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## TGT 7200 Series Dispenser

### Operations Manual

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#### **TGT Pre-Delivery Inspection Certification (PDIC)**

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# **TECHNICAL AND INSTALLATION INFORMATION 7200-CNG50 SERIES DISPENSER**

## **OVERVIEW**

Tulsa Gas Technologies designs and manufactures Compressed Natural Gas (CNG) dispensers for quality service, and are built to uphold the uppermost levels of safety and regulatory compliance. TGT designed these dispensers to operate unceasingly at highest capacity and ease of installation. This manual explains the installation and operation of TGT 7000 Series dispenser. The 7000 Series CNG dispensers are designed for a 3600 psi service pressure. Two base models are available:

TGT 7100	Single-sided, single hose
TGT 7200	Dual-sided, dual hose

For instructional purposes, the TGT 7200 dispenser is discussed. Before installation or servicing the dispenser, open both lower and upper doors to get familiar with the contents of the dispenser. The two hose dispenser, 7200-CNG50, will meter the gas to the hoses independently from each other and provide a display for the volume of and amount of money dispensed. This dispenser sequences up to three separate banks of gas and temperature compensated the fill to either 3000 psi at 70° F or 3600 psi at 70° F. A temperature compensated fill is the temperature range in which the temperature error is valid. Not, as one might think and what is often used the range in which there is no error. In the case of CNG, in a perfect world, the compressed gas is temperature compensated 3600 psi at 70° F. With every degree change, the psi is also changes in either direction.

The dispenser supplies an output pulse scaled to the volume. The mechanical relief valve inside the dispenser is set at 125% of nozzle operating pressure, which is 4500 psi. Each hose has a pressure gauge showing the vehicle pressure when the three way valve is open. Removing power to the dispenser will stop gas flow to the vehicle through the dispenser. If such power loss happens, the display will hold the information needed to complete any transaction for at least 15 minutes at the dispenser.

In the determination of which side of the dispenser is which, locate the explosion proof box inside the dispenser behind the lower doors. Facing the explosion proof box, this side of the dispenser referred to as the front. The arrow on the upper door of the dispenser indicates as to the side the hose and Micro Motion® flow gas through. The mainboard controls the electronics is inside a gray box in the area behind the display. Attached to the door of the gray box containing the control electronics is the keypad used for price and function changes.

1. Maximum Allowable Working Pressure (MAWP) is 4500 psig (pounds per square inch gauge). Relief valve setting is 125% of nozzle operating pressure.
2. Operating temperature range: -40 °C (-40 °F) to 66 °C (150 °F).
3. Electrical rating: 100 – 240 V ac, 3 A maximum, 50/60 Hz, Class 1, Division 1, Group D.
4. Micro Motion CNG50 meter rated for 5000 psi and 170 lb/min fill rate (4627 kg/h). This dispenser maximum flow is 1500 SCFM (Standard Cubic Feet per Meter).
5. These dispensers installed only with a listed or approved overfill protection system (ASME Relief Valve).
6. This dispenser is "For Use with Natural Gas only".
7. TGT dispensers are manufactured under the following guidelines:

NFPA 52  
ANSI B31.3  
AGA 4.1/CGA 12.5 STANDARD  
ANSI/IAS NGV 4.2-1999 Standard for Hoses for Natural Gas Vehicles  
and Dispensing Systems  
NEC NFPA 70  
NIST Handbook 44  
International Fire Code

## INSTALLATION

1. Pour concrete to be flush with the top of the TGT Island Pit Box. The dispenser will mount to this island pit box (ipb) with 1/2" bolts through pre-punched holes. The island box needs to be self-supporting and not dependent on the electrical conduits or piping going to the dispenser for its support.
2. Note the rough-in heights of the conduits on the electrical drawing. The junction box is low in the cabinet; so make sure to leave plenty of room for the seal offs and unions. The top of the seal off should be flush with the top of the island pit box. You must leave access to all seal off for packing and sealing.
3. It is recommended an isolation valve be installed upstream of the dispenser so the dispenser can be removed or serviced without having to undo any pipefittings. If the dispenser is removed, the isolation valve stays with the piping, not the dispenser.
4. The vent line, 1/4" tube fitting, located inside the dispenser cabinet. You will need to connect this to the vent location at the site. An optional location for the vent line is up the retractor pole.
5. The TGT dispenser can be configured so the solenoid valve inside the dispenser serves as the temperature compensation valve. If this is done, there **MUST** be a pressure relief valve (as specified in NFPA 52, AGA NGV 4.1/CGA 12.5 Standard for NGV Dispensing Systems, Article 1.11.3, Item A) downstream of this valve.
6. The user, installation, service, and technical manuals, as applicable, shall be left with the appropriate person. Access to this material by service personnel is required.
7. Grounding is very important to the safe use of this dispenser. Grounding is needed for static discharge of electricity build up. Grounding should be done in accordance to NPFA 70 (NEC). All conduits whether high voltage or low voltage shall have a minimum of No. 12 AWG earth ground pulled separately in with the wires and attached to the grounding screw located inside the explosion proof box or attached to the pigtail wire. It is recommended to install a ground rod at dispenser.

