

Electronic Preset Delivery System

# Smith Meter® microLoad.net™

Operations Manual

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**FMC** Technologies

### ***Caution***

The default or operating values used in this manual and in the program of the microLoad.net are for factory testing only and should not be construed as default or operating values for your metering system. Each metering system is unique and each program parameter must be reviewed and programmed for that specific metering system application.

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# Table of Contents

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<b>Section I – Introduction.....</b>	<b>1</b>
Product Description .....	1
How To Use This Manual .....	1
<b>Section II – Display and Controls.....</b>	<b>2</b>
microLoad Display and Controls .....	2
Power Up .....	3
Ready Screen .....	4
<b>Section III – Run Mode .....</b>	<b>5</b>
Run Mode.....	5
Keypad Functions .....	5
Overview .....	6
Remote Start/Stop.....	7
Additive Monitoring.....	7
<b>Section IV – Dynamic Displays .....</b>	<b>8</b>
Dynamic Displays.....	8
Keypad Functions .....	8
System / Live.....	9
Batch Totals / Averages.....	9
Transaction.....	11
<b>Section V – Automated Proving Mode.....</b>	<b>12</b>
<b>Section VI – Print Pending Reports from Print Menu.....</b>	<b>15</b>
<b>Section VII – Program Mode .....</b>	<b>16</b>
Program Mode .....	16
Keypad Data Entry .....	16
Entry to Main Directories .....	17
Changing Program Mode Parameters .....	18
Numeric Data .....	18
Alphanumeric Data.....	18
<b>Section VIII – Diagnostics Menu .....</b>	<b>19</b>
Main Menu Diagnostics.....	19
Active Alarms .....	19
Alarm History.....	20
Non-Resettable Volumes .....	20
Event Log .....	22
Transaction Log.....	22
Audit Trail .....	25
Digital Inputs .....	25

## Table of Contents

---

Digital Outputs.....	25
Analog Inputs .....	26
Pulse Inputs .....	26
Communications Monitor .....	26
Download Directory .....	27
Boolean Algebraic .....	27
User Boolean Registers .....	27
User Algebraic Registers.....	28
Equation Line State .....	28
General Purpose Timers .....	28
Transaction Archive Data .....	29
Printer Standby Data.....	29
Printer Summary Data.....	29
Summary Data .....	30
Software Version .....	30
Contrast Adjust.....	30
<b>Section VIX – Related Publications .....</b>	<b>31</b>

### ***Product Description***

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The Smith Meter® microLoad.net™ is a micro-processor based single arm, single product electronic preset instrument that supports up to 12 recipes. It is configurable to support a variety of user applications.

Optimum measurement accuracy is attained through continuous linearization of the meter factor with changes in flow rates. The microLoad.net is also capable of maintaining back pressure on the measurement system using automatic flow optimization. Volumetric correction is calculated directly from published API equations providing precise volumetric measurement results. Precise temperature, pressure compensation (using programmed maintenance pressure), and density correction are options that are available in the instrument.

The dynamic real-time display of the current actual operating conditions of the system provides the operator with valuable system information while the system is operating.

The microLoad.net provides several loading system control functions: Additive injection, pump control, alarm control, set stop, valve control, back-pressure control, and automatic adjustment of final trip point. Other significant features are as follows:

- 200 Driver Database
- Ethernet Connectivity
- Three Multi-drop Serial Communications Ports
- Event Logging / Audit Trail
- User Configurable I/O
- Three Security Levels
- Optional Battery Backed Display per OIML
- Programmable language/messages
- Automated Proving
- API Tables from LPG to Crude Oil

### ***How To Use This Manual***

This manual is to be used as an operators guide for the microLoad.net.

This manual is divided into five sections: Introduction, RUN Mode, Dynamic Displays, Automated Proving Mode, Program Mode, and Index.

The “Display and Controls” section describes the microLoad.net’s physical display screen and keypad as well as some of the basic messages that would initially occur.

The “Run Mode” section describes the typical operation of a microLoad.net.

The “Dynamic Displays” section describes the information that can be displayed by the microLoad.net while in the “READY” state or in the Run Mode.

The “Automated Proving Mode” section describes the procedures and events involved in meter proving with a microLoad.net.

The “Program Mode” section describes the mechanics of making configuration changes to a microLoad.net using the integral display and keypad. See the Reference Manual for details of the parameters that are affected in the Program Mode.

The “Index” is a comprehensive listing, with page numbers, of all subjects covered in this manual.

The examples presented in this manual are for clarity and operator convenience. The values might vary for specific installations and/or operations.

### *microLoad.net Display and Controls*

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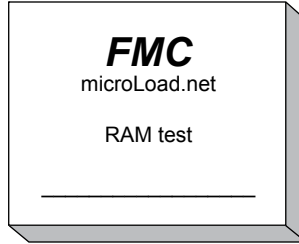
**Figure 1.** microLoad.net Display and Controls

The user interfaces with the microLoad.net through either one of its several communications ports or via the display and keypad found on the face of the instrument. The display and keypad alter their format and function based upon the mode (Run Mode, Programming Mode....) that the instrument is currently running. The following provides previews to the various screens as well as the keypad functions associated with the various modes.

### **Power Up**

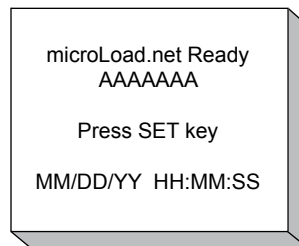
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The following describes the events which occur when the power is applied to a microLoad.net. Upon power up the microLoad.net goes through a start up sequence. The start up screen will be displayed while a RAM test is being performed.



**Figure 2.** Power Up Screen

Once the start up sequence is complete the microLoad.net will go into its normal operating mode. Depending upon how the instrument is configured, one of two screens will be seen next. If the microLoad.net does not have the Powerfail alarm configured the instrument will go directly to the Ready Screen. The Ready Screen is the launching point for all the microLoad.net functions.



**Figure 3.** Ready Screen

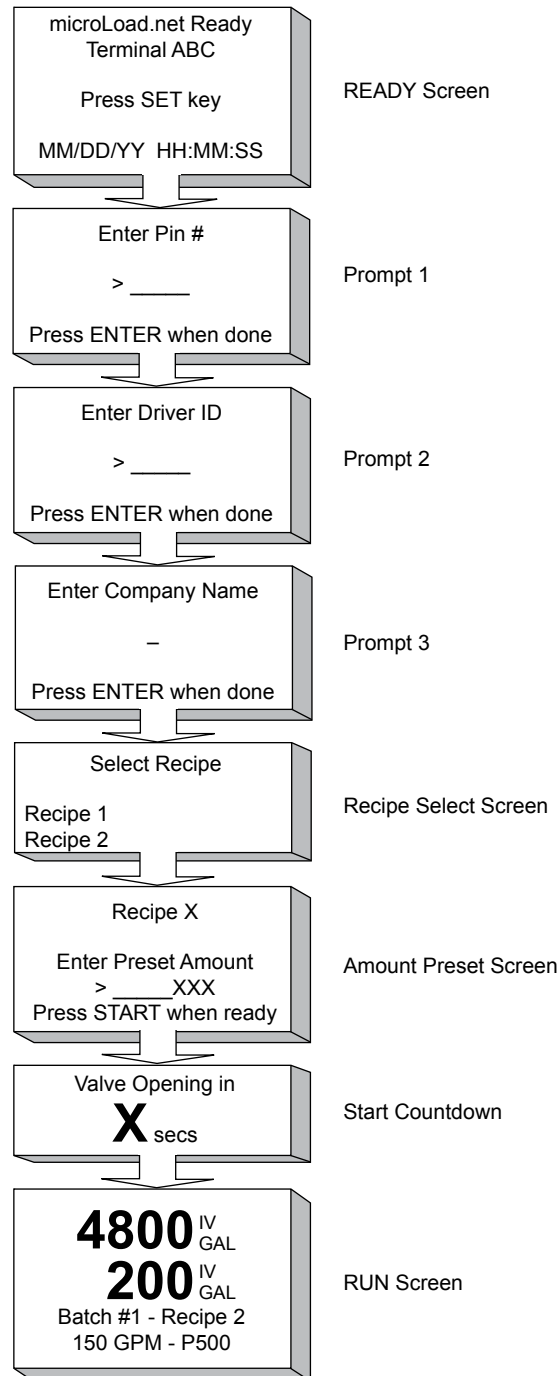
If the Powerfail alarm is configured, the microLoad.net will go to the Powerfail Alarm screen after the start up sequence is completed. It will be necessary for the operator to enter the instrument's passcode in order to acknowledge the alarm and proceed to the Ready Screen.

