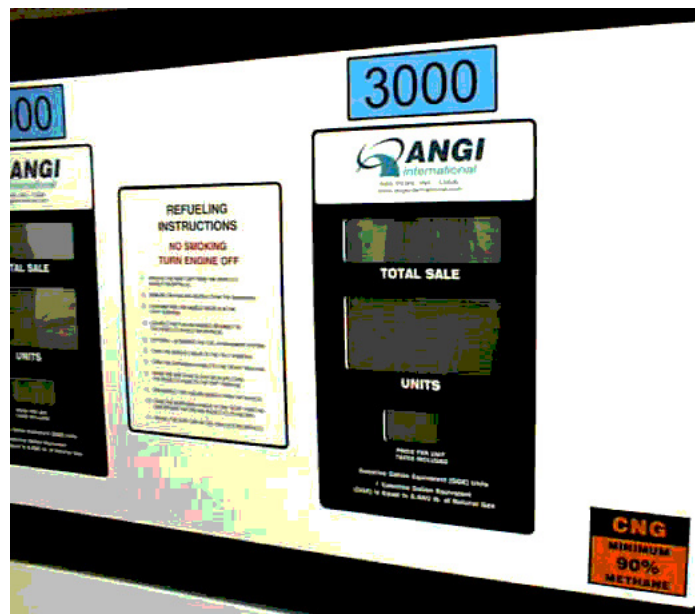




## MONITORING TOOL MANUAL

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# ANGI Series II Dispenser

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# NOTICE

## IMPORTANT SAFETY INFORMATION

Only operate this equipment in accordance with the instructions provided in this manual. Improper application or operation of this equipment may cause serious bodily injury or death. Improper application or operation of this equipment will void the warranty.

Contact ANGI Customer Service if this equipment is to be used in a different application than it was originally designed for.

This equipment must be repaired and maintained by ANGI Customer Service Personnel, or the Customer's qualified service representative.

### **Should you detect a gas leak...**

- Immediately shut down the compressor and leave the compressor station.
- Extinguish any open flame or source of ignition.
- Shut off the supply valve and contact your authorized ANGI service representative and/or gas supply company.



## **WARRANTY**

ANGI hereby warrants that the EQUIPMENT sold hereunder shall be free of defects in material and workmanship appearing within 12 months from the date the EQUIPMENT is placed into service or 18 months from the date the GOODS are available to be shipped; whichever comes first. PURCHASER must give written notice of any defect covered by this warranty to ANGI within the warranty period. For any defect covered by this warranty, ANGI shall repair or replace the EQUIPMENT. Repairs or replacement parts are warranted for 90 days from the date that the repaired or replaced EQUIPMENT OR GOODS are shipped from the factory or until termination of the original warranty, whichever is longer. This warranty does not cover labor costs and other contingent expenses for the diagnosis of defects or for removal and reinstallation of the EQUIPMENT. Such repair or replacement shall be PURCHASER's sole and exclusive remedy for ANGI's breach of this AGREEMENT.

This warranty does not extend to any GOODS or EQUIPMENT which have been (a) subject to misuse, neglect, accidents, acts of God, or causes of a similar nature; (b) repaired or altered by anyone other than ANGI, without ANGI's prior approval; (c) improperly installed by anyone other than ANGI or someone under its direction or (d) to consumable parts or materials such as filter elements, seals, belts, or fuses, or (e) damage resulting from overloading the GOODS or EQUIPMENT. This warranty does not extend to nor does ANGI provide any warranty to components such as motors and drive engines that are separately covered by a warranty issued by their respective manufacturers. ANGI shall transfer or pass through to PURCHASER any such warranties received by ANGI. This warranty is in lieu of all other warranties expressed or implied.

**EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, THIS IS THE ONLY WARRANTY GIVEN FOR THE SALE OF GOODS, EQUIPMENT AND/ OR SERVICES. NO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL ANGI BE LIABLE FOR CONSEQUENTIAL, SPECIAL, INDIRECT, PUNITIVE, OR INCIDENTAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ANGI EQUIPMENT, GOODS, AND/OR SERVICES RESULTING FROM ANY DELAYS OR FAILURE OF PERFORMANCE OF ANGI UNDER ANY AGREEMENT BETWEEN ANGI AND PURCHASER, OR RESULTING FROM ANY SERVICES FURNISHED BY ANGI.**

This warranty may not be modified, amended, or otherwise changed except by a written document properly executed by ANGI.

*For warranty issues contact:* Customer Service  
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## **1. INTRODUCTION**

The ANGI Series II dispenser-monitoring Tool is a computer program that offers access to the Series II dispenser controller's set-up and diagnostic functions. The access to the dispenser is by a computer's serial port through a straight RS232 cable or over an RS485 network link. The controller's system variables and parameters are viewable in a visually based program that runs on the Windows Operating System. The values are individually displayed in a text format that can be selected with a click of the mouse. The computer keyboard is the input device that can enter new values on the selected item. The Tool also uses visual command buttons and check boxes. This manual explains and illustrates how to use the Tool.

## **2. FEATURES**

The main feature of the Tool is the display of the set-up parameters and system variables in a master list. In the list, one can edit parameters and influence variables by selecting the item with the mouse and entering values from the keyboard. Other features are:

- 1) Retrieving and saving parameter values to a file.
- 2) Displays fill variables and flags for real-time monitoring of a fill sequence.
- 3) Historical logs of parameter changes, fill results, and totalizer results.
- 4) Real-time 25 sample-per-second process variable log for a single fill.
- 5) Diagnostic functions of hardware output force, keypad test, and pulse train force.
- 6) Step-by-step calibration for mass, temperature, and pressure measurements.
- 7) Mass flow meter zeroing function.
- 8) A terminal panel to access the dispenser controller's microprocessor for board level programming.
- 9) A panel for accessing the system parameters and variables of the older MCDS dispensers.
- 10) A parameter and variable name search function.

## **3. DISPENSER DESCRIPTION**

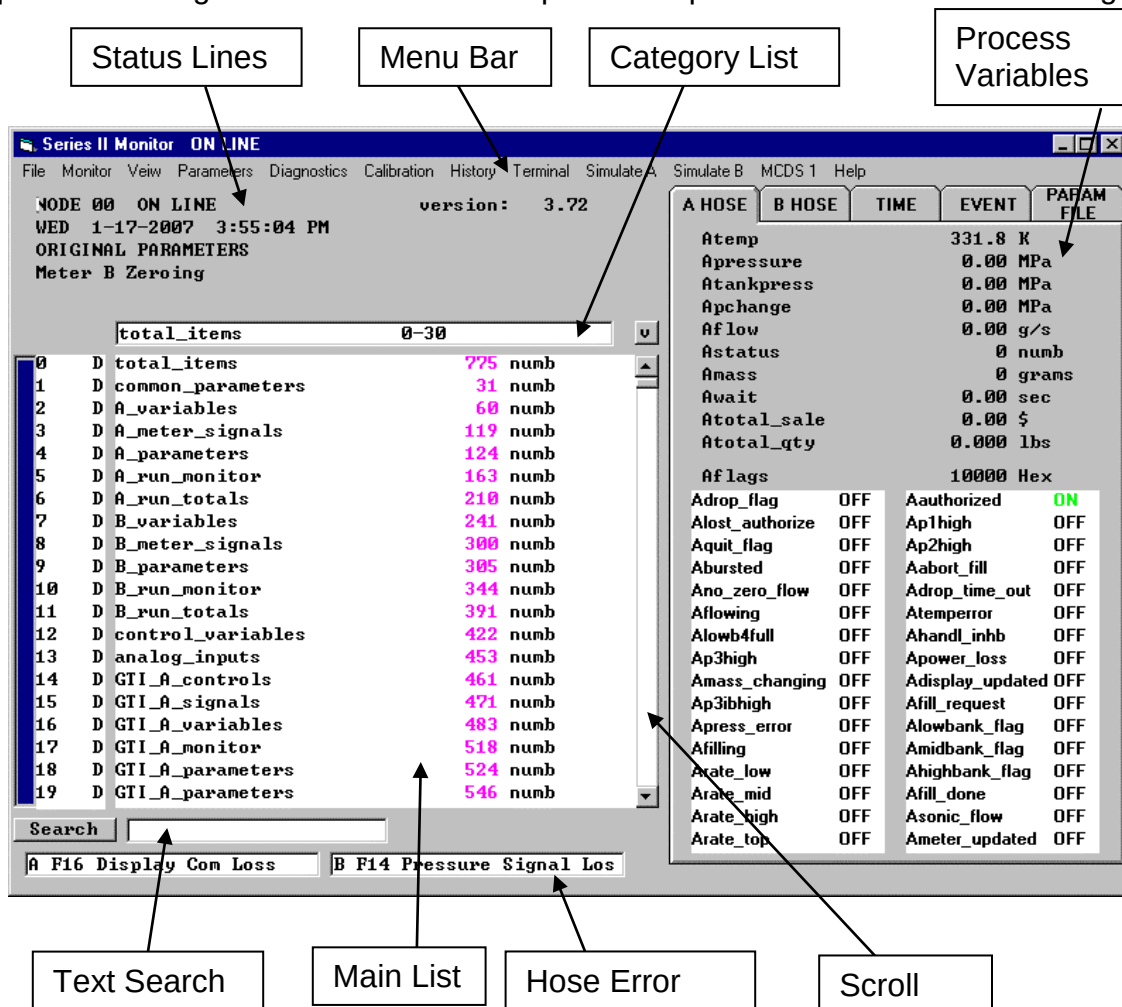
The Series II Dispenser is an electronic microprocessor controlled device that dispenses high-pressure natural gas by a pressure-based algorithm. This algorithm is written into the microprocessor's program along with a set of functions to operate the dispenser's hardware such as LCD displays, communication links, valves, etc. The Series II microprocessor controller runs on one single program that performs all of the dispenser's functions. In the program's algorithm and functions, there are two kinds of numbers used: variables and parameters. The variables are the signals within the program that represent process measurement (pressure, flow, mass, etc.), control (valve on/off, handle on/off, etc.), and process report (sale amount, volume amount, totals, etc.). The parameters are numbers that represent measurement scaling, calibration, control set points, and dispenser function configuration. The parameter numbers adjust the dispenser's performance and do not change once they are set. The controller runs the program in its RAM (Random Access Memory.) RAM holds data only when the power is on. The program is stored in the controller's FLASH memory; memory that retains its data without power. The program is copied from the FLASH to



the RAM when the dispenser is powered-up. The parameters and historical records are also stored in the FLASH. The Series II dispenser control provides access to the program, parameters, and variables through standard serial communication ports by a custom ANGI protocol. The Tool uses this protocol.

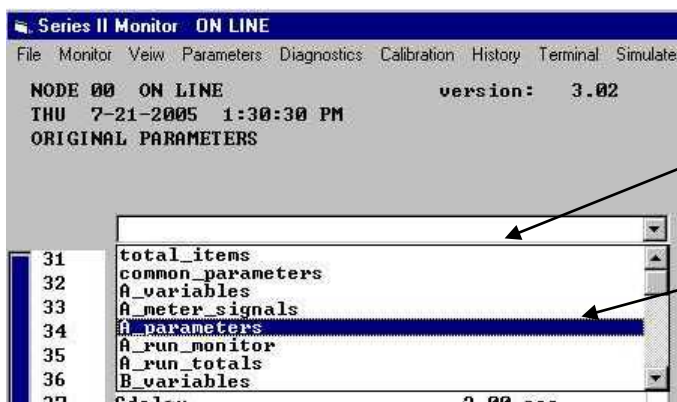
#### 4. MAIN PANEL DESCRIPTION

The picture below is the main panel. On the left side is the main list of variables and parameters. A mouse click on the value number will select the number. The selected number will be highlighted and ready for editing. The list scroll bar will move up and down through the list. Clicking to the right of the value on the units text will change the units. Example: Clicking on the pressure unit "MPa" will change to "Bar," clicking again will change to "PSI." The value to the left will be converted to the correct value for that unit. The status line reports on the state of the controller. The top line shows the communication node for the dispenser and connection status. The node number indicates which dispenser is on-line, providing the Tool is connected to a set of dispensers through an RS485 network. Up to 32 dispensers can be connected together.



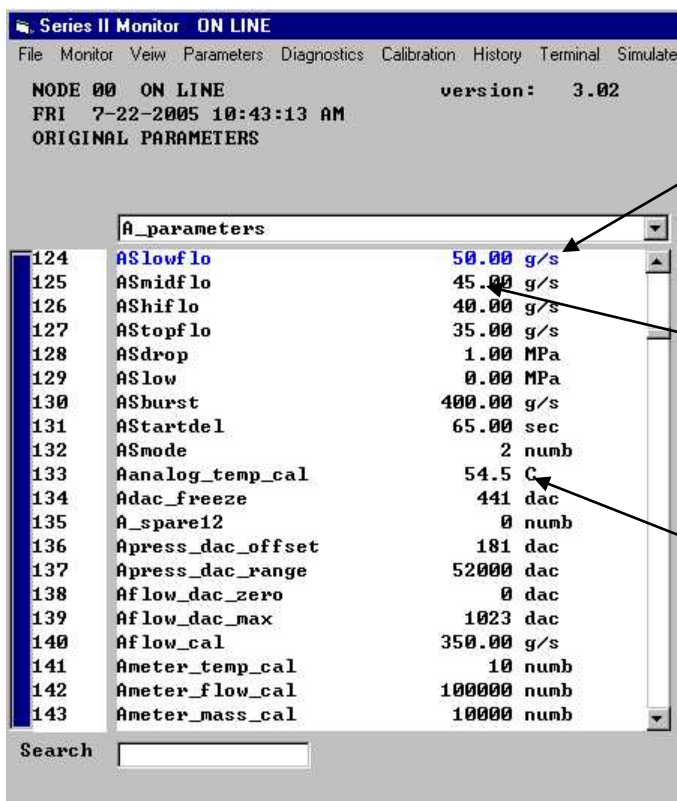
The node number is always zero (NODE 00) when connecting directly to a dispenser by the dispenser's RS232 port. The top line also shows the communication status of either "ON LINE" if connected or "OFF LINE" if not connected. The top line also indicates the calibration mode of the controller. The dispenser will not operate if the line indicates

"Cal Switch On" (calibrate switch sw1-1). The second line is the date and time from the dispenser controller's on board clock, formally called a Real Time Clock. This clock provides the time-date stamp for recorded events in the controller. The third line is the parameter status indicating if any parameters have been edited and not stored in the controller's permanent memory. The line to the right indicates the controller's program version number.



Click on the Box to Open the List

Select by Left Click



List Jumps to the First Parameter in the Hose "A" Group

Click on the Value Test to Select and Edit by the Keyboard

Click on the Units Text to Cycle Through Other Unit Types

The category list is a drop down list of groups of parameters and variables. Clicking on an item in the category list will make the main list jump to that group. In the example below, the main list will start at the first parameter for the A hose after clicking on the highlighted item "A\_parameters."

On the right side of the main panel, shown below, is the process variable tab. It is a list of a few hose variables to monitor during a fill sequence. Just as in the main list, clicking on the unit text will change the units to another type. Below is a list of flags for program functions that are either on or off. The tabs on top of the panel will select between the A or B hose and other functions described later in this manual.

The screenshot shows a software interface with five tabs at the top: **A HOSE**, **B HOSE**, **TIME**, **EVENT**, and **PARAM FILE**. The **A HOSE** tab is selected. Below the tabs, there are two main sections. The top section lists process variables with their current values and units. The bottom section lists status flags, each with a label, a status (ON/OFF), and a unit.

**Tab Panels** points to the top navigation tabs.

**Hose Process Variables** points to the top section of the main panel.

**Status Flags** points to the bottom section of the main panel.

**Click on the Units Text to Cycle Through Other Unit Types** points to the unit text in the process variables list.

| A HOSE          |     | B HOSE           | TIME | EVENT | PARAM FILE |
|-----------------|-----|------------------|------|-------|------------|
| Atemp           |     |                  |      | 331.8 | K          |
| Apressure       |     |                  |      | 0.00  | MPa        |
| Atankpress      |     |                  |      | 0.00  | MPa        |
| Achange         |     |                  |      | 0.00  | MPa        |
| Aflow           |     |                  |      | 0.00  | g/s        |
| Astatus         |     |                  |      | 0     | numb       |
| Amass           |     |                  |      | 0     | grams      |
| Await           |     |                  |      | 0.00  | sec        |
| Atotal_sale     |     |                  |      | 0.00  | \$         |
| Atotal_qty      |     |                  |      | 0.000 | lbs        |
| Aflags          |     |                  |      | 10000 | Hex        |
| Adrop_flag      | OFF | Aauthorized      | ON   |       |            |
| Alost_authorize | OFF | Ap1high          | OFF  |       |            |
| Aquit_flag      | OFF | Ap2high          | OFF  |       |            |
| Abursted        | OFF | Aabort_fill      | OFF  |       |            |
| Ano_zero_flow   | OFF | Adrop_time_out   | OFF  |       |            |
| Aflowing        | OFF | Atemperror       | OFF  |       |            |
| Alowb4full      | OFF | Ahandl_inhb      | OFF  |       |            |
| Ap3high         | OFF | Apower_loss      | OFF  |       |            |
| Amass_changing  | OFF | Adisplay_updated | OFF  |       |            |
| Ap3ibhigh       | OFF | Afill_request    | OFF  |       |            |
| Apress_error    | OFF | Alowbank_flag    | OFF  |       |            |
| Afilling        | OFF | Amidbank_flag    | OFF  |       |            |
| Arate_low       | OFF | Ahighbank_flag   | OFF  |       |            |
| Arate_mid       | OFF | Afill_done       | OFF  |       |            |
| Arate_high      | OFF | Asonic_flow      | OFF  |       |            |
| Arate_top       | OFF | Ameter_updated   | OFF  |       |            |

The Time tab is used to set the dispenser's real time clock. When the Time tab panel is opened, the current time from the clock is captured and displayed in the text box on the top. The time and date is adjusted by clicking on the INC and DEC buttons. The INC button increases the number. The DEC button decreases the number. Writing a new time and date requires an unlock password to enable the "UPDATE" button (see unlocking parameters). Clicking on the "UPDATE" button will write the new time into the dispenser clock. The time and date displayed in the bottom text box comes from the computer's clock. Clicking on the "Load Computer Time" button will write that time and date into the top text box. This is an alternative to using the INC/DEC buttons.

The screenshot shows the 'TIME' tab interface with the following components and callouts:

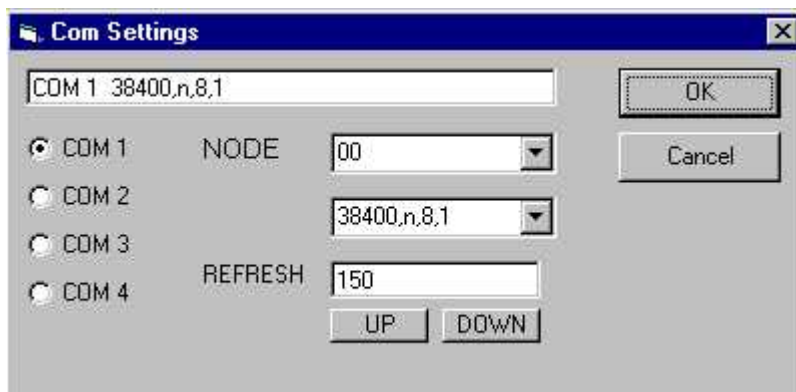
- Top Tabs:** A HOSE, B HOSE, **TIME**, EVENT, PARAM FILE.
- Top Display:** WED 1-24-2007 12:20:17 PM. Callout: "Dispenser Clock's Time and Date Captured when the tab is Opened."
- Adjustment Section:**
  - DAY OF WEEK: INC, DEC
  - MONTH: INC, DEC
  - DAY: INC, DEC
  - YEAR: INC, DEC
  - AM/PM: INC, DEC
  - HOUR: INC, DEC
  - MINUTE: INC, DEC
  - SECOND: INC, DEC
 Callout: "Time and Date Fields are Adjusted by the INC and DEC Buttons."
- UPDATE Button:** A large button labeled "UPDATE". Callout: "UPDATE Button Write the New Time to the Dispenser Clock"
- Load Computer Time Button:** A button labeled "Load Computer Time". Callout: "Writes the Current Computer Time to the Line Above."
- Bottom Display:** WED 1-24-2007 1:42:04 PM. Callout: "Current Computer Time"

On the top of the panel is the menu bar. Clicking on the menu items will bring up a list of other choices under that category. The main menu functions are:

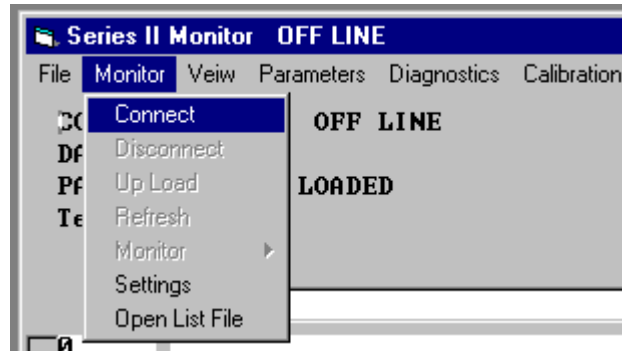
- 1) File: Used to open existing or save files on the computer. The Tool uses and creates files such as parameter, program, process, and historical logs.
- 2) Monitor: Starts or ends communication to the dispenser, uploads parameter data, and selects communication settings.
- 3) View: Opens particular variables and real-time process logs.
- 4) Diagnostics: Tests of hardware functions such as hardwired outputs.
- 5) Calibration: Set-up of various dispenser configurations and scale the process measurements such as mass, mass flow, pressure, and temperature.
- 6) History: Opens viewers for historical logs of totals, fill results, and parameter changes (audit trail).
- 7) Terminal: Opens a terminal text window used to communicate to the controller's microprocessor for program downloads and debugging.
- 8) Simulate A/B: Enables a program algorithm that performs a virtual fill sequence to check dispenser functions without actually dispensing gas.
- 9) MCDS1: Opens a set of panels to view and edit the parameters of the older ANGI MCDS dispenser.
- 10) Help: Opens a dialog box used to identify the Tool's program version number.

## 5. CONNECTING TO A DISPENSER

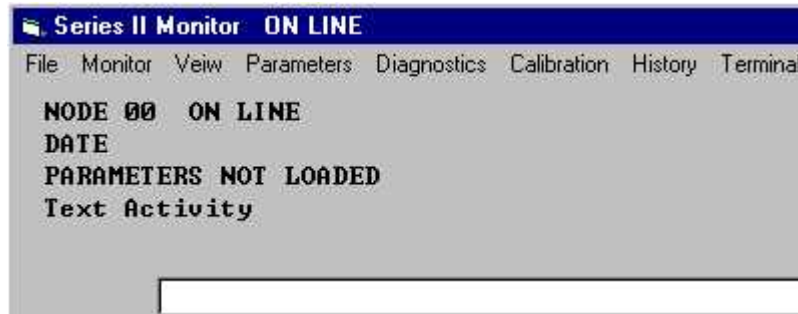
To get started using the monitoring Tool, the computer must be connected to the controller by a communication link. Typically, it is a straight-through cable connecting the 9-pin RS232 port on a computer to the COM-0 9-pin RS232 port on the dispenser interface board. The Series II dispenser comes with an access junction box (located behind the main control enclosure) with an RS232 cable plugged into the controller port. This allows access in the event that the electrical cabinet is sealed. An optional connection is via an RS232 to RS485 converter connected to the COM-5 port on TB6. The settings for the computer's COM port are under the "Monitor" -> "Settings" menu item. Clicking on "Settings" submenu item brings up the Com Settings box. This box allows the selection of the computer's COM port, BAUD rate, dispenser node, and refresh rate. The default settings, shown in the example below, will typically work. The dispenser controller's BAUD rate is fixed at 38.4K. The com-port selection of 1 through 4 may need to be changed depending on the computer's available port number. The NODE number should be left at zero unless one has multiple dispensers on an RS485 network. DIPswitches SW1-2 through SW1-6 on the dispenser interface board set the NODE number for the dispenser. Each dispenser on the network should have its own unique number. The NODE drop down box provides a list of node numbers. The Tool will connect to the dispenser that has that node number. The dispenser's RS232 port node number is always zero.



The REFRESH rate box sets the communication polling time. The polling time may need to be adjusted for an older computer. The Tool repeatedly sends out a data update request to the dispenser and expects a response back. The computer needs time to process the data. If it does not have enough time, the Tool will miss the next response. The Tool is "ON-LINE" if it gets a response back every time. The Tool status line will report a "Retry" if it does not receive a response. After twenty attempts without a response, the Tool will go off-line. The time between these attempts is the refresh rate. The default rate is 150 milliseconds. This works on current computers and laptops. Older computers may need more time to process the response. The "UP" and "DOWN" buttons adjust the refresh number. An example of an old laptop would be a Pentium 90 running Windows 95. The refresh rate should be adjusted up between 500 – 700 milliseconds for these types. Click the "OK" button when finished. The "Cancel" button will abandon any changes.

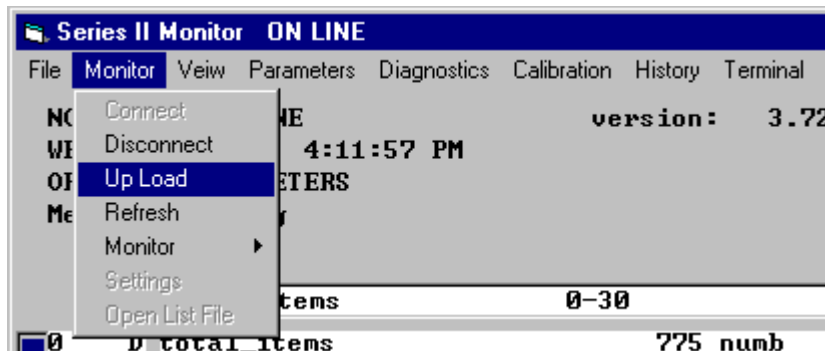


To get the Tool to monitor the Series II controller, click on the “Monitor” main menu item. The “Monitor” sub menu item list will come down. Then left click on the “Connect” sub menu item. The Tool will start to communicate with the controller. The status line will read “ON LINE” if the connection is successful. The status line also indicates which dispenser the Tool is connected to by its NODE number.