8. The installation shall be in accordance with the following: The requirements of the authorities having jurisdiction, in accordance with the provisions of either the CAN/CGA-B108-M95 NGV Refueling Stations Installation Code, or the NFPA 52 Standard for Compressed Natural Gas (CNG) Vehicular Fuel Systems, and;

The CAN/CSA-C22.1-1990 Canadian Electrical Code, Part 1, and NFPA 70 National Electrical Code, and;

The dispenser system is intended for use with gas composition specified by SAE J1616 Recommended Practice for Compressed Natural Gas Vehicle Fuel Composition, unless additional precautions are taken, and;

The dispensing device shall be installed as recommended by the manufacturer, and;

The maximum allowable working pressure (MAWP) of the dispenser is 5000 psig.

9. Select the NGV1 nozzle for the delivery pressure of the vehicle and it shall be in accordance with AGA NGV 4.1/CGA 12.5 Standard for NGV Dispensing Systems, Article 1.9.3.
10. Three lines from the bank storage should be run to the dispenser with tubing sized to handle the flow rate of both sides.
11. It is recommended to put ESD (Emergency ShutDown) valves back at the storage to minimize the available gas to the dispenser in an ESD situation.

## READING TOTALIZERS

Open the display face door on the front side of the dispenser. The front is the side with the termination junction box. If opening the wrong side, the keypad and alphanumeric display will be located on the opposite side. With the front display door opened, the keypad and alphanumeric display mounted on the door of the box containing the control electronics. The following information is representative of the information will be displayed.

H1 MASS	FR	PRESS	END CODE	TEMP
000.000	00.000	+3157	STOP SWITCH	+070
H2 MASS	FR	PRESS	END CODE	
000.000	00.000	+3617	NORMAL	

The above information provides data about both hoses. The top side of the display has data for Hose #1 and the bottom side has data for Hose #2. H1 MASS is the total quantity of gas dispensed through Hose #1. This quantity is in whole units. The gas is being dispensed in gasoline gallon equivalent the total being displayed is whole gallons. Fractions of a gallon will not be displayed from this totalizer. The same will be true if the unit of measure is pounds, kilograms, or cubic meters. The next item is FR. This is the flow rate of the gas being dispensed and will be shown as gallons and fractions of a gallon, pounds and fractions of a pound, kilograms and fractions of a kilogram, or cubic meters and fractions of a cubic meter. The next item is the pressure in psi (pounds per square inch and will be indicated with either a + or a - sign). As previously stated, the bottom side of the display has the same information for Hose #2.



## PRICE SETTING

Open the display face door on the front side of the dispenser. The front is the side with the termination junction box. If the wrong side is opened, the keypad and alphanumeric display will be located on the opposite side. When the front display door is opened, the keypad and alphanumeric display mounted on the door of the grey box contains the control electronics. The following information is representative of the information displayed.

H1 MASS	FR	PRESS	END CODE	TEMP
000.123	00.000	+3157	NORMAL	+070
H2 TOTAL	FR	PRESS	END CODE	
000.234	00.000	+3617	NORMAL	

When the access code for level one has been entered via the keypad, the following main menu will be displayed.