**Note:** The default passcode for the microLoad.net is "0000".

## Section II – Displays and Controls

### Ready Screen

The Ready Screen informs the user that the microLoad.net is operating normally and awaiting the user's input. In normal day-to-day operation, the driver/operator will be accessing the microLoad's Run Mode to enter the information required to dispense their loads. The driver initiates the process by depressing the SET key. The microLoad.net will respond with a series of up to five prompts designed to collect information for the transaction to take place. The number of prompts and their content is defined by Prompt parameters entered into the Communication Directory (761 through 777). The following is an example of a sequence of prompts.



**Figure 4.** Typical Prompt Sequence

**Note:** To adjust the display contrast, go to the Main Menu, click on Diagnostics, scroll through the Diagnostics Menu until the arrow is next to Display Contrast, press Enter, and adjust the screen contrast. (Factory reset settings change only when a Factory Initialize is implemented.)



### ***Run Mode***

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The Run Mode is the normal driver-controlled mode of operation where a preset volume of product is entered into the microLoad.net. The flow is then initiated, controlled, and stopped by the microLoad.net at the end of the batch.

All preset and control operations can be performed either locally through the keypad or through communications. The operation described in this section assumes that the microLoad.net is being operated locally through the keypad. For information on operating through communications, refer to the microLoad.net Communications Manual [MN06147](#) and the Operator Reference Manual [MN06148](#).

### ***Keypad Functions***

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The pushbuttons on the keypad perform the following preset functions in the Run Mode:

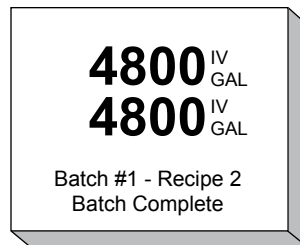
<b>0 - 9</b>	Used for entering numeric data
<b>CLEAR</b>	Used to clear incorrect entries and to exit from the dynamic displays
<b>ENTER</b>	Used for dynamic displays and selecting the recipe to be loaded
<b>PRINT</b>	Signals completion of transaction
<b>SET</b>	Used to initiate the preset sequence
<b>START</b>	Used to start the delivery (providing all external permissive senses are satisfied)
<b>STOP</b>	Used to stop delivery at any time (not intended as emergency stop)
<b>↑</b>	Used to move the selection arrow up in selection of recipes and navigating the dynamic displays and for entry of alphanumeric prompt responses
<b>↓</b>	Used to move the selection arrow down in selection of recipes and navigating the dynamic displays and for entry of alphanumeric prompt responses
<b>←→</b>	Used for entry of alphanumeric prompt responses
<b>F1</b>	Not Used
<b>F2</b>	Not Used

### Overview

The “RUN” Mode permits the operator to select the recipe and preset volume, start the preset volume, and observe the dynamic variables such as flow rate, temperature, volume correction factors, transaction totals and non-resettable totals. The microLoad.net processes normal start-up, flow control and shutdown sequences, and operator-requested stops.

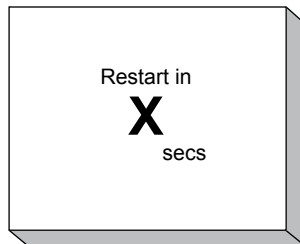
Product delivery is controlled by several program code entries. Functions such as first high flow rate, second high flow rate, low flow start, and first and second trip points are automatically controlled and monitored per their program entries. Safety and volume accuracy functions including excess high flow, low flow, overrun, and temperature probe failure are also monitored per their program parameters. If at any time, an alarm occurs while in the Ready State or the Run Mode, the microLoad.net will attempt to shut down the flow and a message indicating an alarm condition will pop up over the current display.

At the end of the delivery, the “batch complete” message will flash at the bottom of the RUN screen.

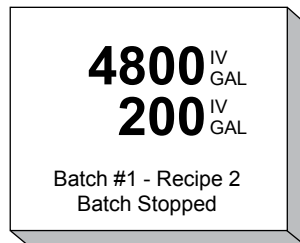


Depending on how the microLoad.net is programmed, a transaction can be ended by pressing the “PRINT” button, by a communication command, or by an external input.

If the “STOP” button is pressed during flow, and if the Start after Stop delay is programmed, the preset position will display:



Once the time-out has been reached, the display will flash “Batch Stopped”.



The operator can then press “START” and continue the batch or “PRINT” to terminate the batch. If the operator elects to continue the batch the microLoad.net will countdown to valve reopening and then return to the RUN screen.

### ***Remote Start/Stop***

Digital inputs can be programmed to be used for Remote Start/Remote Stop operations. When the power is applied to these contacts, the microLoad.net will respond as though the “START” or “STOP” keys have been pressed on the keypad.

### ***Additive Monitoring***

Additive injector feedback provides the capability of the microLoad.net monitoring the additive products that are being injected. The microLoad.net monitors the injector feedback switches for a change of state and counts the errors if no change is detected before the next injection. An alarm will be set if the number of errors exceeds the programmable maximum.

With Smart or metered injectors, the additive volume injected is actually measured, providing the ultimate in feedback. The microLoad.net communicates with the Additive Injector System where the microLoad.net is the master. The microLoad.net constantly monitors the Additive System for its status, polls for additive totals, and signals the system when to inject the additive – all through the communications line.

The microLoad.net communications package has also been designed with a pass-through communications mode. In this mode of operation, the supervisory computer can talk to the Additive Injector System through the communication lines that have been run to the microLoad.net and from the microLoad.net to the Additive Injector System(s). (This is further described in the microLoad.net Communications Manual [MN06147](#).)

microLoad.net interfaces with smart additive injector systems. A system may incorporate one metered injector along with digital outputs to energize additive pumps and injector solenoids.

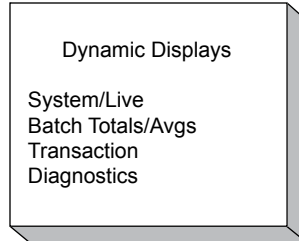
## Section IV – Dynamic Displays

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### ***Dynamic Displays***

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While in the RUN mode the user may review both live and stored data held in the microLoad.net. The ENTER key is used to switch to the Dynamic Displays page. (The CLEAR key will return to the RUN screen.)



There are four groups of dynamic display data available to the user. The “System/Live” data is related to the active data gathered at the time of inquiry. The Batch Totals/Avgs is total and average data for the current or past batches. The Transaction data is related to the ongoing transaction.

