

# Operator's Manual



McElroy Manufacturing, Inc.

The leader by design.

[www.mcelroymfg.com](http://www.mcelroymfg.com)



Fusion Joint DataLogger™



Manual: DL3601 Revision: B 11/02





# Introduction



## Thank You for purchasing this McElroy product.

The DataLogger™ is used to record information when fusing polyolefin piping materials. It is a compact computing unit with a temperature probe for measuring the heater plate surface temperature and a pressure transducer for measuring hydraulic cylinder pressure during the fusion process. The unit is battery operated and is portable between any of the McElroy hydraulic fusion machines.

With reasonable care and maintenance, the DataLogger™ will give years of satisfactory service.

Before operating the DataLogger™, please read this manual thoroughly, and keep a copy with the unit for future reference. This manual is to be considered part of your equipment.

TX01335-4-25-97



PH01581-4-15-99

## World Class Training

This manual is intended as a guide only and does not take the place of proper training by qualified instructors.

The information in this manual is not all inclusive and can not encompass all possible situations that can be encountered during various operations.

McElroy Manufacturing, Inc., offers advanced training classes to enhance efficiency, productivity, safety and quality. Training is available at our facility or on-site at your location. Call (918) 836-8611

TX01333-4-23-97



PH00917-8-15-96



# Warranty



## LIMITED WARRANTY

McElroy Manufacturing, Inc. guarantees this product to the original purchaser against workmanship and material defects for three (3) years from date of shipment, with the exception of purchased items (such as electronic devices, pumps, switches, etc.), in which case that manufacturer's warranty applies. This warranty does not apply to any product or component which has been repaired or altered by anyone other than McElroy Manufacturing, Inc., or has become damaged due to misuse, negligence or casualty, or has not been operated or maintained according to McElroy Manufacturing, Inc.'s printed instructions and warnings.

Claims cannot be allowed until the questioned product has been received, freight prepaid, at the manufacturer's factory, with complete information and data regarding the failure. Materials returned to McElroy Manufacturing, Inc. for warranty work, repair, etc., **must have a Return Material Authorization (RMA) number**, and be so noted on the package at time of shipment. This number may be obtained by calling (918) 836-8611. If seller's review indicates that warranty applies, the defective product will be repaired or replaced and returned to purchaser F.O.B. Tulsa, Oklahoma.

McElroy Manufacturing, Inc. is not responsible or liable for loss of any sort including incidental and consequential damages.

McElroy Manufacturing, Inc. specifically disavows any other representations as to warranty or liability, related to the condition or use of the product.

For assistance, inquiries shall be directed to McElroy Manufacturing, Inc., P.O. Box 580550, 833 North Fulton, Tulsa, Oklahoma 74158-0550, (918) 836-8611, Telex No. 200470, Fax No. (918) 831-9285

## DISCLAIMER OF LIABILITY

McElroy Manufacturing, Inc. accepts no responsibility of liability for fusion joints. Operation and maintenance of the product is the responsibility of others. We recommend qualified joining procedures be followed when using McElroy fusion equipment.

McELROY MAKES NO OTHER WARRANTY OF ANY KIND WHATEVER, EXPRESS OR IMPLIED; AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESTATED OBLIGATION ARE HEREBY DISCLAIMED BY McELROY.

## PRODUCT IMPROVEMENT

McElroy Manufacturing, Inc. reserves the right to make any changes in or improvements on its products without incurring any liability or obligation to update or change previously sold machines and/or the accessories thereto.

## TERMS AND CONDITIONS

Net 30 Days - Subject to credit approval. A carrying charge of 1-1/2% per month computed from invoice date will apply to invoices not paid within 30 Day Terms.

McElroy Manufacturing, Inc. must be notified of any discrepancy in shipment, order, and/or invoice within 10 days after receipt.

Freight is F.O.B. Tulsa, Oklahoma - usually motor freight collect or UPS unless otherwise specified.

Prices are subject to change without notice.

Minimum order is \$50.00.

**(Copy information listed on the Warranty Card for your records).**

Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Date Received \_\_\_\_\_

Distributor \_\_\_\_\_



# Table of Contents



## Equipment Safety

|                                            |     |
|--------------------------------------------|-----|
| Safety Alerts . . . . .                    | 1-1 |
| Read and Understand . . . . .              | 1-1 |
| General Safety . . . . .                   | 1-2 |
| Wear Safety Equipment . . . . .            | 1-2 |
| Equipment is Not Explosion Proof . . . . . | 1-2 |
| Units With Hydraulics . . . . .            | 1-3 |
| Fusion Machine Procedures . . . . .        | 1-3 |
| Heater is Hot . . . . .                    | 1-3 |

## Overview

|                                           |     |
|-------------------------------------------|-----|
| Case Layout . . . . .                     | 2-1 |
| Computer . . . . .                        | 2-2 |
| Battery Operation . . . . .               | 2-2 |
| Temperature Probe . . . . .               | 2-2 |
| Pressure Transducer . . . . .             | 2-2 |
| Fusion Data Storage and Display . . . . . | 2-3 |
| Printer . . . . .                         | 2-3 |
| Limit Exposure to Sun . . . . .           | 2-3 |

## Installation

|                                                                                 |     |
|---------------------------------------------------------------------------------|-----|
| Connecting To a Fusion Machine . . . . .                                        | 3-1 |
| No.28, No.412 and No.618 Fusion Machine . . . . .                               | 3-1 |
| Mc28 Pit Bull™ , No.824, No.1236,<br>No.1648 & No.2063 Fusion Machines. . . . . | 3-1 |
| Optional Mounting Position Bracket . . . . .                                    | 3-2 |
| Sidewinder™ Fusion Machine . . . . .                                            | 3-2 |

## Keyboard Commands

|                                         |     |
|-----------------------------------------|-----|
| On and Off . . . . .                    | 4-1 |
| Function Keys . . . . .                 | 4-1 |
| Arrow Keys. . . . .                     | 4-1 |
| BKSP (Backspace) Key . . . . .          | 4-2 |
| SP (Space) Key . . . . .                | 4-2 |
| Enter Key . . . . .                     | 4-2 |
| N Key . . . . .                         | 4-2 |
| AlphaNumeric and Decimal Keys . . . . . | 4-3 |
| Blue Shift Key . . . . .                | 4-3 |
| Diagnostic Screen . . . . .             | 4-3 |
| Y Key . . . . .                         | 4-4 |

COPYRIGHT® 2002

McELROY MANUFACTURING, INC.

Tulsa, Oklahoma, USA

All rights reserved

All product names or trademarks are property of their respective owners. All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.



# Table of Contents



## Operation

|                                                                           |      |
|---------------------------------------------------------------------------|------|
| Getting Started . . . . .                                                 | 5-1  |
| Unlisted Machines . . . . .                                               | 5-1  |
| Piston Area . . . . .                                                     | 5-1  |
| Calculate Recommended Gauge Pressures . . . . .                           | 5-2  |
| Measuring Drag . . . . .                                                  | 5-2  |
| Measuring the Heater Temperature Using the<br>DataLogger™ Probe . . . . . | 5-3  |
| Using an External Source For Measuring<br>Heater Temperature . . . . .    | 5-3  |
| Recording the Fusion Pressures . . . . .                                  | 5-4  |
| Report Data . . . . .                                                     | 5-5  |
| Graphs . . . . .                                                          | 5-6  |
| Printing Joint Reports . . . . .                                          | 5-7  |
| Downloading a Report File . . . . .                                       | 5-7  |
| Typical Plot . . . . .                                                    | 5-8  |
| Interruption Before Data Logging is Turned Off . . . . .                  | 5-9  |
| Incorrect Shift Sequence . . . . .                                        | 5-10 |

## Downloading Joint Reports

|                                                  |      |
|--------------------------------------------------|------|
| Introduction. . . . .                            | 5-11 |
| System Requirement . . . . .                     | 5-11 |
| Installing the Program . . . . .                 | 5-11 |
| Using the Program . . . . .                      | 5-11 |
| Download Joint Reports. . . . .                  | 5-12 |
| Features of the McElroy Joint Reporter . . . . . | 5-12 |

## Maintenance

|                                          |     |
|------------------------------------------|-----|
| Cleaning The DataLogger™ . . . . .       | 6-1 |
| Battery Operation Overview . . . . .     | 6-1 |
| Recharging Batteries. . . . .            | 6-2 |
| Replacing Batteries in Unit. . . . .     | 6-3 |
| Replacing Batteries in Printer . . . . . | 6-3 |
| Unit Does Not Respond. . . . .           | 6-3 |
| Diagnostic Test Screen . . . . .         | 6-4 |
| Battery Calibration. . . . .             | 6-5 |
| Reprogram the DataLogger™ . . . . .      | 6-5 |
| No Maintenance Inside Case. . . . .      | 6-6 |
| Calibration . . . . .                    | 6-6 |

## Specifications

|                               |     |
|-------------------------------|-----|
| McElroy DataLogger™ . . . . . | 7-1 |
|-------------------------------|-----|



# Equipment Safety



## Safety Alerts

This hazard alert sign  appears in this manual. When you see this sign, carefully read what it says. YOUR SAFETY IS AT STAKE.

You will see the hazard alert sign with these words: DANGER, WARNING, and CAUTION.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

In this manual you should look for two other words: **NOTICE** and **IMPORTANT**.

**NOTICE:** can keep you from doing something that might damage the machine or someone's property. It may also be used to alert against unsafe practices.