### MAIN MENU

01 = CONFIGURATION MENUS

02 = DISPLAY MENUS

CANCEL KEY = EXIT

Select 01 CONFIGURATION MENUS (from main menu) and press ENTER

When item 01 is selected from the MAIN MENU the following menu will be displayed:

### CONFIGURATION MENUS

01 = CONFIG MENU A

03 = CONFIG MENU C

02 = CONFIG MENU B

04 = CONFIG MENU D

CANCEL KEY = EXIT

Select 03 CONFIG MENU C

Selecting item 03 and ENTER from the CONFIGURATION MENUS will cause the following message:

CONFIGURATION MENU C

01 = PRICE HOSE A      04 = MAX PRESS FOR 3000

02 = PRICE HOSE B      05 = MAX PRESS FOR 3600

Selecting item 01 or 02 from the CONFIGURATION MENU C dependent upon which hose is desired to be changed will cause the following message to be displayed:

ENTER NEW PRICE PER UNIT

MINIMUM 1 DIGIT    MAXIMUM 4 DIGITS

0000

The system will automatically know where the decimal needs to be, therefore enter just the price without a decimal. When the programming mode is exited, the new price will appear on the price display. Once the price has been entered, the display will return to the CONFIGURATION MENU C. Press the CLEAR key and then the CANCEL key to exit the programming mode.

**ELECTRICAL CONNECTIONS  
AND  
GENERAL INFORMATION**

All wiring must be installed in accordance with national and local electrical codes.

**-WARNING-**

**SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**

The customer leads are located in the bottom of the dispenser in the explosion-proof box. All unused wires must be capped or taped off.

<b>WIRE COLOR</b>	<b>WIRE NUMBER</b>	<b>DESCRIPTION</b>
Black 18 AWG	1	120 VAC head power hot line. If power is interrupted on this line, The head will go into standby and Power-fail modes. If an ESD system is used, removing voltage from this line will disable all dispenser functions.
White 18 AWG	2	Common for dispenser power and main board authorize/authorize request circuit.
Green 14 AWG	3	Earth Ground This line is connected internally to the casting and must be connected to the service ground. Per NFPA 70 (NEC).
Brown 18 AWG	14	Authorize input. Application of 120 V ac will authorize the electronic head to dispense product, if 120 V ac is not present when the handle switch is turned on the dispenser will not authorize until voltage is present.

<b>WIRE COLOR</b>	<b>WIRE NUMBER</b>	<b>DESCRIPTION</b>
Red 18 AWG	8	Solenoid valve output. When the electronic head is ready to dispense product, voltage will be applied to this line. This is normally connected to the solenoid valve. This wire is also used as an IN USE signal, after the reset has completed. This voltage will go away if the handle is shut off (120 V ac). This is used in most common card readers and consoles.
Red 18 AWG	80	This is the wire directly from the solenoid valve. In normal operation there is a jumper from #8 to #80. Some card readers will switch this line to control gas from the card reader.

### **LOW VOLTAGE LINES**

THE PULSER OUTPUT IS AN OPTICALLY COUPLED OPEN COLLECTOR TRANSISTOR. THIS TRANSISTOR IS CAPABLE OF SWITCHING UP TO 40 V dc @ 100 mA.

Yellow 18 AWG	4	Emitter: if the transistor needs to sink the pulse signal, this line needs to be connected to the pulser power supply common. If the transistor needs to source the pulse line, this line is the pulse output.
Blue 18 AWG	18	Collector: if the transistor needs to sink the pulse signal, this line is the pulse output. If the transistor needs to source the pulse signal, this line is to be connected to the pulser power supply positive line.

## **PROGRAMMING**

This part of the manual is broken down into sections following the menus of the system. The manual will start with the main menu and will discuss the subjects of the menu as they appear in the menu from top to bottom. Sub-menus will be addressed in the order in which they are encountered in the menu.

## **GETTING STARTED**

The dispenser covered by this manual can be programmed (i.e. change any operating parameter changeable or loadable) by either of two methods. One method is via a laptop computer, the other is via a keypad and alphanumeric LCD display. The keypad and display is normally supplied with the dispenser and this method will be discussed first. In either case, the programming feature is a menu driven function. A few features available by means of the laptop computer are not available via the keypad and display. These items will be discussed in the section covering the computer method.