## 6. UPLOADING PARAMETERS

When connecting for the first time, the status lines will indicate the parameters are not yet retrieved from the controller. All the information about the parameters and variables for the dispenser controller are stored in the dispenser’s control board. They must be uploaded from the controller into the Tool before they can be monitored or changed. To do this, click on the “Monitor” main menu item. Then click on the “Up Load” sub menu item.



The Tool will start uploading the parameter's information. The status line will show the parameter number being loaded at the moment. The progress bar on the left of the list will give a visual indication of where the percent complete in the upload process. When the progress bar reaches the top, the upload is complete.

When the upload is complete, the Tool will continuously monitor the variable changes. Values that change and get refreshed will be highlighted red (magenta). The status lines will show the date and time of the clock that is in the dispenser controller, the version of firmware that is loaded in the dispenser, and the state of the parameters. The dispenser's time clock will update every second.

**Series II Monitor ON LINE**

File Monitor View Parameters Diagnostics Calibration History Terminal Simulate A

NODE 00 ON LINE version: 3.72

DATE

LOADING PARAMETERS 260 0

Text Activity

Progress Bar

|    |   |                   |     |      |
|----|---|-------------------|-----|------|
| 0  | D | total_items       | 775 | numb |
| 1  | D | common_parameters | 31  | numb |
| 2  | D | A_variables       | 60  | numb |
| 3  | D | A_meter_signals   | 119 | numb |
| 4  | D | A_parameters      | 124 | numb |
| 5  | D | A_run_monitor     | 163 | numb |
| 6  | D | A_run_totals      | 210 | numb |
| 7  | D | B_variables       | 241 | numb |
| 8  | D | B_meter_signals   | 300 | numb |
| 9  | D | B_parameters      | 305 | numb |
| 10 | D | B_run_monitor     | 344 | numb |
| 11 | D | B_run_totals      | 391 | numb |
| 12 | D | control_variables | 422 | numb |
| 13 | D | analog_inputs     | 453 | numb |
| 14 | D | GII_A_controls    | 461 | numb |
| 15 | D | GII_A_signals     | 471 | numb |
| 16 | D | GII_A_variables   | 483 | numb |
| 17 | D | GII_A_monitor     | 518 | numb |
| 18 | D | GII_A_parameters  | 524 | numb |
| 19 | D | GII_A_parameters  | 546 | numb |

Search

A F14 Pressure Signal Los B F7 Hose Burst



**Series II Monitor ON LINE**

File Monitor View Parameters Diagnostics Calibration History Terminal Simulate.A

NODE 00 ON LINE version: 3.72  
 WED 1-17-2007 4:15:02 PM  
 ORIGINAL PARAMETERS  
 Meter B Zeroing

total\_items 0-30

|    |   |                   |     |      |
|----|---|-------------------|-----|------|
| 0  | D | total_items       | 775 | numb |
| 1  | D | common_parameters | 31  | numb |
| 2  | D | A_variables       | 60  | numb |
| 3  | D | A_meter_signals   | 119 | numb |
| 4  | D | A_parameters      | 124 | numb |
| 5  | D | A_run_monitor     | 163 | numb |
| 6  | D | A_run_totals      | 210 | numb |
| 7  | D | B_variables       | 241 | numb |
| 8  | P | B_meter_signals   | 3   | numb |
| 9  | D | B_parameters      | 305 | numb |
| 10 | D | B_run_monitor     | 344 | numb |
| 11 | D | B_run_totals      | 391 | numb |
| 12 | D | control_variables | 422 | numb |
| 13 | D | analog_inputs     | 453 | numb |
| 14 | D | GTI_A_controls    | 461 | numb |
| 15 | D | GTI_A_signals     | 471 | numb |
| 16 | D | GTI_A_variables   | 483 | numb |
| 17 | D | GTI_A_monitor     | 518 | numb |
| 18 | D | GTI_A_parameters  | 524 | numb |
| 19 | D | GTI_A_parameters  | 546 | numb |

Search

A F16 Display Com Loss B F14 Pressure Signal Los

Pull Down Menu

Drag Bar, Hold Down Mouse Button to Scroll

Scroll Bar, Click to Jump Ten At a Time

Click to Single Step

All the parameters and variables will be listed in the main list. This part of the main list shows the names on the left, the current value in the middle, and the units on the right. The parameters are write protected and cannot be edited at this time. To edit the parameters, they must be “unlocked” by a password. Click on and hold the drag bar on the right with the mouse pointer to move through the list. The parameters and variables are divided into sections according to their function. These sections are listed first as a directory. The directory is also listed in the pull down menu. Clicking on the pull down menu item will make the main list jump to that section (described earlier).

The "Search" text box located at the bottom left of the main panel is used to find a parameter if the name or part of the name is known. The example below shows part of a parameter name "smode" which is entered into the "Search" text box. Pressing the Enter Key starts the search of all the parameter names. The search found a match in the parameter name "ASmode" and put the parameter on the top of the list. Pressing the Enter Key again will find the next occurrence of "smode" which will be "BSmode." Pressing the Enter Key will search for another match down the list. The search function will start over at the top of the list if no other matches were found. The search function is not case sensitive.

Search Found  
"ASmode"

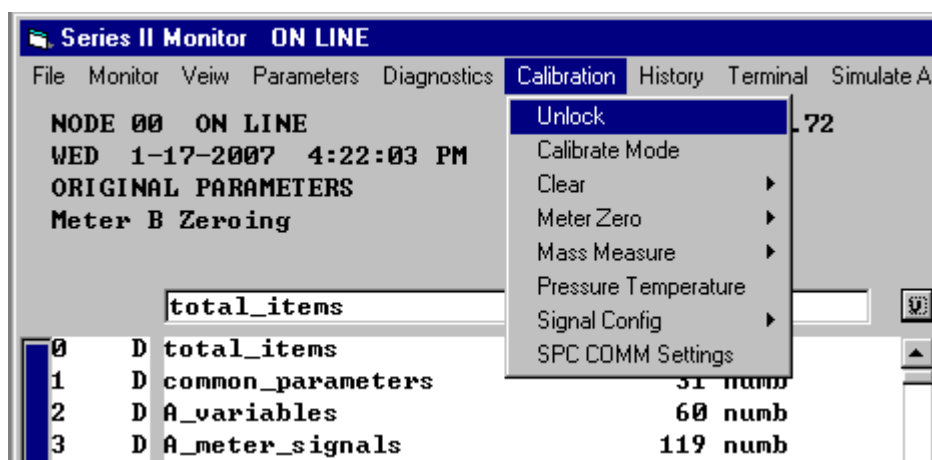
| A_variables |                   |                |
|-------------|-------------------|----------------|
| 132         | ASmode            | 2 numb         |
| 133         | Aanalog_temp_cal  | 327.5 K        |
| 134         | Adac_freeze       | 441 dac        |
| 135         | A_spare12         | 0 numb         |
| 136         | Apress_dac_offset | 180 dac        |
| 137         | Apress_dac_range  | 52000 dac      |
| 138         | Aflow_dac_zero    | 0 dac          |
| 139         | Aflow_dac_max     | 1023 dac       |
| 140         | Aflow_cal         | 350.00 g/s     |
| 141         | Ameter_temp_cal   | 10 numb        |
| 142         | Ameter_flow_cal   | 100000 numb    |
| 143         | Ameter_mass_cal   | 10000 numb     |
| 144         | Apress_unit       | 2 numb         |
| 145         | Asignal_config    | 135661137 numb |
| 146         | ASlowtarget       | 99 %           |
| 147         | ASmidtargt        | 100 %          |
| 148         | AShightarget      | 100 %          |
| 149         | Ato_mid           | 3.00 MPa       |
| 150         | Ato_high          | 1.50 MPa       |
| 151         | Ato_full          | 0.25 MPa       |

Search for  
"smode" in any  
Parameter Name

Search Text  
Box

## 7. UNLOCKING THE WRITE PROTECT

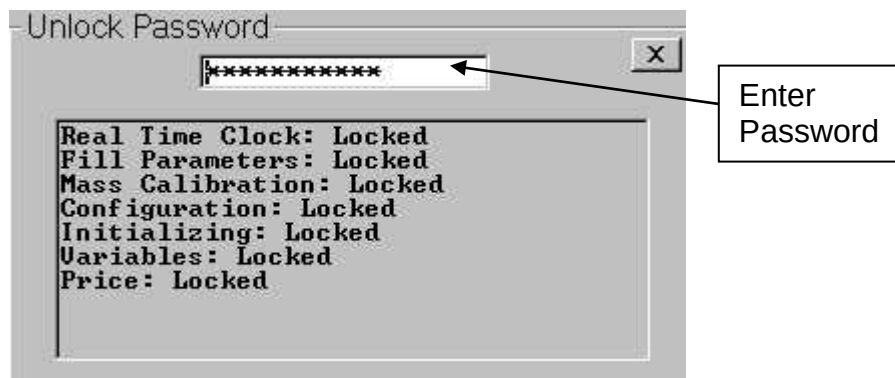
All parameters and variables are write protected. This is to keep unauthorized personnel from changing parameter values. To “unlock” the write protect, a set of passwords must be entered and sent to the dispenser controller. These passwords are necessary to meet the weights-and-measures approval requirements. This allows for the calibration of the dispenser without breaking the weights-and-measures seal on the electrical cabinet. There are three levels of password protection based on the function of the parameter. Each level gets its own password. The first level parameters are the “Fill” parameters; they do not affect mass measurement, scaling, or calibration. Such parameters adjust pressure, temperature, and performance parameters. The second level is mass scaling and calibration parameters. These parameters affect the volume display and mass-pulse train scaling. The third level is the configuration parameters and real time variable write. This level should only be open to technicians for hardware set-up during test, start-up, or diagnostics. Access to the third level must also include setting a hardware DIP switch on the dispenser controller board.



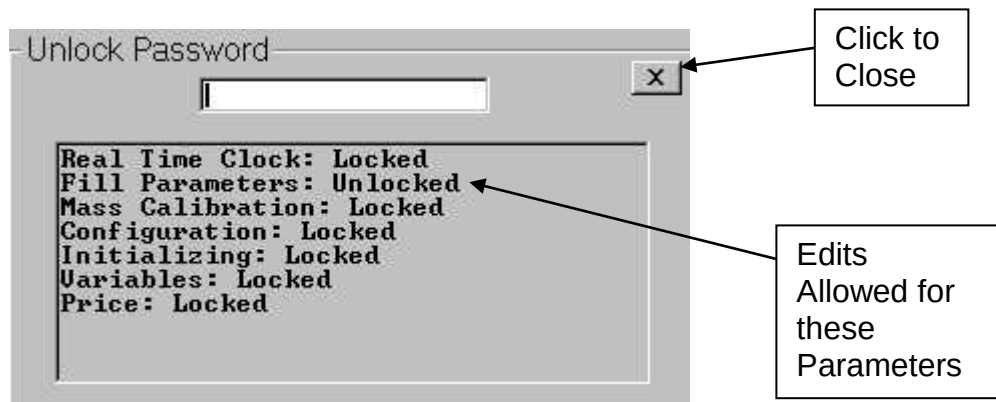
To gain access to edit the parameters, click on the “Calibration” main menu item for the calibration list. Next, click on the “Unlock” sub menu item. The “Unlock” panel will appear in the middle of the screen. Click on the text box on the top of the panel and enter a password. The password is case sensitive; if the password is in capitals, the capitals must be entered. Hyphens must be typed in also. Mistakes can be backspaced over and the correct characters re-entered.



In the example below, the password to unlock the Fill Parameters is has been entered. The password will not be shown. Asterisks will be shown in place of the letters, numbers, or hyphens.



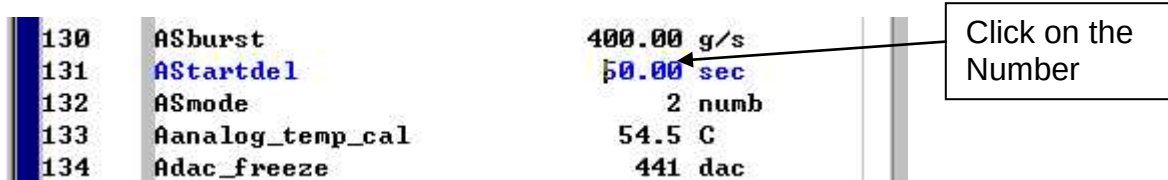
After the password is entered, pressing the Enter Key sends it to the controller. If the password is correct, the parameters should unlock as shown below. If anything other than a correct password is entered, the status line will indicate "INVALID PASSWORD" and the write protect will go back to the "locked" state. Clicking the "X" button can close the Unlock Password window.



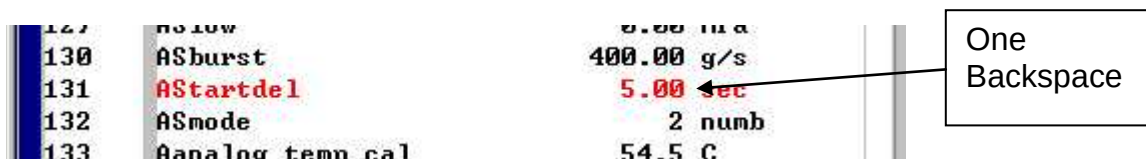
The parameters will remain unlocked as long as the Tool is on-line and connected to the dispenser controller. The write protect will go back to the locked state if communication between the Tool and the dispenser is stopped.

## 8. EDITING PARAMTERS

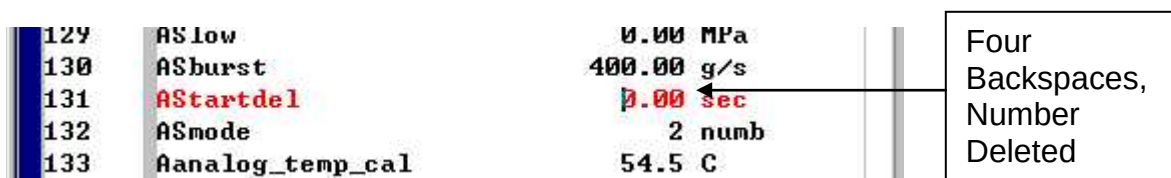
To edit a parameter, click on the parameter value. The parameter will be highlighted in blue.



To remove the old number, use the backspace key. This will backspace the old number to the right and delete the least significant number. The parameter will be highlighted in red indicating it has been changed.



To remove the number completely, keep backspacing until the number is zero.



Type in the new number. The numbers will shift to the left as they are typed. The decimal point will remain fixed. In the example below, the number entered is 6500.



At the moment, the number is *only* changed on the screen and is *not* sent to the dispenser controller. The escape key can be hit to abort the change and return to the original number. The original number will return if another parameter is selected. The new number is sent to the dispenser controller by hitting the enter key.

The new parameter value is now in the dispenser. The status lines indicate that a parameter has been changed and is different than what is in the dispenser's permanent memory. Additional parameters may be edited. If all the parameter values are returned to their original values, the status line will state "ORIGINAL PARAMETERS."

**Series II Monitor ON LINE**

File Monitor View Parameters Diagnostics Calibration History Terminal Simulate

NODE 00 ON LINE Calibrate version: 3.01  
 MON 6-13-2005 3:33:45 PM  
 CHANGED PARAMETERS, UNSAVED!

|     |                  |            |
|-----|------------------|------------|
| 124 | ASlowflo         | 50.00 g/s  |
| 125 | ASmidflo         | 45.00 g/s  |
| 126 | AShiflo          | 40.00 g/s  |
| 127 | AStopflo         | 35.00 g/s  |
| 128 | ASdrop           | 1.00 MPa   |
| 129 | ASlow            | 0.00 MPa   |
| 130 | ASburst          | 400.00 g/s |
| 131 | ASstartdel       | 65.00 sec  |
| 132 | ASmode           | 2 numb     |
| 133 | Aanalog_temp_cal | 54.5 C     |
| 134 | Adac_freeze      | 441 dac    |

A Parameter has been Changed in the Controller but not Saved to Permanent Memory

The dispenser will not operate if the parameters are changed, but not saved to memory. To save the changes, click on the "Parameters" main menu item and then click on the "Save to Memory" sub menu item. This will save all the parameters.

**Series II Monitor ON LINE**

File Monitor View **Parameters** Diagnostics Calibration History Terminal Simulate

NODE 00 ON version: 3.01  
 MON 6-13-2005 3:33:45 PM  
 CHANGED PARAMETERS

- Save to Memory
- Restore from Memory
- Write from File
- Write to File
- Compare to File

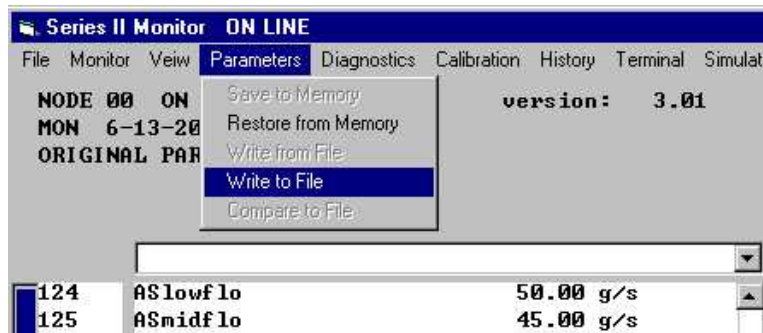
|     |                  |            |
|-----|------------------|------------|
| 124 | ASlowflo         | 50.00 g/s  |
| 125 | ASmidflo         | 45.00 g/s  |
| 126 | AShiflo          | 40.00 g/s  |
| 127 | AStopflo         | 35.00 g/s  |
| 128 | ASdrop           | 1.00 MPa   |
| 129 | ASlow            | 0.00 MPa   |
| 130 | ASburst          | 400.00 g/s |
| 131 | ASstartdel       | 65.00 sec  |
| 132 | ASmode           | 2 numb     |
| 133 | Aanalog_temp_cal | 54.5 C     |

Saves All Parameter Changes into Flash Memory



## 9. SAVING PARAMETERS TO A FILE

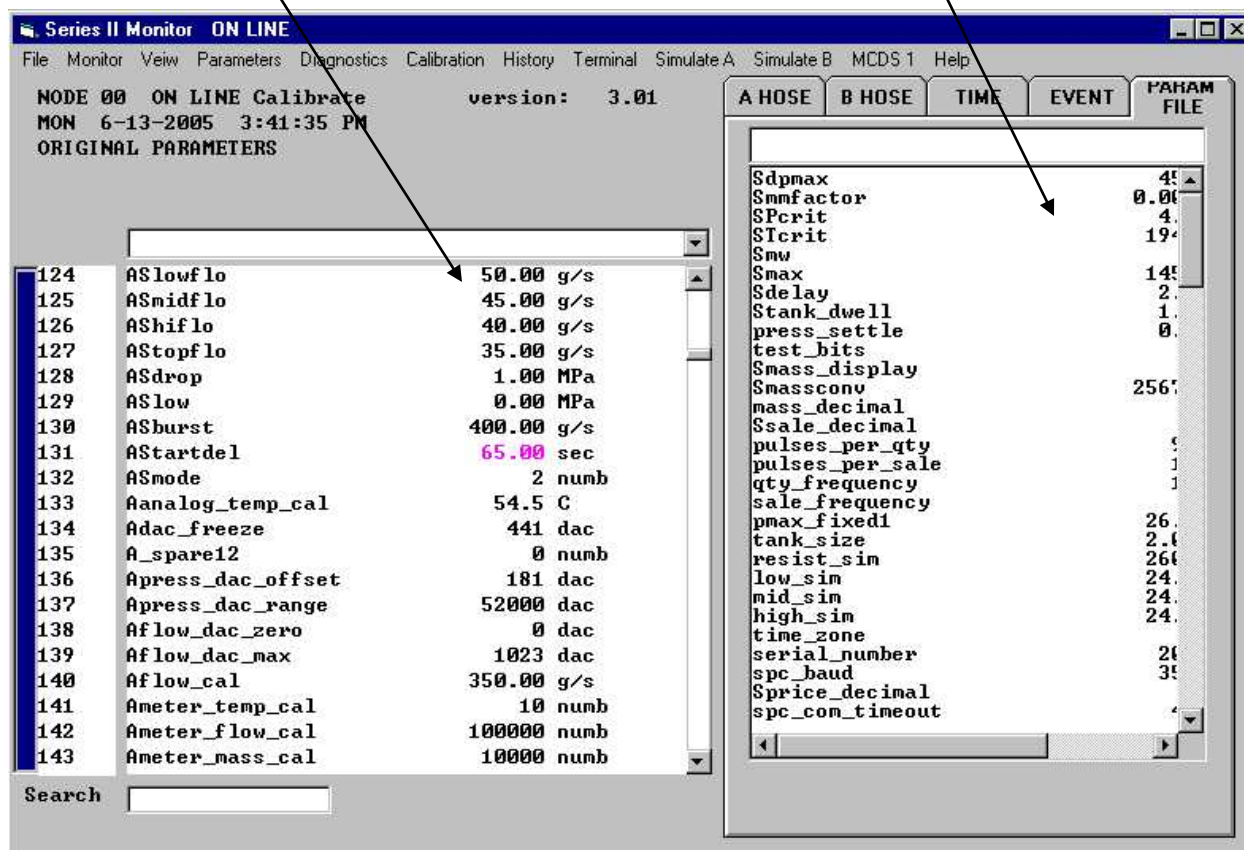
The parameters from the Tool list can be saved to a new or existing file for record keeping purposes. To create a file, click on the “Parameters” main menu item and then click on “Write to File” sub menu item.



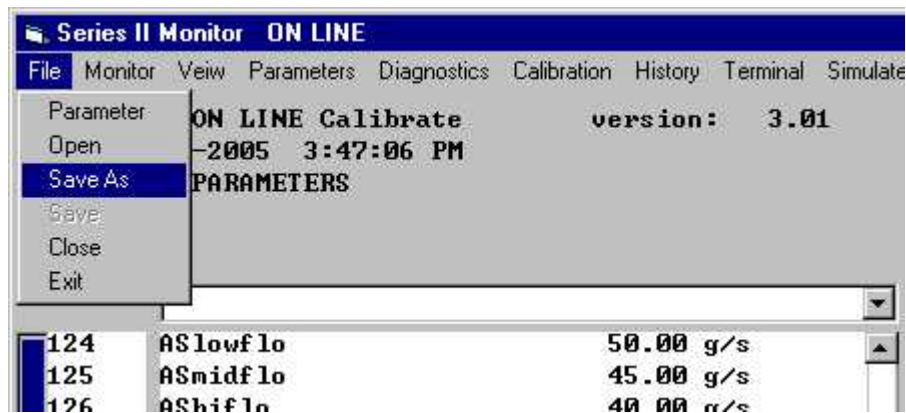
This takes the present parameters on the main list and creates a file displayed under the “Param File” tab to the right. This overwrites any parameter file that was previously displayed in the tab box. The values in the file are always in the base units used by the controller.

List of Parameter Values  
Uploaded from the Dispenser.

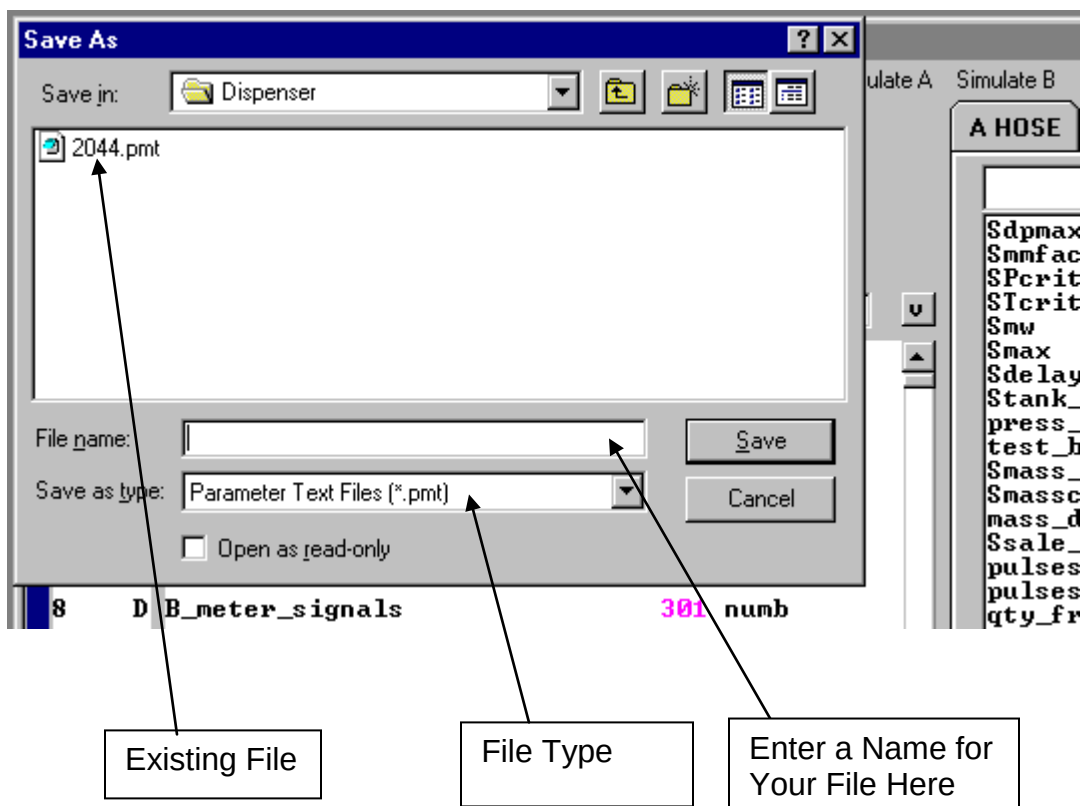
New Parameter File Created from the  
List. File is Not Yet Named.



To save this file to the computer, click the “File” main menu item and then click on the “Save As” sub menu item.