**IMPORTANT:** can help you do a better job or make your job easier in some way.

TX00030-12-1-92



WR00051-11-30-92

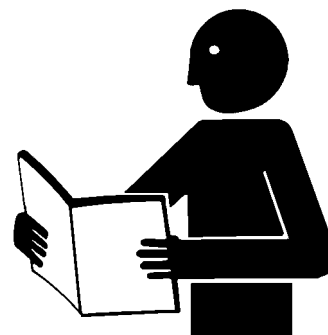
## Read and Understand

Do not operate this equipment until you have carefully read, and understand the "Safety" and "Operation" sections of this manual, and all other equipment manuals that will be used with it.

Your safety and the safety of others depends upon care and judgment in the operation of this equipment.

Follow all applicable federal, state, local, and industry specific regulations.

McElroy Manufacturing, Inc. cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this manual and on the machine are therefore not all inclusive. You must satisfy yourself that a procedure, tool, work method, or operating technique is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation or maintenance you choose.



TX00031-12-8-92

WR00052-12-1-92



# Equipment Safety



## General Safety

Safety is important. Report anything unusual that you notice during set up or operation.

**LISTEN** for thumps, bumps, rattles, squeals, air leaks, or unusual sounds.

**SMELL** odors like burning insulation, hot metal, burning rubber, hot oil, or natural gas.

**FEEL** any changes in the way the equipment operates.

**SEE** problems with wiring and cables, hydraulic connections, or other equipment.

**REPORT** anything you see, feel, smell, or hear that is different from what you expect, or that you think may be unsafe.



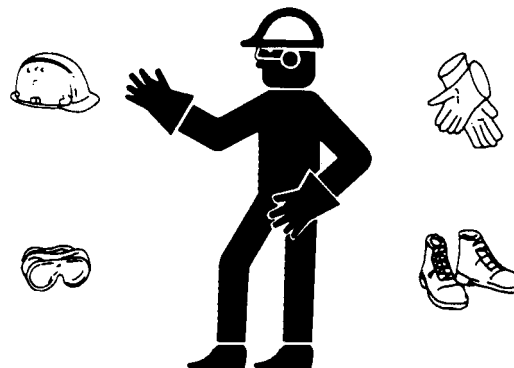
SAFE1ST-12-22-92

TX00114-4-22-93

## Wear Safety Equipment

Wear a hard hat, safety shoes, safety glasses, and other applicable personal protective equipment.

Remove jewelry and rings, and do not wear loose-fitting clothing or long hair that could catch on controls or moving machinery.



WR00053-12-2-92

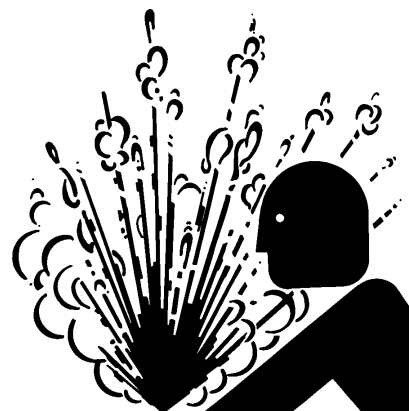
TX00032-4-7-93

## Equipment is Not Explosion Proof



Datalogger™ equipment is not explosion proof. Operation of equipment in a hazardous environment may result in explosion and death.

Do not operate this equipment in a hazardous environment.



WR00034-11-30-92

TX01395-6-12-97



# Equipment Safety



## Units With Hydraulics

Although the hydraulic pressures in this machine are low compared to some hydraulically operated equipment, it is important to remember that a sudden hydraulic oil leak can cause serious injury, or even be fatal if the pressure is high enough.

### **⚠ WARNING**

Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes which eject fluid under pressure. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, it must be immediately removed by a doctor familiar with this type of injury.

**NOTICE:** Wear safety glasses, and keep face clear of area when bleeding air from hydraulic system to avoid spraying oil into eyes.



WR00078-4-8-93

TX00110-8-23-95

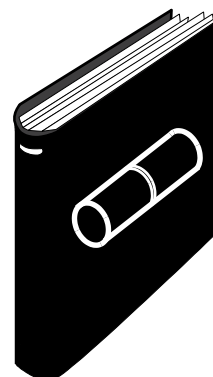
## Fusion Machine Procedures

Familiarize yourself with the fusion machine you will be working with by reading the Manufacturer's manuals for the machine. Read the Safety Information to avoid potentially dangerous situations.

### **⚠ WARNING**

Follow the pipe manufacturer's procedures for fusing the pipe being used.

Failure to adhere to proper machine and fusion procedures can result in injury and bad fusion joints.



WR00079-2-7-96

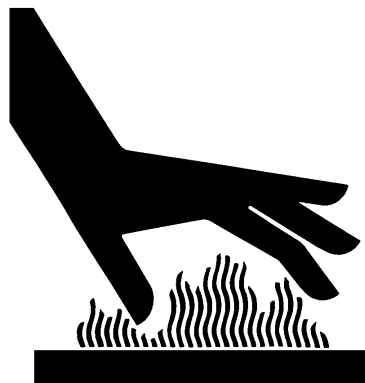
TX01396-6-12-97

## Heater Is Hot

### **⚠ CAUTION**

The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater stand or blanket when not in use, and use care when heating the pipe.

**NOTICE:** Use only a clean non-synthetic cloth such as a cotton cloth to clean the heater plates.



WR00030-2-10-93

TX00104-8-12-94



# Overview



## Case Layout





# Overview



## Computer

The DataLogger™ is an MS-DOS computer with a 16 line by 25 character display screen. The unit is sealed to resist moisture and dust. There is a numeric keyboard with key buttons for operating the system and entering joint data. The combination of lead-through operator prompts on the screen and simple keyboard data entry make for easy operator training and use.

The computing unit is programmed to operate in two languages: English, and Spanish. The language is selected by the operator.

TX01339-4-15-99



## Battery Operation

The computing unit is battery operated and will typically operate continuously for 8 hours without recharging. It can be operated and charged simultaneously or can be charged when not being used to log fusion data.

Simply plug the DataLogger™ charger into the jack on the handle to charge the batteries within the unit.

TX01340-4-15-99



## Temperature Probe

The temperature probe uses non-contact infra-red technology. The probe is attached to a coiled cord. The probe is fastened to the DataLogger™ unit when not in use.

TX01341-4-15-99



## Pressure Transducer

The pressure transducer is attached to the unit by a coiled cord. The transducer is fitted with a quick disconnect for connecting to the fusion machine. The fusion machine must be fitted with an adapter for connecting the transducer. Power for the transducer is supplied by the computing unit. The transducer is stored on the DataLogger™ unit for transportation between machines.

TX01342-4-15-99



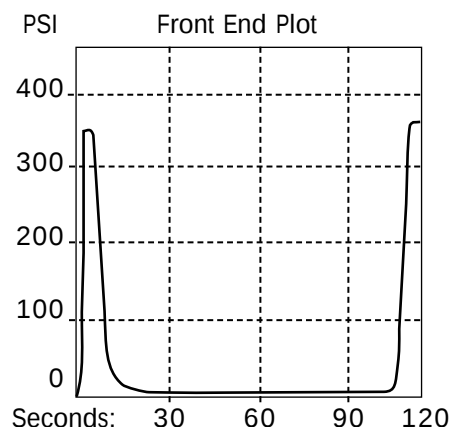


# Overview



## Fusion Data Storage and Display

The computing unit will capture and store data on the fusion process. The number of joints that can be stored is determined by the number of data points recorded for each joint. Joints with more pressure variations consume more storage space than joints with consistent pressure readings. The fusion record can be displayed on the screen in the form of a graph showing a pressure profile of the cylinder pressure vs. time. The fusion record can be downloaded to a Personal Computer for storage or further analysis.



TX01343-4-15-99

## Printer

A portable printer is provided for printing the fusion data. The printer is a portable, rechargeable, battery operated unit which attaches to the computing unit with an electrical cable. The fusion report is printed on 2-1/4" wide paper and includes the machine, job, and operator identification information along with the graph of the pressure profile vs. time.

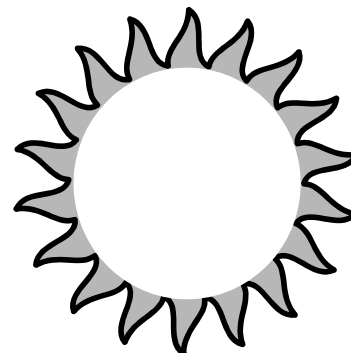


PH01570-4-15-99

TX01344-4-15-99

## Limit Exposure to Sun

**NOTICE:** Do not leave the DataLogger™ exposed to the sun for long periods of time. The airtight casing can accumulate sufficient heat to cause a malfunction.



CD003736-12-97

TX01391-4-15-99



# Installation

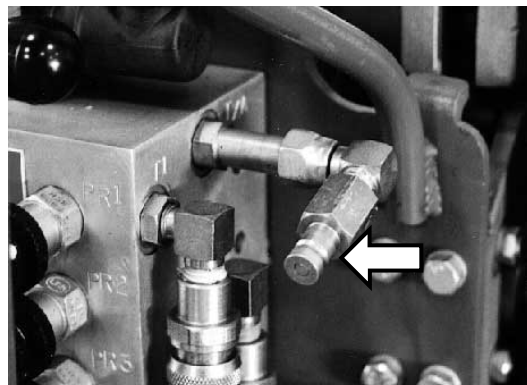


## Connecting To A Fusion Machine

**NOTICE:** The fusion machine must have a hydraulic quick disconnect for connecting the DataLogger™ pressure transducer. If the machine does not have one, contact your distributor for the proper adapter or retrofit kit.