### ***Keypad Functions***

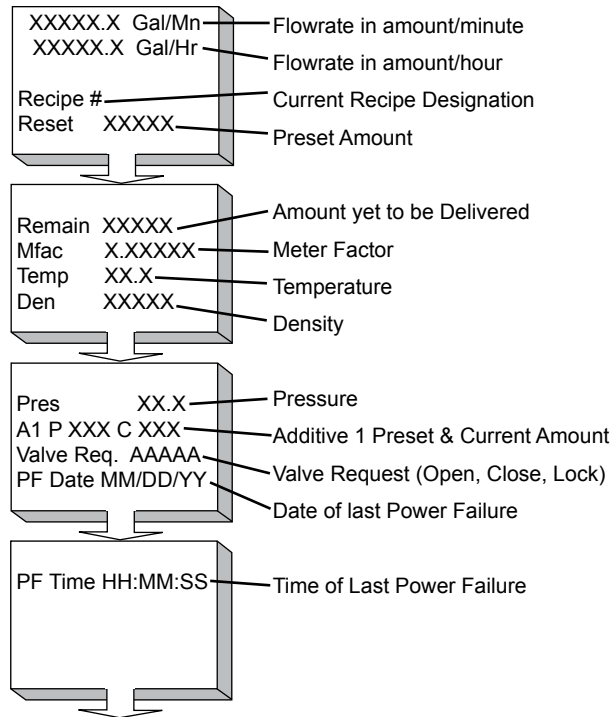
The keys on the keypad perform the following functions when accessing the dynamic displays:

<b>0 - 9</b>	Used for entering numeric data
↑	Used to move the selection arrow up in selection of recipes and navigating the dynamic displays and for entry of alphanumeric prompt responses
←	Once in the dynamic displays, this works like the up arrow to move backwards through the displays
→	Once in the dynamic displays, this works like the down arrow to move forward through the displays
↓	Used to move the selection arrow down in selection of recipes and navigating the dynamic displays and for entry of alphanumeric prompt responses
<b>CLEAR</b>	Used to clear incorrect entries and to exit from the dynamic displays
<b>ENTER</b>	Used for dynamic displays and selecting the recipe to be loaded System / Live

## Section IV – Dynamic Displays

### System / Live

The System / Live data appears on several screens which are accessible using the UP and DOWN ARROW keys. The information includes: Flowrate (/minute), Flowrate (/hour), Recipe #, Preset Amount, Amount Remaining, Meter Factor, Temperature, Density, Pressure, Additive Presets, Valve Position, Date and Time of last power failure.

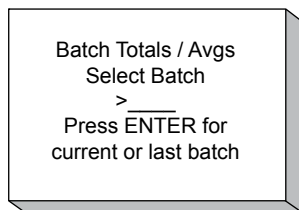


**Figure 5. System/Live Screens**

Press Clear to return to the Dynamic Displays screen.

### Batch Totals / Averages

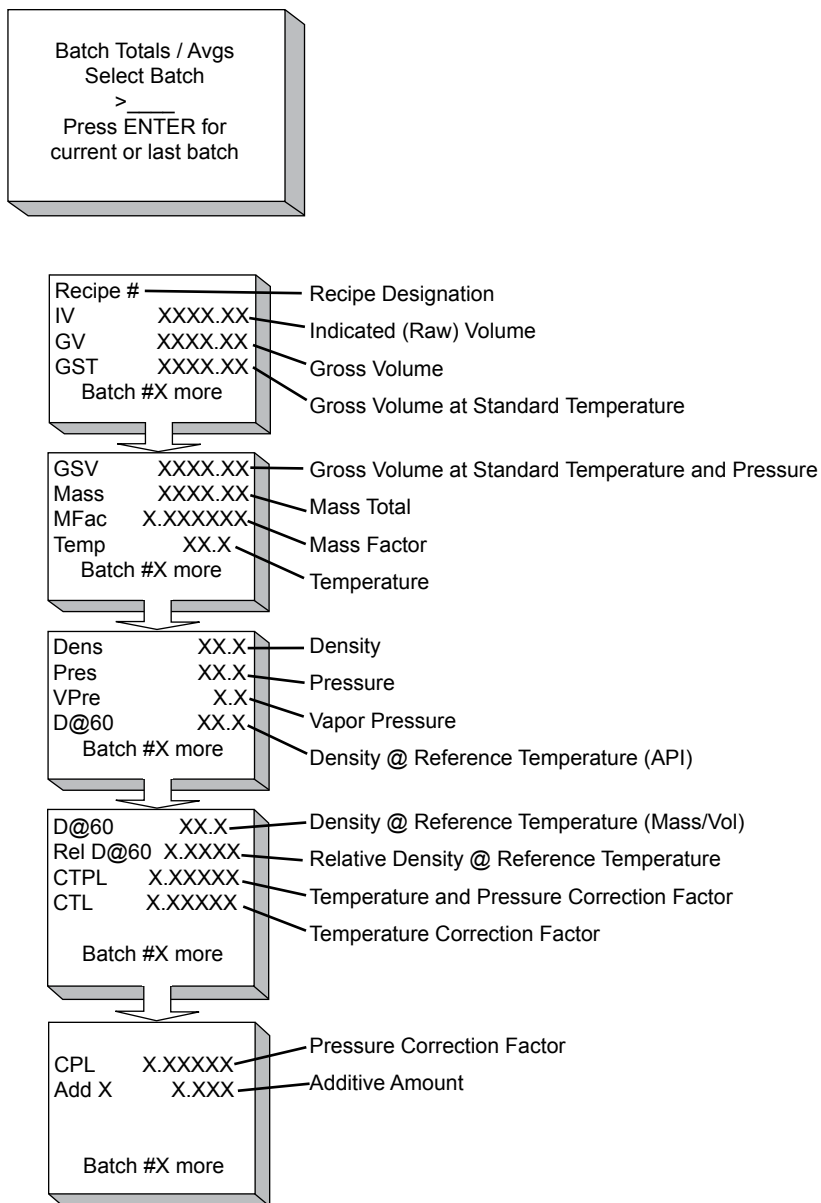
The microLoad.net will require the operator to select which batch data is to be viewed. Simply pressing the ENTER key will provide the current data.



The data provided includes the various volume types (i.e. IV, GV, GST, GSV), Mass, Meter Factor, Temperature, Density, Pressure, Vapor Pressure, CTL, CPL, and Additive Amount.

## Section IV – Dynamic Displays

### Batch Totals / Averages



**Figure 6.** Batch Totals / Averages

# Section IV – Dynamic Displays

## Transaction

The transaction data provided includes the various volume types (i.e. IV, GV, GST, GSV), Mass, Temperature, Density, Pressure, Meter Factor, CTL, CPL, and Additive Amount.

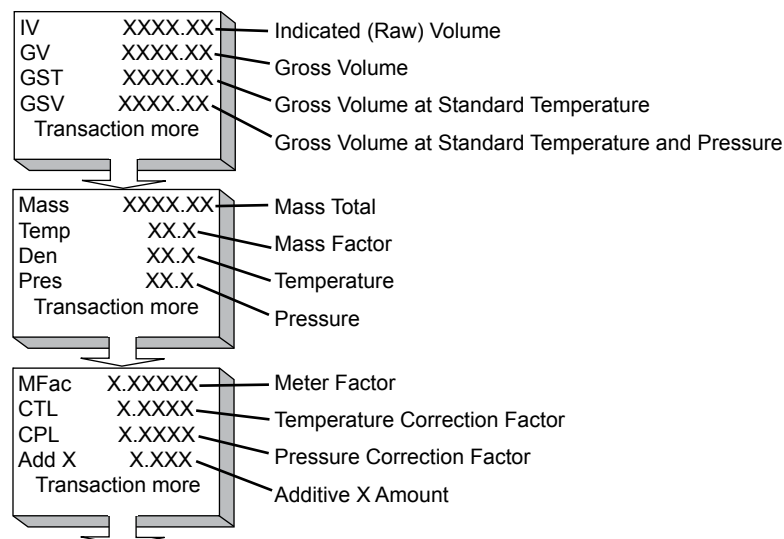


Figure 7. Transaction Display

Press Clear to return to the Dynamic Displays screen.