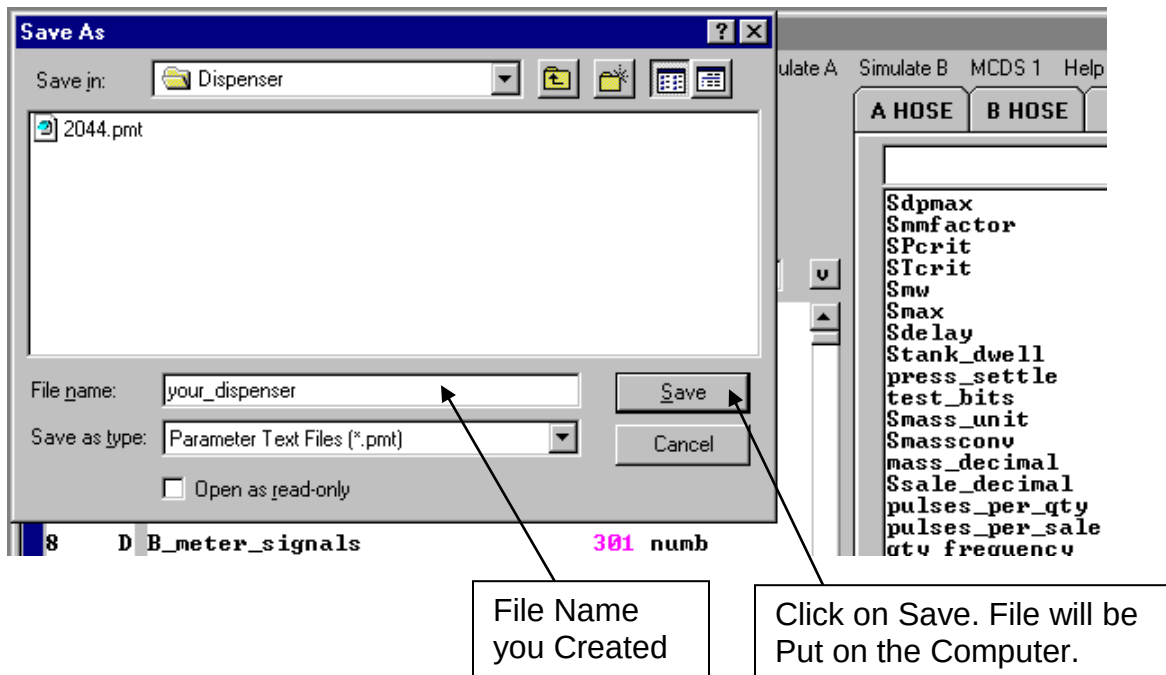


This brings up the standard Windows file save dialog box. Entering a name in the “File name” box and clicking on the “Save” button will create a new file. The file extension “.prt” will automatically be added to the name.

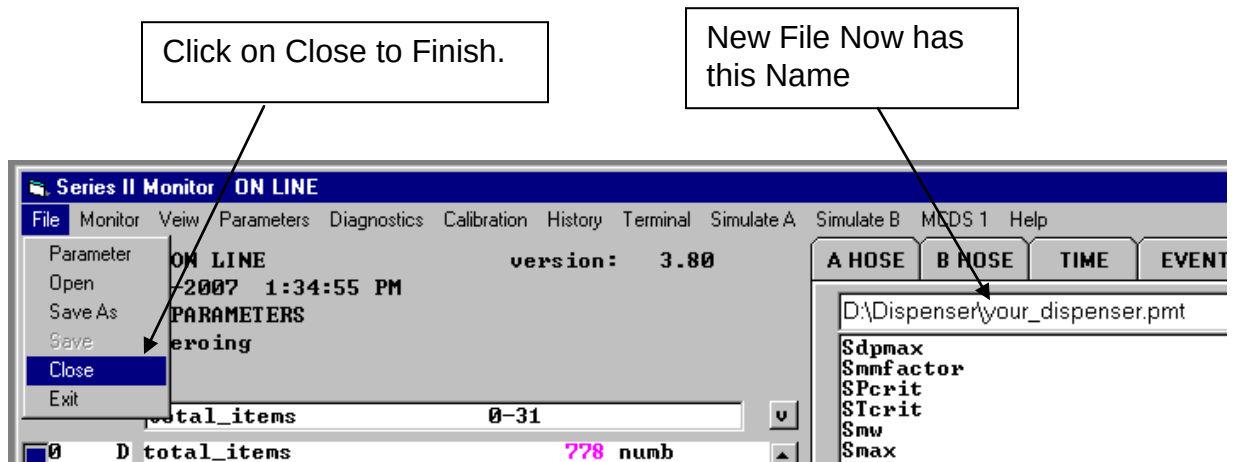




The example below shows the entered name as “Dispenser201.” It will be saved in the example folder called “Parameters.”

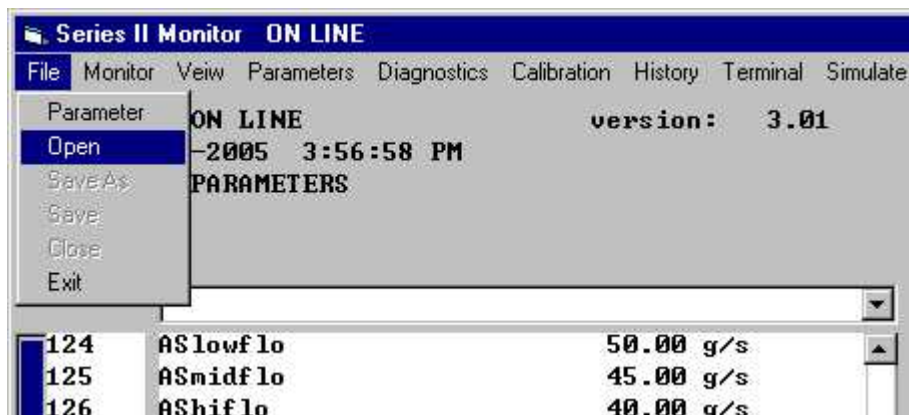


When finished with editing and saving the parameters, the file can be closed. This will clear the displayed file under the “PARAM FILE” tab.

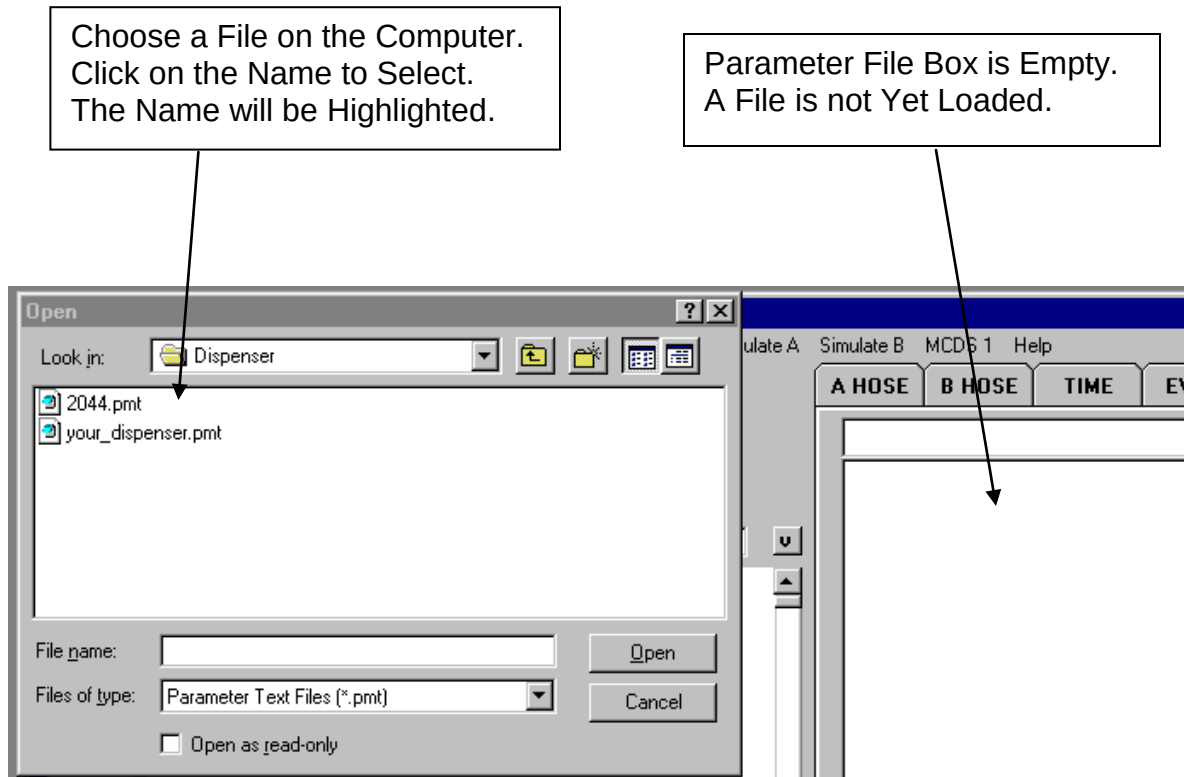


## 10. OPENING AN EXISTING PARAMETER FILE

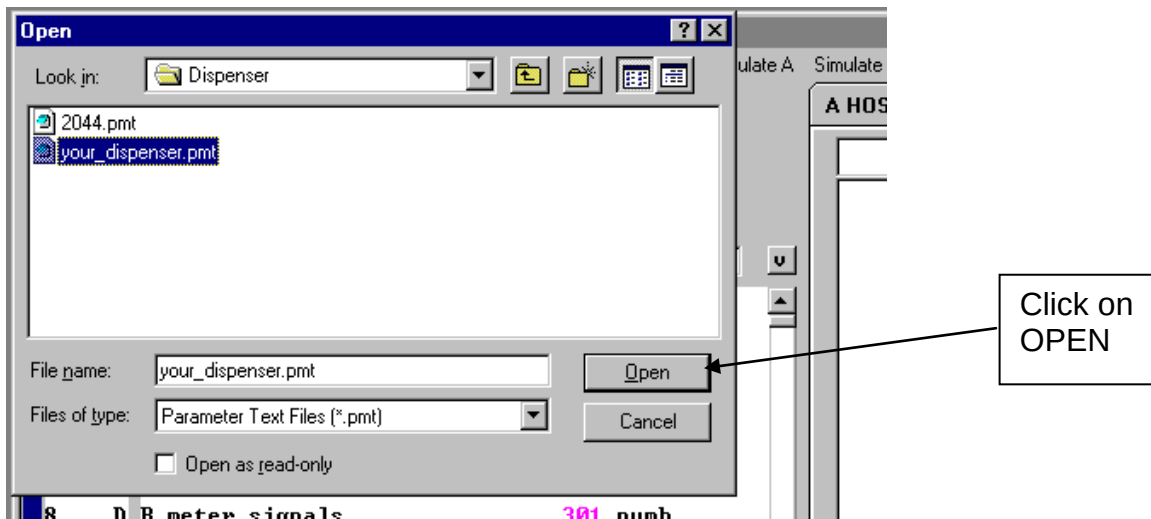
Parameters that are saved in a file can be loaded into a dispenser controller. Dispensers that are started up for the first time and have no parameters loaded can be initialized this way with a default set of parameters. To get a parameter file, click on the “File” main menu item and then click on the “Open” sub menu item.



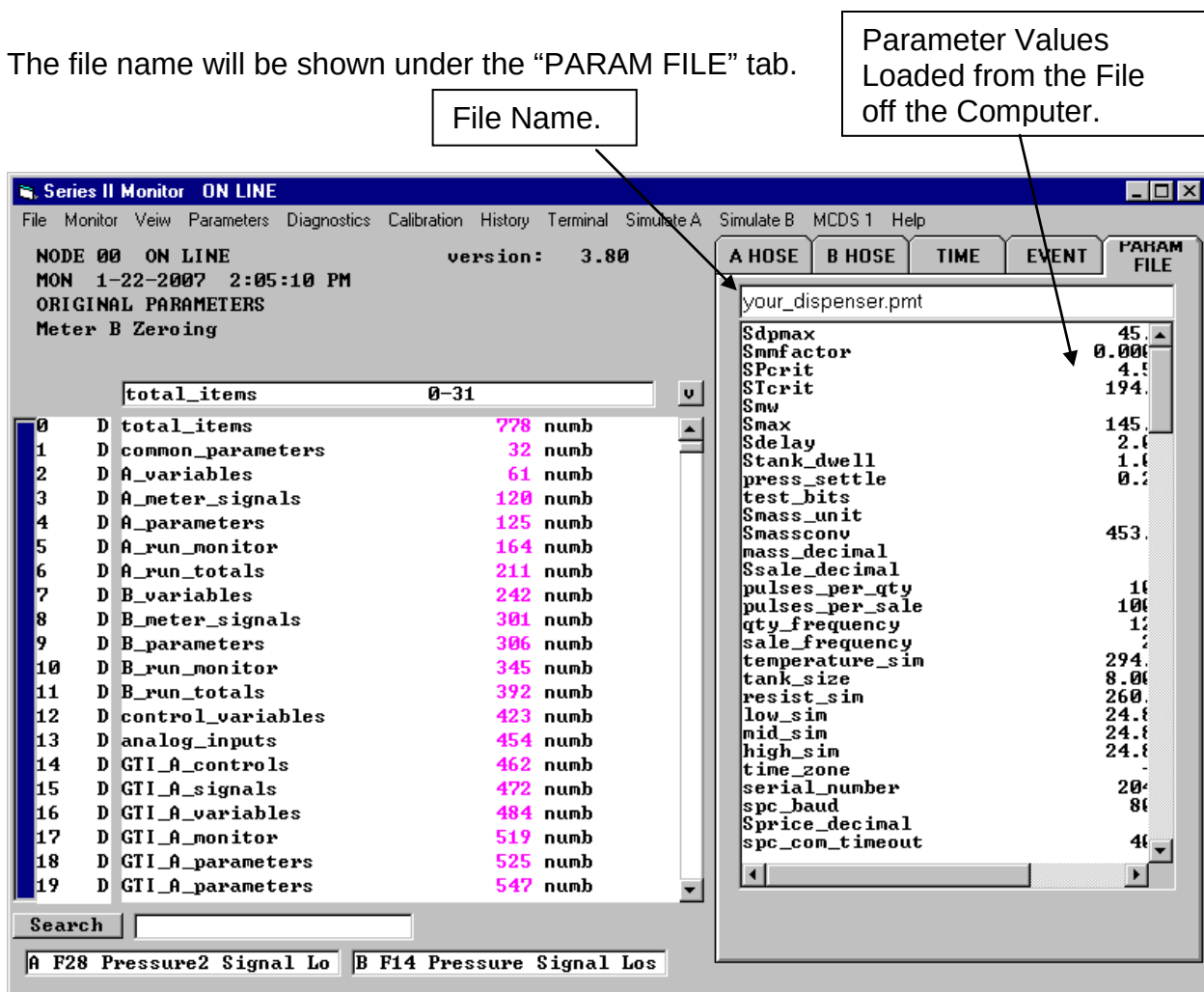
The standard Windows Open file dialog box will appear. In the example below, there are two files to choose from. Pick a parameter file by clicking on its name on the list with the mouse cursor.



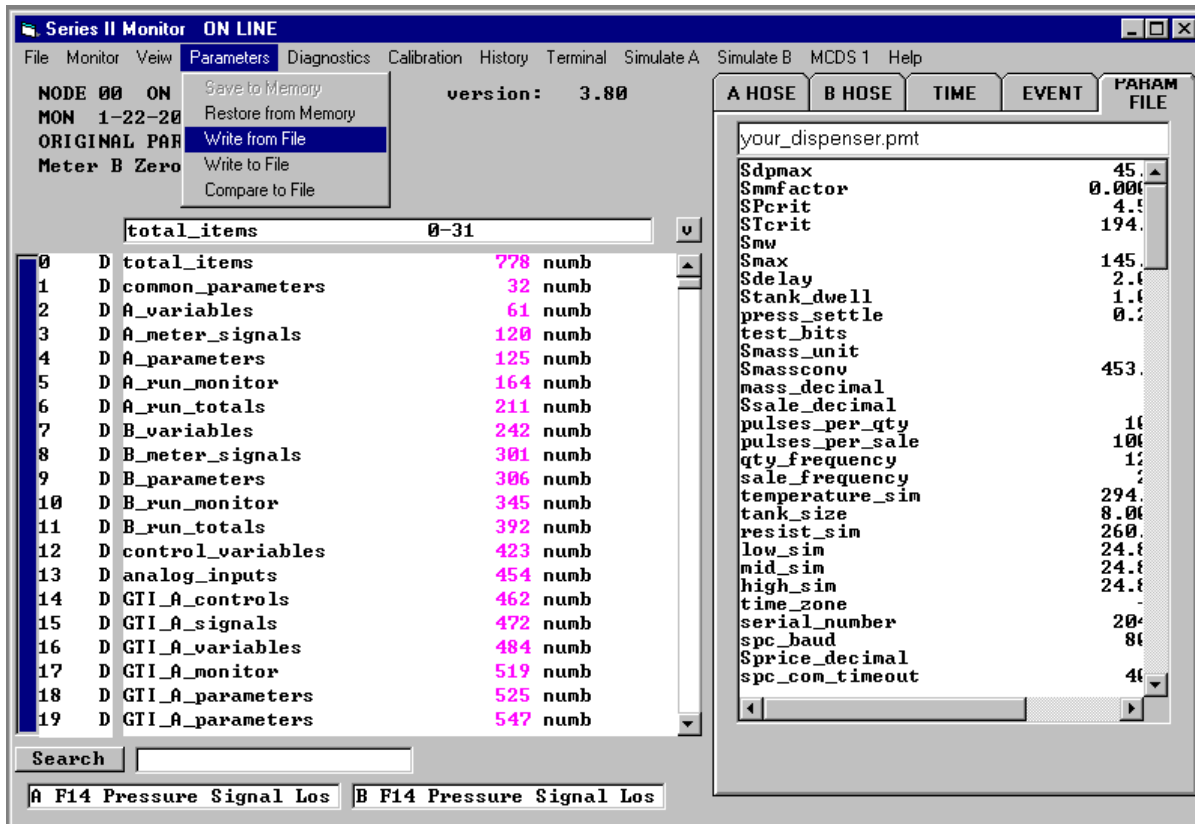
In the example below, the file Dispenser202.prm was selected and highlighted. Its name will appear in the “File name” box indicating the selected file. Next, click on the “Open” button. This will load the file in the box under the “Param File” tab.



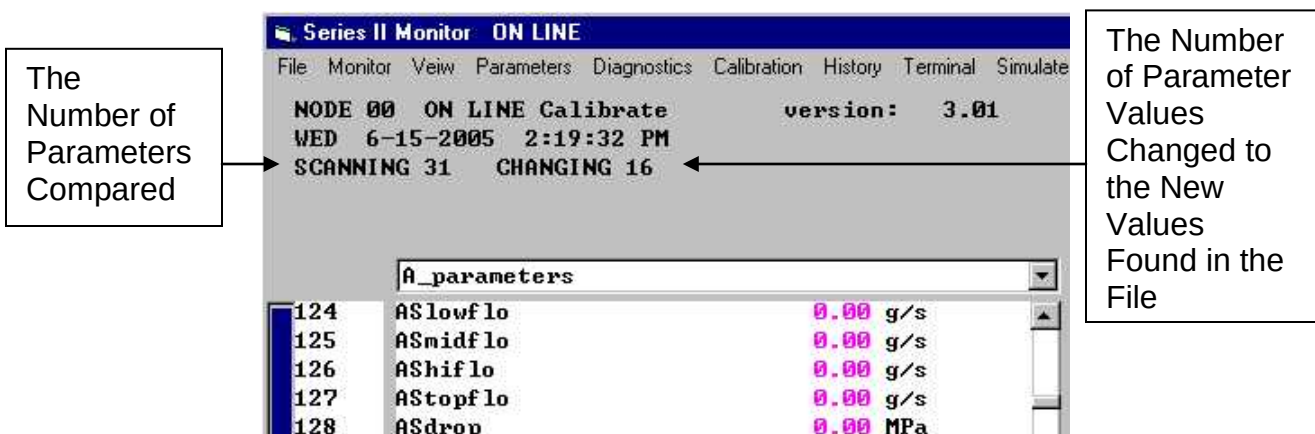
The file name will be shown under the “PARAM FILE” tab.



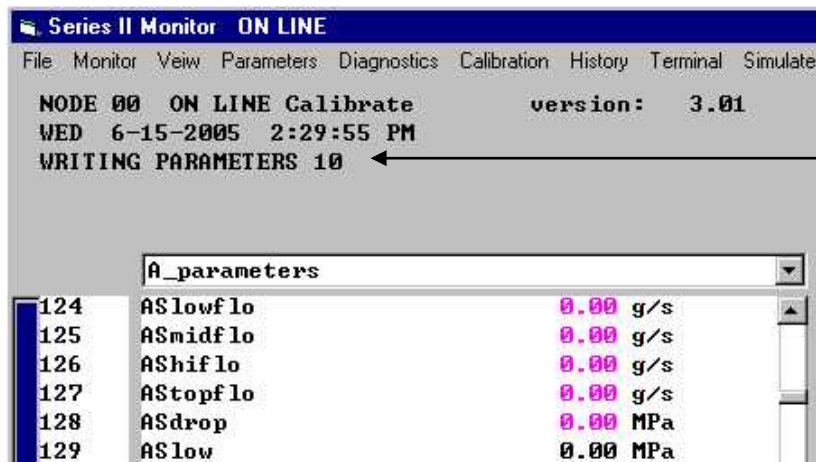
A set of parameters can now be loaded into the dispenser controller. The example below shows a controller without a set of parameters loaded. First, follow the parameter write protect unlock procedure described previously in this manual. Click on the “Parameters” main menu item and then on the “Write from File” sub menu item.



The status lines will indicate the loading process, which begins by scanning the current parameter values in the main list with the values in the open file to find values that are different. The scanning process counts the parameter's values that will be change and written to the dispenser controller.

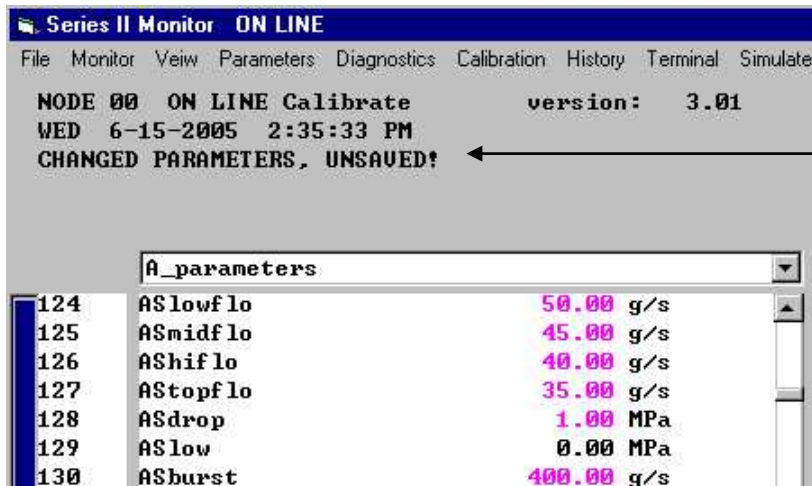


Once the scanning process is finished, the Tool will write the new parameters into the dispenser controller.



New Values  
being Written  
to the  
Dispenser  
Controller

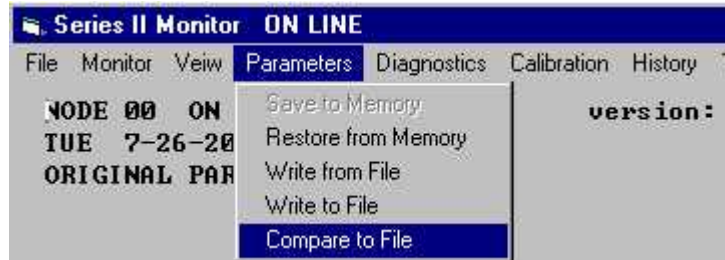
The status line will indicate the parameters were changed and not yet saved after the writing process is complete. Follow the procedure to save parameters to memory described previously in this manual.



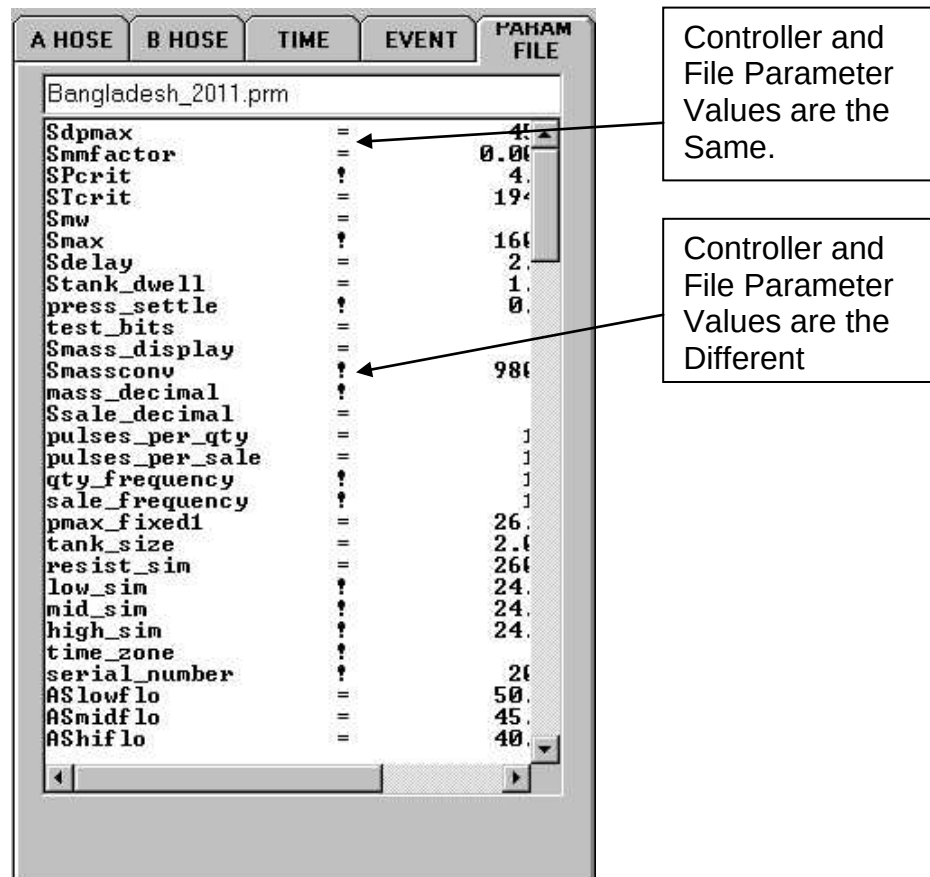
Ready to  
Saved to Flash  
Memory

## 11. COMPARING PARAMETERS TO A FILE

The parameters from the controller can be compared to a set of parameters in a file. Assuming a file is open in the “PARAMAM FILE” box, click on “Parameters” main menu item, then click on “Compare to File” sub-menu item.