## KEYPAD USE

The information seen on the alphanumeric display when power for the dispenser has been turned on will look similar to the following: *(For the purposes of this manual, we will assume no gas is being dispensed at the start of this procedure).*

H1 MASS	FR	PRESS	END CODE	TEMP
000.123	00.000	+3157	NORMAL	+079
H2 MASS	FR	PRESS	END CODE	
000.234	00.00	+3617	NORMAL	

The above information provides data about both hoses. The top of the display has data for Hose #1 and the bottom has data for Hose #2. H1 MASS is the total quantity of gas dispensed through Hose #1. This quantity is in whole units. If the gas is being dispensed in gasoline gallon equivalent, the total being displayed is whole gallons. Fractions of a gallon will not be displayed from this totalizer. The same will be true if the unit of measure is pounds, kilograms, or cubic meters. The next item is FR (Flow Rate). This is the flow rate of the gas being dispensed and will be shown as gallons and fractions of a gallon, pounds and fractions of a pound, kilograms and fractions of a kilogram, or cubic meters and fractions of a cubic meter. The next item is the pressure in psi (pounds per square inch and will be indicated with either a + or a – sign). As previously stated, the bottom side of the display has the same information for Hose #2.

To gain access to system parameters enter the default codes. There are three levels of access to system parameters. For discussion purposes these are identified as level zero (0), level one (1), and level two (2). Level 0 is restricted to viewing parameters, data only with the exception of price changes for both hoses. It is a hardcoded default access code [1, 2, 3], then press ENTER, and cannot be changed. The only parameter to be edited from this level is the price change. Level 1 which has a default access code [7, 8, 9] and then press ENTER. This access code can be modified, and will allow most parameters to be changed with the exception of amending the: access codes, max pressures, psi calibration, target pressures or enabling or disabling the sequencing, temperature compensation, or pressure switches. Level 2 has a default access code [4, 5, 6] and then press ENTER. This code can be modified and access all parameters and functions. The dispenser will be shipped with a known access code allowing the owner to have full access. Once the dispenser has been

installed and started up, it is highly recommended the access codes be changed so only authorized personnel can have access to Level 2.

When the access code for either level has been entered via the keypad, the following menu will be displayed:

**MAIN MENU SELECTION**

01 = CONFIGURATION MENUS

02 = DISPLAY MENUS

CANCEL KEY = EXIT

To access either of these menus, enter the two digit menu number followed by the ENTER key. If the code for level 0 was entered, the only sub-menus available are 04 and 05. If any other menu is selected the following message will appear on the display:

**NOT A VALID SELECTION**

**PRESS CLEAR KEY TO CONTINUE**

Pressing the CLEAR key will take you back to the main menu. Regardless of where you are in the menus, pressing the CLEAR key will always take you back to the previous menu. Pressing the CANCEL key will always cause an exit from the programming mode of operation.

**01 CONFIGURATION MENUS**

When you select item 01 the following menu is displayed:

**CONFIGURATION MENUS**

01 = CONFIG MENU A

03=CONFIG MENU C

02 = CONFIG MENU B

05=CONFIG MENU D

CANCEL KEY = EXIT

In the CONFIG MENU A the following menus will appear:

#### CONFIGURATION MENU A

01 = CAL PSI SENSORS	04 = NOT AVAILABLE
02 = NOT AVAILABLE	05 = ACC CODE LEVEL 1
03 = NOT AVAILABLE	06 = ACC CODE LEVEL 2

Menu item 01 should be selected when it is desired or is necessary to calibrate the pressure sensors. The procedure for calibrating the sensors can be found in APPENDIX A (page 46). Only the use of the menu is explained here.

#### **01 CAL PSI SENSORS**

When menu item 01 is selected, the following sub-menu will be displayed.

#### PRESSURE SENSOR CALIBRATION MENU

1 = HOSE # 1 ZERO	2 = HOSE # 1 SPAN
3 = HOSE # 2 ZERO	4 = HOSE # 2 SPAN

When you are at this menu level, entering the number for any of the selections will take you immediately to the following display:

ENTER NEW CALIBRATION VALUE  
MINIMUM 1 DIGIT    MAXIMUM 4 DIGITS  
USE THE DEBIT KEY FOR A    MINUS SIGN  
0000

At this point, the necessary data should be entered. The data entered will be reflected in the area where the four zeros are displayed. As the data is entered, it will be shifted from the right to the left on the display and in all cases, the most significant digit must be entered first. The minus sign is used only when it is necessary to enter negative data for the zero value of either sensor. The data is always considered positive unless a minus sign precedes the data (i.e. a positive sign is not used with this data). Please refer to APPENDIX A (page 46) for the calibration procedure. When the data has been entered and the ENTER key



pressed, the data will be stored and the display will return to the configuration menu. The calibration menu can be selected again or another menu item can be selected.