## Section V – Automated Proving Mode

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### ***Automated Proving Mode***

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The microLoad.net firmware provides an automated proving mode of operation. This feature allows the operator to prove the meter and update meter factors and associated flow rates without having to enter the program mode. When the automated proving mode is activated, the microLoad.net will calculate the meter factor for a proving run based on information that is obtained during the prove. The operator can select the flow rate and associated meter factor that is being proved through the keypad of the microLoad.net. After the prove is complete, the operator enters the prover volume and prover temperature and the microLoad.net calculates the new meter factor. The operator has the choice of accepting the new meter factor or ignoring it. The microLoad.net also has the capability of providing an average meter factor over a maximum of ten proves.

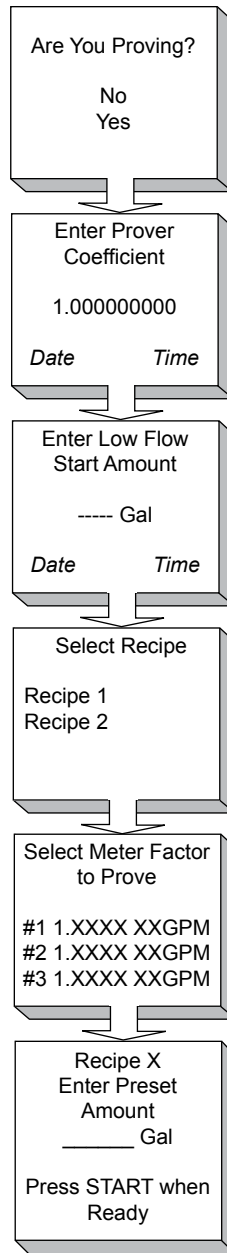
Entry to the Automated Proving Mode will require several conditions to be met.

1. The Automated Proving Mode must be enabled via “Volume Accuracy, Auto Prove Select”, parameter 331. This parameter is used to enable or disable the Automated Proving Mode. The default for this program code will be disabled. Select one of the two (2) security options to enable the automated prove and associated security. Once selected and the security activated, the beginning of the next transaction will launch the auto prove.
2. The counters must be set to the proving mode through “Volume Accuracy, Proving Counters”, parameter 332. In this mode the microLoad.net operates as in the Run Mode, except the preset and delivery counters both count up and go to tenths resolution. Volume preset and delivery units are in the volume units selected in the display units select code. The factory default is “Not Proving.”
3. The programmed security must be met. When normal conditions are met for starting a transaction (pressing the “SET” key or receiving authorization via communications), the Automated Proving Mode will be activated. After the microLoad.net has gone through the user programmed prompts (see Figure 4) the will display the question “Are You Proving?”. If the user indicates NO, the balance of the preset sequence will continue as if a normal load. If the user answers YES, the automated proving sequence continues.
4. To initiate the proving sequence, the microLoad.net will prompt for the prover volumetric coefficient of expansion. Note that the most recent value for this entry will be displayed. If this value is acceptable, the operator need only press “ENTER.”
5. The microLoad.net will prompt for the low flow start volume. If low flow start is not desired, enter zero. Press “ENTER.”
6. Next, the microLoad.net will display the “Select Recipe” prompt. If in remote control communications mode, only those recipes allocated will be available for selection. Recipes must be selected before the meter factors, since the recipe determines the product being proved. Using the up and down arrow keys, select the required recipe.
7. The operator must next select the meter factor and associated flow rate for proving.

Move the up or down arrow keys to the meter factor associated flow rate that is required. Note that only those factors currently programmed will be offered as selections. Press ENTER after entering the selection.

8. Enter the batch amount desired.
9. Press “START” to begin flow. The flow rate associated with the selected meter factor will be used as the high flow rate. The batch will be delivered. The flow rate ramp-down from first trip to the end of the batch will be the same as if not proving.





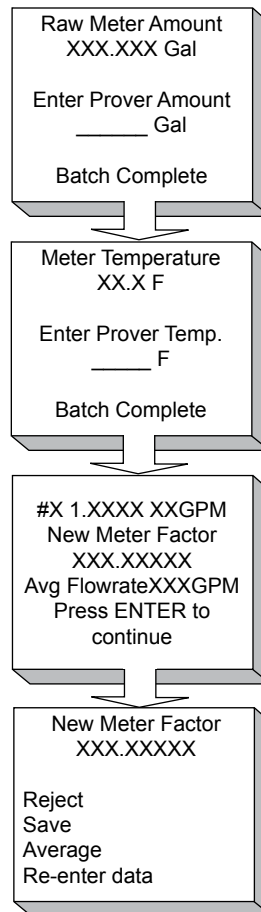
**Figure 8.** Prove Setup

10. When the batch has completed, the microLoad.net will prompt for the actual prover volume. Enter the prover volume and press “ENTER.”
11. The microLoad.net will prompt for the prover temperature. Press ENTER to have the meter factor calculated.
12. The microLoad.net will then calculate the meter factor. The new meter factor will be displayed.
13. When the ENTER key is pressed, the microLoad.net will display the following screen.
14. If “REJECT” or “SAVE” is selected, the microLoad.net will return to the Run Mode display where the transaction

## Section V – Automated Proving Mode

can be ended. If "AVERAGE" is selected, the microLoad.net will then average all meter factors in the buffer (up to ten of them). The average meter factor will be displayed. Select "SAVE" to download the average meter factor into the Program Mode.

15. If "Save" is selected, the microLoad.net will download the average meter factor and will return to the "RUN" mode display where the transaction can be ended or a new batch can be started. If "Continue" is selected, a new batch can be started allowing the microLoad.net to continue proving at this rate. Note that if the microLoad.net is in remote control mode, authorization is required for each batch.



**Figure 9.** Prove Data

16. In the event that the meter factor is not successfully downloaded, the microLoad.net will display a message indicating that the meter factor was rejected.

## Section VI – Print Pending Reports

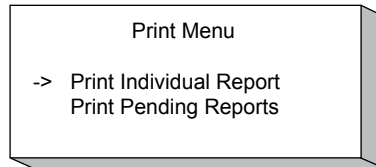
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### ***Printing Pending Reports from Print Menu***

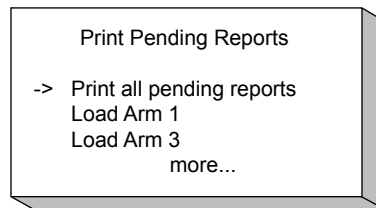
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Pending reports may be re-printed from the Print Menu.

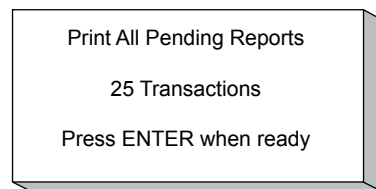
First select "Print Menu" from the microLoad's Main Menu. If there are pending reports to be printed, the microLoad will display the following prompt message:



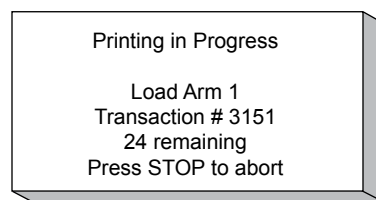
If "Print Pending Reports" is selected, the microLoad will prompt whether it is desired to print pending reports from all arms or a particular arm. Note that only arms with pending reports will be displayed.