The status lines will display the progress of scanning through the parameters and noting the unequal values. The parameter file list will be refreshed to show the results of the comparisons after the scanning is complete. An equal sign (=) indicates the parameter value in the controller matches the parameter value in the file. The exclamation point (!) indicates the parameter values are different.



| Parameter       | Controller | File |
|-----------------|------------|------|
| Sdpmax          | =          | 41   |
| Snmfactor       | =          | 0.00 |
| SPcrit          | !          | 4    |
| STcrit          | =          | 19   |
| Smw             | =          |      |
| Smax            | !          | 16   |
| Sdelay          | =          | 2    |
| Stank_dwell     | =          | 1    |
| press_settle    | !          | 0    |
| test_bits       | =          |      |
| Smass_display   | =          |      |
| Smassconv       | !          | 98   |
| mass_decimal    | !          |      |
| Ssale_decimal   | =          |      |
| pulses_per_qty  | =          | 1    |
| pulses_per_sale | =          | 1    |
| qty_frequency   | !          | 1    |
| sale_frequency  | !          | 1    |
| pmax_fixed1     | =          | 26   |
| tank_size       | =          | 2    |
| resist_sim      | =          | 26   |
| low_sim         | !          | 24   |
| mid_sim         | !          | 24   |
| high_sim        | !          | 24   |
| time_zone       | !          |      |
| serial_number   | !          | 2    |
| ASlowflo        | =          | 50   |
| ASmidflo        | =          | 45   |
| AShiflo         | =          | 40   |

Controller and File Parameter Values are the Same.

Controller and File Parameter Values are the Different

## 12. PARAMETER FILE STRUCTURE

The parameter file saved on the computer is a text file that can be opened and read by any text-editing program. Below is an example of the structure for file with a “.pmt” extension. The each line in the file structure is dedicated to one parameter. Each line starts with the parameter name followed by the value, the units, a unit code, and a cast code. When the file is opened, the monitoring tool expects exactly this order with no deviation. The tool searches each line for the parameter name to identify the parameter. The name must be exact and is case sensitive. The parameter line will not be processed if the tool comes across a name it does not recognize. The value is accepted if the decimal point is in the right place with only number characters. The unit text is ignored but the unit code is compared to the units in the main list. The parameter is not processed if the unit code does not match. A text editor can change the values as long as the decimal point placement is respected. The units is for reference only and should be left alone. The cast number is used to distinguish between 32 bit numbers and floating point numbers. This should also be left alone. Parameters that have individual bit definitions are broken out over 32 lines for each bit. In the example below the parameter “Asignal\_config” has an asterisk instead of a numerical value. This character tells the tool to assemble the parameter value from the 32 following lines. The name for each bit is pre-appended with a backslash to indicate it is a bit name. The order starts with bit zero and proceeds up to bit 31. Any more lines than 32 are ignored. The tool adds the bit weights, 1, 2, 4, etc. to derive the 32-bit parameter value.

| Parameter Name           | Value  | Unit | Unit code | Cast Code |
|--------------------------|--------|------|-----------|-----------|
| ASlowflo                 | 50.00  | g/s  | 40        | 0         |
| ASmidflo                 | 45.00  | g/s  | 40        | 0         |
| AShiflo                  | 40.00  | g/s  | 40        | 0         |
| AStopflo                 | 35.00  | g/s  | 40        | 0         |
| ASdrop                   | 1.00   | MPa  | 30        | 0         |
| ASlow                    | 0.00   | MPa  | 30        | 0         |
| ASburst                  | 600.00 | g/s  | 40        | 0         |
| AStartdel                | 65.00  | sec  | 10        | 0         |
| ASmode                   | 4      | numb | 0         | 0         |
| Apress_unit              | 2      | numb | 0         | 0         |
| Asignal_config           | *      | Hex  | 1         | 0         |
| \Ause_meter_mass_flow    | 1      |      |           |           |
| \Ause_meter_vol_flow     | 0      |      |           |           |
| \Ause_analog_mass_flow   | 0      |      |           |           |
| \Ause_meter_vol_total    | 0      |      |           |           |
| \Ause_meter_mass_total   | 1      |      |           |           |
| \Ause_pulse_mass_counter | 0      |      |           |           |
| ....(more)               |        |      |           |           |

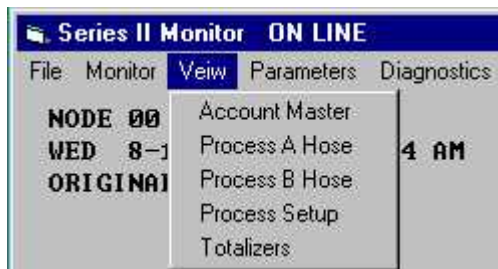
32 Bit Names Under  
Asignal\_config

32 Bit Values. 1 for ON. 0  
for OFF.



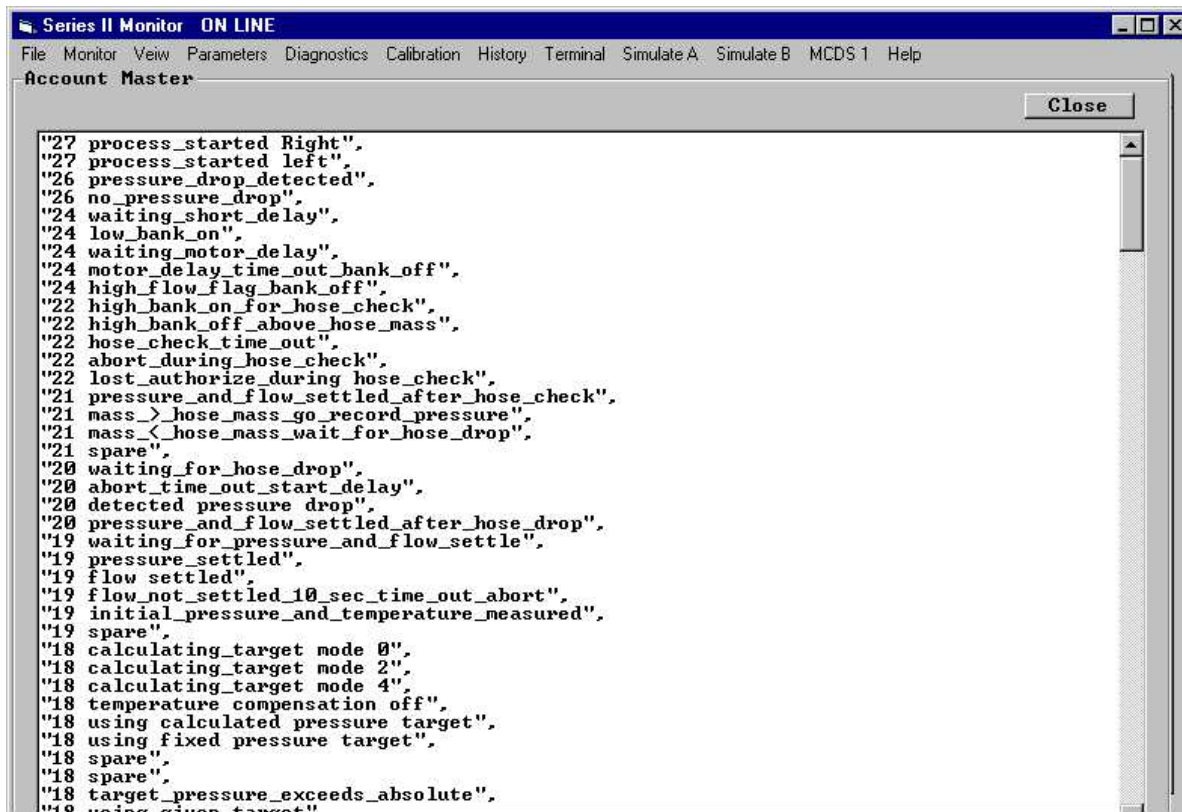
### 13. VIEW

Under the “View” main menu item is a list of panels to read miscellaneous variables and functions.



### 14. VIEW: ACCOUNT MASTER

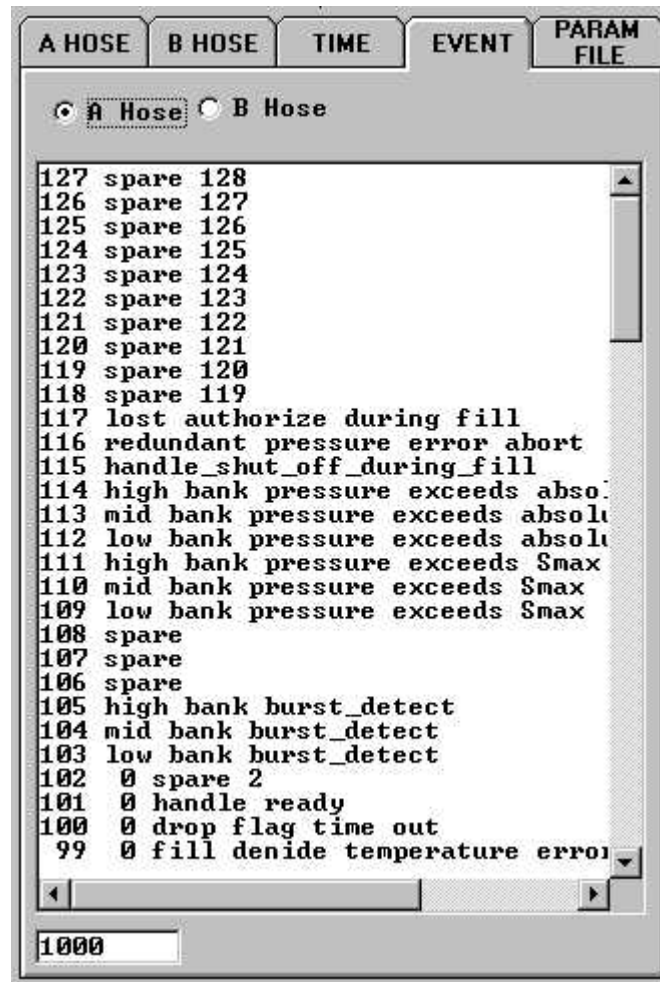
The Account Master is a list of all the point-by-point actions and decisions made by the fill sequence program from start to finish. This list is referenced by the “EVENT” tab function to generate a list of actions that happen during a fill sequence. The event function picks a line out of the master list according to whether a bit is on or off in the “Account” monitor variables. If an event occurred, the bit is on. If the bit is off, that event did not occur. Example: if operator opened the hose valve and a hose drop occurred,



the “drop flag” will be on. When the program gets to the point of checking for the hose drop, the program will set a bit on that corresponds to the line “26 pressure drop



detected” and keep the bit off that corresponds to the line “26 no pressure drop.” When the “EVENT” function makes its list, only the line “26 pressure drop detected” gets listed. The “EVENT” list is resolved every time the monitor variables “account1,” “account2,” “account3,” and “account4” change value. This means if the “EVENT” tab is open, the list will be generated as the fill sequence progresses in real time. This list makes it easy to diagnose why a certain fill had problems or why it aborted.



## 15. VIEW: PROCESS A / B

The process panel displays a time-based list of the fill process variables for a single fill. The process variables such as mass, flow, pressure, etc. are sampled and recorded by the dispenser controller. The sample rate is a multiple of 40 milliseconds, based on the controller's program cycle. The results can be uploaded to the process text box. This list can be saved to disk as a text file. Click the "File" main menu item "Save As" sub menu item to bring up the Save As dialog box. Name and save the file. The values entered in the "Start At" and "End At" boxes will specify the section of time to upload. These values must be entered before uploading. To upload, click the "Upload A/B" button. The box to the left of the button will indicate the upload progress. Click on the "Refresh" button to generate the list once the upload is complete.

The screenshot shows the 'Series II Monitor' application window. The title bar reads 'Series II Monitor ON LINE'. The menu bar includes 'File', 'Monitor', 'View', 'Parameters', 'Diagnostics', 'Calibration', 'History', 'Terminal', 'Simulate A', 'Simulate B', 'MCDS 1', and 'Help'. The main window title is 'Real Time Process Variable Log: Hose A'. Below this, there are input fields for 'Upload A' (with a progress indicator), 'Start at', and 'End at', all currently set to '0'. A 'REFRESH' button is to the right. The data area is titled 'ANGI International Series II NGV Dispenser' and 'A Hose Process Measurement'. It shows the date '08-10-2005', time '10:55:59', and serial number '2010'. A table of process variables is displayed with columns for Time (sec), Amass (grams), Apressure (MPa), Aflow (g/s), Atemp (K), Atankpress (MPa), and Aflags (Hex). The table contains 16 rows of data, showing a linear increase in mass and pressure over time.

| Time<br>sec | Amass<br>grams | Apressure<br>MPa | Aflow<br>g/s | Atemp<br>K | Atankpress<br>MPa | Aflags<br>Hex |
|-------------|----------------|------------------|--------------|------------|-------------------|---------------|
| 0.04        | 10             | 0.11             | 0.12         | 1.3        | 0.14              | F             |
| 0.08        | 20             | 0.21             | 0.22         | 2.3        | 0.24              | 19            |
| 0.12        | 30             | 0.31             | 0.32         | 3.3        | 0.34              | 23            |
| 0.16        | 40             | 0.41             | 0.42         | 4.3        | 0.44              | 2D            |
| 0.20        | 50             | 0.51             | 0.52         | 5.3        | 0.54              | 37            |
| 0.24        | 60             | 0.61             | 0.62         | 6.3        | 0.64              | 41            |
| 0.28        | 70             | 0.71             | 0.72         | 7.3        | 0.74              | 4B            |
| 0.32        | 80             | 0.81             | 0.82         | 8.3        | 0.84              | 55            |
| 0.36        | 90             | 0.91             | 0.92         | 9.3        | 0.94              | 5F            |
| 0.40        | 100            | 1.01             | 1.02         | 10.3       | 1.04              | 69            |
| 0.44        | 110            | 1.11             | 1.12         | 11.3       | 1.14              | 73            |
| 0.48        | 120            | 1.21             | 1.22         | 12.3       | 1.24              | 7D            |
| 0.52        | 130            | 1.31             | 1.32         | 13.3       | 1.34              | 87            |
| 0.56        | 140            | 1.41             | 1.42         | 14.3       | 1.44              | 91            |
| 0.60        | 150            | 1.51             | 1.52         | 15.3       | 1.54              | 9B            |
| 0.64        | 160            | 1.61             | 1.62         | 16.3       | 1.64              | A5            |

## 16. VIEW: PROCESS SETUP

The selection of the variables and sample rates for the process list are set-up in the "Process Setup" dialog box. The box opens with the default selection for each hose in the list boxes on the right. All the variables that can be sampled are in the left list box. To change an entry, click on the variable name in the right boxes labeled "Current Process List Hose A/B." The text will highlight and the "< -Remove" button will activate. Click on the "< -Remove" button to delete the selected variable from the list. To select another variable, click on the variable name in the left "Available Variables" box. The name will highlight and the "Add to ->" button will activate. Click on the "Add to ->" button to add the selected variable to the list. The limit of the number of variables in the sample list is ten. The minimum default time base is 40 milliseconds. The time-base can be increased by 40 millisecond increments by clicking on the "A/B Timebase" boxes and pressing the up and down arrow-keys. These selections are sent and stored in the dispenser controller. This set-up should be done before the fill and not during the fill. The selection goes to the default list when the dispenser power is cycled.

The screenshot displays the 'Form Process' dialog box, which is used for configuring the process setup. It features a title bar with 'Form Process' and standard window controls. Below the title bar is an 'Exit' button. The main area is divided into several sections:

- Available Variables:** A list box on the left containing 28 variables: Astatus, Aawait, Amass, Apressure, Apreslow, Aflow, Atemp, Apres\_stored, Atemp\_stored, Apmax, Apmax\_calc, Atankpress, Aflow\_max, Apres\_test, Aresist, Apres\_mem, Aresist\_ave, Aflags, Acontrol\_bits, Apchange, Aflow\_analog, Aabs\_press, and Amax\_moles. An arrow points from the label 'All Controller Variables' to this list.
- Buttons:** Between the variable lists are two sets of buttons. For each hose, there is an 'Add to A/B' button and a '< -Remove A/B' button.
- Timebase:** Below the buttons are two input fields for 'A Timebase' and 'B Timebase', both currently set to '40 ms'.
- Current Process List:** On the right, there are two list boxes. The top one is titled 'Current Process List: Hose A' and contains: Amass, Apressure, Aflow, Atemp, Atankpress, Aflags, Aaccount\_1, Aaccount\_2, Aaccount\_3, and Aaccount\_4. An arrow points from the label 'Variables Sampled by the Controller' to this list. The bottom list box is titled 'Current Process List: Hose B' and contains: Bmass, Bpressure, Bflow, Btemp, Btankpress, Bflags, Baccount\_1, Baccount\_2, Baccount\_3, and Baccount\_4.

## 17. VIEW: TOTALIZERS

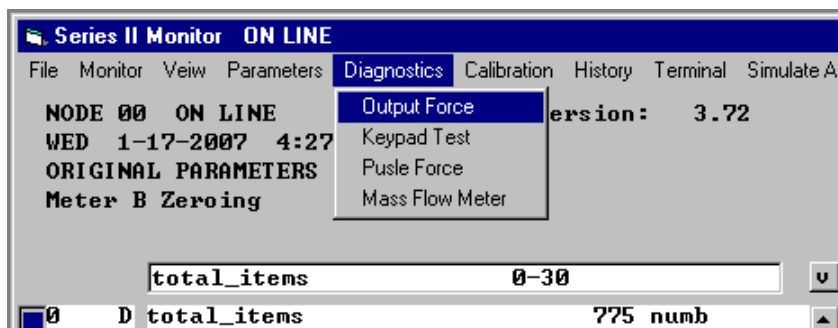
The totalizer panel lists the dispenser's totalizer values for both A and B hoses. The same totalizers that can be viewed on the dispenser LCD display via the dispenser keypad. Clicking on the unit box can change the mass units. The units will cycle through grams, pounds, kilograms, EGals, and Eliters. The time and date stamps are the time and date of the most recent fill. The sale totals are displayed in the monetary units shown on the dispenser's LCD display. The log count is the number of hose fills performed by the dispenser in its lifetime.

| Series II Monitor ON LINE                                                      |              |      |
|--------------------------------------------------------------------------------|--------------|------|
| File Monitor View Parameters Diagnostics Calibration History Terminal Simulate |              |      |
| Totalizers                                                                     |              |      |
| Close                                                                          |              |      |
| Alog_count                                                                     | 0            | numb |
| Atime_stamp                                                                    | 12:00:00 AM  | time |
| Adate_stamp                                                                    | SUN 0-0-2000 | date |
| Atotal_sale_tier1                                                              | 0.00         | \$   |
| Atotal_mass_tier1                                                              | 0.000        | EGal |
| Atotal_sale_tier2                                                              | 0.00         | \$   |
| Atotal_mass_tier2                                                              | 0.000        | EGal |
|                                                                                |              |      |
| Blog_count                                                                     | 0            | numb |
| Btime_stamp                                                                    | 12:00:00 AM  | time |
| Bdate_stamp                                                                    | SUN 0-0-2000 | date |
| Btotal_sale_tier1                                                              | 0.00         | \$   |
| Btotal_mass_tier1                                                              | 0.000        | EGal |
| Btotal_sale_tier2                                                              | 0.00         | \$   |
| Btotal_mass_tier2                                                              | 0.000        | EGal |

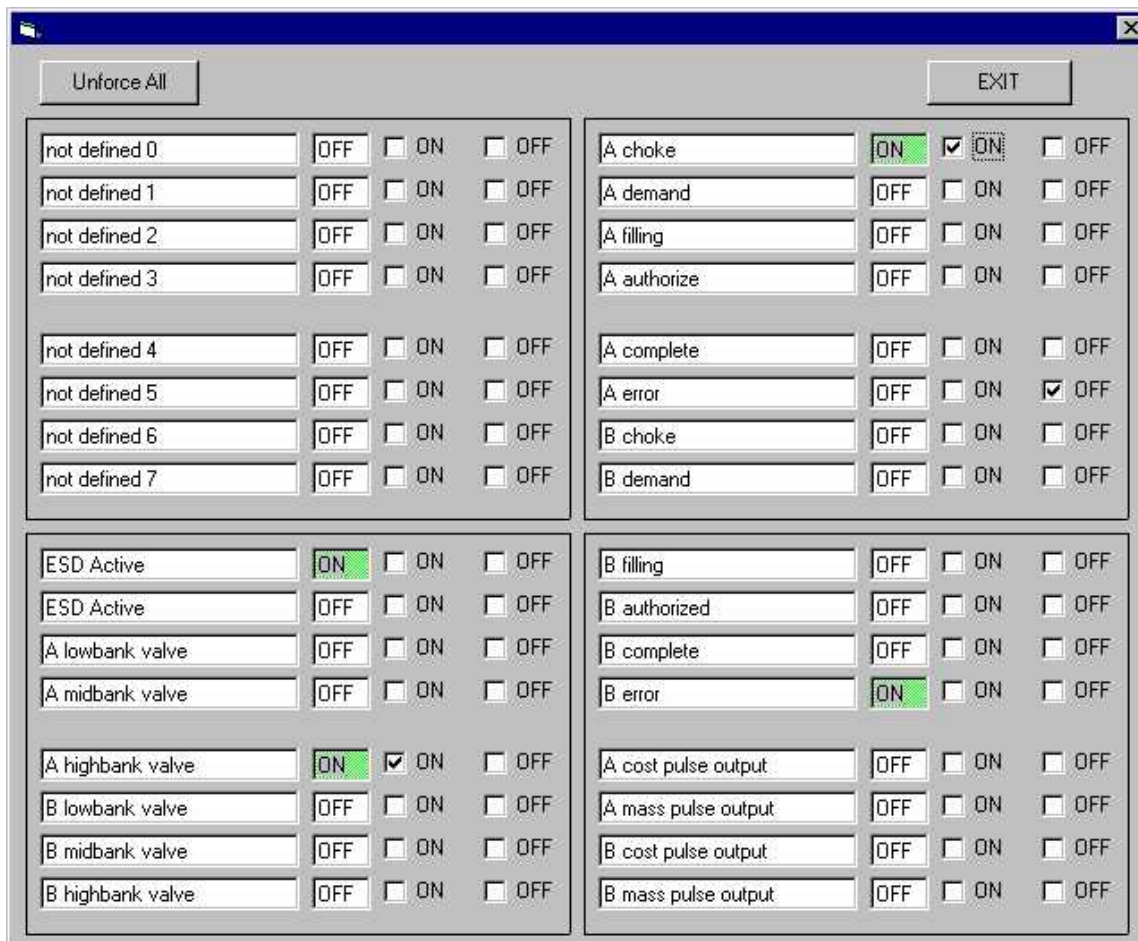
Click to  
Change  
Units

## 18. DIAGNOSTICS, OUTPUT FORCE

The Output Force panel is used to diagnose and test the hardware output functions of the dispenser controller. Click on “Diagnostics” main menu item and then “Output Force” sub menu item to open the panel. The DIP switch SW1-1 must be up and “Variables” must be unlocked to enable the panel.



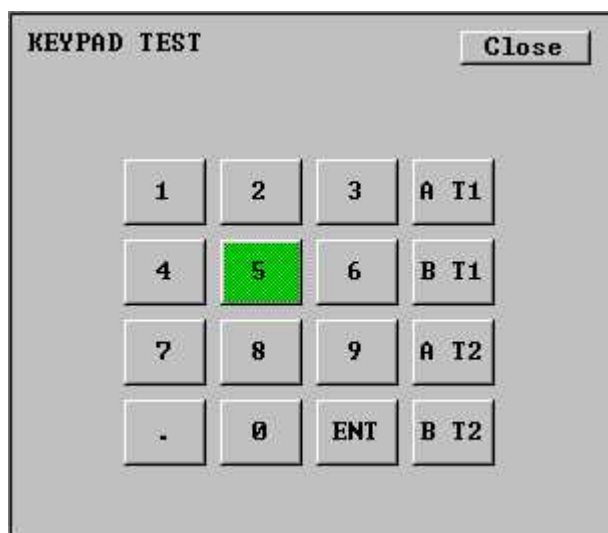
Clicking the “ON” check box will force an output on. The example below shows the “A highbank valve” and “A choke” forced on. The “A error” output is forced off with its “OFF” box checked. Clicking on a check box again will remove the force. The “Unforce All” button removes all forces; unchecks all boxes. Outputs with blank check boxes are not



forced and are on or off from the controller logic. The dialog box below shows “ESD Active” and “B error” on without forcing. The forces are automatically removed if the Tool communication stops (goes off line.) Click the “Exit” button or the “X” to close the panel.

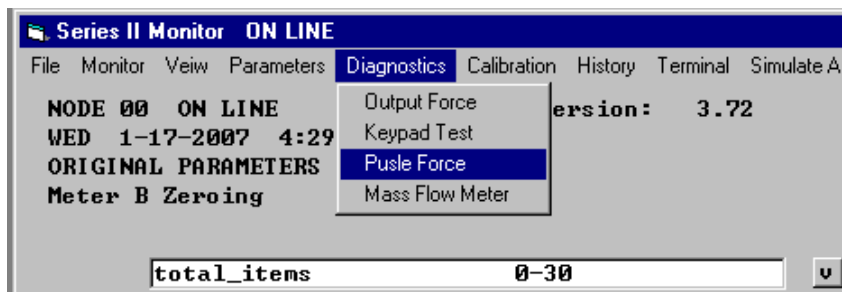
## 19. DIAGNOSTICS, KEYPAD TEST

The keypad test panel is used to test the dispenser’s keypad. Pressing a key on the keypad will highlight the corresponding key on the screen. The example below shows key 5 highlighted green when key 5 is pressed.