## **02 PULSES PER UNIT**

Selecting item 02 from the CONFIGURATION MENU A will cause the following sub-menu to be displayed:

### **OUTPUT PULSES PER UNIT OF MEASURE**

1=H1 1000      2=H1 100      3=H1 10  
4=H2 1000      5=H2 100      6=H2 10

**MAKE YOUR SELECTION**

An output pulse per unit of measure is a feature in the program for the dispensers are not under the Weights and Measures guidelines. An explanation of these selections follows. The selections with H1 are used for Hose 1 (A) and H2 are used for Hose 2 (B). "1000" means the dispenser will output one pulse for each pulse received from the Micro Motion meter. "100" means the dispenser will output one pulse for each one hundred pulses received from the Micro Motion meter. "10" means the dispenser will output one pulse for each ten pulses received from the Micro Motion meter.

When one of the six items listed is selected, information is stored in the system and the display returns to the CONFIGURATION MENU. You may now make another selection from this menu or return to the MAIN MENU.

## **03 MASS VALUE HOSE A**

Selecting item 03 or 04 from the CONFIGURATION MENU dependent of which hose needed to adjusting will display the following message:

**ENTER NEW MASS FACTOR**

**HOSE A**

**MINIMUM 1 DIGIT                  MAXIMUM 3 DIGITS**

**0000**

The value entered **must match the mass value set up in the Micro Motion meter.** After the initial setup of the dispenser, this value will rarely need to be changed. Once the value needed has been entered followed by the ENTER key the display will return to the CONFIGURATION MENU.

## **02 CONFIGURATION MENU B**

When item 02 is selected from the CONFIGURATION MENUS the following menu will be displayed:

### **CONFIGURATION MENU B**

01 = DATE & TIME	04 = NOT AVAILABLE
02 = FLOW RATES	05 = NOT AVAILABLE
03 = TIME DELAYS	06 = LOAD DEFAULT VALUES

Selecting 01 from the CONFIGURATION MENU B will cause the following message to be displayed:

```
ENTER DATE-TIME IN THE FOLLOWING FORMAT
YEAR = YY MONTH = MM DAY OF MONTH = DD
HOUR = HH MIN. = MM          ENTER DATA
0000000000
```

The date or the time cannot be set separately. You must always enter data for both. As the message indicates, two digits for year must be entered first followed by two digits for the month (January being 01 and December being 12), two digits for the day of the month, two digits for the hour (the clock is a 24 hour clock i.e. 1:00pm will be 13 for the hour), and two digits for the minutes. Once the data has been entered pressing the ENTER key will cause the date and time to be set. When the ENTER key is pressed the display will return to the CONFIGURATION MENU B menu.

## 02 FLOW RATES

When item 02 is selected from the CONFIGURATION MENU B, the following menu will be displayed:

```

                                FLOWRATES MENU
01=A1    02=A2    03=A3    04=A4    05=A5    06=A6
07=B1    08=B2    09=B3    10=B4    11=B5    12=B6
                                MAKE A SELECTION
```

Please refer to APPENDIX B (page 47) for a list of the flow rates and their use. This section of the manual only describes how to enter the value of a flow rate. When one of the flow rates has been selected, the following message will appear on the display.

```

    ENTER NEW FLOWRATE VALUE
MINIMUM 1 DIGIT    MAXIMUM 5 DIGITS
```

0000

When this message is displayed, enter the value needed for the flow rate selected. As always, the most significant digit must be entered first. As the data is entered it will appear on the display where the "00000" is located and will be shifted from right to left as the data is entered. Once the correct data has been entered, pressing the ENTER key will store the value entered into the appropriate place in memory. The display will then revert to the FLOWRATES MENU. Another flow rate can now be selected or pressing the CLEAR key will take you back to CONFIGURATION MENU B menu.

## 03 TIME DELAYS

Selecting item 03 from the CONFIGURATION MENU B list will cause the following menu to be displayed:

```

    TIMER VALUE CHANGE MENU
1 = TIMER # 1          4 = TIMER # 4
2 = TIMER # 2          5 = TIMER # 5
3 = TIMER # 3
```

Refer to APPENDIX C (page 48) for a complete list of the timers and how they are used. This section of the manual only describes how to enter the value of a timer. When one of the timers has been selected, the following message will appear on the display.

