconds in multiples of .1 seconds

Flashing: compatible with fixed rate flashing circuits

Memory

Type

Non-volatile, Event Records and Setup Database are stored in battery backed-up RAM

Storage Longevity

Minimum: 1 year with power off

Connectors

All on rear panel

Inputs

Detachable, screw-down with 12 terminals, 12 to 22AWG

RS-232 Ports

DE-9 male, configured as DCE

Power

B and N to No. 6 screw terminals

Telephone Line

RJ-11 jack and No. 6 screw terminals

Controls

LCD Contrast Adjust

Potentiometer: 20-turn, located on Power Supply PCB

Power On/Off Switch

Toggle: SPST, located on Power Supply PCB

Indicators

LCD Panel

Includes LED back lighting for enhanced visibility

Displays numerous command menus for configuring the recorder 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)

Resolution

Event Records are time stamped to nearest .1 seconds

Internal Clock (continued)

Operation

Full calendar, auto-adjusted for leap year

Non-volatile with power off

Y2K compliant

Password Protection

Administrative Level

Access to all functions, limit 10 characters

Restricted Level

Access to Event Record and Setup Database viewing only, limit 10 characters

Passcode

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

Internal Modem (optional)

Type

V.32bis, 14,400 Baud, data compression and error correction

Usage

Remote access via auto-answer operation

Compliance

Designed to meet FCC part 68 standards

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

Terminal Port Cable

The following cable is included with every Model 24D/48D.

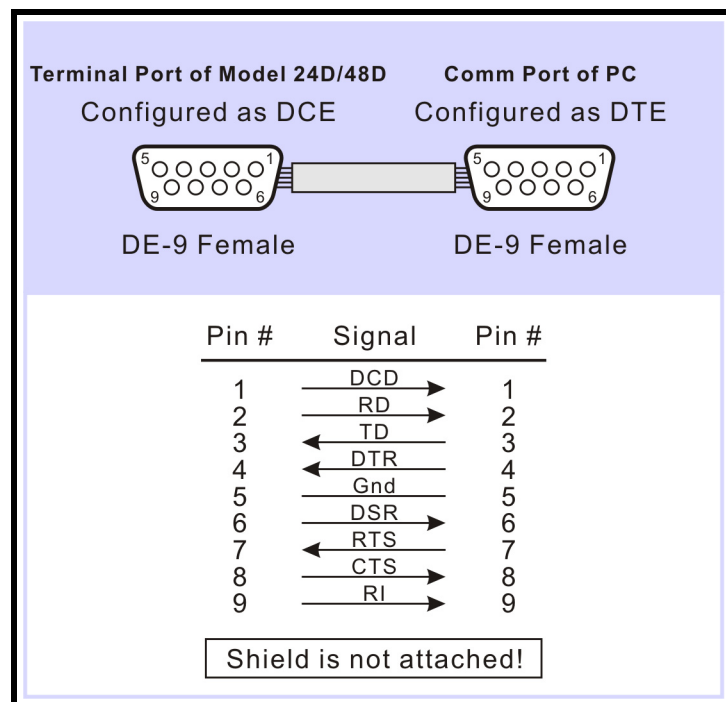


Figure 9 - terminal Port Cable - Wiring Diagram

OPTIONS AND ACCESSORIES

Options

Internal Modem

80-0064: 14,400 Baud, V.32bis, V.32, V.22bis, V.22 and V.21, V.42bis and MNP 5 data compression, MNP 2-4 and LAP-M error correction

Memory Expansion

80-0046 CPU PCB RAM options

41-0256: 60,612 Event Records

41-0384: 85,188 Event Records

41-0512: 126,148 Event Records

41-1024: 240,836 Event Records

41-1536: 363,716 Event Records

41-2048: 478,404 Event Records

Accessories

External Recorder Clock

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

Current Sensors

HCS-4: High Current Sensor, 4 inputs, 1 to 20Adc or Aac

Battery Charger Monitors

CSI-1: Charge Status Indicator, single input, monitors voltage and current

Voltage Detectors

FVD-2: Failed Voltage Detector, 2 inputs, .5 to 48Vdc, .5 to 36Vac, high and low limit values

Light Out Detectors

FLD-2: Failed Lamp Detector, 2 inputs, 3 to 11 lamps each input, DC or AC lamp current, compatible with all recorders

Jumper Combs

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

Mounting

31-0002: 23" rack mounting brackets

31-0003: Wall mounting brackets

Cables

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

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.

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

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

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