## 20. DIAGNOSTICS: PULSE FORCE

The pulse output test panel is used to force pulses out of the mass and sale outputs to the fuel management system. Click on the “Diagnostics” main menu item and the “Pulse Force” submenu item to open the panel.



The variable write protect must be unlocked and the DIPswitch SW1-1 must be in the on position before the panel will operate. The four pulse outputs are:

- 1) A Sale: sale pulses for the A hose. Also called a “penny pulser.”
- 2) A Qty: mass or volume pulses for the A hose.
- 3) B Sale: sale pulses for the B hose. Also called a “penny pulser.”

4) B Qty: mass or volume pulses for the B hose.

The pulse scaling is set by the parameters pulses-per-qty and pulses-per-sale for both hoses. Typically, one pulse equals one unit of the least significant digit on the dispenser's LCD display or the fuel management's printout number. The pulse width is set by the parameters qty-frequency and sale-frequency.

The screenshot shows a window titled "Pulse Output Force Test" with a close button (X) in the top right corner. The window is divided into two main columns: "Pluses Entered" and "Pulses Sent". Under "Pluses Entered", there are four input fields labeled "A Sale", "A Qty.", "B Sale", and "B Qty.", each containing the number "0". Below each input field is a "Clear" button. Under "Pulses Sent", there are four corresponding input fields, each also containing "0", with a "Send" button below each. The window has a light gray background and a standard Windows-style border.

Click on any of the "Pulses Entered" boxes and enter a number. The output will start sending pulses when the Enter-Key is pressed or if the "Send" button is clicked. The "Pulses Sent" box will count up the pluses as they are sent.

This screenshot shows the same window as before, but with annotations. A box labeled "Enter number" has an arrow pointing to the "A Sale" input field, which now contains "1000". A box labeled "Increasing Number as Pulses are Sent Out." has an arrow pointing to the "A Sale" input field. A box labeled "Click to start sending" has an arrow pointing to the "Send" button under "A Sale". The "Pulses Sent" field for "A Sale" now contains "202". The "Clear" and "Send" buttons are still present below each input field.

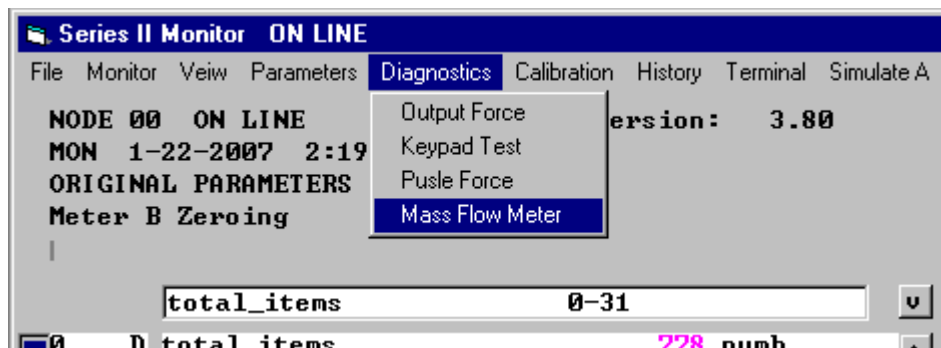
The output will stop pulsing when the "Pulses Sent" amount equals the "Pulses Entered" amount. To start the output pulsing again, click on the "Clear" button and enter another number. The "Clear" button will reset the number to zero.

This screenshot shows the window after the "Clear" button has been clicked. The "A Sale" input field now contains "1000" and the "Pulses Sent" field for "A Sale" also contains "1000". The "Clear" and "Send" buttons are still present below each input field. The other input fields and buttons remain unchanged from the previous state.

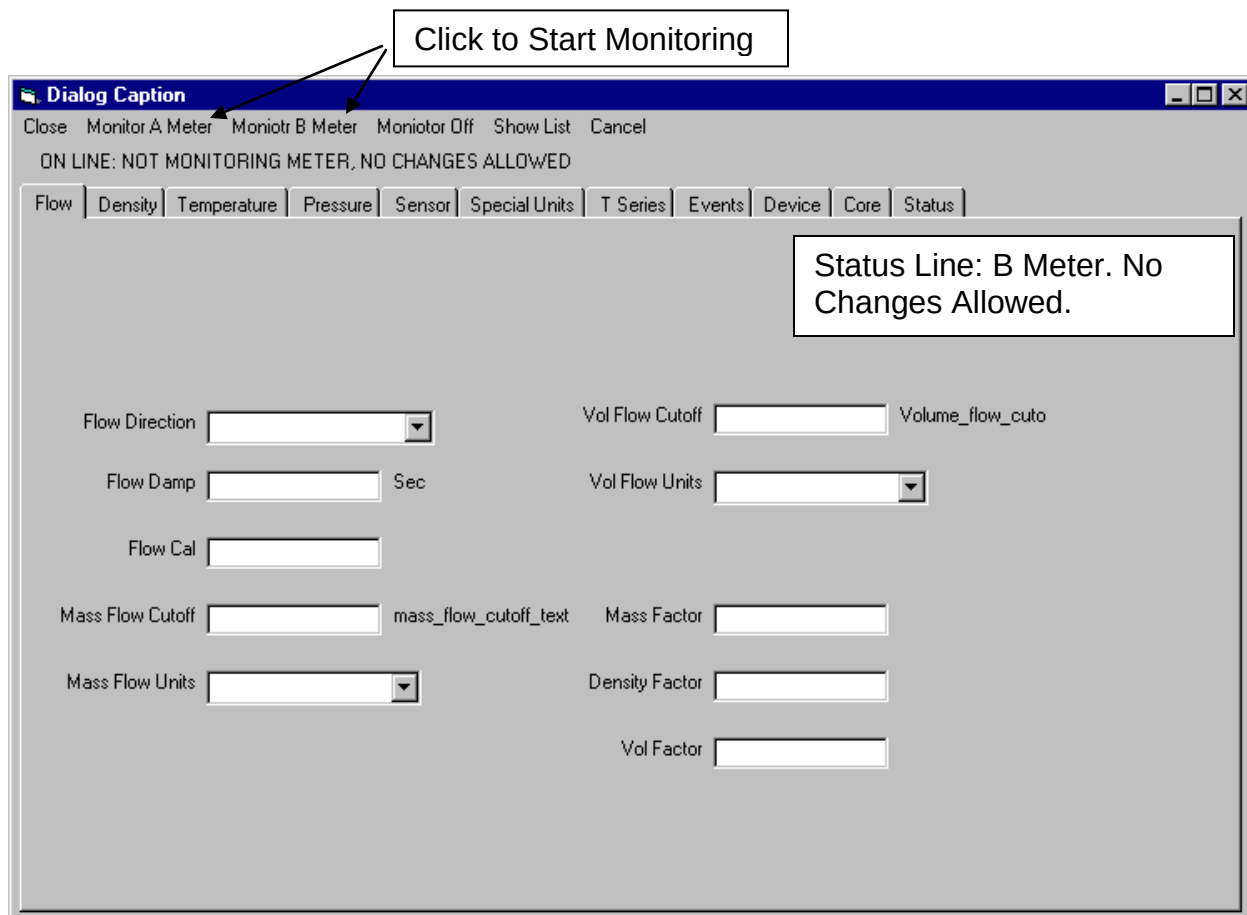
Close the Pulse Force panel by clicking on the "X" box.

## 21. DIAGNOSTICS: MASS FLOW METER

The Mass Flow Meter menu brings up a panel to access the parameters in the MicroMotion mass flow meters in dispensers operating with rev 3.80 firmware or greater. Meter parameter values can be viewed and edited. Operational variables and status bits are viewable for diagnostic purposes. The tool must be “ON LINE” as shown below to monitor a meter. To open the panel, click on the “Mass Flow Meter” submenu.



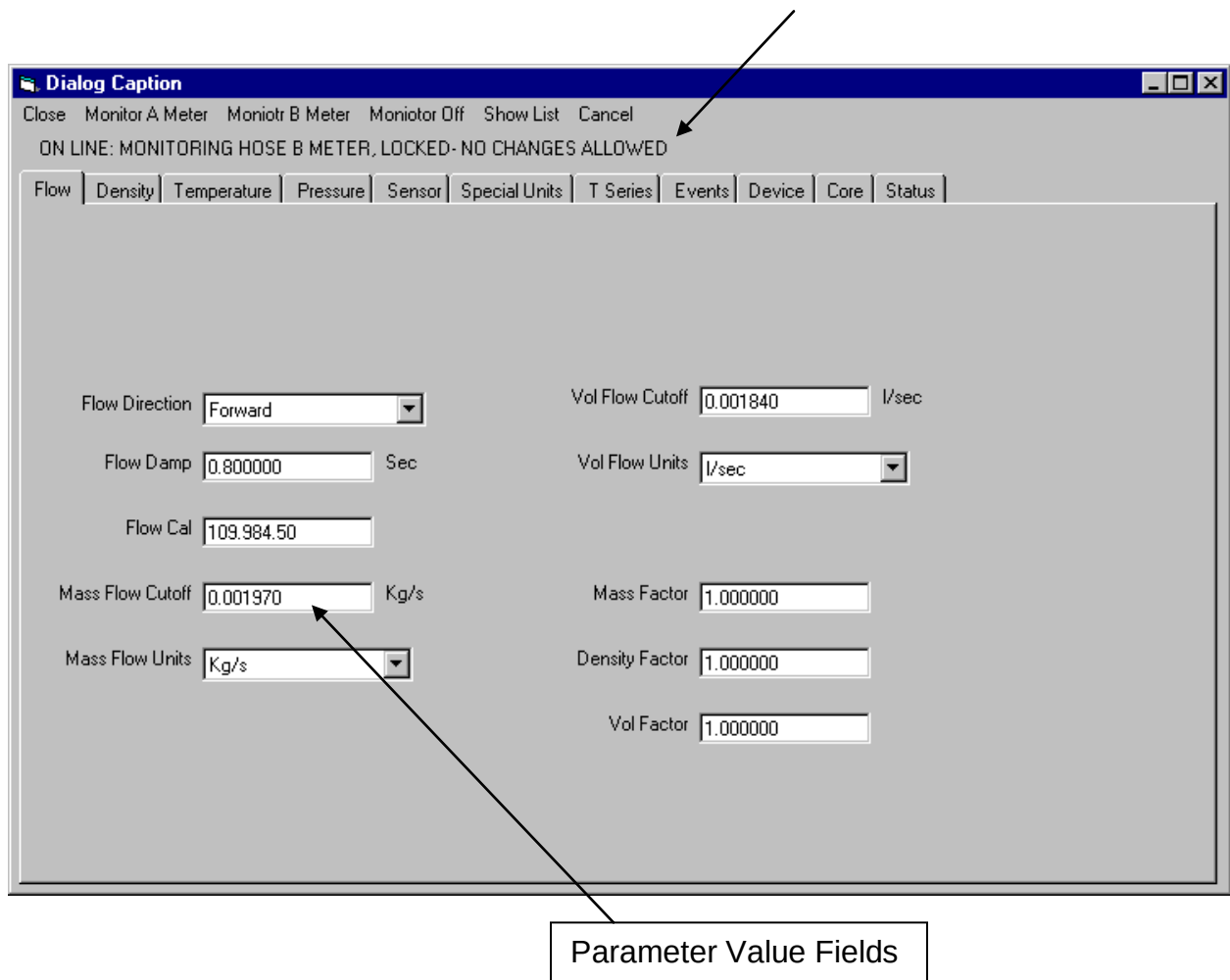
The panel shown below the meter’s parameters organized under categories with a tab panel for each. The fields are blank when not monitoring a meter. Click on “Monitor A Meter” menu item to load the A hose meter values. Click on “Monitor B Meter” menu item to load the B hose meter values. Click on “Monitor Off” to stop monitoring.



The panel below shows the values retrieved from the B meter through the dispenser control. The values are continuously updated. These parameter values are write



protected just as the dispenser parameters are by the same unlock passwords. The status line shows the parameter write is locked. Any value entries in the fields are ignored.



If a meter value is not retrieved by the dispenser control system, the field will show a single tilde character "~".

The panel below shows a value being edited will be highlighted yellow. The status line states the parameter value write protect has been unlocked. The new value will stay highlighted until it is written to the meter or aborted. Pressing the enter key will write the new value to the meter and log the change on the audit trail. Pressing the escape key

will abort the change and return the old value. Changes will also be aborted if the monitoring is stopped or the panel is closed. Numbers, the minus sign, and the decimal point must be entered. Any other characters entered are invalid and will be automatically aborted when the enter key is pressed.

Status Line: Unlocked.

Flow Direction: Forward

Flow Damp: 0.800000 Sec

Flow Cal: 109.984.50

Mass Flow Cutoff: 0.00182 Kg/s

Mass Flow Units: Kg/s

Vol Flow Cutoff: 0.001840 l/sec

Vol Flow Units: l/sec

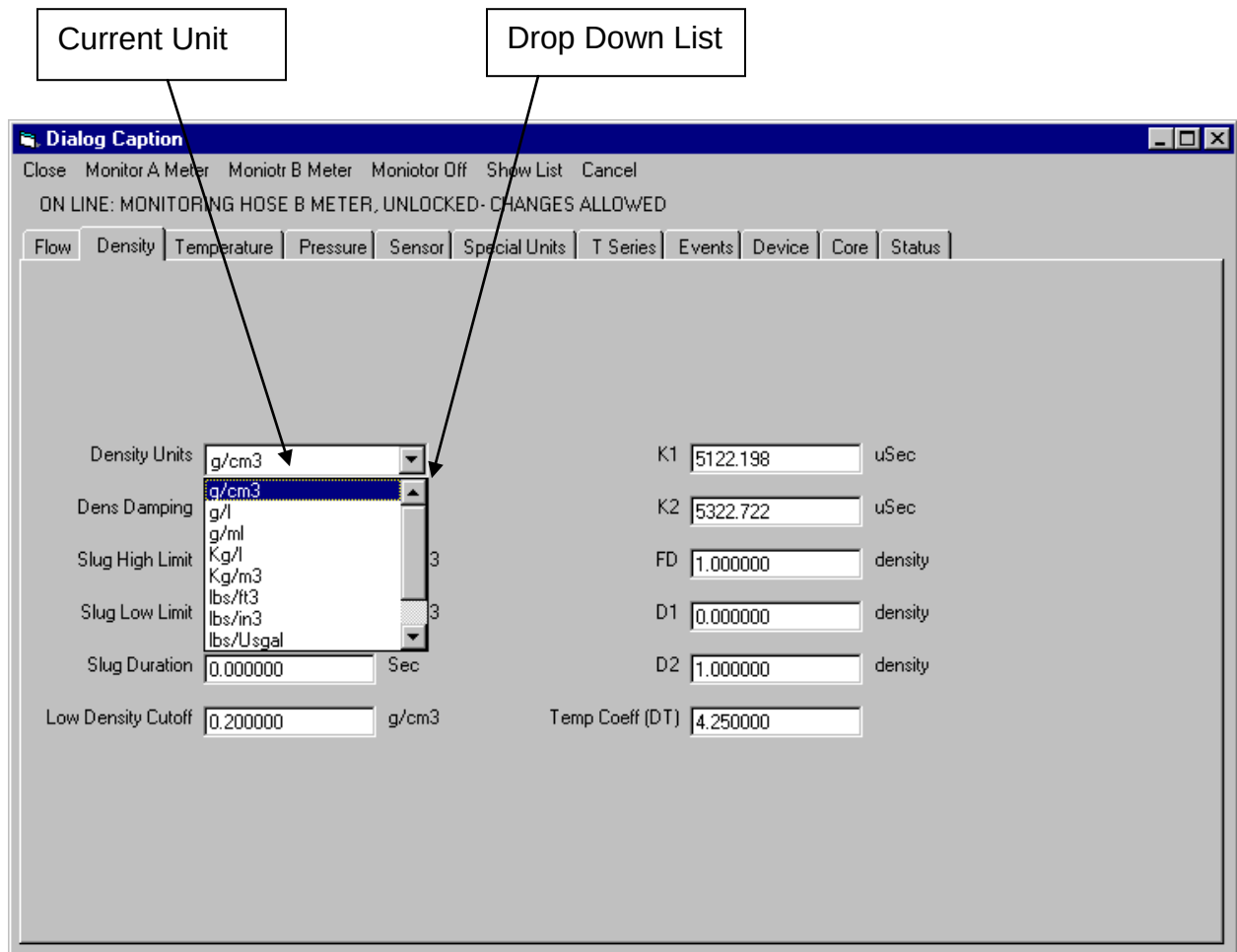
Mass Factor: 1.000000

Density Factor: 1.000000

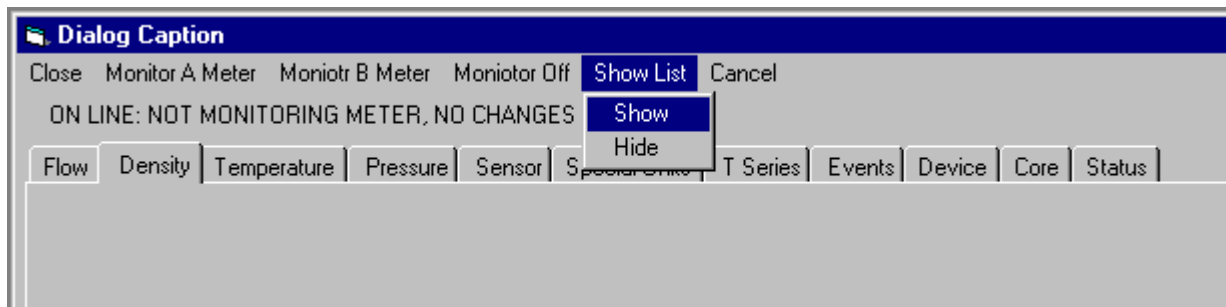
Vol Factor: 1.000000

New Value Entered. Highlighted Yellow Until Written to the Meter. Press the enter key to write. Press the escape key to abort.

The panel below shows an example drop down list of density units. The highlighted unit is the current unit shown in the top field box. Clicking on another unit in the list changes the units in the top field box. Like the other number fields, the drop down list field will highlight yellow when it is changed. Pressing the enter key will write the change. Pressing the escape key will abort the change and return the original units.



The last feature of the meter monitor is the comprehensive list of all the meter parameters and variables. Click on the main menu item "Show List" and the submenu item "Show" to bring up this panel. Click on the submenu item "Hide" to get the tab panels back.



The list gives the parameter/variable address number, name, value, and units. The number refers to the ModBuss address. Single address numbers are integers with a value range of 0 to 65536. Larger and floating-point numbers require two address numbers. These address numbers start as odd numbers followed by the next greater even number. Parameter values can not be edited in the list.

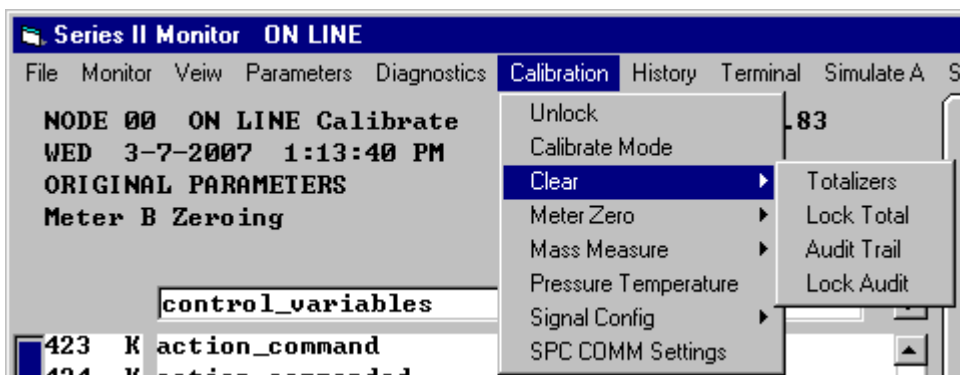
The screenshot shows the "Dialog Caption" window with the "Show List" button clicked. The window displays a list of parameters. Annotations with arrows point to specific columns in the list:

- Address Numbers:** Points to the first column containing address numbers (e.g., 0137, 0138, 0139).
- Names:** Points to the second column containing parameter names (e.g., Event 1 variable assingment, Event 2 variable assingment).
- Single Integer:** Points to the third column containing integer values (e.g., 0, 3, 2).
- Floating Point:** Points to the fourth column containing floating-point values (e.g., 0.000000, 0.200000).
- Units:** Points to the fifth column containing units (e.g., Sec, mA, Hz, g/cm3, deg C).

| Address Numbers | Names                                      | Single Integer | Floating Point | Units |
|-----------------|--------------------------------------------|----------------|----------------|-------|
| 0137            | Event 1 variable assingment                | 0              |                |       |
| 0138            | Event 2 variable assingment                | 3              |                |       |
| 0139            | Event 1 type                               | 2              |                |       |
| 0140            | Event 2 type                               | 2              |                |       |
| 0141 0142       | Slug duration                              | 0.000000       |                | Sec   |
| 0143 0144       | Fixed current primary mA output test       | 0.000000       |                | mA    |
| 0145 0146       | Fixed current secondary mA output test     | 0.000000       |                | mA    |
| 0147 0148       | Fixed Frequency for frequency/ output test | 0.000000       |                | Hz    |
| 0149 0150       | Cutoff for density                         | 0.200000       |                | g/cm3 |
| 0151 0152       | Temperature offset/slope calibration       | 0.000000       |                | deg C |

## 22. CALIBRATION: CLEAR TOTALIZERS AND AUDIT TRAIL

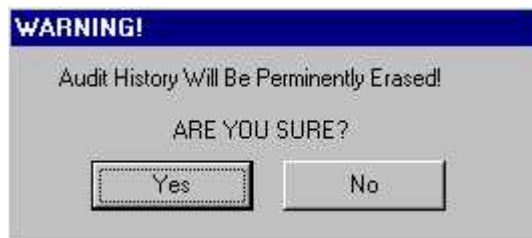
This calibration function is used to initialize the record keeping functions: the non-resettable mass and sale totalizers and parameter change log (audit trail). The clearing functions are performed only in manufacturing test. They are unlocked by their own unique password. These clearing functions can be permanently disabled by the “Lock \_” menu items. Once locked the dispenser controller will not let a clear to be performed again. The clearing functions are locked before a dispenser is shipped from the factory.



After clicking on the “Totalizers” submenu item, a dialog box will pop up for confirmation. Clicking the “Yes” button will start the process of setting the totalizer FLASH memory areas to zero. Click the “No” button will exit without clearing to memory. The confirmation box will close after selecting “Yes” or “No.”

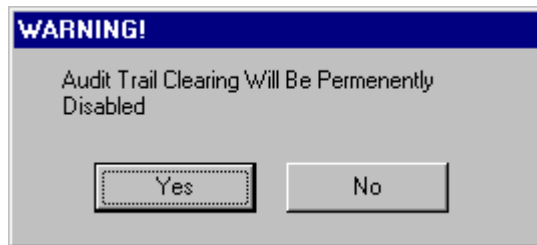
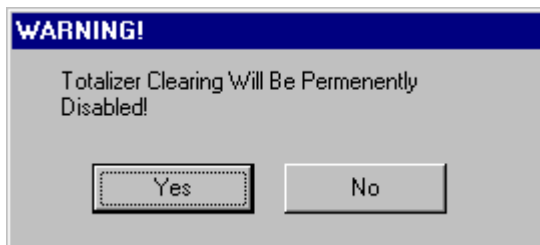


After clicking on the “Audit Trail” submenu item, a dialog box will pop up for confirmation. Clicking the “Yes” button will start the process of setting the audit trail FLASH memory areas to zero. Clicking the “No” button will exit without clearing the memory. The confirmation box will close after selecting “Yes” or “No.”



Clicking on the “Lock Total” submenu item, a dialog box will pop up for confirmation. Clicking the “Yes” button will disable the “Clear/Totalizer” function. Once disabled, the clear totalizer function can not be re-enabled. Clicking the “No” button will cancel. The

“Lock Audit” submenu item functions the same way for the “Clear/Audit Trail” submenu item.

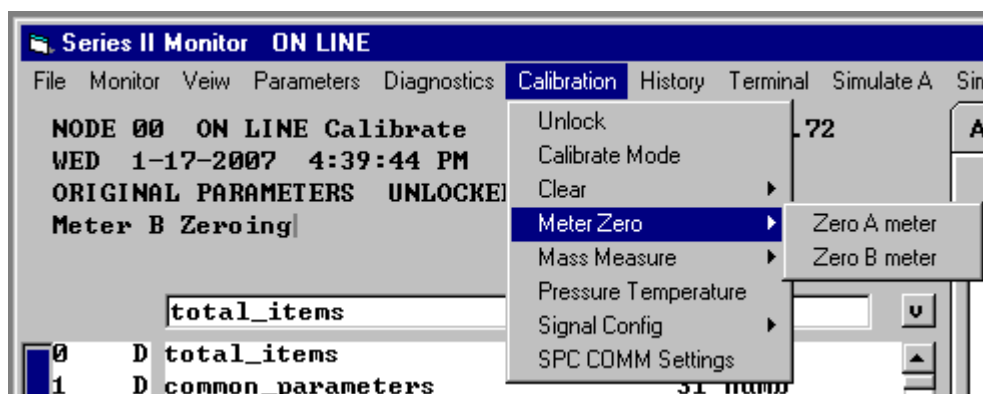


## 23. CALIBRATION: METER ZERO

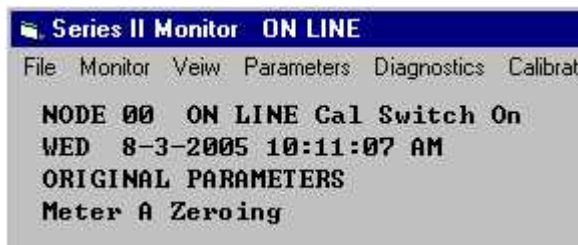
The “Meter Zero” function starts the meter flow zeroing process in the mass flow meter. This process takes ten to twenty seconds. To zero a meter, one must:

- 1) Insure the gas pressure in the meter is up to rated pressure or at least > 2000 PSI.
- 2) Insure there is no flow and will be no flow during the process.