**ENTER NEW TIMER VALUE**

**MINIMUM 1 DIGIT                      MAXIMUM 3 DIGITS**  
000

Enter the value necessary based on the use of the specific timer selected. After the data has been entered pressing the ENTER key will store the data into memory and the timer menu will again be displayed. Another timer can now be selected or pressing the CLEAR key will take you back to the CONFIGURATION MENU B menu.

**04 DISPLAY UNIT HOSE A**

Selecting item 04 from the SETUP MENU A on a dispenser not under the Weights and Measures guidelines will cause the following message to be displayed:

**DISPLAY UNIT OF MEASURE @ 1000 PP/LB**  
1=GGE      2=CUBIC FEET      3=POUNDS  
**DISPLAY UNIT OF MEASURE @100 PP/LB**  
4=GGE      5=CUBIC FEET      6=POUNDS

The purpose of this item may seem obvious but for clarification, this is the selling price of gas per unit of measure. This means the gas is sold in gasoline gallon equivalents this is the price per gallon. If gas is sold in kilograms, this is the price per kilogram. The system will automatically know where the decimal needs to be, therefore enter just the price without a decimal. When the programming mode is exited, the new price will appear on the price display. Once the price has been entered, the display will return to the SETUP MENU A.

## 05 DISPLAY UNIT HOSE B

Selecting item 05 from the SETUP MENU A will cause the following message to be displayed.

DISPLAY UNIT OF MEASURE @ 1000 PP/LB

1=GGE      2=CUBIC FEET      3=POUNDS

DISPLAY UNIT OF MEASURE @ 100 PP/LB

4=GGE      5=CUBIC FEET      6=POUNDS

There are two units of measure most often used as the basis for pricing and measuring gas for sale through a dispenser:

**GGE – Gasoline Gallon Equivalent.** In general terms, this is the amount of gas it takes to equal the equivalent energy of one gallon of gasoline. In the USA, it takes 5.66 pounds of gas to be equivalent to one gallon of gasoline. Items 2 and 3, cubic feet and pounds are usually used for test purposes within the USA.

**KG – Kilograms.**

**M<sup>3</sup> – Cubic Meters.**

If it is necessary to change the DISPLAY UNIT OF MEASURE after the dispenser leaves the factory, be aware the Micro Motion setup must also be changed and the MASS FACTOR in the dispenser program must be changed. When a selection is made the information is immediately stored in memory and the display returns to the SETUP MENU A.

## **06 LOAD DEFAULT VALUES**

From the CONFIGURATION MENUS selecting 02 = CONFI MENU B will display the following message:

### **CONFIGURATION MENU B**

01 = DATE & TIME	04 = NOT AVAILABLE
02 = FLOW RATES	05 = NOT AVAILABLE
03 = TIME DELAYS	06 = LOAD DEFAULT VALUES

To download defaults SW1 switch must be moved to the left. The SW1 switch is located on the Mainboard inside of the grey box. It is located approximately 2 inches right from the EPROM displaying the program version DSP 1.04.XX. The SW1 switch has two switches, one on top and one on bottom. The switch on top is the one moved to the left during configuration. Selecting 06, the following message will be displayed:

PLEASE WAIT  
DATA BEING TRANSFERRED  
  
NON TRANSIT DEFAULT VALUES  
HAVE BEEN LOADED  
PRESS CLEAR KEY TO CONTINUE

When the CLEAR key is pressed the display returns to the CONFIGURATION MENU B MENU. Pressing the CANCEL key without setting the SW1 switch back to its original position will result in an ERROR CODE 66 on the Displays and will read the following message:

!!!! WARNING !!!!  
CONFIGURATION SWITCH IS ACTIVATED

#### DE-ACTIVATE SWITCH

By deactivating the switch and moving it to the original position, the error code flashing will stop and will exit out of the program

#### NOTE

**Normally, this feature should only be used at initial startup by the factory. If changes have been made to the dispenser setup, using this feature will undo all of the changes made. Not only will the changes be undone, the transaction memory will also be erased. It is recommended this feature be used only if it is deemed necessary.**