Once the selection is made, the microLoad will display the number of pending reports to be printed.



While printing is in progress, the microLoad will display the current transaction being printed.



Pressing STOP will abort the printing after the current transaction report is finished. Also, if any report fails to be printed within programmed communications timeout, the microLoad will abort printing any more pending reports.

**Note:** *If it is desired to abort the printing of pending reports initiated automatically (auto reprint) or via communications command, the Print Menu may be entered and will allow the printing to be aborted.*

### ***Program Mode***

---

The microLoad.net has a significant number of customizable features which are selectable by the user. The process of selecting these features and customizing the microLoad.net to each application is performed in the Program Mode. All programming information is entered via the keypad or through communications. This section will describe the procedure for entering via the keypad. The program codes for microLoad.net are divided into several main directories plus Diagnostics. The main directories and their contents are discussed in detail in the microLoad.net Operator Reference Manual [MN06148](#).

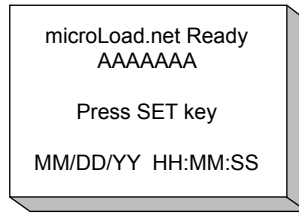
#### ***Keypad Data Entry***

The pushbuttons on the keypad perform the following functions while the instrument is in the Program Mode:

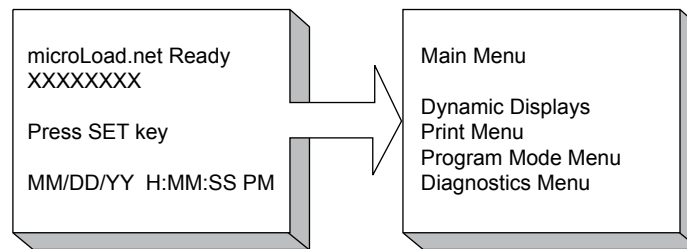
<b>0 - 9</b>	Used to enter the access code and for data entries
<b>CLEAR</b>	Used for clearing incorrect entries or for getting to an exit point
<b>ENTER</b>	Used to enter the Program Mode security access code, to enter the subdirectory, and to enter program data
<b>START</b>	Not used in Program Mode
<b>SET</b>	Page scrolling
<b>PRINT</b>	Used to access Help Messages
<b>STOP</b>	Used to set the security level
<b>F1</b>	Not Used
<b>F2</b>	Not Used
<b>↑</b>	Used to move up through the menus and rows for alphanumeric entries
<b>↓</b>	Used to move down through the menus and rows for alphanumeric entries
<b>+/-</b>	Used for adding signs to values being programmed
<b>.</b>	Decimal point, for values requiring one
<b>←→</b>	Used for alphanumeric entries

### Entry to Main Directories

1. Assert the security input if configured. This will provide the first step for access to program codes.

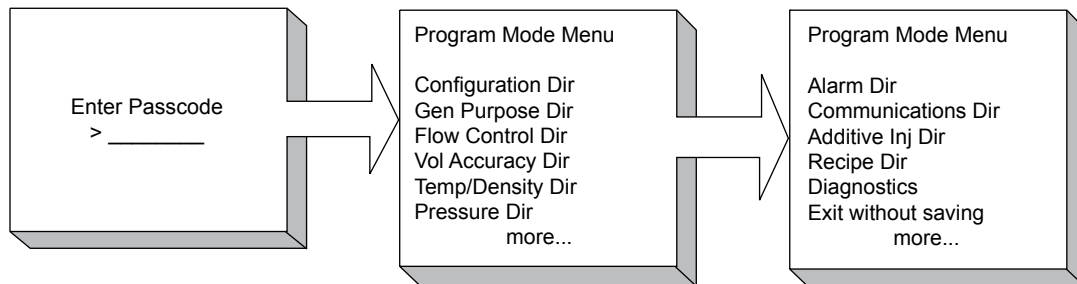


2. Press “ENTER.” This displays the main menu.



**Figure 10.** Accessing Main Menu

3. Move the arrow to the Program Mode menu and press “ENTER.” This will display the “Enter Passcode” screen.
4. Enter the access code. (The access code preset at the factory is “0”.) For security, any digit entered will be displayed as an “X”. (Access codes can be up to four digits long.)
5. Press “ENTER.” This procedure checks for the proper access code. If it is correct, the following will be displayed.
6. If an incorrect access code was entered, an “Access Denied, CLEAR = re-enter” message will appear. Press CLEAR to return the display to the “Enter Passcode Screen” in Step 3. Repeat Steps 3, 4, and 5 to re-enter Program Mode.



**Figure 11.** Opening Program Mode

### ***Changing Program Mode Parameters***

---

The program codes represent parameters that can be changed either to enhance the performance of the microLoad.net or to accommodate application changes. There are three types of parameters in microLoad.net: codes that require numerical data, codes where an option can be selected from a list, and codes where alphanumeric data is entered. Once a code has been selected, change the programmed contents by entering a new value through the keypad.

#### ***Numeric Data***

The numeric data is entered into the program codes via the keypad just as numbers are entered into a calculator. The number of digits for each entry is listed in the Reference section of this manual.

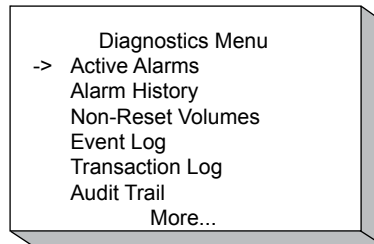
#### ***Alphanumeric Data***

The parameters that require alphanumeric data are the codes that display Product Messages, Prompt Messages, or Permissive Messages on the displays of microLoad.net, or provide information to be printed out on the Bill of Lading Emulation. When adding or changing information in these alphanumeric program codes, the keys listed below perform the following functions.

<b>Key</b>	<b>Description</b>
<b>ENTER</b>	Moves the character from the character set to the ID line. Also enters the data into the instrument's memory after END has been selected from the character set
<b>SET</b>	Moves the cursor six positions to the right
<b>→</b>	Moves the cursor one position to the right each time it is pressed
<b>←</b>	Moves the cursor one position to the left each time it is pressed
<b>↑ and ↓</b>	Selects the next block of characters. An example of this is changing from uppercase letters to lowercase letters. The blocks of characters available in microLoad.net are as follows: <ul style="list-style-type: none"><li>• A B C D E F G H I J K L M N O P Q R S T U V W X Y Z # *</li><li>• a b c d e f g h i j k l m n o p q r s t u v w x y z &amp; @</li><li>• 0 1 2 3 4 5 6 7 8 9 &lt; &gt; ( ) ? ! . , ' - " / + = _ END</li></ul>

### Main Menu Diagnostics

Main Menu Diagnostics allow the operator to review current configurations, identify causes of system errors, and analyze data collected by the microLoad. Selecting "Diagnostics" from the main menu, and then choosing a specific diagnostic, usually results in the screen shown directly below. Position the cursor beside the appropriate selection, and then press ENTER to reach the desired diagnostic screen.



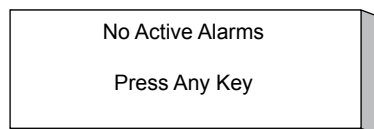
**Note:** The diagnostics available through the Main Menu are run-time diagnostics only. Program mode diagnostics are accessed from the Program Mode Main Menu.