**NOTICE:** Make sure the fusion machine hydraulic pump is turned off and the pressure is at 0 psi before connecting the DataLogger™ to the fusion machine.

TX01336-4-15-99

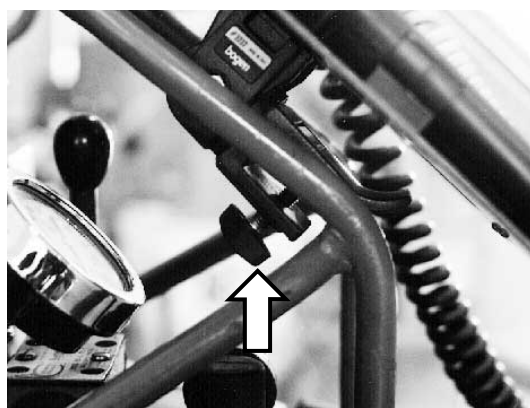


## No.28, No.412 and No.618 Fusion Machines

Loosen the thumb screw on the back of the unit. Place the slotted swivel adapter on the back of the unit over the top rectangular bar around the hydraulic manifold. Position the unit on the bar and lightly tighten the thumbscrew.

Remove the pressure transducer from the holder on the unit by pulling down on the knurled collar on the quick disconnect. Connect the pressure transducer quick disconnect to the fusion machine quick disconnect.

TX01337-4-15-99

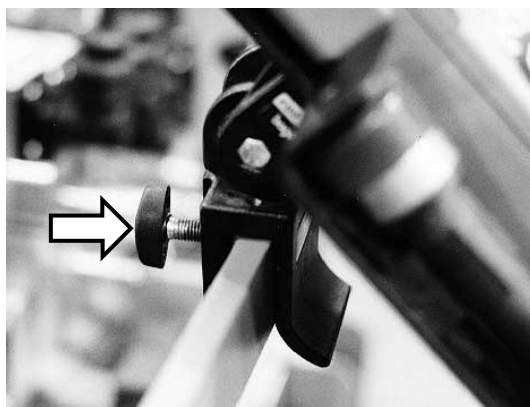
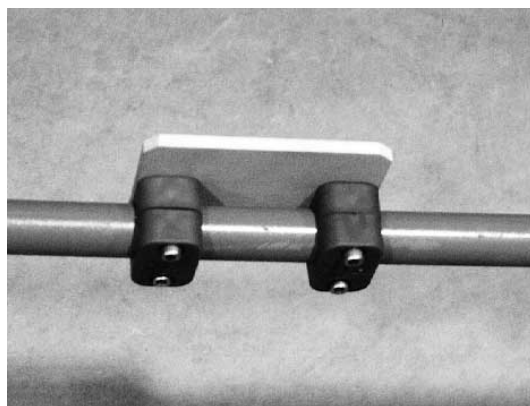


## Mc28 Pit Bull™, No.824, No.1236, No.1648 & No.2063 Fusion Machines

The Mc28 Pit Bull™ and all MegaMc® machines except the No.1236 require an adapter to mount the DataLogger™ on the bar surrounding the manual hydraulic controls. Install the adapter in a convenient place on the bar. Tighten the adapter. Loosen the thumbscrew on the back of the DataLogger™ unit and place the unit on the bar (1236) or on the bar adapter. Lightly tighten the thumbscrew.

Remove the pressure transducer from the holder on the unit by pulling down on the knurled collar on the quick disconnect. Connect the pressure transducer quick disconnect to the fusion machine quick disconnect.

TX01338-4-15-99





# Installation



## Optional Mounting Position Bracket

A bracket kit is included with the datalogger which allows the datalogger to be mounted to the side of the hydraulic controls.

To install the bracket, drill two size H holes (.266") thru the hydraulic manifold guard using the bracket as a template. Fasten the bracket to the guard with the enclosed hardware.



PH02403-11-20-02

TX02092-11-20-02

## Sidewinder™ Fusion Machine

Attach DataLogger™ to mounting bracket on top of Sidewinder™ and tighten thumbscrew.

Remove the pressure transducer from the holder on the unit by pulling down on the knurled collar on the quick disconnect. Connect the pressure transducer quick disconnect to the fusion machine quick disconnect.



PH01168-6-9-97

TX01392-4-15-99



# Keyboard Commands



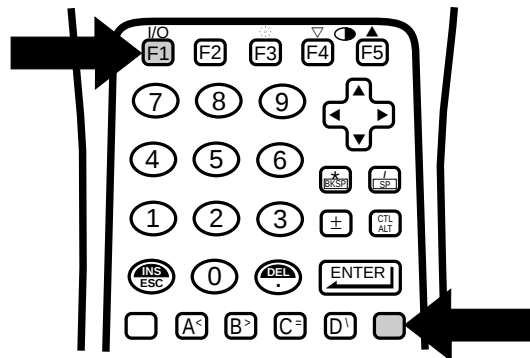
## On and Off

To turn the unit on, press the **F1** key. To turn the unit off, press the blue key once and then press the **F1** key.

**NOTICE:** The unit cannot be turned off while it is plugged into the battery charger.

**NOTICE:** The unit will remember the screen you were in when you turn the unit off. It will come back to that screen when you turn it back on.

TX01345-4-15-99



CD01531-4-15-99

## Function Keys

There are five function keys across the top of the keyboard, F1 through F5.

**F1** Turns the Datalogger on.

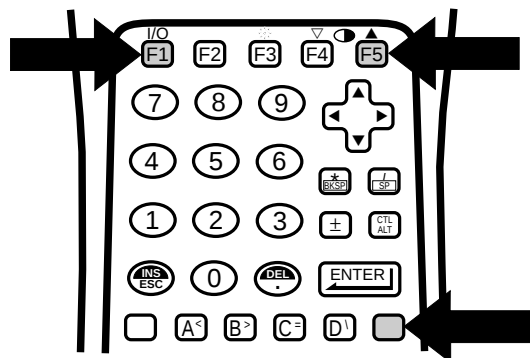
<Blue Key> **F1** Turns the Datalogger off.

<Blue Key> **F3** Turns on and off the backlight.

<Blue Key> **F4** Brighten contrast.

<Blue Key> **F5** Darken contrast

TX01346-4-15-99



CD01532-4-15-99

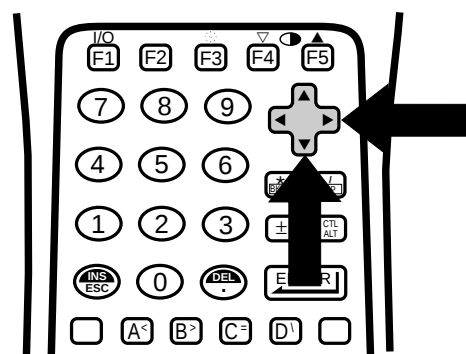
## Arrow Keys

There are four arrow keys, an up arrow, a down arrow and both left and right arrows. These keys are used for scrolling through various menu selections and the joint report.

When you see the reverse video on the screen (black background with green text) use the arrow keys to scroll through the selections in reverse video.

When you are viewing the joint report use the arrow keys to scroll across the report so that you can view the entire report.

TX01347-4-15-99



CD01533-4-15-99

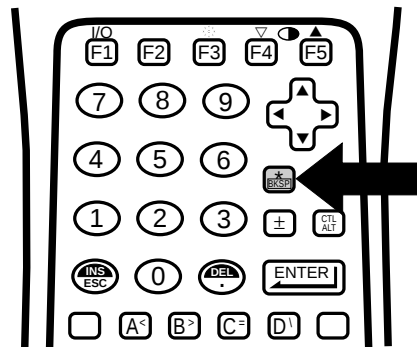


# Keyboard Commands



## BKSP (Backspace) Key

The **<BKSP>** key is used to backup from screen to screen. Each time you press the **<BKSP>** key you will back up once in the operating sequence.

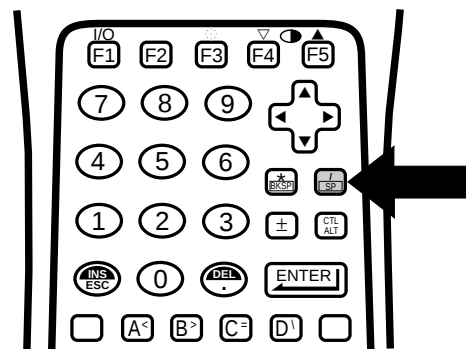


CD01534-4-15-99

TX01348-4-15-99

## SP (Space) Key

The **SP Key** is used to enter a white space in alpha-numeric entry screens.

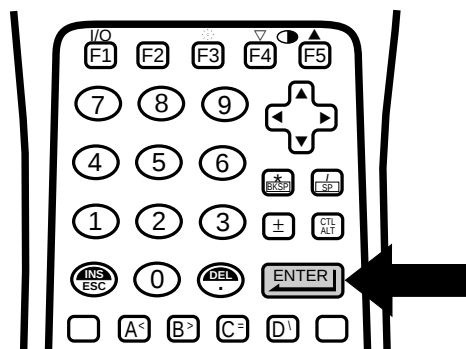


CD01535-4-15-99

TX01350-4-15-99

## Enter Key

The **Enter** key is used to accept the data listed on each screen and to move on to the next screen.

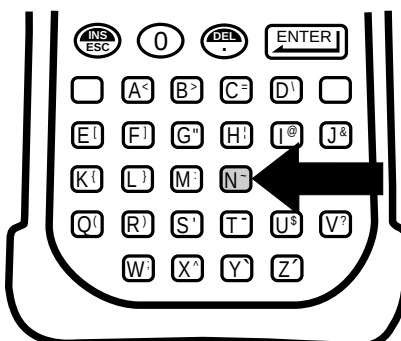


CD01536-4-15-99

TX01352-4-15-99

## N Key (No)

The **N** key skips an entry and advances a screen or moves back a screen, depending on the prompt.