#### DISPLAY MENUS

The display menus are the means by which the variable parameters used by the dispenser program can be viewed. By entering an access code, the following message is displayed:

##### MAIN MENU SELECTION

01 = CONFIGURATION MENUS

02 = DISPLAY MENUS

CANCEL KEY = EXIT

#### DISPLAY MENU A

Selecting item 02 from the MAIN MENU will cause the following message to be displayed:

##### DISPLAY MENU SELECTION

01 = DISPLAY MENU A

02 = DISPLAY MENU B

CANCEL KEY = EXIT

Selecting item 01 will cause the following information to be displayed:

DISPLAY DATA MENU A

01=TARGET PRESSURES	04=DATE & TIME
02=FLOW RATE VALUES	05=HOSE TOTALS
03=TIME DELAYS	06=MASS FACTOR

By selecting 01 for the Target Pressures, the following message will be displayed:

ASSIGNED HOSE PRESSURES

HOSE #1		HOSE #2	
ASSIGNED TEMP COMP		ASSIGNED TEMP COMP	
3600	3600	3600	3600

In the USA today, two pressure ranges are commonly used. They are 3600 psi and 3000 psi. These pressure ranges are specified at 70 degrees Fahrenheit. The temperature compensated value is the pressure to which the vehicle will be filled when the temperature is something other than 70 degrees Fahrenheit. In the example above, the temperature is above 70 degrees. When the data has been observed and are ready to view the next data, press the CLEAR key. When the clear key is pressed, the display will return to the DISPLAY DATA MENU A.

Selecting item 02 will cause the following information to be displayed:

SYSTEM FLOWRATES

A1 = 02000	A2 = 02000	A3 = 02000	A4 = 02000
A5 = 01500	A6 = 13000	B1 = 02000	B2 = 02000
B3 = 02000	B4 = 02000	B5 = 01500	B6 = 13000

Please refer to APPENDIX B (page 47) for the meaning and use of the flow rates.

Selecting item 03 will cause the following information to be displayed:



SYSTEM TIMER VALUES

TIMER	TIMER	TIMER	TIMER	PULSE
ONE	TWO	THREE	FOUR	TIMER
03	03	03	90	04

Please refer to APPENDIX C (page 48) for the list of timers and how they are used in the system.

Selecting item 04 will cause the following information to be displayed.

SYSTEM DATE AND TIME

YEAR	MONTH	DAY	HOUR	MINUTE
2015	JULY	04	13	01

Selecting item 05 will cause the following information to be displayed.

DISPENSER TOTALIZERS

HOSE # 1		HOSE # 2	
VOLUME	MONEY	VOLUME	MONEY
00000100	000124.37	00000992	001225.78

This display shows the total number of whole “units of measure” have been dispensed through each hose. The totalizer is a 7-digit counter. This provides the ability to display up to 9,999,999 units and then start at zero again.

Selecting item 06 will cause the following information to be displayed:

THE CURRENT MASS FACTOR IS

HOSE A	HOSE B
0566	0566

This example indicates the current mass factor is 5.66. This represents 5.66 pounds per unit of measure, i.e. this is the normal mass used for a “gasoline gallon equivalent”.

## DISPLAY MENU SELECTION

Selecting item 02 from the DISPLAY MENU SELECTION list will cause the following menu to be displayed:

### DISPLAY DATA MENU B

01 = PRESS CAL VALUES	04 = MAX PRESSURES
02 = PULSES PER UNIT	05 = PROGRAM VERSION
03 = DISPLAY UNIT	06 = ENA/DA FUNCTIONS

Selecting item 01 will cause the following information to be displayed:

### PRESSURE CALIBRATION VALUES

HOSE #1		HOSE #2	
ZERO	SPAN	ZERO	SPAN
-026	5000	+018	5000

In this example, with no adjustment for zero and with no pressure on the sensors the dispenser was reporting a pressure for hose # 1 (side a) of -026 psi and for hose # 2 +018 psi. The sensor calibration procedure requires to enter the pressure reported as the zero offset. With a zero value of -026 loaded, the dispenser will report a pressure of +0000 psi for Hose 1 and with a zero value of +018 loaded for Hose 2 the dispenser will report a pressure of +0000 psi for hose # 2. The pressure range for both sensors is 0 to 5000 psi.