The Diagnostics menu available through the Main Menu consists of the following:

- Active Alarms
- Alarm History
- Non-Resettable Volumes
- Event Log
- Transaction Log
- Audit Trail
- Digital Inputs
- Digital Outputs
- Analog Inputs
- Pulse Inputs
- Communications Monitor
- Download Directory
- Boolean Algebraic
- Transaction Archive Data
- Print Standby Data
- Summary Data
- Software Version
- Contrast Adjust

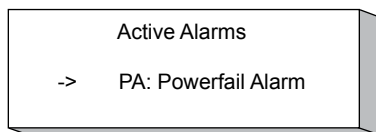
#### Active Alarms

The Diagnostics menu provides the selection "Active Alarms" where all active alarms for the load arm can be viewed with the arrow in front of "Active Alarms." Press ENTER, and one of the following will be displayed. If no alarms are active, the following screen will be displayed.



## Section VIII – Diagnostics Menu

If there are active alarms, they will be displayed as follows:

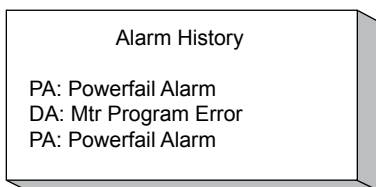


The active alarms can be cleared from this display by moving the arrow to the alarm and pressing “ENTER.” The microLoad will then ask for the passcode. When the passcode is entered, the alarm will clear.

Pressing the CLEAR key will return the system to the Diagnostic menu.

### **Alarm History**

The Diagnostics menu provides the selection “Alarm History” where the most recent alarms can be viewed. With the arrow in front of “Alarm History,” press ENTER, and the historical alarms will be displayed. The alarms will be listed in order of occurrence.



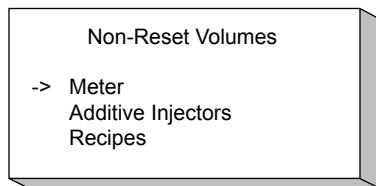
This is an alarm history for the transaction. For a more complete history of alarms, please access the Event Log.

Pressing the up and down arrow keys will allow the operator to page through the Alarm History displays. If “More...” is not displayed, then there is only one screen of alarms in the alarm history.

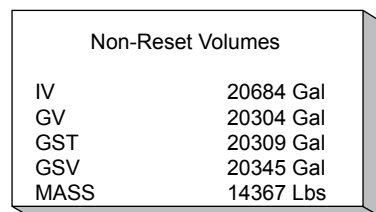
Pressing the CLEAR key will revert to the Diagnostic menu.

### **Non-Resettable Volumes**

The Diagnostics menu provides the selection “Non-Reset Volumes” where the meter and additive injector volumes can be viewed. With the arrow in front of “Non-Reset Volumes,” pressing ENTER will display a menu to allow the operator to view either the meter, the additive volumes or recipes. Choosing either the meter, additive injectors or recipe by moving the arrow and pressing ENTER will either display the non-resettable volumes or in the case of meter which load arm.



Meter volumes are displayed as follows:

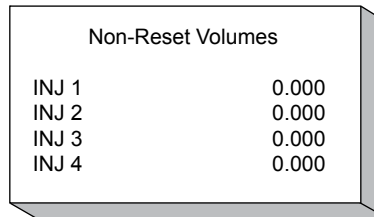


Press Clear to return to the Non-Resettable Volumes screen.



## Section VIII – Diagnostics Menu

Additive injector values are displayed as follows: additives 1 through 4 are displayed. Using the arrow keys on the keypad will allow the operator to move through all 4 of the additives.

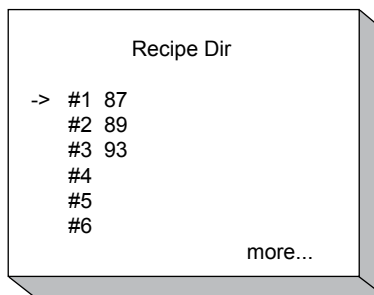


A screenshot of the 'Non-Reset Volumes' screen. It is a rectangular display with a title 'Non-Reset Volumes' at the top. Below the title, there is a list of four items: 'INJ 1', 'INJ 2', 'INJ 3', and 'INJ 4'. To the right of each item is a numerical value '0.000'.

Non-Reset Volumes	
INJ 1	0.000
INJ 2	0.000
INJ 3	0.000
INJ 4	0.000

Pressing the CLEAR key will return the display to the Non-Reset Volumes screen.

Choosing “Recipes” from the “Non-Reset Volumes” menu results in the following screen:



A screenshot of the 'Recipe Dir' screen. It is a rectangular display with a title 'Recipe Dir' at the top. Below the title, there is a list of six items: '#1 87', '#2 89', '#3 93', '#4', '#5', and '#6'. To the right of the list, there is a 'more...' link.

Recipe Dir	
-> #1 87	
#2 89	
#3 93	
#4	
#5	
#6	
more...	

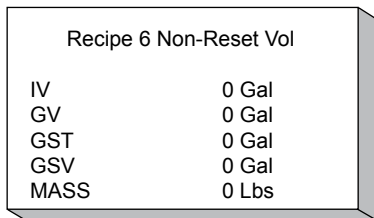
To view the other six available recipes, simply scroll with the arrow keys up or down.



A screenshot of the 'Recipe Dir' screen, showing a different set of recipes. It is a rectangular display with a title 'Recipe Dir' at the top. Below the title, there is a list of six items: '#7', '#8', '#9', '#10', '#11', and '#12'. To the right of the list, there is a 'more...' link.

Recipe Dir	
-> #7	
#8	
#9	
#10	
#11	
#12	
more...	

The following is displayed after the desired Recipe is selected by moving the arrow in front of the name and pressing ENTER.



A screenshot of the 'Recipe 6 Non-Reset Vol' screen. It is a rectangular display with a title 'Recipe 6 Non-Reset Vol' at the top. Below the title, there is a list of five items: 'IV', 'GV', 'GST', 'GSV', and 'MASS'. To the right of each item is a numerical value: '0 Gal', '0 Gal', '0 Gal', '0 Gal', and '0 Lbs'.

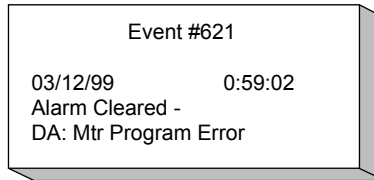
Recipe 6 Non-Reset Vol	
IV	0 Gal
GV	0 Gal
GST	0 Gal
GSV	0 Gal
MASS	0 Lbs

Press CLEAR to return to the recipe directory. Press CLEAR to return to the Non-Resettable Volumes screen. Press CLEAR to return to the Diagnostics Menu.

## Section VIII – Diagnostics Menu

### Event Log

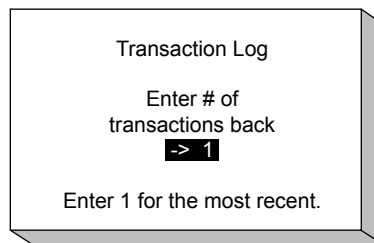
The View Only Diagnostics menu displays “Event Log” where past event can be viewed. #With the arrow in front of “Event Log,” pressing ENTER will display the last event that occurred in the microLoad. The “Event Log” includes alarms, transaction start and end, and program mode parameter changes.



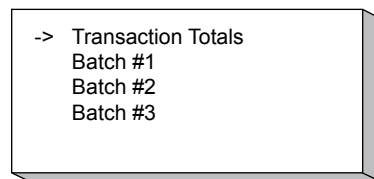
From the display, the operator can go back through the events using the up and down arrow keys. Pressing the CLEAR key will display the Diagnostics menu.