CD01537-4-15-99

TX01353-4-15-99

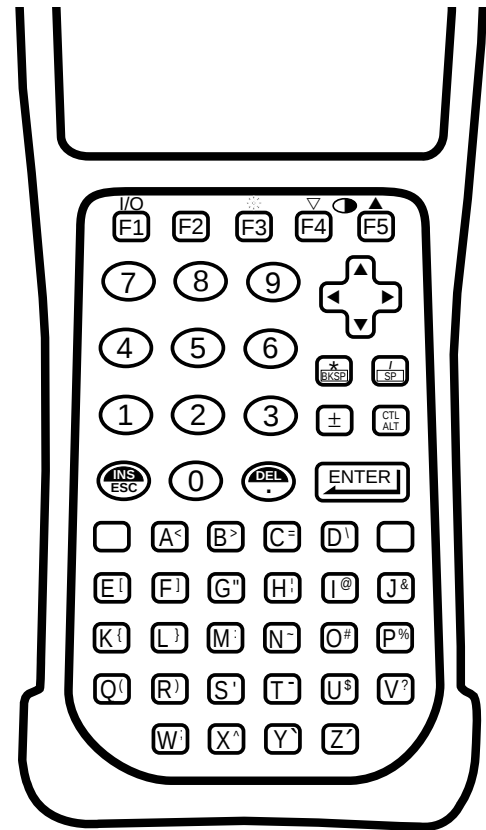


# Keyboard Commands



## AlphaNumeric and Decimal Keys

The number and decimal keys are used to enter numeric information when prompted. The alphanumeric keys are used for other text entries.

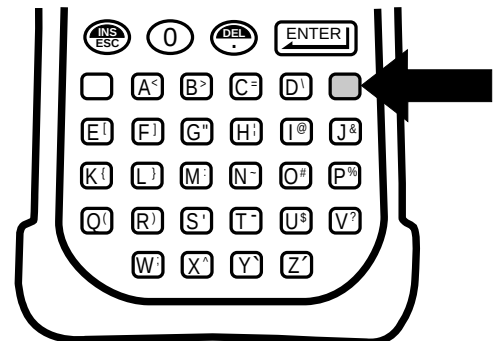


CD01538-4-15-99

TX01923-5-2-01

## Blue Shift Key

The blue shift key selects the alternate key function highlighted in blue on or above an individual key.



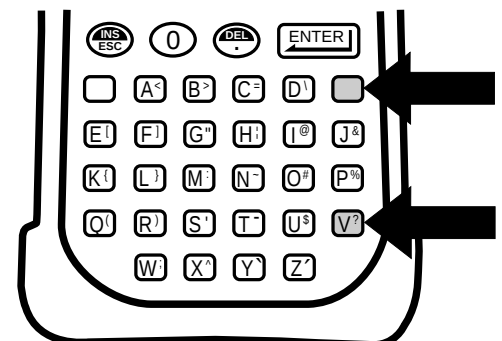
CD01539-4-15-99

TX01613-4-15-99

## Diagnostic Screen

Select the **<?>** key by pressing the **<Blue Key>** and **<V>** at the same time to display the diagnostic screen.

Select **<BKSP>** to Cancel and return to previous screen.



CD01540-4-15-99

TX01614-4-15-99

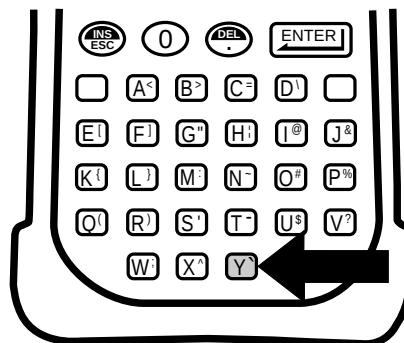


# Keyboard Commands



## Y Key (Yes)

The **Y** key advances a screen.



CD015404-15-99

TX01614-4-30-99



# Operation



## Getting Started

Turn the unit on by pressing F1. In a few seconds the display screen will appear. If this is the start of the job, press BKSP until you see screen 000. The screens are numbered in the upper left corner.

Use the following function keys to select data units:

Press 6 to select a pressure unit (PSI, BAR, or Kg/cm2).

Press 7 to select temperature unit (F or C)

Press 8 to select date format (month/day/year or day/month/year)

Press 9 to select decimal point (. or ,)

Select the appropriate language using the numeric key pad.

From the Main Menu screen, check the date and time. If either is incorrect, select the System Menu by pressing 3 and select SET CLOCK from the menu. Follow the instructions on the screen to set the date and time. Press

ENTER to return to the Main Menu.

From the Main Menu select LOG DATA.

Follow the instructions on the screen to enter the machine and job setup data.

TX01367-4-15-99



000 Select Language:

<1> English

<2> Español

Use numeric keys.

<6> PSI

<8> M/D/Y

<7> °F

<9> 1.0

## Unlisted Machines

A list of machines are programmed into the DataLogger™ for selection. If your machine is not on the list, you may enter the name of the machine. To enter a machine, scroll to UNLISTED from the Select Machine menu and press enter. Enter the machine description or name using alphanumeric keys. This is an optional field. If you do not wish to enter a name, press - and ENTER to enter a blank for the machine name.

TX01368-4-15-99

102 Select Machine:

Unlisted

Use <↑> and <↓>

Press <YES> to select

## Piston Area

Piston area is required to determine recommended gauge pressures. Machines listed in the DataLogger™ Select Machine menu have piston area values assigned to them. If an unlisted machine is selected, the piston area must be entered to calculate gauge pressure. However, pressure calculation is not mandatory. Leaving the piston area and the piston area unit entries blank, skips all the prompts for interfacial pressure entries.

To enter piston area, type in the piston area value in desired units, then select the units in the next screen.

TX01369-4-15-99

108 Enter Piston  
Area:

New:  
4.710

Use numeric keys.  
Press <ENTER> when done



# Operation



## Calculate Recommended Gauge Pressures

A total of four interfacial pressures can be entered; heat pressure, soak pressure, fuse pressure, and cool pressure. To skip a pressure, simply press <N>. An interfacial pressure that is skipped will not be displayed or printed out. Entering zero (0) pressure is not the same as skipping a pressure. Zero (0) pressure is a valid entry, and the resulting recommended pressure is the sum of the calculated pressure, which is 0, and the drag pressure entered later on.

180 Calculate Gauge pressures?

Press <Y> or <N>

TX01370-4-15-99

## Measuring Drag

Use the fusion machine controls to measure drag using the following procedure.

Move the carriage so that the inner jaws are approximately 3" apart.

Shift the carriage control valve to the middle (neutral) position.

Select the heating mode, and adjust the middle pressure reducing valve to its lowest pressure by turning the valve counterclockwise.

Shift the carriage control valve to the left.

Gradually increase the pressure by turning the valve clockwise. Increase the pressure until the carriage moves.

Quickly reduce the heating pressure by turning the valve clockwise until the carriage is just barely moving.

Record this drag pressure.

To read the drag pressure you can use either the pressure gauge on the fusion machine or the pressure display on the screen. After measuring drag, enter the drag pressure using the DataLogger™ keyboard. If you do not enter a drag pressure value, the default pressure of 30psi will be used.

The DataLogger™ records actual hydraulic cylinder pressure. When you are analyzing the pressure profile recorded by the DataLogger™ you must subtract the drag pressure from the recorded pressure to get the actual fusion pressure.

160 Drag Pressure:

Drag:            PSI

Standard: 30 PSI

Carriage:    0 PSI

Use numeric keys.  
Press <ENTER> when done

TX01371-5-19-97



# Operation



## Measuring the Heater Temperature Using The DataLogger™ Probe

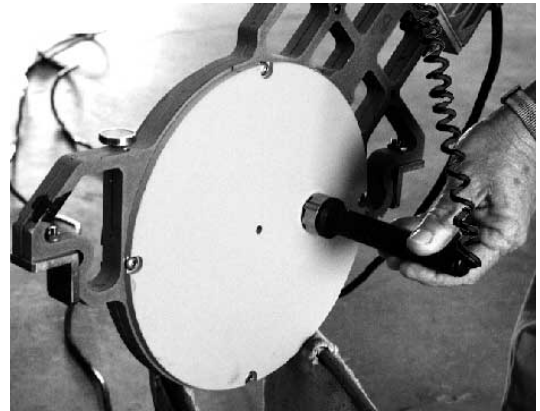
Follow the instructions on the screen to measure the heater plate surface temperature. Remove the temperature probe from the storage location on the DataLogger™ and place the metal tip flat on the surface of the heater plate. Read the heater plate temperature on the screen. Press ENTER to record the measured heater temperature while still holding the probe on the heater plate.

**NOTICE:** Remove the probe from the plate as soon as possible. Excessive heating of the probe will cause an inaccurate reading.

**NOTICE:** Make sure the probe is not at an angle when measuring the temperature. Incorrect probe placement will result in measurement errors.

**NOTICE:** Keep the lens on the temperature probe clean. If the lens is dirty, it will give an inaccurate reading.

When finished measuring the heater temperature, return the probe to the holder on the DataLogger™. Press the probe onto the plastic strip firmly to secure the probe.



PH011716-9-97

TX01372-5-19-97

## Using an External Source For Measuring Heater Temperature

When using an external probe for measuring heater temperature, key in the measured value instead of using the DataLogger™ probe.