Clicking on the submenu item “Zero A Meter” or “Zero B Meter” will start the process.

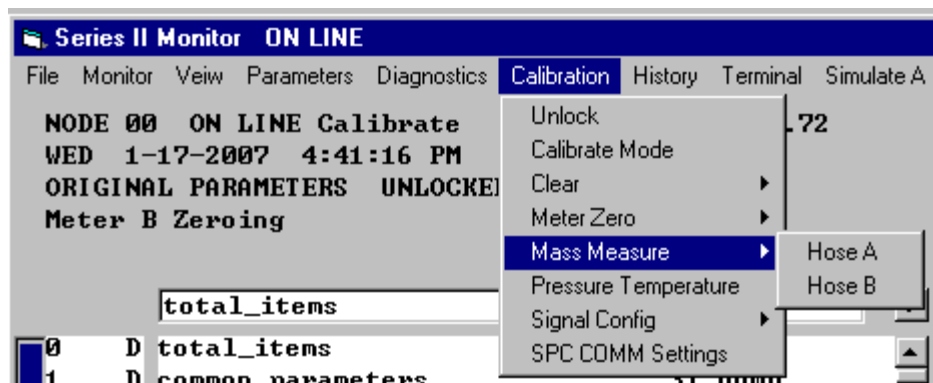


The fourth status line will indicate a meter is busy zeroing. The status line will indicate the process is complete when it goes blank. The dispenser LCD display will indicate an “E10” in the pressure digits.

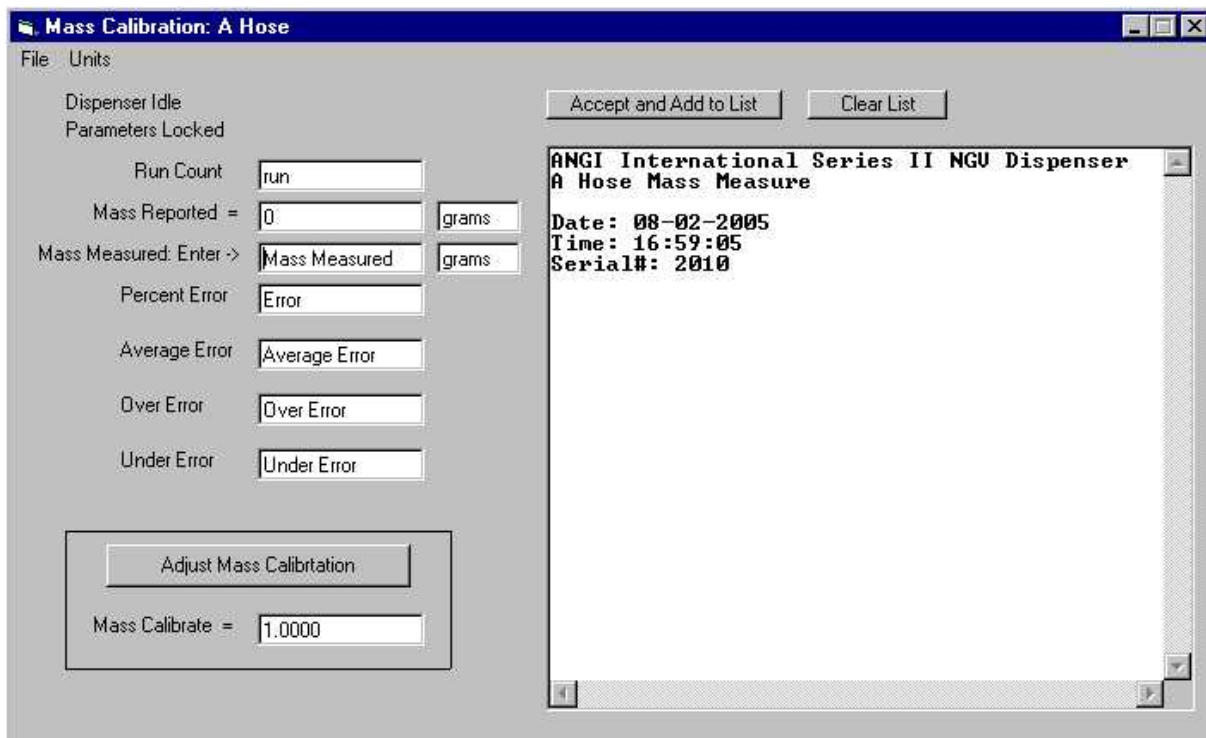


## 24. CALIBRATION: MASS MEASURE

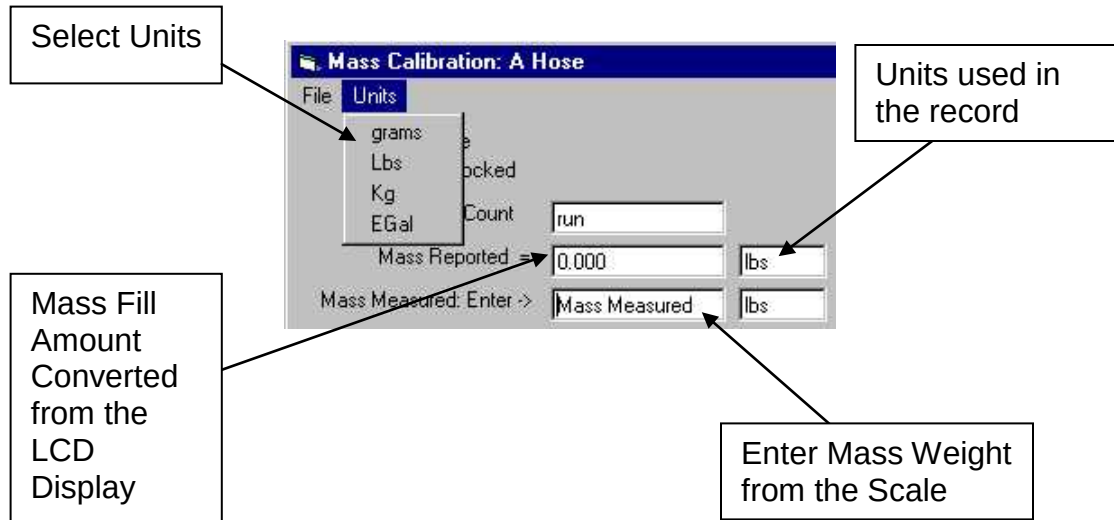
The “Mass Measure” submenu item brings up a panel that is used to record the results of a weights-and-measures test. Click on “Hose A” or “Hose B” to open the panel for that respective hose.



The results of a test tank fill are recorded in the text box on the right. The contents of this box can be saved to disk under the “File” main menu item “Save As” submenu on the panel. It will be saved as a (\*.txt) text file. The header states the hose, date, time, and dispenser serial number automatically. The data and time come from the clock on the computer and not from the clock in the dispenser controller.



Before performing a fill, select the units under the main menu item “Units.” These are the mass units used in this panel. The units that are used on the dispenser’s LCD display will be converted to the units selected for the panel.



For example: if the mass unit on the LCD display is in EGals and the unit selected in the test panel is pounds, then the value on the LCD display will be converted to pounds in the “Mass Reported” field. In a weights-and-measures test, the dispenser hose is connected to a test tank on a weight scale. The units used in the panel should be the units used on the scale. A test starts with zeroing the scale. Next, the tank is filled. When the fill is complete, the mass values from the dispenser controller will appear in the “Mass Reported” field. The reading from the weight scale should be manually entered in the “Mass Measured” field. The values for over and under error will automatically be calculated. Next click on the “Accept and Add to List” button. The field values will be recorded in the text box. The “Run Count” field will increment with every fill. A file of the results can be saved to disk once enough samples are taken. The “Average Error” field indicates the accuracy of the dispenser over all the accepted and recorded measurements. The “Adjust Mass Calibration” button is used to adjust the dispenser’s mass measurement calibration parameter based on the “Average Error” field. Clicking on this button will change that parameter. Save the parameter to memory in the main panel. If the “Average Error” result is acceptable, the calibration can be left, as set (does not require adjustment).

## 25. CALIBRATION: PRESSURE TEMPERATURE

This panel is a step-by-step procedure function for calibrating the hose pressure and temperature measurements. The fill parameter write protect must be unlocked for this panel to work. DIP switch SW1-1 does not need to be in the on position. Calibration can be performed with the control enclosure sealed. The pressure calibration goes as follows:

- 1) Select the preferred pressure units. Click on the unit text to select the units.
- 2) Have zero pressure in the hoses. Empty the hose if necessary.



- 3) Click on the “Write” button for the hose being calibrated. The number in the left text box, “pressure analog zero,” will be written in the right text box.
- 4) Save parameters to memory by clicking on the “Save” button or “Save to Memory” in the main panel.
- 5) Cycle the handle to enable a hose charge. Fill the hose to rated pressure, if possible, or at least the current storage pressure.
- 6) Enter the analog pressure gauge reading in the text box.
- 7) Click on the “Write” button for the hose being calibrated. The text box below should match the gauge pressure value. The new “pressure range” parameter value will be automatically calculated.
- 8) To finish, save the parameters to memory by clicking on the “Save” button.

The screenshot displays the 'Signal Calibration' software window, which is divided into two main sections: 'Pressure Calibrate' and 'Temperature Calibration'.

**Pressure Calibrate Section:**

- Step1: Choose units:** MPa, Bar, **PSI** (highlighted in green).
- Step2: Apply zero pressure to hoses:** A text box contains the value '2'.
- Step3: Write analog zero value (below):** Includes 'Write A' and 'Write B' buttons. Below are input fields for 'A pressure analog zero' (0, 180) and 'B pressure analog zero' (0, 181).
- Step4: Charge hose to full pressure**
- Step5: Enter gage pressure reading (below):** Includes 'A Hose gage pressure' (0.00) and 'B Hose gage pressure' (0.00).
- Step6: Write full pressure value:** Includes 'Write A' and 'Write B' buttons. Below are input fields for 'A Hose control pressure' (0, PSI) and 'B Hose control pressure' (0, PSI).
- Step7: Save parameters to memory:** Includes 'A pressure range' (52000) and 'B pressure range' (52000), with a 'Save' button.

**Temperature Calibration Section:**

- Step1: Chose Units:** K, C, **F** (highlighted in green).
- Step2: Install 100 Ohm resistor TB12**
- Step3: Hit write dac freeze value:** Includes a 'Write' button. Below are input fields for 'Temperature analog input' (1023) and 'DAC at freeze parameter' (A: 441, B: 441).
- Step4: Remove 100 Ohm resistor**
- Step5: Reinstall temperature probe**
- Step6: Enter current temperature:** Includes a text box with '0.0' and a unit selector 'F'.
- Step7: Hit write current temperature:** Includes a 'Write' button. Below are input fields for 'Actual Temperature' (0.0) and 'Temperature reading' (A: 130.0, B: 130.0, both with 'F' units).

Temperature calibration requires a 100.0-ohm resistor to replace the temperature sensor for simulating 32 degrees Fahrenheit. The sensor wires are removed from TB12 terminals 90 and 91 and the resistor is wired across these terminals. A 110.7-ohm resistor can be used to simulate 76 degrees F if the actual temperature is below 70 F.

The temperature probe calibration goes as follows:

- 1) Select the preferred temperature units. Click on the unit text to select the units.
- 2) Unwire or unplug the temperature sensor. Install the 100.0-ohm resistor.
- 3) Click the “Write” button. The value in the left box should be written to the A and B boxes on the right. Click the “Save” button.
- 4) Remove the 100.0-ohm resistor.
- 5) Plug in the temperature sensor or install a 110.7-ohm resistor.
- 6) Enter the current temperature in the text box. If using the 110.7-ohm resistor, enter in the number 76 (76.0 degrees F.)
- 7) Click on the “Write” button. The actual temperature in the left box should be reflected in the right A and B boxes. Click the “Write” button.

- 8) Click the “Save” button.
- 9) Remove the 110.7-ohm resistor and reconnect the temperature probe wires.

## 26. CALIBRATION: SIGNAL CONFIGURATION

The signal configuration panel breaks down the functions of the configuration parameter. Each of the 32 bits in the parameter is a switch that toggles a function on or off: “YES” for on and “NO” for off. Click on the box and press the “Y” key for yes or the “N” key for no. The cursor keys can be used to select a bit as well.

Signal Configuration: Hose A

Exit Hose

To edit press "Y" or "1" key to enable, "N" or "0" to disable

Parameter is Locked: Change is not allowed.

|                         |     |                         |     |
|-------------------------|-----|-------------------------|-----|
| Ause_meter_mass_flow    | YES | Ause_pmax_fixed         | NO  |
| Ause_meter_vol_flow     | NO  | Ause_price_decimal      | NO  |
| Ause_analog_mass_flow   | NO  | Aspc_com_enable         | NO  |
| Ause_meter_vol_total    | NO  | Ause_ored_authorize     | NO  |
| Ause_meter_mass_total   | YES | Ause_redundant_pressure | NO  |
| Ause_pulse_mass_counter | NO  | Ause_early_check        | NO  |
| Ause_meter_temperature  | NO  | Ause_resist_ave         | YES |
| Ause_analog_temperature | YES | Ause_comm_authorize     | NO  |
| Ause_right_handle       | NO  | Aenable_sim_cycle       | NO  |
| Ause_left_handle        | YES | Adisable_low_flow       | NO  |
| Ause_dual_display       | NO  | Aspare26                | NO  |
| Aspare11                | NO  | Aspc_test               | NO  |
| Ause_auth1_input        | NO  | Ause_totalizer          | NO  |
| Ause_auth2_input        | NO  | Ause_remote_valves      | YES |
| Ause_auth3_input        | NO  | Aspare30                | NO  |
| Ause_tier_input         | NO  | Aspare31                | NO  |

DIP switch SW1-1 must be on and the parameters unlocked to make any changes. There is a separate panel for each hose. Open the panel by clicking on the “Calibration” main menu item, “Signal Config” submenu item, then “A Hose” or “B Hose.”

Series II Monitor ON LINE

File Monitor View Parameters Diagnostics Calibration History Terminal Simulate A

NODE 00 ON LINE Calibrate

WED 1-17-2007 4:43:08 PM

ORIGINAL PARAMETERS UNLOCKED

Meter B Zeroing

total\_items

0 D total\_items

1 D common\_parameters

Calibration menu options:

- Unlock
- Calibrate Mode
- Clear
- Meter Zero
- Mass Measure
- Pressure Temperature
- Signal Config
- SPC COMM Settings

Hose A

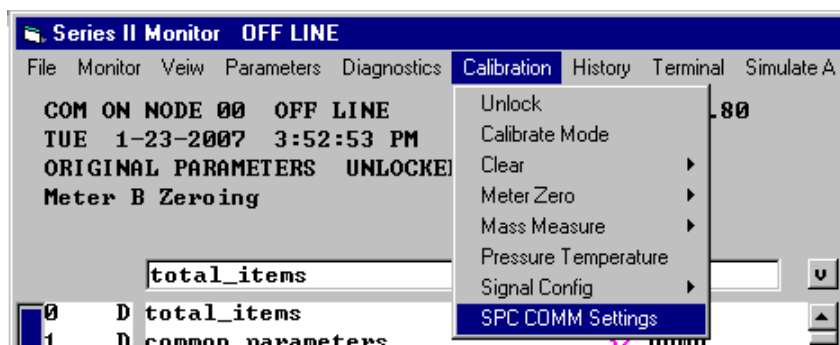
Hose B

The configuration functions are:

- 1) Use-meter-mass-flow: The mass flow variable value in the controller is read from the mass flow meter's mass flow register through the serial com-link. Bits 2 and 3 must be off to use this function.
- 2) Use-meter-vol-flow: The mass flow variable value in the controller is read from the mass flow meter's volume flow register through the serial com-link. Bits 1 and 3 must be off to use this function.
- 3) Use-analog-mass-flow: The mass flow variable value in the controller is read from a 4-20 Ma analog signal input. Bits 1 and 2 must be off to use this function.
- 4) Use-meter-vol-total: The mass variable value in the controller is read from the resetable volume totalizer register through the serial com-link. Bits 5 and 6 must be off to use this function.
- 5) Use-meter-mass-total: The mass variable value in the controller is read from the resetable mass totalizer register through the serial com-link. Bits 4 and 6 must be off to use this function.
- 6) Use-pulse-mass-counter: The mass variable value in the controller is read from a pulse counter tied to a hardwired pulse input. Bits 4 and 5 must be off to use this function.
- 7) Use-meter-temperature: The temperature variable value is read from the temperature register in the mass flow meter through the serial com-link. Bit 8 must be off.
- 8) Use-analog-temperature: The temperature variable value is derived from the analog temperature probe. Bit 7 must be off.
- 9) Use-right-handle: The handle or on/off switch input is tied to the right handle input on TB10. The right handle input of one hose will lockout the use of the other hose tied to its right handle input. Only one hose can operate at a time. This is used when two hoses share one meter and valve stack. Simultaneous hose use is possible if the handles are wired to the opposite input, i.e. the other hose wired to the left handle input. ON will enable the input. OFF will disable the input.
- 10) Use-left-handle: The handle or on/off switch input is tied to the left handle input on TB10. The same rules apply as the right handle input.
- 11) Use-dual-display: On when the dispenser has two LCD displays per hose and Off when there is one display per hose.
- 12) Spare23: Not used.
- 13) Use-auth1-input: Enables the hardwired authorize input #1.
- 14) Use-auth2-input: Enables the hardwired authorize input #2.
- 15) Use-auth3-input: Enables the hardwired authorize input #3. When an "Authorize Input" is enabled by the configuration, the authorization will pass through if the input is on. The authorization will be stopped if the input is off. If the input is not enabled by the configuration, the authorization test skips that input. If none of the hardwire inputs are enabled, the dispenser is always authorized.
- 16) Use-tier-input: Enables the tier hardwire input to select between the two price tiers. If not enabled, the price tier is selected from the keypad.
- 17) Use-pmax-fixed: The final fill pressure target is a fixed value parameter. The temperature compensated value is not used. Off uses the temp-comp value.
- 18) Use-price-decimal: Enables the "price\_decimal" parameter to control the placement of the decimal point in the LCD price display. The decimal point will be fixed. Off allows the keypad entry to place the decimal point.

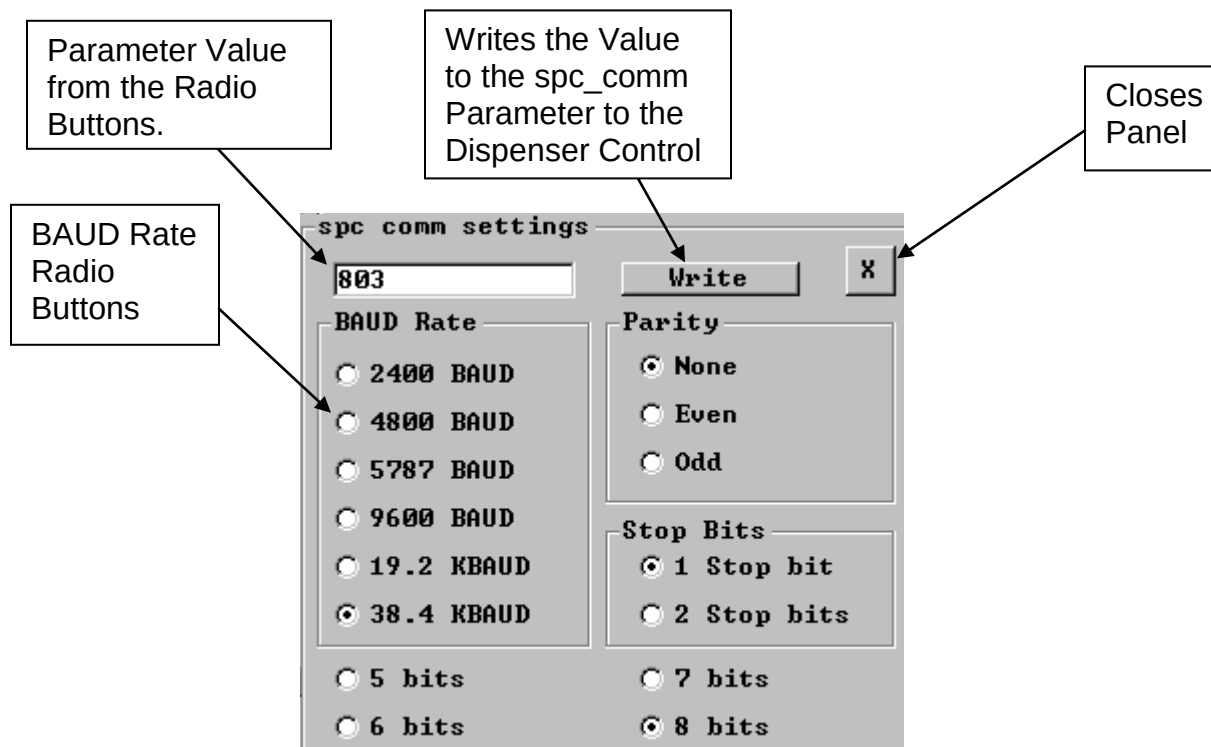
- 19) Spc-COM-enable: Turns on the Gilbarco two-wire communication protocol for COM 5 TB6 RS485 port. This function takes over price entry, tier selection, and authorize functions. It delivers fill mass and money total data. Off reverts to the ANGI monitoring Tool protocol.
- 20) Use-ored-authorize: Enables the hardware authorize digital inputs to be used in parallel with comm-link authorizing. Works with Gilbarco and ANGI protocols.
- 21) Use-redundant-pressure: Enables a pressure difference trip error. A second pressure sensor is installed in the dispenser for a redundant pressure reading. A fill stop error will occur if the second pressure reading differs from the main pressure reading by a set percentage.
- 22) Use-early-check: Enables a high-bank hose check stop based on an amount mass delivered. The stop will occur when the mass delivered is more than what fills a hose. This is used to check for an open nozzle valve at the start of a fill. If this is not enabled, the hose check will stop after a two-second time period.
- 23) Use-resist-average: Enables an algorithm that calculates the hose resistance continuously during sonic flow and produces an accumulated average value during the first bank fill. If not enabled, the hose resistance is calculated once at the start of the first fill.
- 24) Use-comm-authorize: Enables authorization through the serial communication links. Writing a specific set of action commands to the action control variable can authorize and de-authorize a dispenser hose. ANGI protocol only.
- 25) Enable-sim-cycle: Turns on a demo routine for show purposes.
- 26) Disable-low-flow: Turns off low flow threshold bank shift. Bank shift on pressure target or time-out.
- 27) Spare: Not implemented.
- 28) SPC-test: Diagnostic test of the Gilbarco communication link.
- 29) Use-totalizer: Enables the use of an electromechanical mass totalizer. The "Demand" digital output sends out pulses. One pulse per mass unit.
- 30) Use-remote-valves: Changes the "Filling" digital output to go on and off with the bank valves. Used for operating a local valve when the bank valves are not in the dispenser.

## 27. CALIBRATION: SPC COMM SETTINGS



This panel breaks out the communication settings for the Comm 5 RS485 serial port on TB6. When the panel is opened the current scp\_comm parameter value is displayed and broken out over the radio buttons. New communication settings are selected by clicking on the individual radio buttons. One button each gets highlighted for BAUD rate, parity, number of stop bits, and number of data bits.

The new `spc_comm` parameter value will automatically be created show in the upper left text box. Clicking on the “Write” button will write this parameter value to the `spc_comm` parameter in the dispenser controller. A parameter “Save to Memory” must then be performed. Click on the “X” button to close this panel.



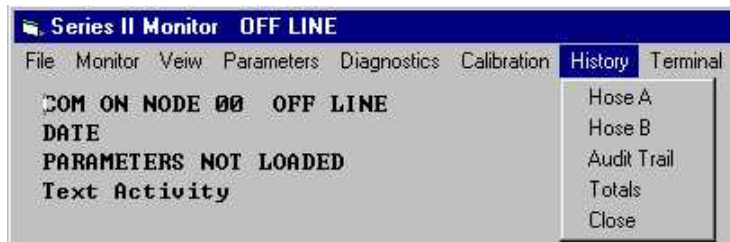
The value shown in this example above is the default setting. It matches the default Comm 0 RS232 port setting. The 5787-BAUD rate is a non-standard rate used by the Gilbarco communication protocol. If the Gilbarco communication protocol is not enabled, the comm 5 port will work with the ANGI Series II protocol.