### Transaction Log

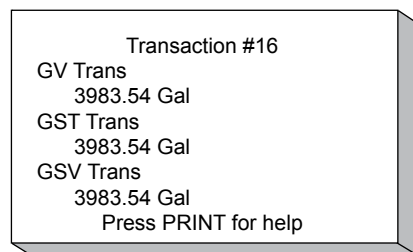
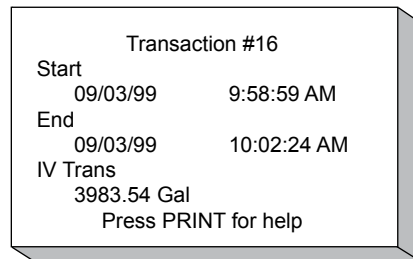
The Diagnostics menu provides the selection “Transaction Log,” where the transaction date can be viewed. With the arrow in front of “Transaction Log,” pressing ENTER will display the following:



Entering the number of batches back, the microLoad will display the following screen:



From the display, the operator can choose either “Transaction Totals” or “Batch Data.” If more than one batch is included in a transaction, each will be listed separately. The following information is displayed for Transaction Totals:



## Section VIII – Diagnostics Menu

---

Transaction #16

Mass Trans  
16465.39 Lbs  
Number of Batches  
1  
Trans Avg Mtr Factor  
1.06547  
Press PRINT for help

Transaction #16

Trans Avg Temp  
60.0 F  
Trans Avg Dens  
42.7 Lb/Ft3  
Trans Avg Press  
70.0 PSI  
Press PRINT for help

Transaction #16

Trans Avg CTL  
1.0000  
Trans Avg CPL  
1.0006  
IV Non-Reset  
677789 Gal  
Press PRINT for help

**Note:** Additive totals will be displayed only for those injectors used in the transaction.

Transaction #16

GV Non-Reset  
677789  
GST Non-Reset  
677789  
GSV Non-Reset  
677789  
Press PRINT for help

Transaction #16

Mass Non-Reset  
9509 Lbs  
Press PRINT for help

When “Batch” is selected from the above menu, the following data will be displayed:

## Section VIII – Diagnostics Menu

---

Transaction #16 – Batch #1

Recipe #  
02  
IV Batch  
1902.33 Gal  
GV Batch  
1902.33 Gal  
Press PRINT for help

Transaction #16 - Batch #1

GST Batch  
1902.33 Gal  
GSV Batch  
1902.33 Gal  
Mass Batch  
6557 Lbs  
Press PRINT for help

Transaction #16 - Batch #1

Batch Avg Mtr Factor  
1.0000  
Batch Avg Temp  
60.0 F  
Batch Avg Dens  
42.7 Lb/Ft3  
Press PRINT for help

Transaction #16 - Batch #1

Batch Avg Press  
70 PSI  
Batch Avg CTL  
1.0000  
Batch Avg CPL  
1.0006  
Press PRINT for help

Transaction #16 - Batch #1

Add 1 Batch  
150.000 cc  
Add 2 Batch  
110.000 cc  
Alarm Occurred  
1:VF  
Press PRINT for help

## Section VIII – Diagnostics Menu

Press CLEAR to return to the Transaction selection. Press CLEAR again to return to the Transaction Log screen. Press CLEAR again to return to the Diagnostics Menu.

### **Audit Trail**

The View Only Diagnostics menu provides the selection “Audit Trail” where audit trail data is available for viewing. With the arrow in front of “Audit Trail,” pressing ENTER will display the last audit trail entry that occurred in the microLoad.

Audit Trail Entry #13	
02/12/99	11:43:32
Flow Simulator	
Enabled	

The audit trail provides the date, time, and description of Program Mode changes. Note that only changes to parameters secured at the two highest security levels programmed are logged in the audit trail. Pressing the up and down arrows on the keypad will allow the operator to step through the audit trail.

Audit #478	
02/12/99	11:36:13AM
Program Mode exit	
thru keypad	
Calculated CRC 0xC515	
Flash address 29f580	

Pressing the CLEAR key will display the Diagnostic menu.

### **Digital Inputs**

The Diagnostics menu provides for the selection of “Digital Inputs” where the current status of the digital inputs can be viewed. With the arrow in front of “Digital Input,” pressing ENTER will display the digital inputs, the programmed function, and their status.

Digital Inputs		
#1	Permissive 1	ON
#2	NA	OFF
#3	Permissive 2	OFF

Viewing the above displays provides information on digital input #1. It is used as a permissive and the current status is ON. Likewise, the functions and status of digital inputs #2 and #3 are also available. Pressing the CLEAR key will display the Diagnostics menu.

### **Digital Outputs**

The Diagnostics menu provides the selection “Digital Outputs” where the function and status of the digital outputs can be viewed. With the arrow key in front of “Digital Outputs,” pressing ENTER will display all six digital outputs and their status.

Digital Outputs		
#1	NA	OFF
#2	Pump	OFF
#3	Upstream Sole	OFF
#4	Downstream Sol	OFF
#5	N/A	OFF
#6	N/A	OFF

Pressing the CLEAR key will display the Diagnostics menu.

## Section VIII – Diagnostics Menu

### Analog Inputs

The Diagnostics menu provides the selection “Analog Inputs,” where the function and status of the analog inputs can be viewed. With the arrow in front of “Analog Inputs,” pressing ENTER will display the two analog inputs, their current reading in engineering units, current, or voltage, and raw analog input value.

Analog Inputs	
#1: M1 Temp In	15.0 C
14.062 mA	36863
#2: M1 Pressure	6.2 Kg/cm2
16.170 mA	42388
#1 Cal: 0131072	0917504
#2 Cal: 0131072	0917504

Pressing the CLEAR key will display the Diagnostics menu.

### Pulse Inputs

The Diagnostics menu provides the selection “Pulse Inputs” where the leakage pulses and the batch pulses are displayed. The leakage pulses are the pulses received when the valve is not told to open and no flow is authorized. Batch pulses are zero since no batch is in progress. With the arrow in front of “Pulse Inputs,” pressing ENTER will display the pulse inputs. Select meter pulse inputs or configurable pulse inputs.

If no transaction is in progress, the following display will appear:

Pulse Inputs	
Mtr Leak	0
Metered Inj	0

If there is a transaction in progress, the following display will appear:

Pulse Inputs	
Mtr Count	233
Metered Inj	0

Pressing the CLEAR key will display the Diagnostics menu.

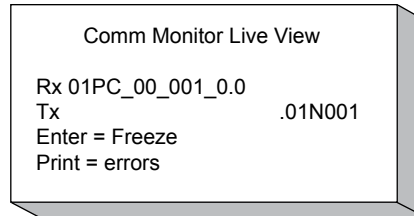
### Communications Monitor

The Diagnostics menu provides the selection “Comm Monitor” to review messages being sent and received across the communications lines. With the arrow in front of “Comm Monitor,” pressing ENTER will display the following:

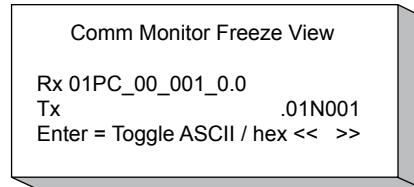
Comm Monitor Live	
->	comm 1
	comm 2
	comm 3

This display allows the operator to choose the communication port to be viewed. Pressing the ENTER key when the arrow is in front of the desired communications port will display the data that is being received by the microLoad and the response of the microLoad.

## Section VIII – Diagnostics Menu

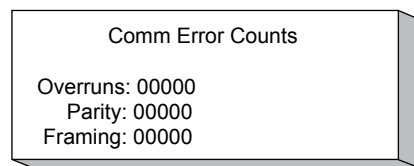


This display indicates that microLoad address 01 received a PC command from the host and responded with a “no response,” indicating that it is in Program mode. To freeze a command or response for further viewing, press “ENTER.”



On this display, the operator can toggle the message between the ASCII and hex characters. The decimal point key allows toggling between page scrolling (“<< >>”) and character scrolling (“< >”). To return to the previous display, press CLEAR.