170 Heater Temp.:

External: °F

Datalogger: 0°F

Use numeric keys  
Press <ENTER> when done

TX01373-5-19-97



# Operation



## Recording the Fusion Pressures

The proper time to begin recording the fusion pressure is just after placing the heater into the fusion machine. Install the heater in the machine and then press 4 to begin recording the pressure. When recording the pressure, simply operate the fusion machine in the normal manner. There is no special technique required to use the DataLogger™.

The logging screen shows the elapsed time since the 4 key was pressed and also shows a stopwatch timer. The stopwatch can be used for timing during the fusing process. Press 0 to reset and restart the stopwatch.

The recording should be stopped as soon as the recommended cool time is finished. Press the 6 key to stop recording before doing any other machine operation. Stopping the recording will prevent filling up the joint storage memory with unnecessary data.

Follow the screen instructions to view the graph, print the graph, or log another joint.

200 Ready to Log Data

DataLogger: 0°F

External: 0°F

Recommended:

Fuse: 338 PSI

Cool: 338 PSI

Carriage: 0 PSI

Battery: ?100%

<4> to Begin.

<6> to Stop.



# Operation



## Report Data

Allows the operator to quickly identify individual reports. The first page of the report, lists the text information that was the entered into the Datalogger™. The entire screen is larger than the Datalogger™ display. The operator can pan right, left, up, and down using the arrow keys. Press <Y> to go to the graphs.

### Left Side (Upper)

<Y> <↓> and <→>

1. Date and Time : 04 /14 /  
2. Joint Number : 10  
3. Job Number : 613270  
4. Employee Num. : 2162  
5. Machine I.D. : 99001  
6. Machine Model : MMI 28  
7. Piston Area : 4.71 i  
8. Pipe Material : Drisco  
9. Pipe Size : 8" IPS  
Interfacial Pressures:  
10. Fuse : 75 P  
11. Cool : 75 P  
Recommended Gauge Pressur  
12. Fuse : 338 P  
13. Cool : 338 P  
Recorded data:  
14. Drag Pressure : 30 P  
15. DataLogger Probe: 0°F  
16. External Probe: 0°F

### Right Side (Upper)

<Y> <↓> and <←>

4/14/99 09:23:34  
0  
13270  
162  
9001  
MI 28 Butt  
71 in<sup>2</sup>  
isco 6500/6800  
" IPS SDR 11  
S:  
75 PSI  
75 PSI  
essures:  
338 PSI  
338 PSI  
  
30 PSI  
: 0°F  
0°F

### Left Side (Lower)

9. Pipe Size : 8" IPS  
Interfacial Pressures:  
10. Fuse : 75 P  
11. Cool : 75 P  
Recommended Gauge Pressur  
12. Fuse : 338 P  
13. Cool : 338 P  
Recorded data:  
14. Drag Pressure : 30 P  
15. DataLogger Probe: 0°F  
16. External Probe : 0°F

<Y> <↑> and <→>

### Right Side (Lower)

8" IPS SDR 11  
es:  
75 PSI  
75 PSI  
ressures:  
338 PSI  
338 PSI  
  
30 PSI  
e: 0°F  
0°F

<Y> <↑> and <←>



# Operation

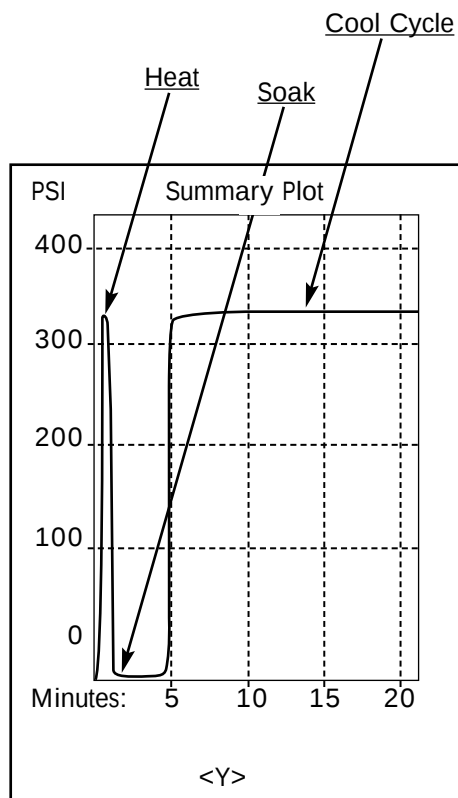
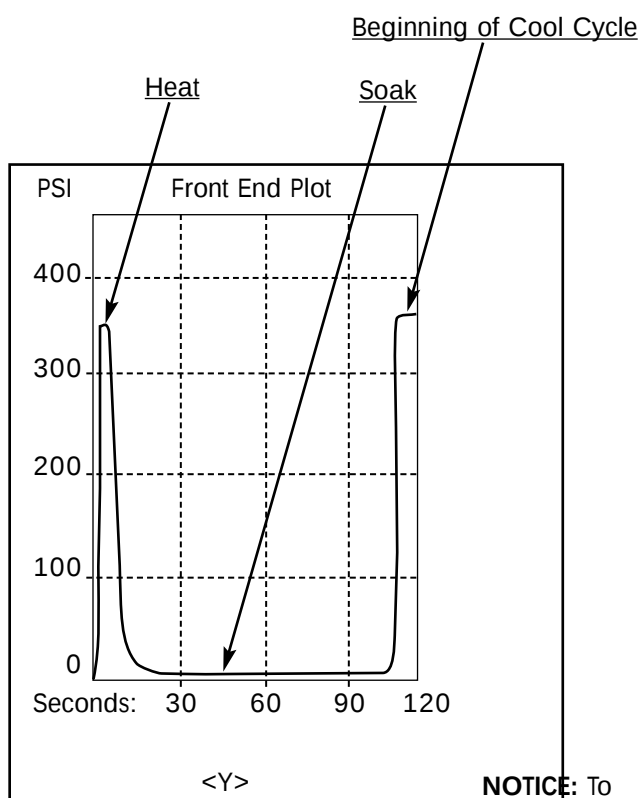


## Graphs

There are two plots associated with each joint report, a front end plot and a summary plot. The front end plot shows the actual start time to the last significant change in pressure. This feature zooms into the part of the pressure profile where pressure fluctuates the most. Typically, this includes the pressure changes at the beginning of heat, soak and the beginning of the cool cycle.

The summary plot shows the entire cycle, from the start of data logging until the end of data logging, either canceled by the operator, timed out, or ran out of memory.

For plots of 5 minutes or less, the time scale is shown in seconds.  
For long plots, the time scale changes to minutes.



**NOTICE:** To  
prolong the

battery charge, turn off the unit if there will be some time before logging the next joint. Remember that you will not lose your machine and job setup and will not have to re-enter the data because the unit will return to the same screen where it was turned off.



# Operation



## Printing Joint Reports

A portable printer, EXTECH Instruments Mini Serial Printer, IIa42, is available to print joint reports. You may print the report at the end of each joint or use the Report Menu.

Connect the printer to the DataLogger™ with the cable provided with the printer. Connect the 9-pin cable connector to the connector on the backside of the handle DataLogger™ and connect the 9-pin to 25 pin adapter to the printer.

**NOTICE:** Use the cable provided. Use of other cables may cause damage to the unit or the printer. Make sure the printer batteries are charged and that the printer has enough paper to print all the reports you will be printing.

Turn the printer on with the switch on the right side of the printer.

Any number of available reports can be printed from the Report Menu. If you only want to print one report select the same report on both the 'From' and 'To' selections. Start the printing process. If you have problems operating the printer, refer to the printer manual provided with the printer.



PH015704-15-99



PH015724-15-99

TX01376-4-15-99

## Downloading a Report File

Follow these steps to download a report file from the DataLogger™:

1. Locate the cable female 9-pin to female 9-pin. Connect the cable to your computer's 9-pin serial port.

**NOTICE:** Use the cables provided. Use of other cables may cause damage to the unit or the printer.

2. Use the BKSP key on the DataLogger™ to get to the MAIN MENU. Press 2 to select the Report Menu.
3. Press 4 to select Upload Reports.
4. The DataLogger™ is now ready to send the report to the personal computer as soon as the McElroy Joint Reporter program is started on the personal computer.
5. Start the Joint Reporter program on the personal computer. From the File menu, select Download. Once the file transfer is started, both the DataLogger™ and PC screens will be updated with the file transfer status. At the end of the transfer, the Joint Reporter program will prompt you to enter a description for the report. After that, you may view or print the report and graphs.