## 28. HISTORY

The Series II dispenser keeps fill, total, and parameter change records in its FLASH memory. The “History” main menu item has a list that opens a viewing panel for each of these categories:

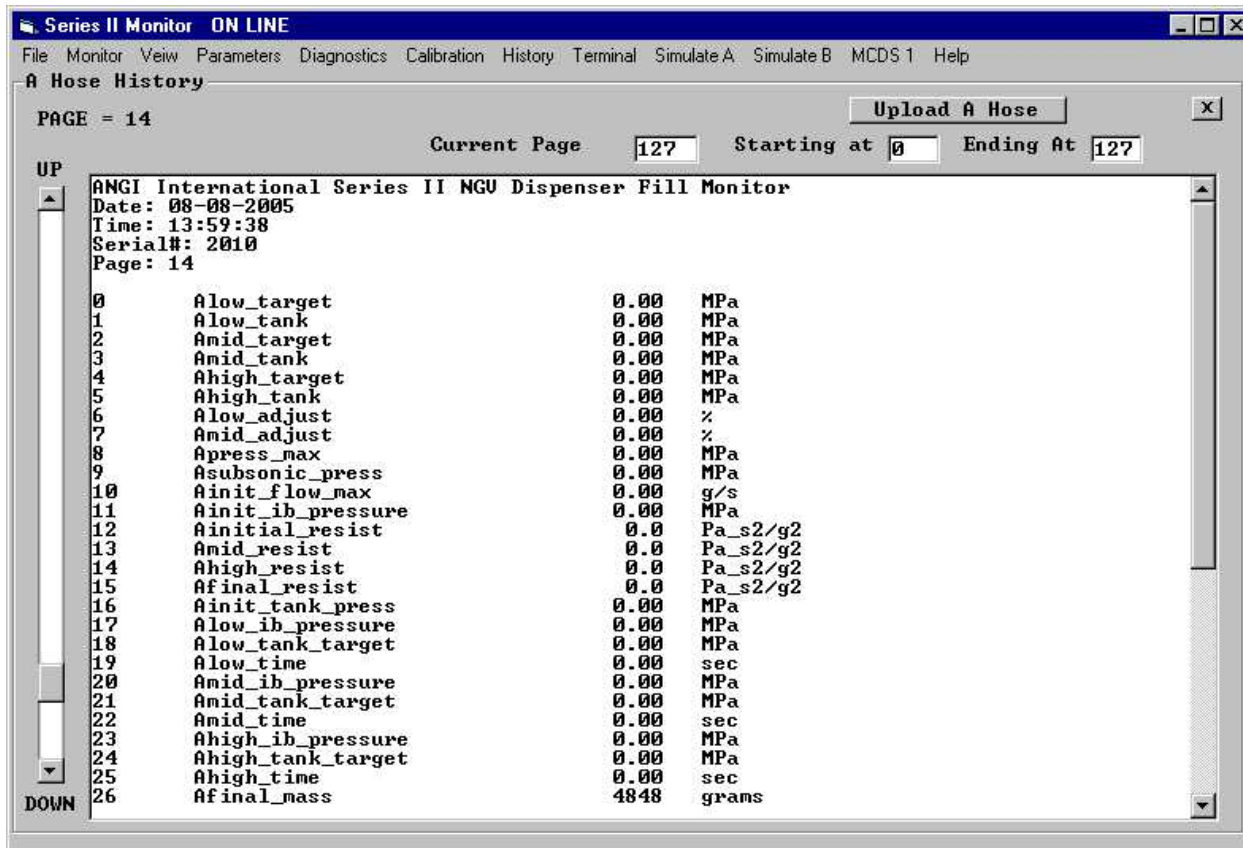
- 1) Hose A / Hose B: A record of variables captured during a fill for showing fill performance. The record contains 128 of the most recent fills for each hose.
- 2) Audit Trail: A record of all of the parameter changes ever made in the dispenser. The list can record 1024 most resent changes including a time-date stamp.
- 3) Totals: A record of the mass, sale, and valve cycle totalizers. The record contains 128 of the most resent fills for each hose.

Each of these records can be downloaded from the dispenser controller. Once downloaded, they can be saved to a text file.



## 29. HISTORY: A HOSE / B HOSE

Below is the A Hose History panel. This list is a copy of the A monitor variables saved to the FLASH memory after a fill is completed or terminated. These copies must be uploaded by clicking on the "Upload A Hose" button. The upload process takes about a minute. Specifying the start and end page boxes can upload a smaller set of pages. Clicking on the vertical scroll bar on the left will page through the last 128 saves. The example below is at page 14. The controller fills the pages up starting at zero and continues to 127. The controller goes back to page zero when the memory is full. The page for the 129<sup>th</sup> most previous fill is overwritten. The most recent page is displayed in the "Current Page" field. The "File" main menu item will save all the pages to a text file. The units shown are always the units used in the controller.



### 30. HISTORY: AUDIT TRAIL

The audit trail panel generates a listing of any or all of the parameters that have been changed over time. The audit trail can store 1024 changes. Changes beyond 1024 will overwrite the oldest change.

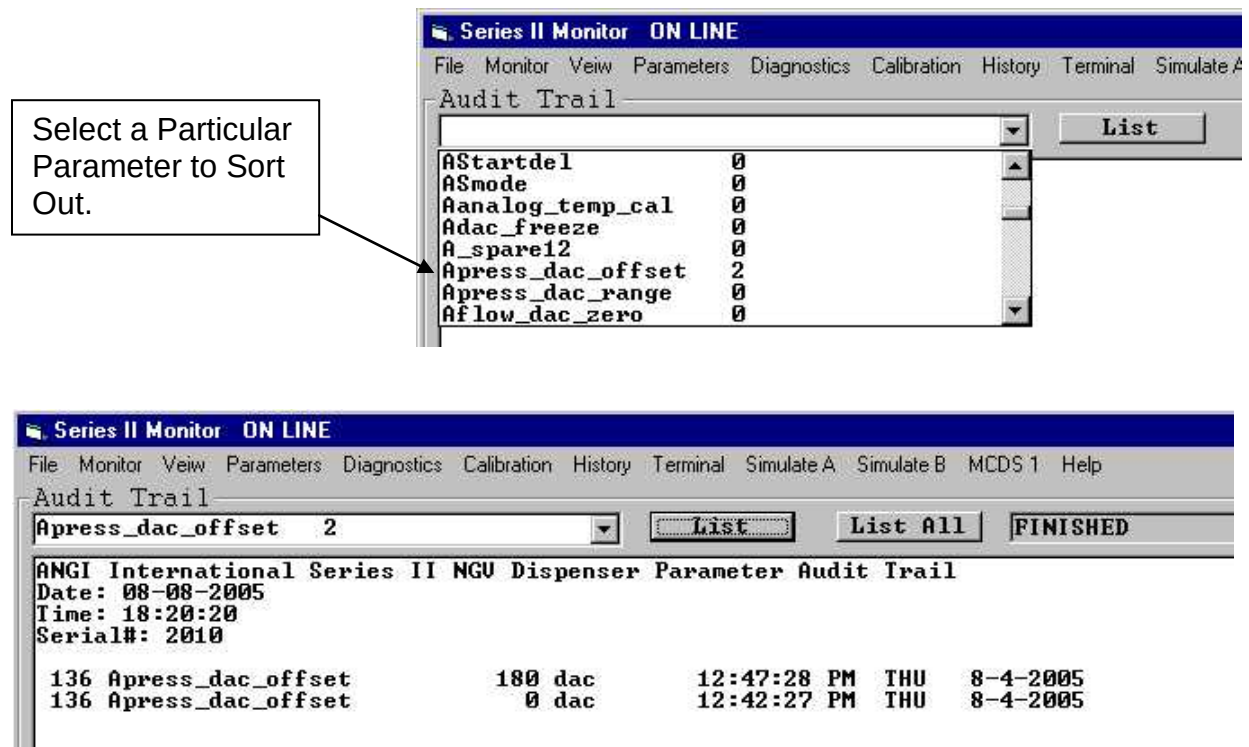
Note: The purpose of the audit trail is to keep a legal record of parameters that affect mass calibration in order to detect fraud. This legal condition covers the remote access ability to calibrate the dispenser without breaking the physical seal and needing a supervising official. The dispenser is electronically "sealed" by a password that unlocks parameter changes only by authorized personnel. Each change lists the parameter number, name, new value, time, and date.

The list is uploaded from the controller by clicking on the “List All” button. The example below is a list all download. The list can be saved to disk under the “File” “Save As” main menu item as a text file.

| count | number | list# | Name             | Value  | Units  | Time        | Date  |
|-------|--------|-------|------------------|--------|--------|-------------|-------|
| 18    | 1      | 32    | Smmfactor        | 0.0000 | g/pls  | 1:24:15 PM  | MON 1 |
| 19    | 4      | 35    | Snw              | 0      | mol/l  | 1:24:15 PM  | MON 1 |
| 2     | 4      | 35    | Snw              | 2      | mol/l  | 1:00:23 PM  | MON 1 |
| 1     | 4      | 35    | Snw              | 1      | mol/l  | 12:59:52 PM | MON 1 |
| 20    | 7      | 38    | Stank_dwell      | 1.01   | sec    | 1:24:15 PM  | MON 1 |
| 42    | 9      | 40    | test_bits        | 0      | numb   | 2:29:06 PM  | WED 1 |
| 41    | 9      | 40    | test_bits        | 255    | numb   | 1:10:56 PM  | WED 1 |
| 21    | 10     | 41    | Smass_unit       | 1      | numb   | 1:24:15 PM  | MON 1 |
| 3     | 10     | 41    | Smass_unit       | 3      | numb   | 1:00:43 PM  | MON 1 |
| 22    | 11     | 42    | Smassconv        | 453.6  | g/unit | 1:24:15 PM  | MON 1 |
| 4     | 11     | 42    | Smassconv        | 2567.4 | g/unit | 1:00:43 PM  | MON 1 |
| 23    | 15     | 46    | pulses_per_sale  | 1000   | ppu    | 1:24:15 PM  | MON 1 |
| 24    | 17     | 48    | sale_frequency   | 25     | Hz     | 1:24:15 PM  | MON 1 |
| 25    | 19     | 50    | tank_size        | 8.000  | feet3  | 1:24:15 PM  | MON 1 |
| 26    | 24     | 55    | time_zone        | -5     | numb   | 1:24:15 PM  | MON 1 |
| 27    | 27     | 58    | Sprice_decimal   | 3      | numb   | 1:24:15 PM  | MON 1 |
| 43    | 35     | 129   | ASlow            | 1.00   | g/s    | 8:44:03 AM  | TUE 1 |
| 13    | 35     | 129   | ASlow            | 0.23   | g/s    | 1:19:14 PM  | MON 1 |
| 9     | 38     | 132   | ASmode           | 4      | numb   | 1:17:55 PM  | MON 1 |
| 7     | 38     | 132   | ASmode           | 2      | numb   | 1:02:25 PM  | MON 1 |
| 10    | 41     | 135   | ASpare12         | 0      | numb   | 1:17:55 PM  | MON 1 |
| 8     | 41     | 135   | ASpare12         | 45     | numb   | 1:02:25 PM  | MON 1 |
| 14    | 50     | 144   | Apress_unit      | 1      | numb   | 1:19:14 PM  | MON 1 |
| 12    | 63     | 157   | Amass_calibrate  | 1.0001 | numb   | 1:18:50 PM  | MON 1 |
| 36    | 65     | 159   | Adelay_adj_limit | 0.00   | MPa    | 1:52:59 PM  | MON 1 |
| 11    | 68     | 162   | Ahose_mass       | 450    | grams  | 1:17:55 PM  | MON 1 |
| 44    | 75     | 310   | BSlow            | 1.00   | g/s    | 8:57:07 AM  | TUE 1 |



The pull down list on the top left is a list of all of the parameters and the number of times they have been changed. Selecting a the parameter in the list will start a sorting process in the controller that tags the selected parameter. Clicking on the “List” button will download only the changes made to the selected parameter. The sorting process may take some time if there is a large number of changes.



### 31. HISTORY: TOTALS

Below is the Totals History list. Like the Fill Results list, the totals for the last 128 fills are recorded in the FLASH memory. The totals are updated at the end of a fill and written to a page. The oldest page is overwritten as new totals are recorded. Both A and B hose totals are contained on a page. Clicking on the "Upload Totals" button will retrieve the total data from the controller. Clicking on the vertical scroll bar will page through the 128 pages. All the pages can be saved to disc as a text fill by clicking on the "File" main menu item then the "Save As" sub menu item.

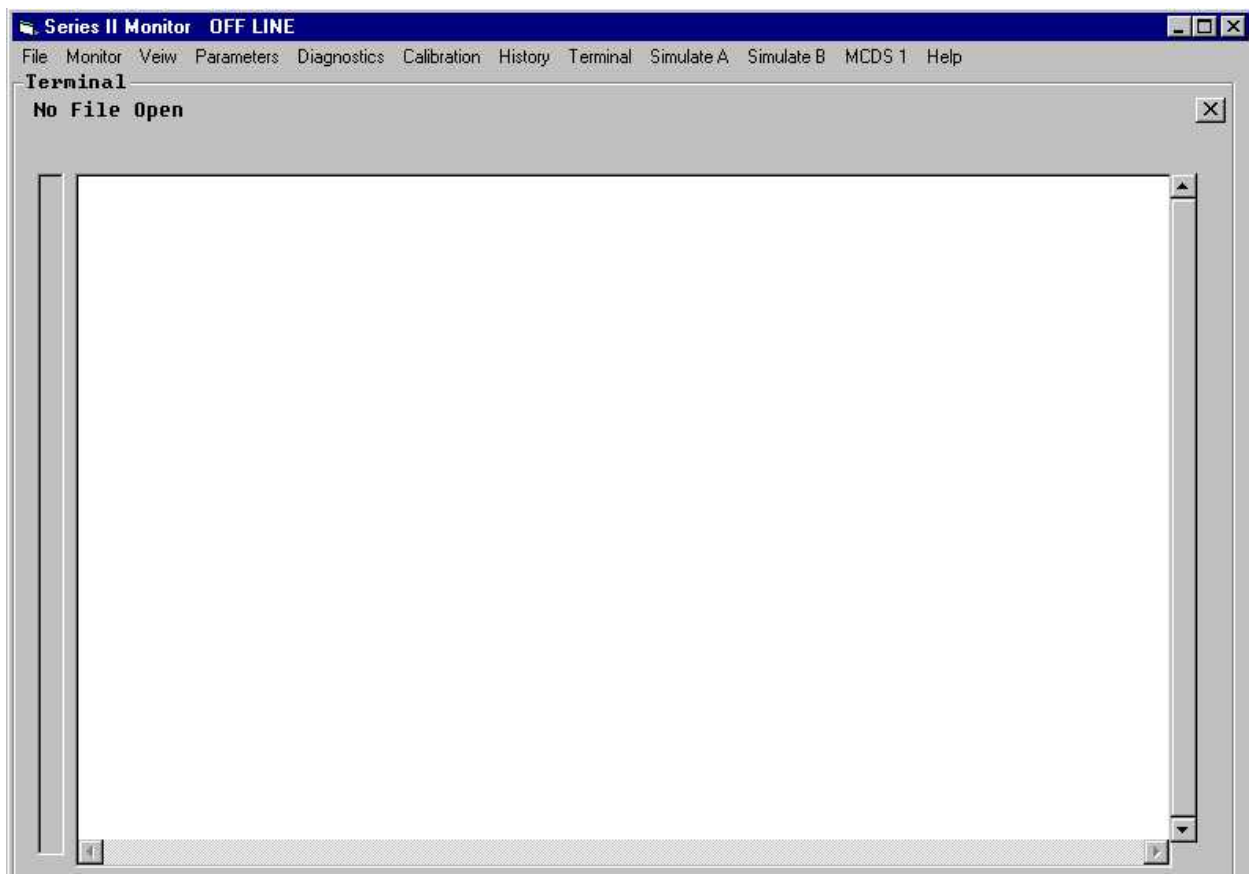
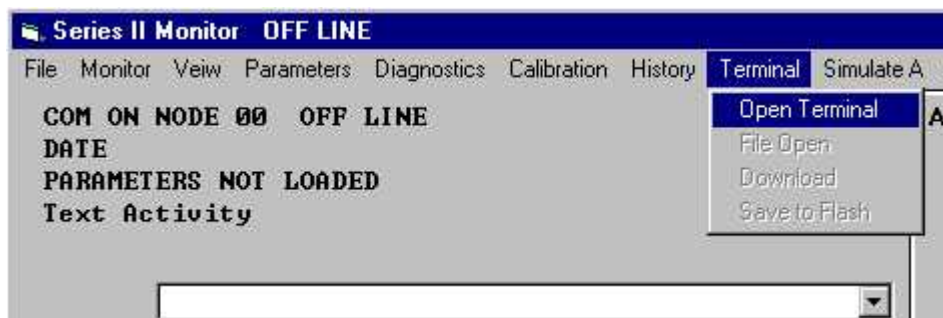
The screenshot shows the 'Series II Monitor ON LINE' application window. The 'Totals History' section is active, displaying 'PAGE = 13'. At the top right of this section is an 'Upload Totals' button. Below it are input fields for 'Current Page' (set to 0), 'Starting at' (set to 0), and 'Ending At' (set to 127). A vertical scroll bar on the left is labeled 'UP' at the top and 'DOWN' at the bottom. The main display area contains the following text:

ANGI International Series II NGU Dispenser Fill Monitor  
Date: 08-09-2005  
Time: 10:23:14  
Serial#: 2010  
Page: 13

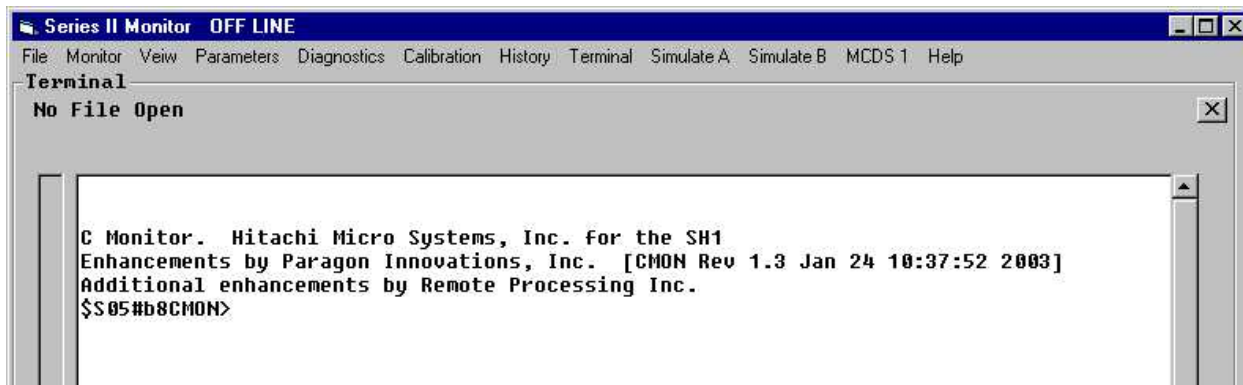
|    |                    |             |       |
|----|--------------------|-------------|-------|
| 0  | Atotal_save_count  | 0           | numb  |
| 1  | Alog_count         | 0           | numb  |
| 2  | Atime_stamp        | 12:00:00 AM | time  |
| 3  | Adate_stamp        | UN 0-0-2000 | date  |
| 4  | Aid                | 0           | numb  |
| 5  | Atotal_extend      | 0           | Hex   |
| 6  | Atotal_sale_tier1  | 0.00        | \$    |
| 7  | Atotal_mass_tier1  | 0           | grams |
| 8  | Atotal_sale_tier2  | 0.00        | \$    |
| 9  | Atotal_mass_tier2  | 0           | grams |
| 10 | Atotal_mass_ran    | 0           | grams |
| 11 | Atotal_sale_ran    | 0           | \$    |
| 12 | Atotal_qty_ran     | 0           | numb  |
| 13 | Aprice_ran         | 0.000       | \$    |
| 14 | Aprice_tier_ran    | 0           | numb  |
| 15 | Asale_ran_decimal  | 0           | numb  |
| 16 | Aqty_ran_decimal   | 0           | numb  |
| 17 | Aprice_ran_decimal | 0           | numb  |
| 18 | Alow_cycle_total   | 0           | numb  |
| 19 | Amid_cycle_total   | 0           | numb  |
| 20 | Ahigh_cycle_total  | 0           | numb  |
| 21 | Atotal_fault       | 0           | numb  |
| 22 | Ashift_sale_tier1  | 0           | \$    |
| 23 | Ashift_mass_tier1  | 0           | grams |
| 24 | Ashift_sale_tier2  | 0           | \$    |
| 25 | Ashift_mass_tier2  | 0           | grams |
| 26 | Ashift_time_stamp  | 12:00:00 AM | time  |

## 32. TERMINAL PANEL

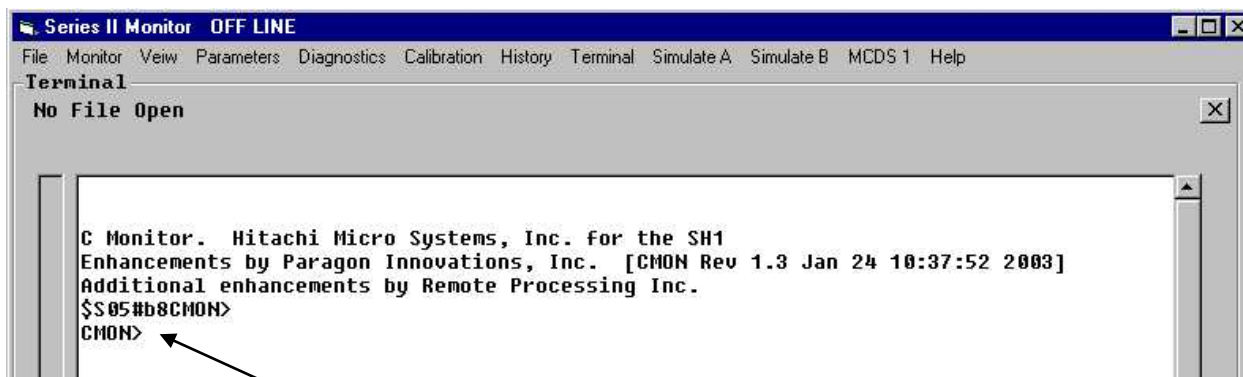
The terminal window is a Tool used to access the dispenser controller CPU for program loading and diagnostics. The dispenser controller CPU can be accessed directly through the terminal window when the controller CPU is placed in terminal or program mode. The dispenser controller will respond to commands entered on the computer keyboard to perform tasks such as viewing memory values and loading programs. Commands execute when the Enter Key is pressed. To enter the Terminal sub menu item. A blank terminal window will appear. Clicking on the "X" box on the upper right will closed the window.



The Terminal window will send typed characters out to the dispenser controller board via the serial port on the computer. When the dispenser controller is placed in the program mode, these typed in characters will be sent back and displayed in the window. To place the dispenser controller in the program mode, switch DIP switch SW3 on the Dispenser Interface board in the dispenser electrical enclosure to the right and push the RESET button or cycle the power. The controller will “boot up” in the terminal mode and will send out an introduction prompt.



The intro should show the Hitachi Micro Systems and Remote Processing brand names, firmware revision, and processor type used in the dispenser controller. A blinking cursor should appear after the prompt. This is where typed characters will appear. Pressing the Enter Key will test the communication to the controller. The controller will respond with the command prompt “CMON>.”

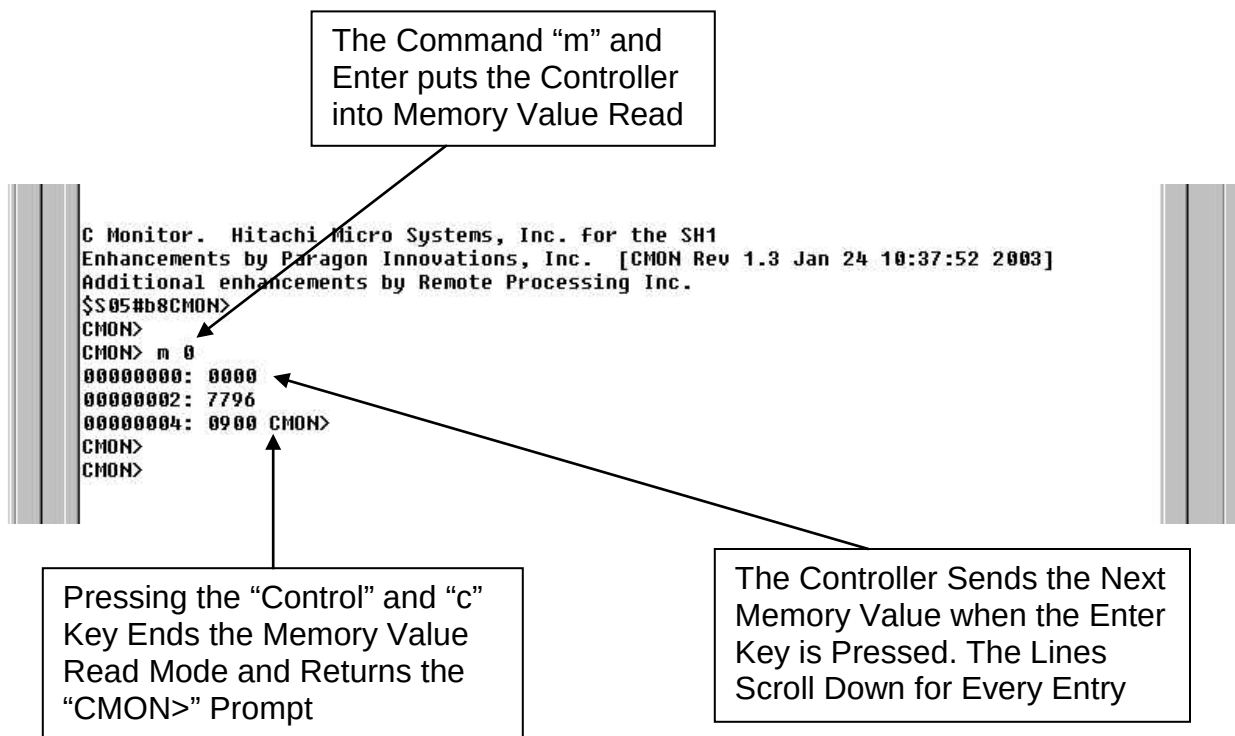


The Controller Sends the  
“CMON>” Prompt when  
the Enter Key is Pressed

Characters entered will not appear if the communication to the controller is disconnected.

Below is an example of a command sent to the controller and the response back. The “m” key is a code for looking at single controller memory values. In the example below,

an "m 0 Enter" is entered to start looking at memory point zero. The controller sends the "m 0 Enter" characters back and they appear right after the "CMON>" prompt.



The controller then goes into displaying the memory values. Each time the Enter Key is pressed, the next memory value is displayed on the next line. Pushing the "Control" and "c" keys together ends this mode and returns the "CMON>" prompt.