Pressing the PRINT key in the live view will display the following screen:



From this display, the overrun errors, parity errors, and framing errors can be viewed. Pressing CLEAR will return to the Live View display.

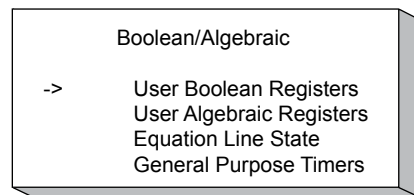
When completed, press CLEAR until the Diagnostics menu is displayed.

### **Download Directory**

This directory will give a listing of all files that have been downloaded from the micromate. Some examples would be Translations, Configurable Bill of Lading Reports (factory default also), html webpages, Driver Database, Boolean Equations, etc. Simply press ENTER on the menu to view the listing and use the up and down arrows to navigate all downloads if they exist. Press CLEAR to get back to the Diagnostics Menu.

### **Boolean Algebraic**

The Diagnostics menu provides the selection “Boolean Algebraic” to view Boolean/Algebraic registers and their results. General-purpose timers can also be viewed from this screen. With the arrow in front of “Boolean Algebraic,” pressing ENTER will display the Boolean/Algebraic Processing menu.



### **User Boolean Registers**

The User Boolean Registers display indicates the registers and their current True or False value, where 0 is False and 1 is True.

## Section VIII – Diagnostics Menu

User Boolean Regs			
#1	0	#7	0
#2	0	#8	0
#3	0	#9	0
#4	0	#10	0
#5	0	#11	0
#6	0	#12	0
More...			

Using the up and down arrows, the 50 User Boolean Registers can be viewed. Pressing CLEAR will return to the Boolean/Algebraic Processing menu.

### User Algebraic Registers

The User Algebraic Registers display the current values of the variables in the register. This display is read-only, but the registers can be modified via Boolean/Algebraic equation or via communications. These registers are used to check the values of the variables that have been set up and/or downloaded from the micromate.

User Algebraic Regs	
#1	0
#2	0
#3	0
#4	0
#5	0
#6	0
More...	

Using the up and down arrows, all 50 Use Algebraic Registers can be viewed. Pressing CLEAR will return to the Boolean/Algebraic Processing menu.

### Equation Line State

The Equation Line Status displays the current status of the equations, where “D” indicates that the equation is disabled, “T” is True, and “F” is false. All equations without an “IF” statement will have a “True” status. Those with an “IF” will indicate the result of the “IF” expression: either “True” or “False.”

Equation Line State	
1	7
2	8
3	9
4	10
5	11
6	12
More...	

Using the up and down arrow keys, view all 50 equations. Pressing CLEAR will return to the Boolean/Algebraic Processing menu.

### General Purpose Timers

The General Purpose Timers display the current time on the timers. The timers are broken down as follows:

Clear the timer by writing a zero to the database location of the desired timers.

Timer Numbers	Resolution	Range
1-2	0.1 second	109 minutes
3-4	1.0 second	18.2 hours
5-6	1.0 minute	45.5 days
7-8	1 hour	7.5 years



## Section VIII – Diagnostics Menu

General Purpose Timers			
#1	0	#7	0
#2	0	#8	0
#3	0		
#4	0		
#5	0		
#6	0		

Using the up and down arrow keys will display the remaining timers. Pressing CLEAR will return to the Boolean/Algebraic Processing menu. Pressing CLEAR again will return the display to the Diagnostics menu.

### **Transaction Archive Data**

The Diagnostics menu provides the selection “Transaction Archive Data,” which allows the operator to view transaction data on the load arm. With the arrow in front of “Transaction Archive Data,” pressing ENTER will display the following screen:

Transaction Archive	
Actual # stored -	51
Max # allowed -	1023

Pressing CLEAR will return to the Diagnostics menu.

### **Printer Standby Data**

The following screen will be available for printer standby data:

Printer Standby Data	
# Transactions	500
# Locked	15
Transaction # Range	3251-3265
In Printer Standby Mode	

The bottom line in the above screen will indicate one of the following options:

- In Printer Standby Mode (last attempt at printing failed)
- Printer Available (last transaction report was successfully printed)
- Storage Full (transactions are not permitted)

The transaction range shown will indicate the oldest transaction pending and the latest transaction pending. If the printer is down intermittently and pending reports have not been printed, it is possible that not all of the transactions in the range shown are pending.

### **Printer Summary Data**

Printer Summary Data		
# Transactions	41	# of Total Transactions
# Locked	3	# of Transactions that unsuccessfully printed
Transaction # Range	001-003	Transaction range of unsuccessfully printed reports
Printer Available		Status of Printer (Printer Available, In Printer Standby, or Storage Full)

## Section VIII – Diagnostics Menu

### **Summary Data**

This menu gives the totals for the batch running in the transaction. It displays how much was delivered and the associated pulses from the meter for the batch in progress. If a new batch is started in the same transaction, only the current batch information will be shown.

Summary Data	
GV	0.0 GAL
GSV	0.0 GAL
Temp In	0.0 F
Mtr Count	0
Err Count	0

### **Software Version**

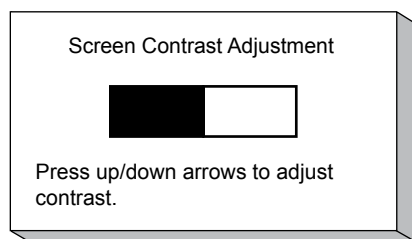
The Diagnostics menu provides the selection “Software Version,” which allows the operator to view the version of software that is running in the microLoad. With the arrow in front of “Software Version,” pressing ENTER will display the software version, CRC, and MAC address.

Summary Version	
microLoad Rev	00.06
CRC	9CFCE469
Boot Load Rev	00.04
MAC	00:50:C2:XX:XX:XX
Copyright 2004-2009 FMC Smith Meter Inc	

Pressing CLEAR will return to the Diagnostics menu.

### **Contrast Adjust**

This Diagnostics menu provides for adjusting the display contrast.



Press CLEAR to return to the Diagnostics menu.

## Section VIX – Related Publications

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The following literature can be obtained from FMC Technologies Measurement Solutions Literature Fulfillment at [measurement.fulfillment@fmcti.com](mailto:measurement.fulfillment@fmcti.com) or online at [www.fmctechnologies.com/measurementsolutions](http://www.fmctechnologies.com/measurementsolutions). When requesting literature from Literature Fulfillment, please reference the appropriate bulletin number and title.

### ***microLoad.net***

Specification .....	Bulletin <a href="#">SS06045</a>
MicroMate for microLoad.net.....	Bulletin <a href="#">SS06046</a>
Installation .....	Bulletin <a href="#">MN06150</a>
microLoad.net Operator Reference .....	Bulletin <a href="#">MN06148</a>
Communications.....	Bulletin <a href="#">MN06147</a>
Operations .....	Bulletin <a href="#">MN06149</a>
MicroMate for microLoad.net Installation/Operation.....	Bulletin <a href="#">MN06152</a>
Modbus and Modbus/TCP Communications .....	Bulletin <a href="#">MN06155</a>

Revisions included in MN06149 Issue/Rev. 0.4 (9/13):

"Print Pending Reports" added to Section VIII. Diagnostics Menu and Printer Standby Data added after Transaction Archive Data and before Summary Data.

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The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

Contact information is subject to change. For the most current contact information, visit our website at [www.fmctechnologies.com/measurementsolutions](http://www.fmctechnologies.com/measurementsolutions) and click on the "Contact Us" link in the left-hand column.

**[www.fmctechnologies.com/measurementsolutions](http://www.fmctechnologies.com/measurementsolutions)**