### 010 Report Menu

- <1> View a Graph
- <2> Delete Reports
- <3> Delete Reports
- <4> Upload Reports

3 reports in memory

(19829882 bytes free)

TX01379-4-15-99



# Operation

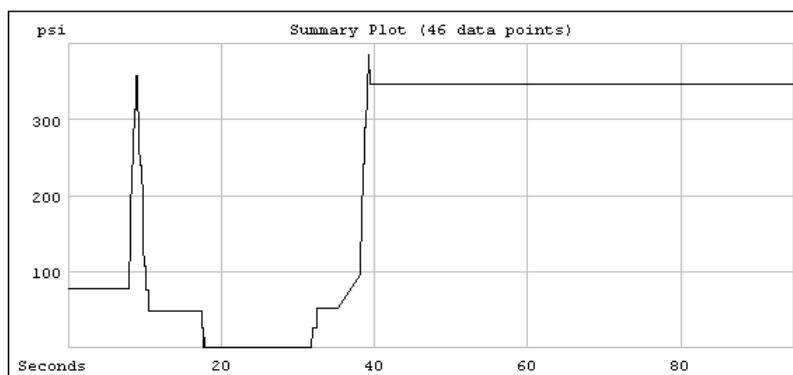
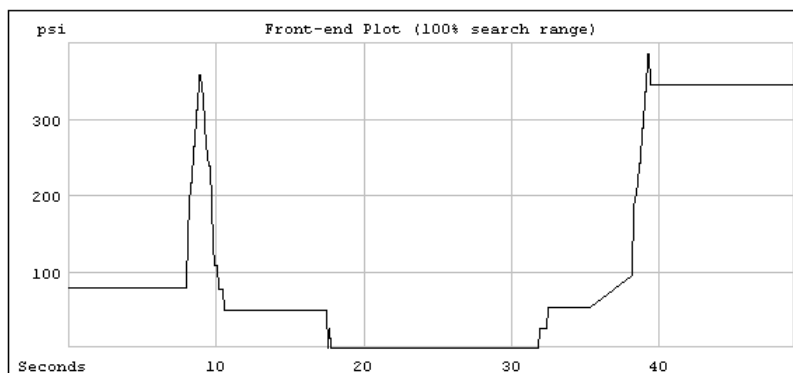


|                                       |                              |
|---------------------------------------|------------------------------|
| 1. Date and Time: 06/07/95 15:35:34   | Recommended Gauge Pressures: |
| 2. Joint Number : 1                   | 18. Heat : 338 psi           |
| 3. Job Number : 10                    | 19. Soak : 30 psi            |
| 4. Employee Num.: 9127                | 20. Fuse : 338 psi           |
| 5. Machine I.D. : 12345               | 21. Cool : -----             |
| 6. Machine Model: MMI 28 Butt         |                              |
| 7. Piston Area : 4.71 in <sup>2</sup> | Recorded data:               |
| 8. Pipe Material: Drisco 1000/6400    | 24. Drag Pressure: 30 psi    |
| 9. Pipe Size : 8.0" IPS SDR 11        | 25. DataLogger Probe: 81°F   |
|                                       | 26. External Probe: 0°F      |

|                        |          |
|------------------------|----------|
| Interfacial Pressures: |          |
| 12. Heat               | : 75 psi |
| 13. Soak               | : 0 psi  |
| 14. Fuse               | : 75 psi |
| 15. Cool               | : -----  |

PH02057-52.01



## Typical Plot

The pipe is brought together against the heater. Heat mode is selected on the manifold and pressure drops rapidly to zero for the soaking period. The carriage control is then shifted to neutral.

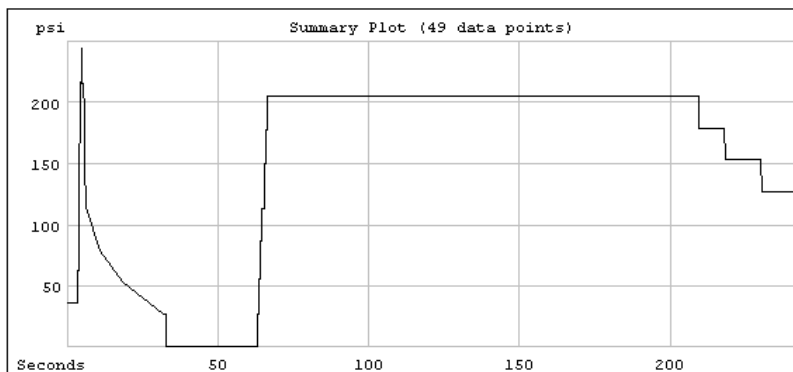
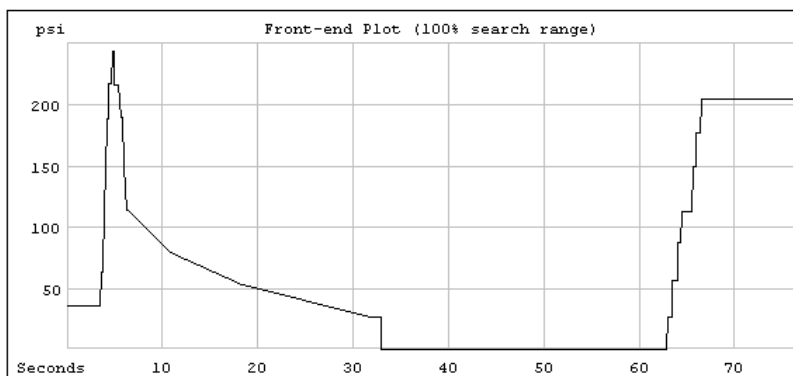
When the soaking time is complete, the carriage is shifted to remove the heater and the pipe is brought back together under fusion pressure.



# Operation



|                                       |                              |
|---------------------------------------|------------------------------|
| 1. Date and Time: 12/06/95 10:33:17   | Recommended Gauge Pressures: |
| 2. Joint Number : 3                   | 18. Heat : 30 psi            |
| 3. Job Number : 0001                  | 19. Soak : 30 psi            |
| 4. Employee Num.: 0001                | 20. Fuse : 204 psi           |
| 5. Machine I.D. : 001                 | 21. Cool : 30 psi            |
| 6. Machine Model: MMI 28 Combo        | Recorded data:               |
| 7. Piston Area : 4.71 in <sup>2</sup> | 24. Drag Pressure: 30 psi    |
| 8. Pipe Material: Udonor UAC 2000     | 25. DataLogger Probe: 503°F  |
| 9. Pipe Size : 6.0" IPS SDR 11.5      | 26. External Probe: 429°F    |
| Interfacial Pressures:                |                              |
| 12. Heat : 0 psi                      |                              |
| 13. Soak : 0 psi                      |                              |
| 14. Fuse : 75 psi                     |                              |
| 15. Cool : 0 psi                      |                              |



PH02058-52-01

## Interruption Before Data Logging is Turned Off

The right side of the plot shows a tapering off of pressure. This could indicate that power was lost or a jaw opened before Datalogging was turned off.



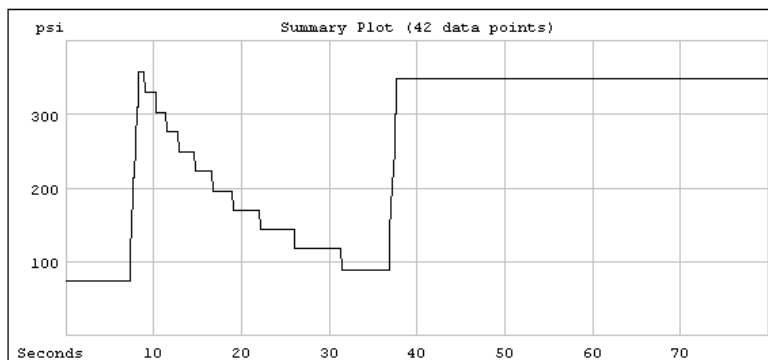
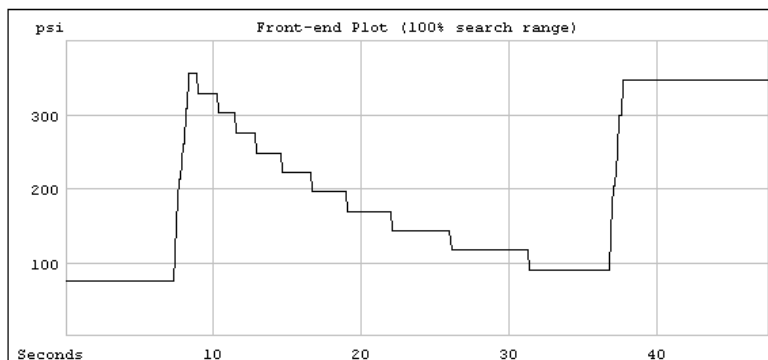
# Operation



|                                       |                              |
|---------------------------------------|------------------------------|
| 1. Date and Time: 06/07/95 15:40:35   | Recommended Gauge Pressures: |
| 2. Joint Number : 2                   | 18. Heat : 338 psi           |
| 3. Job Number : 10                    | 19. Soak : 30 psi            |
| 4. Employee Num.: 9127                | 20. Fuse : 338 psi           |
| 5. Machine I.D. : 12345               | 21. Cool : -----             |
| 6. Machine Model: MMI 28 Butt         | Recorded data:               |
| 7. Piston Area : 4.71 in <sup>2</sup> | 24. Draw Pressure: 30 psi    |
| 8. Pipe Material: Drisco 1000/6400    | 25. DataLogger Probe: 420°F  |
| 9. Pipe Size : 8.0" IPS SDR 11        | 26. External Probe: 340°F    |

|                        |        |
|------------------------|--------|
| Interfacial Pressures: |        |
| 12. Heat :             | 75 psi |
| 13. Soak :             | 0 psi  |
| 14. Fuse :             | 75 psi |
| 15. Cool :             | -----  |



## Incorrect Shift Sequence

Pressure not dropping to zero in a timely mannner could indicate that the carriage was shifted to neutral before heat mode was selected on the manifold.

PH020595-201



# Downloading Joint Reports



## Introduction

The McElroy Joint Reporter allows you to download joint reports from the DataLogger™ and Coach™ family of machines (including the TracStar™ 500, TracStar™ 900, and McHiLYT™) to an IBM compatible PC for viewing, printing, and archiving.

## System Requirement

To use this program, you need a PC with Microsoft Windows 95 or higher. This program will also run on Windows NT 4.0 or higher systems.