### 33. LOADING A PROGRAM

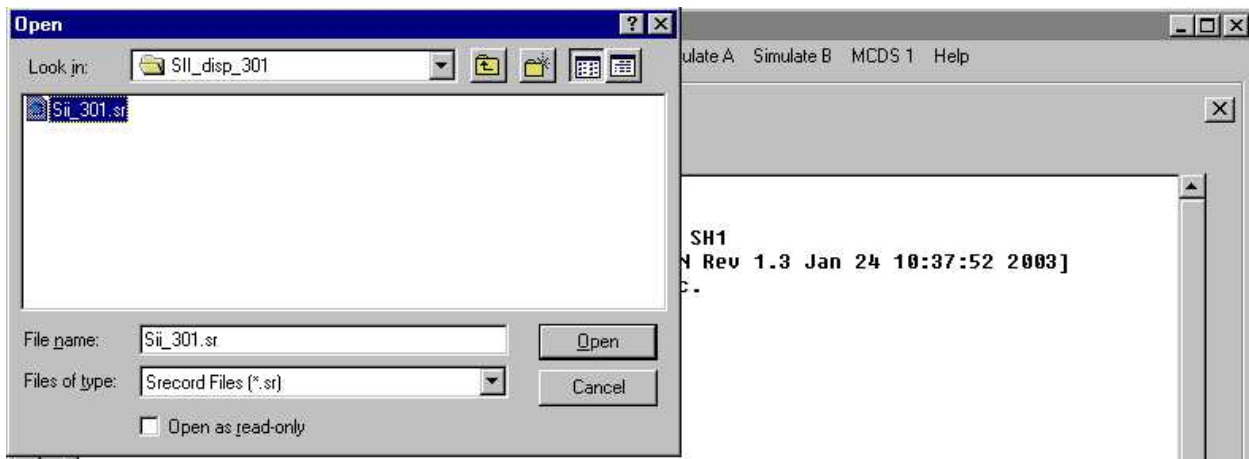
The dispenser controller runs on a single program in the CPU's RAM. The program is stored in the FLASH memory. The FLASH memory stores information without the need for the power to be on. When the dispenser is powered up, the CPU starts a "boot-up" program from FLASH memory. This program first checks its system for hardware errors. It then reads the "RUN-PROGRAM" switch to decide which mode to operate: the terminal mode or run the dispenser program. In the run mode, the boot program copies the dispenser program from the FLASH memory into the RAM. It then exits the boot program and runs the dispenser program. The controller continues to run the dispenser program until the power is removed. Under the program mode, the boot program runs as a terminal as described in the previous section. One of the functions in the terminal mode is to load the dispenser program into the FLASH memory. Loading a program into the dispenser controller takes a set of typed commands in four steps:

- 1) The first step is opening the program file on the computer.
- 2) Second is typing the load command: "L" and Enter-Key at the terminal cursor.
- 3) Third is downloading the program to RAM.
- 4) Fourth is saving the program from the RAM to the FLASH memory.

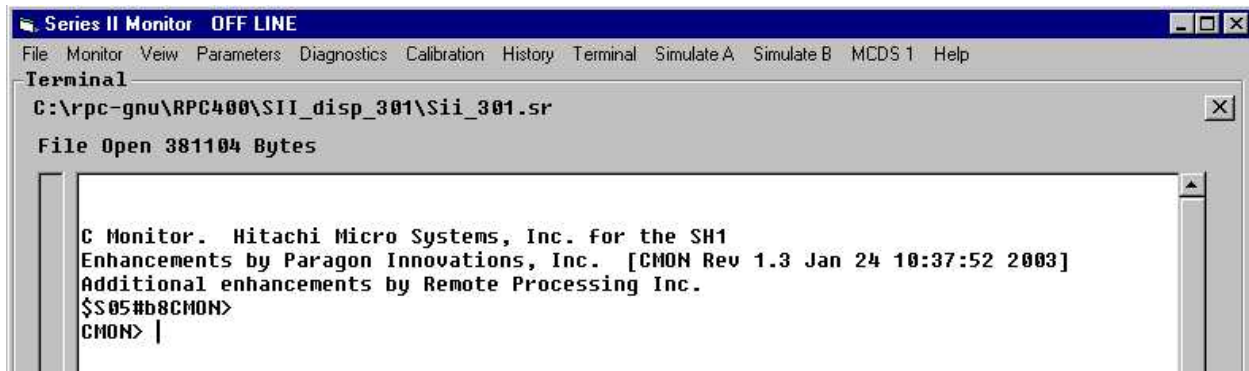
To load a dispenser program into the controller, bring up the Terminal window and put the controller in the terminal mode as described in the previous section. Click on either the “File” main menu item then the “Open” sub menu item, or the “Terminal” main menu item then the “File Open” sub menu item.



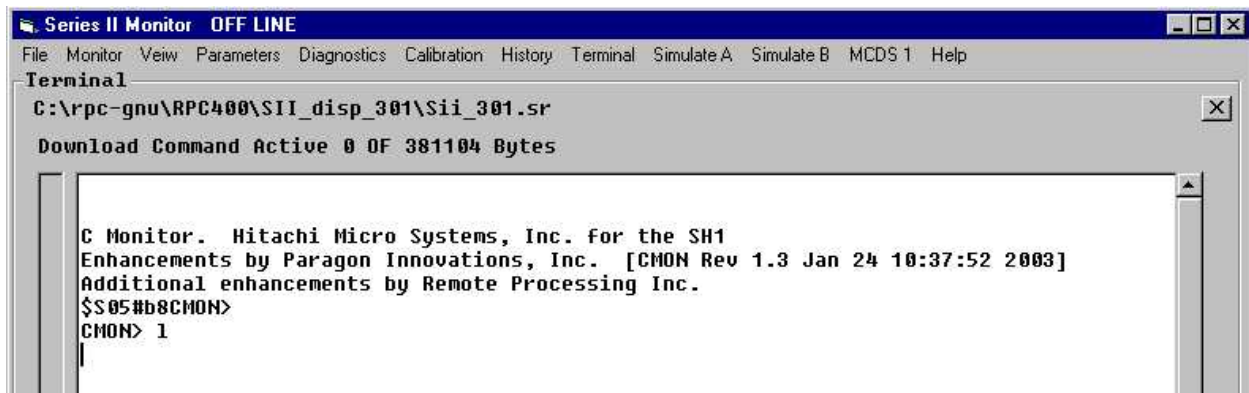
The standard Windows “File Open” dialog box will appear. The file type to open will have an “.sr” extension, which is called an S-Record file. The example below shows the dispenser program “SII\_301.sr” which stands for Series 2 rev 3.01. After clicking on the “Open” button, the Tool will check the file to determine that it truly is an S-Record.



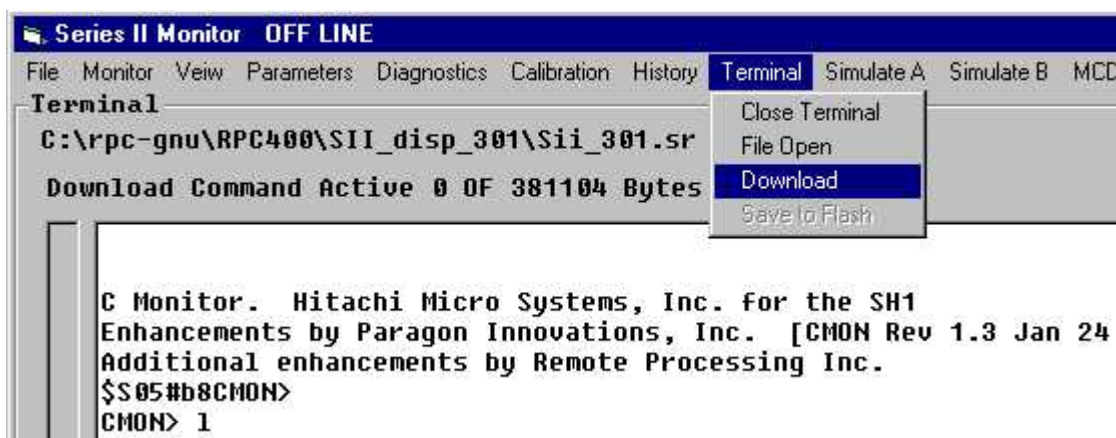
After the file passes the check, the status lines will show the path, the name of the file, and the file size. If the file is not an S-record type, the status lines will indicate that the file is invalid.



Next enter an upper case “L” or a lower case “l” and hit Enter. This puts the controller in the download ready mode. The status lines indicate this mode is active.

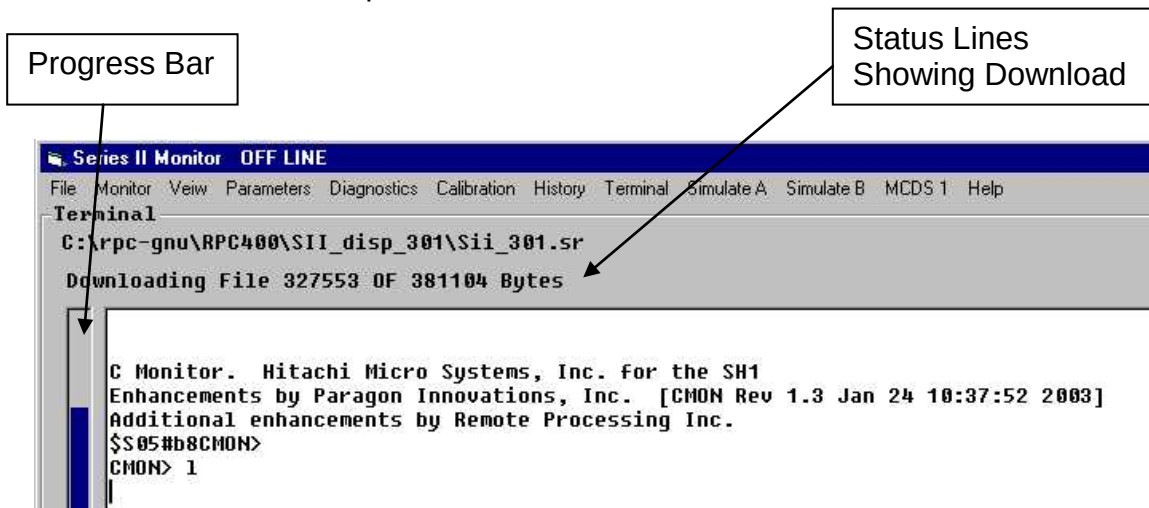


Next click on the “Terminal” main menu item and then click on the “Download” sub menu item to start downloading the program into the controller’s RAM.

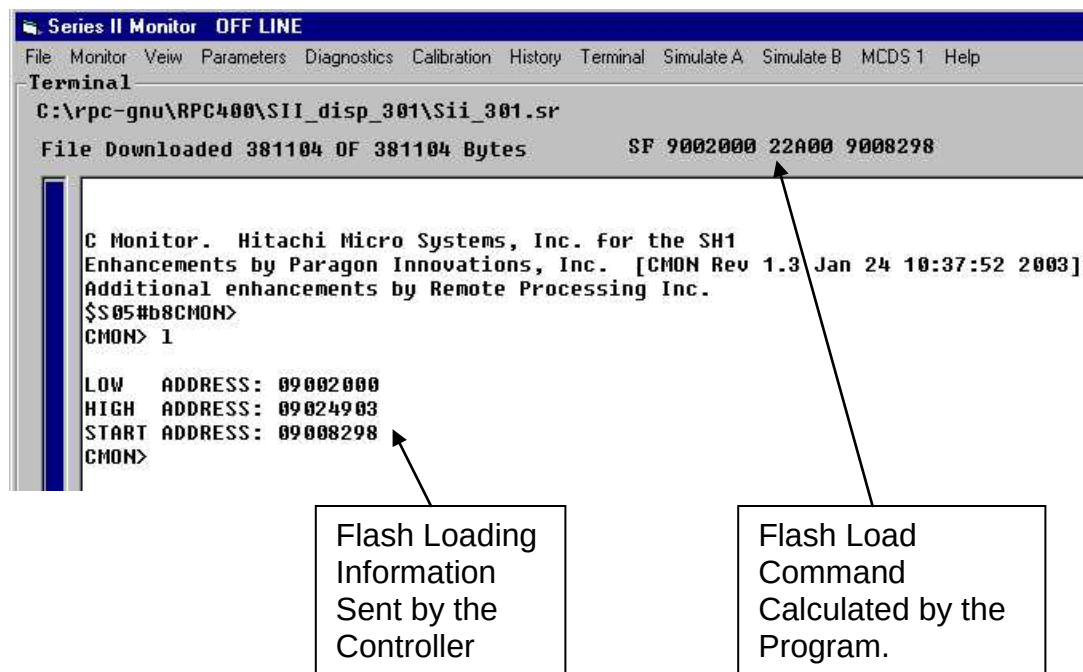




The status lines will indicate how much of the program was sent to the controller. A progress bar on the left gives a visual indication of the progress. Downloading will be complete when the bar rises all the way to the top. The status lines will also indicate when the download is complete.



When the download is completed, the controller sends the program size and the location addresses to the Terminal for copying the program to the FLASH. The Tool will automatically calculate the size of the program and construct the command to start the process.

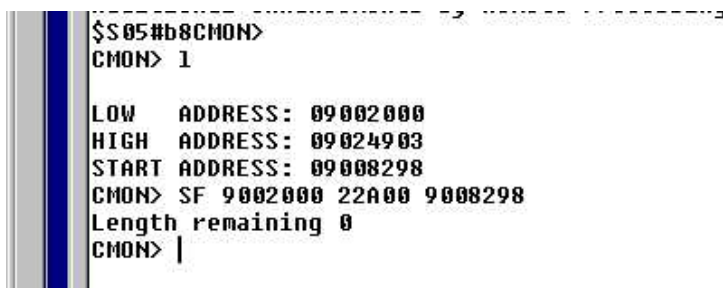
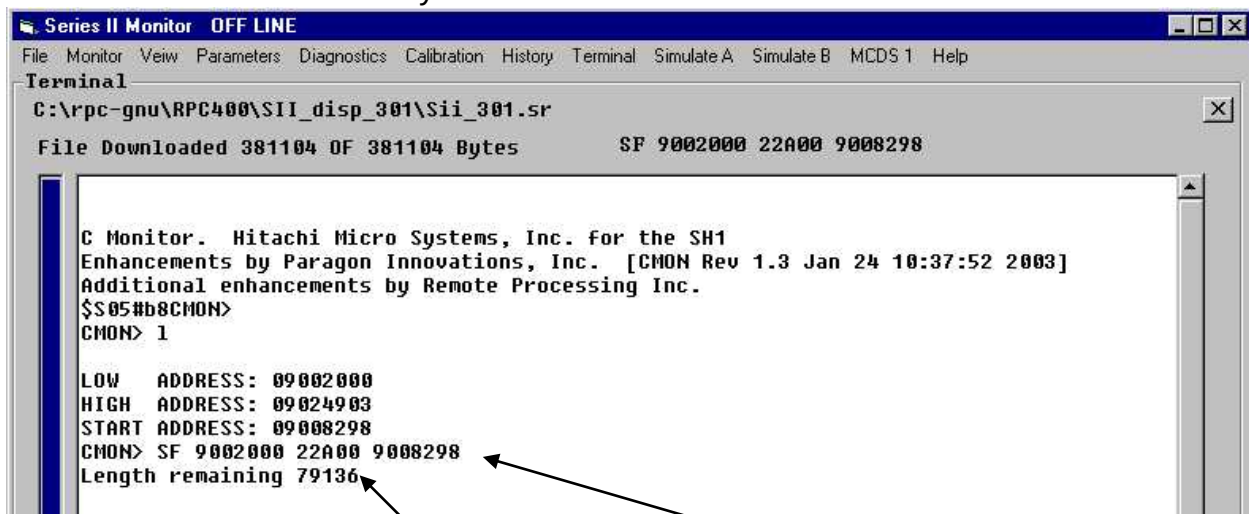


Next click on the "Terminal" main menu item and the "Save to Flash" sub menu item. This will start transferring the program from the RAM to the FLASH.





The “Save-to-Flash” command will be sent to the controller and will automatically appear after the cursor. The controller will send back information on the progress by reporting the length of program remaining to save. The save is complete when the length remaining goes to zero and the prompt returns. The dispenser program is loaded into the controller and is ready to run.

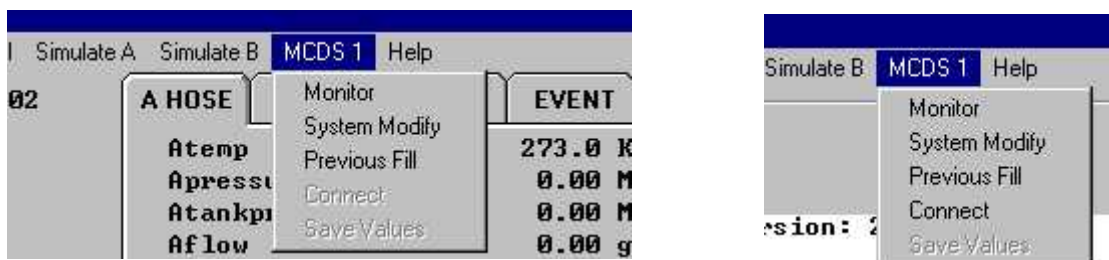


To run the dispenser, move the “RUN-PROGRAM” switch to the left in the run position and cycle the power.

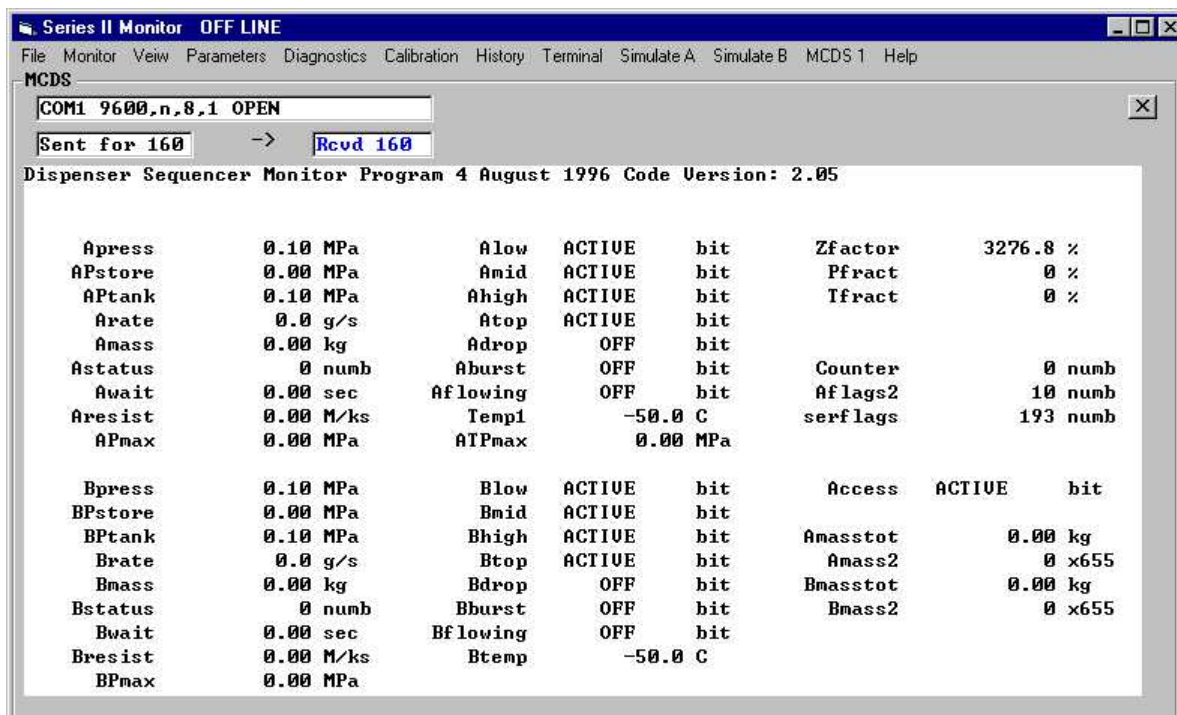
### 34. MCDS1

Under the MCDS1 main menu item is a list of panels that interface with the previous generation of ANGI MCDS dispensers. The panels match the MSDOS based DMON program which was originally used for this purpose. The panels are:

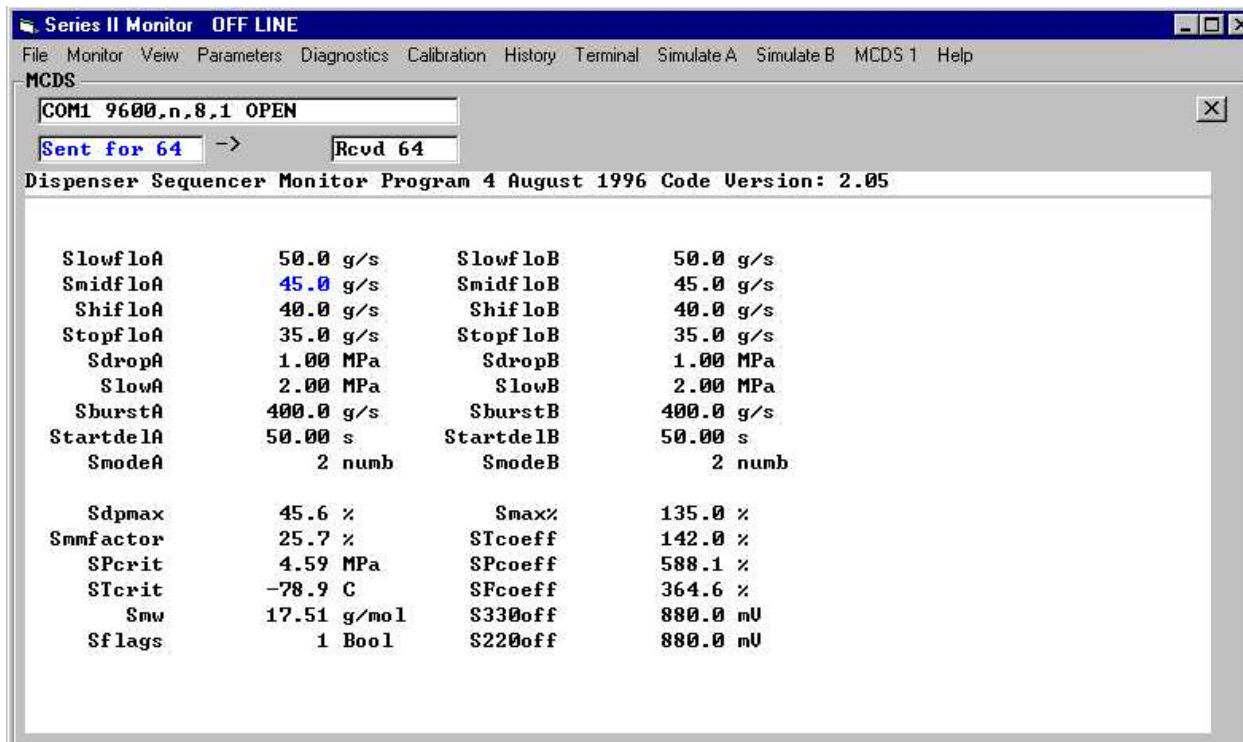
- 1) Monitor: Brings up fill variables that are continuously updated to monitor the actions of a fill sequence.
- 2) System Modify: Brings up the calibration parameters. The parameters can be edited and saved to FLASH memory.
- 3) Previous Fill: Brings up the fill results.



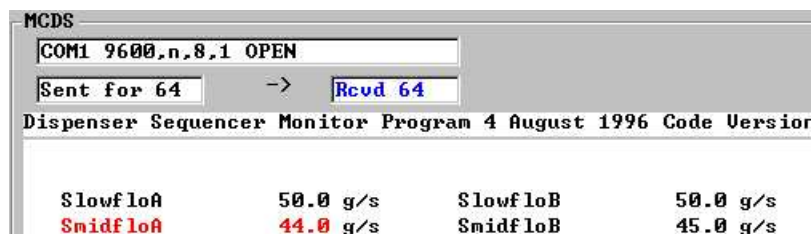
Below is the monitor panel. Clicking on the “Monitor” sub menu item opens the monitor panel. The “Connect” sub menu item will activate when a panel is opened. The MCDS dispenser controller is connect to a computer through an RS232 link box. With the box and cable connected, click on the “Connect” sub menu item. The Tool will start sending data. The “Sent for X” and “Rcvd X” status boxes will indicate the communication action. The Tool will first send for the program date and revision level, then monitor the variables. All the variables will be refreshed three times per second.



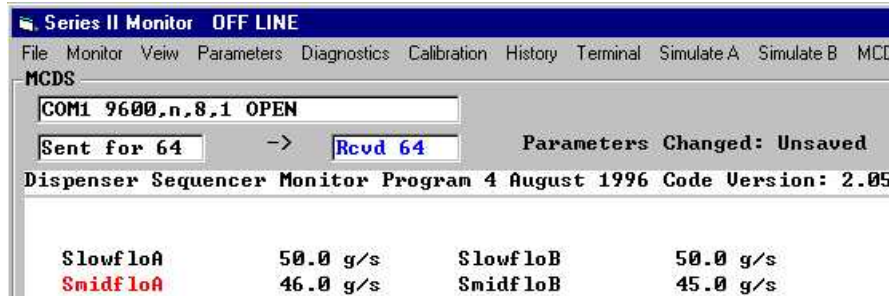
Below is the System Modify panel. Clicking on the “Connect” sub menu item will upload the version, program date, and parameter values from the MCDS controller. If the Tool is already connected in another panel, switching between panels will also perform an upload. The parameters can be edited on the text screen by clicking on the number. The number will be highlighted in blue.



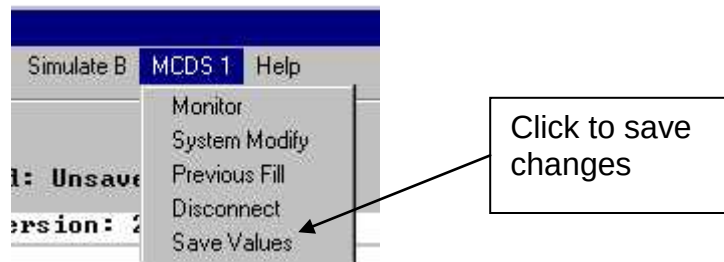
The number and name will be highlighted in red when its value is changed. The standard Windows mouse click, select, and replace actions work in the value text field. The decimal point will remain fixed. Press the Enter Key to send the number to the MCDS controller. Pressing the Escape Key will abort the change and return the original number.



After sending the number to the MCDS controller a status line will report “Parameters Changed: Unsaved,” indicating the new value has not been save to the FLASH memory. If the power is removed from the controller at this point, the value will revert back to the original number.



The “Save Values” sub menu item will activate after any value edit. Click on the “Save Values” sub menu item to save the new parameter values to the controller’s FLASH.



After saving the edited values, the status line will revert to its original blank state and the text highlighting will be removed. The “Previous Fill” panel shows the values of the variables captured during a complete fill. Only the most recent fill is retained.