## Installing the Program

On Windows 9x and Windows NT 4.0 or higher PC's:

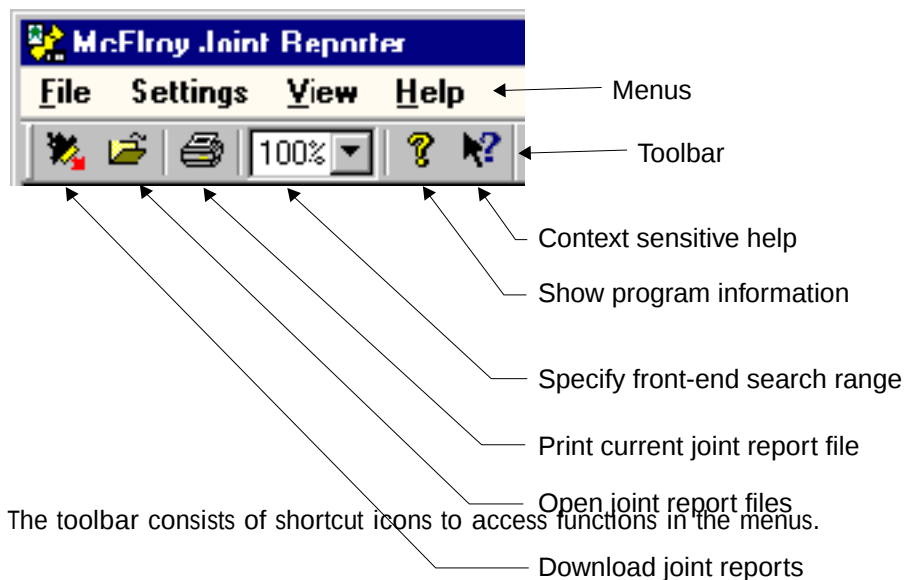
1. Insert the installation diskette in drive A:
2. Click the Start button and choose Run...
3. Type a:\setup and press Enter

Follow the setup program prompts on the screen. You may accept all the default settings and allow the setup program to install the McElroy Joint Reporter in the recommended directory.

## Using the Program

To start the program, click the Start button, then click Programs and find the McElroy Joint Reporter's icon. Click on the icon to run the program.

The program will display the following menus and toolbar icons:





# Downloading Joint Reports

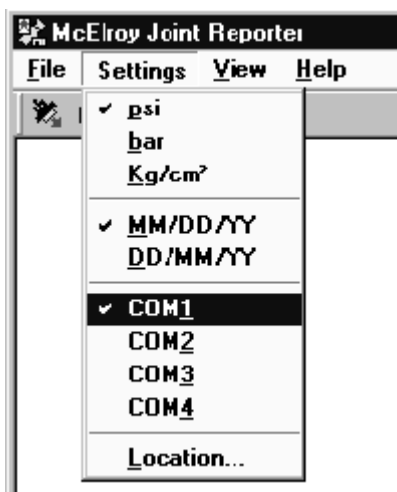


## Download Joint Reports

To download joint reports, connect the download cable between the Couch™ or DataLogger™ and a PC serial port.

On the Coach™ or DataLogger™, go to the report menu and press 4 to begin uploading report to the PC. At the PC, select Download... from the File menu or click on the download icon on the tool bar. Once communication is established, the download process is automatic, and the PC will inform you when the download is completed.

If you need to change COM port setting on your PC, click Settings on the menu bar, and select the appropriate COM port:



Once downloaded, you may open individual report files for viewing and printing. Only one file can be opened for viewing at a time, but multiple files can be selected for printing.

## Features of the McElroy Joint Reporter

### File Menu

1. Download joint reports from DataLogger™ and Coach™ systems. Individual reports are saved in individual joint report files with an extension ".JRP". Each download is organized in a folder under the default main folder "C:\My Reports\".
2. Open a joint report file (with the file extension ".JRP") for on screen viewing and printing.
3. Print the currently displayed joint report.
4. Print Preview the currently displayed joint report before printing.
5. Print Setup - change the printer settings (to a different printer, etc) before printing.

PH01996-12-15-00



# Downloading Joint Reports



6. Print Many - print a selected group of report files (\*.JRP). To select a group of files, hold down the CTRL key and click the files you want to print one at a time. To select a range of files, click the first file you want to print, then hold down the SHIFT key and click on the last file you want to print. To select all files in the current folder, hold down CTRL and press A. Selected files are shown in reverse-video or white letters on blue background on most PC's.
7. Convert report files downloaded by the DataLogger™ Companion Program or MMI Joint Report Manager to the new JRP file format.
8. Send - attach joint report file(s) to e-mail for transmission.
9. Keeps a list of 4 most recently opened report files.
10. Exit program.

## Settings Menu

1. Change unit of measurements: psi, bar, and Kg/cm2.
2. Change date display format: US (MM/DD/YY) and others (DD/MM/YY).
3. Change serial port for download: COM1, COM2, COM3, or COM4.
4. Location - change the report storage location from the default 'C:\My Reports\' to any sub-folder on any drive accessible by the computer.

## View Menu

1. Show or hide the Toolbar.
2. Show or hide the Status Bar.

## Front-end Search Range

This feature is to help graph the front-end plot and open/close plot more accurately in case logging was not turned off before removing pipe from the carriage. Because the program cannot tell the difference between an "open/close to remove heater" from an "open/close to remove fused pipe", the program cannot produce the correct front-end plot if logging is not turned off as intended. As a remedy, you can specify in percentage a range you want the program to start searching for the open/close point. The range is between 5% to 100% in 5% increments. For example, if by looking at the summary plot you estimate the open/close point occurred in the first 30% of the entire plot, then specifying 30% will tell the program to ignore all pressure fluctuations beyond the first 30%. This setting remains for subsequent joint reports until you change it or restarts the program.

## Getting Help

At anytime you need help, click on the help menu for online instructions. Or, click on the context sensitive help icon to activate the special context sensitive help cursor. Then using that cursor, you may click on any of the toolbar icons to get help on it.



# Maintenance and Troubleshooting



## Cleaning The DataLogger™

Use a soft cloth and a mild soap and water solution to clean the case of the unit. Do not use abrasives.



PH01581-4-15-99

TX01382-5-20-97

## Battery Operation Overview

The unit is powered by a rechargeable battery. When the battery level is low, the unit shuts off automatically. When you resume processing, whether or not you have recharged the batteries, the unit displays a message indicating that the unit shut down automatically because the battery was low, and that the battery should be recharged if you have not already done so.

The unit typically runs 8 or more hours on a full battery charge. It is best to recharge the unit overnight on the night before you will use the unit to record fusion joints.

The recharging operation will be completed in 4 hours. The intelligent recharging circuit will automatically stop when the batteries are recharged. If the unit turns off because of a low battery level, processing will resume where it was interrupted once recharging starts.

**NOTICE:** Even though the data will be saved, the joint data will be interrupted when the batteries get low. It is recommended to always start the day on a fresh battery charge or charge the batteries while operating the unit from the charger.

The unit is equipped with a backup battery which ensures that your data is saved, even when the main batteries are low or when you are replacing them.

The unit can be operated and continually used to log joints while the batteries are being recharged.



PH01588-4-15-99

TX01377-4-15-99



# Maintenance and Troubleshooting



## Recharging Batteries

### Computer

To recharge the unit select the DAP plug-in charger marked "DataLogger Computer" and plug the cord into the connector on the bottom of the handle . Plug the charger into an electrical outlet with the correct voltage for the charger you are using. The unit will come on when the charger is connected and you cannot turn it off with the <Blue, F1> keys. It may take a few seconds for the batteries to charge to a level sufficient to turn the unit on.

### Printer

To recharge the printer select the EXTECH plug-in charger marked "Printer" and plug the cord into the connector on the side of the printer. Plug the charger into an electrical outlet with the correct voltage for the charger you are using.

**NOTICE:** Use only the battery charger provided. Other chargers with the incorrect voltage, current, or polarity may result in damage to the unit.

### Battery Life

The batteries can be recharged many times. If you find that they are not lasting for the normal period (at least 8 hours) after having been recharged, it is time to change them. In order to avoid problems, we strongly suggest that you replace the batteries once a year.

To maintain battery efficiency at optimum levels, we suggest that you periodically leave the unit on until the batteries are fully discharged. You can do this by leaving the unit on continuously until the unit automatically shuts off due to low battery charge.



PH01578-4-15-99



PH01591-4-15-99



# Maintenance and Troubleshooting



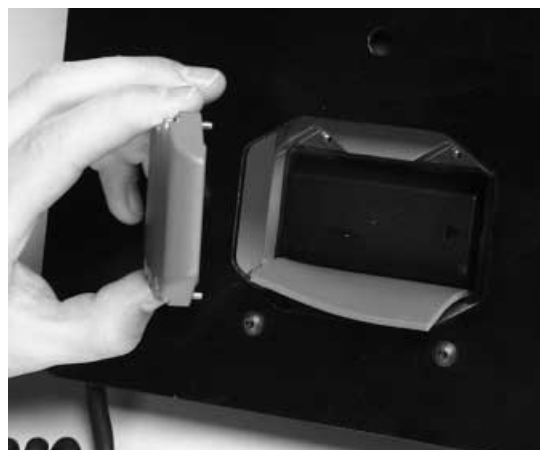
## Replacing Batteries in Unit

It is preferable to replace the batteries in a clean, dry area. Make sure that either water nor dust enters the unit.

**NOTICE:** Always shut off the DataLogger™ before replacing the batteries. Your data will be retained by the non-volatile memory.

To change the batteries follow the steps below:

1. Turn the power off.
2. Using a small, flat blade, screw driver, remove the 4 screws on the back of the computer.
3. Pull out the battery and insert the new one, inserting the left side first. Be sure to align the arrow on the right.
5. Re-install the 4 screws, and tighten them until you feel some resistance.
6. Press the F1 key to turn on the unit.



PH01588-4-15-99

TX01381-4-15-99

## Replacing Batteries in Printer

Turn the printer off.

Remove the access panel on the bottom of the printer.

Replace the battery pack.



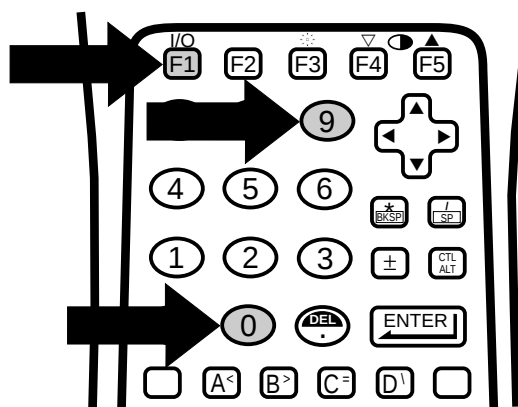
PH01564-4-15-99

TX01393-6-9-97

## Unit Does Not Respond

If the unit does not respond to pressing any keys (appears to be 'locked up') press <F1>, <9>, and <0> for about 5 seconds and then release. The unit will perform a reset and after a few seconds will become ready at the start of the program.

**NOTICE:** Performing a reset will abort datalogging and data will be lost for the joint currently in progress. Use this method only in case of an apparent "lock up" of the unit.



CD01541-4-15-99

TX01383-4-15-99



# Maintenance and Troubleshooting



## Diagnostic Test Screen

The diagnostic test screen can be accessed any time except when the unit is logging joint data on screen number 202. This screen is accessed by pressing the <Blue Key> and <V>, which is the "?". The displayed information is useful in diagnosing problems that may arise in the computing unit, temperature probe, or pressure probe.

Ch: 0 Msg: 0 When these numbers are rapidly changing it indicates that the Probe Interface Board located in the handle is providing data for the DAP computer.

(Input) = the actual voltage output of the pressure transducer.

(Offset) = Pressure transducer voltage at 0 psi.

Raw temperature input voltage

adjusted temperature voltage

Battery: Percentage of Charge Remaining

Cal =1999/03/13 = Is the date the battery was calibrated.

(Final) = actual pressure transducer output voltage minus offset voltage. (Input minus offset).

Transducer pressure reading in psi.

Temperature reading in °F

Software Version

Computer Model and BIOS

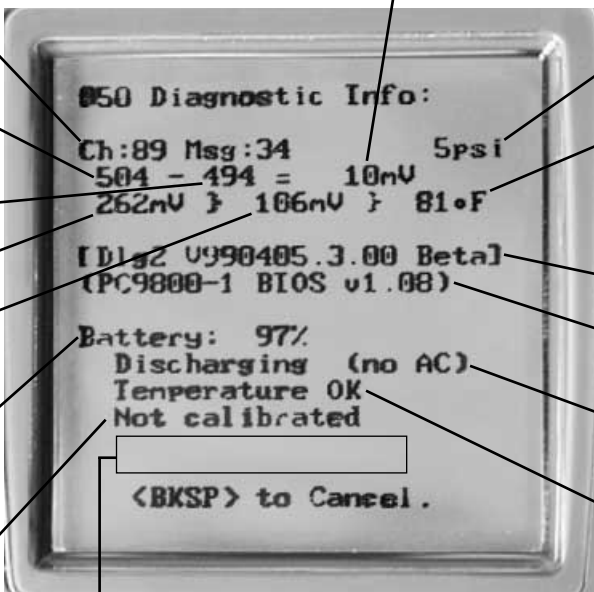
Discharging or Charging (no AC) or (AC)

Temperature OK, too high, too low

1545mA/h (capacity of the battery)

Disch=13:26 Estimated time before discharge is completed

Ch=03:04 Recorded length of charging time.



050 Diagnostic Info:  
Ch:89 Msg:34 5psi  
504 - 494 = 10mV  
262mV } 106mV } 81°F  
[D1g2 0990405.3.00 Beta]  
(PC9800-1 BIOS v1.08)  
Battery: 97%  
Discharging (no AC)  
Temperature OK  
Not calibrated  
[REDACTED]  
<BKSP> to Cancel.

PH01580B-4-15-99

If you have problems with the unit this information will be useful in diagnosing the trouble when you contact your distributor for assistance.



# Maintenance and Troubleshooting



## Battery Calibration

Battery Level is reported in several screens (the main menu, and screen #200 Ready to Log Data). In order for accurate reading, the battery must be calibrated. Uncalibrated battery readings are preceded by a '?' symbol. The battery needs to be calibrated if (a) it was completely discharged, (b) it was removed from the PC 9800, or (c) a new battery was installed.

The DataLogger™ program must be running to perform battery calibration. The calibration could take 20 hours.

Follow these steps to calibrate the PC 9800 battery:

- 1) Plug in the AC adapter and turn on the PC 9800.
- 2) From the Main Menu, press <3> for System Menu
- 3) In the System Menu, press <5> to Calibrate Battery
- 4) Type 123 and press <Enter> for password.
- 5) The PC 9800 screen should read BATTERY MANAGER V1.42 at the top, and the screen font is reduced in size.

6) This process will take 20 hours. (However, you may abort it any time by pressing the BLUE key followed by the <I> key to generate an <@>. If you do abort, you need to press the <Enter> key again to exit the calibration program and return to the DataLogger™ program. In addition, if AC power is disrupted during calibration, the calibration will be aborted, and you need to manually restart the calibration.)

7) At the end of the calibration, the screen font will be restored to normal (larger) size, and you need to press <Enter> to return to the DataLogger™ program.

8) Press the BLUE key and then the <V> key (? key) for the diagnostics screen. If the calibration was successful, the third battery status line should read "Calibrated", and the fourth battery status line should show the charge and discharge times of the calibration, and the battery's capacity.

TX01385-4-15-99

## Reprogram the DataLogger™

Follow these steps to update or reprogram the DataLogger™:

- 1) Locate the DB9 to DB9 Communication Cable. Connect one end of the cable to the DataLogger™, and the other end to your PC's serial port. Remember which PC serial port you are connected to.
- 2) Plug in the DataLogger™ AC adapter to ensure that power is not interrupted during programming.
- 3) On the DataLogger™, navigate to the System Menu by pressing <3> in the Main Menu.
- 4) Press <7> to execute COM.EXE, then press <Y> when asked "Are you sure you want to run COM.EXE?"
- 5) You should see the top line of the DataLogger™ screen read COM Ver 2.46.
- 6) Insert the DataLogger™ Program Diskette in Drive A: of your PC.
- 7) From the Start button of a your Windows 95/98 or NT 4.0 PC, choose Run.

8) If you are using COM1 on your PC, type LOAD1 and press <Enter>. If you are using COM2, type LOAD2 and press <Enter>. There are also LOAD3 and LOAD4 for COM3 and COM4.

9) Once programmed, your PC will close the COM.exe program automatically. The DataLogger™ will reboot. After the reboot, the DataLogger™ program should be up and running with the new program.

TX01385-4-15-99



# Maintenance and Troubleshooting



## No Maintenance Inside Case

**NOTICE:** There are no parts inside the DataLogger™ that can be repaired by the user. Do not try to open the case. Any attempt to open the case can affect the weatherproofing and can damage the unit.

TX01390-6-4-97



PH01581-4-15-99

## Calibration

Unit must be sent to McElroy every year for calibration to ensure accuracy.

TX01917-5-2-01



PH01594-4-15-99



# Specifications



## McElroy DataLogger™

### DAP PC9800 Environmental Ratings:

Rain: 50" (127 cm)

Dust: 60" (152 cm)

Heat: 67" (170 cm)

Cool: 76" (193 cm)

### Operating Temperature:

The recommended temperature range, where the DataLogger may be used, is from - 30°C to + 50°C (-22°F to +122°F).

A short exposure to temperatures lower or higher than these could possibly make the screen very dark or light until the unit returns within the suggested temperature range.

Long exposure to temperature below - 40°C (- 40°F) may damage the screen. Prolonged exposure to temperatures above +60°C (+140°F) will damage the main battery and above +70°C may damage the unit (+158°F).

### DAP PC9800 Computer Specification:

80386 microprocessor

200 x 200 pixel LCD display

MS-DOS operating system

2MB battery-backed SRAM

4MB NAND memory

### Temperature Probe:

Range: 350° - 540° F

Accuracy:  $\leq \pm 10^\circ \text{ F}$  Accuracy not guaranteed below 350°

### Pressure Probe:

Range: 0 to 2000 psi

Accuracy:  $\leq 100 \text{ PSI}$ :  $\pm 2 \text{ PSI}$

$> 100 \text{ PSI}$ :  $\pm 1\%$

## About this manual . . .

McElroy Manufacturing continually strives to give customers the best quality products available. This manual is printed with materials made for durable applications and harsh environments.

This manual is waterproof, tear resistant, grease resistant, abrasion resistant and the bonding quality of the printing ensures a readable, durable product.

The material does not contain any cellulose based materials and does not contribute to the harvesting of our forests, or ozone-depleting constituents. This manual can be safely disposed of in a landfill and will not leach into ground water.

TX001660-8-19-99



**McElroy Manufacturing, Inc.**

---

**The leader by design**

---

P.O.Box 580550 • Tulsa, Oklahoma 74158-0550  
(918) 836-8611 • Fax: (918) 831-9285  
[www.mcelroymfg.com](http://www.mcelroymfg.com)