Selecting item 02 will cause the following information to be displayed:

### OUTPUT PULSES PER UNIT OF MEASURE

HOSE # 1	HOSE # 2
1000/GAL	1000/GAL

In this example the dispenser will put out one pulse for each pulse it receives from the Micro Motion meter.

Selecting item 03 will cause the following information to be displayed:

### DISPLAY UNIT OF MEASURE IS

HOSE A	HOSE B
GAL AT 1000 PP/LB	GAL AT 1000 PP/LB

Selecting item 04 will cause the following information to be displayed:

THE CURRENT MAXIMUM PRESSURES ARE

FOR 3000 PSI  
3700

FOR 3600 PSI  
4450

Selecting item 05 will cause the following information to be displayed:

DISPENSER PROGRAM  
VERSION DSP 1.04.12 06-09-2015  
MAN MACHINE INTERFACE PROGRAM  
VERSION MMI 1.04.12 6-21-2015

This example displays the version number and date of the dispenser control program. It also displays the version number and date of the program allowing communication with the dispenser using the keypad and alphanumeric display.

## COMPUTER USE

Using a computer to communicate with the dispenser program is somewhat different than using the keypad and display. One of the differences is more data is displayed at a time. In addition, there are things done from the computer is not available via the keypad. Communications with a Micron Motion Meter can only be done via the computer. There is a special method of communicating with Micro Motion, and is covered in detail later in this manual. One more thing done from the computer is a diagnostics routine and is discussed in detail later in this manual. Another difference is an access code is not required with the computer. This approach has been taken with the idea anyone who has access to the internal components of the dispenser and has a computer is authorized to access the operating parameters. The style of communication is the same however. This is the communication protocol is menu driven.

In order to gain access with the computer, is by connecting a communications cable from the computer to the main control board connector P13 and the computer must have a communications software program allowing serial ASCII communications at 9600 baud, 7 data bits, 1 stop bit, and even parity.

Once the computer is connected, access is gained by pressing the “enter” key. If the computer is setup correctly, the following menu is displayed:

\*\*\*\*\* LOCAL MAIN MENU \*\*\*\*\*

A = DISPLAY DATA

B = SYSTEM CONFIGURATION

C = DIAGNOSTICS

SELECT A MENU ITEM

CTRL + X WILL CAUSE AN EXIT FROM ANY ROUTINE

This section of the manual will follow the menu and sub-menus. When a menu item is selected the ENTER key does not need to be pressed. The ENTER key will be used when data is to be entered.

## DISPLAY DATA

When the “A” (uppercase or lowercase letters may be used) key is pressed the following sub-menu will be displayed:

\*\*\*\*\* DISPLAY DATA MEU \*\*\*\*\*

1 = HOSE # 1 STATUS

2 = HOSE # 2 STATUS

3 = DISPLAY UNIT OF MEASURE

4 = DISPENSER TOTALS

5 = LAST TEN TRANSACTIONS

6 = DISPLAY DATE AND TIME

7 = DISPLAY TARGET HOSE PRESSURES

8 = FLOW RATES

9 = TIMER VALUES

SELECT A MENU ITEM

CTRL + X WILL CAUSE AN EXIT FROM ANY ROUTINE

When item 1= HOSE #1 STATUS or 2 = HOSE #2 STATUS is selected the following information will be displayed:

SWITCHES				VALVES							
AUTH	HNDL	STRT	PSW	DEL	BNK2	BNK3	RESC	PRES	FR	QUANTITY	TEMP
ON	ON	OFF	ON	CLSD	CLSD	CLSD	CLSD	+3900	0000	000.000	+070

This information will be displayed and continually updated until the control (Ctrl) key and the X key are pressed at the same time. AUTH represents the authorization input voltage and in this case, we are showing it to be on. HNDL represents the handle switch or “stop” switch as it is sometimes identified. In this representation, it is showing to be “on”. This is showing the switch in the position it must be in for the dispenser to dispense gas. If this switch is activated at any time during a dispensing operation, the operation will stop immediately. STRT represents the start switch. This switch will always be “off” until it is activated to start a dispensing operation. PSW represents the “over pressure” pressure switch. Should this switch become activated it will stop a dispensing operation immediately or will not allow a dispensing operation to begin until it becomes deactivated. DEL represents the delivery valve. This first valve will be opened in any dispensing operation.

You can also think of this valve as the bank #1 (or low bank) valve. BNK2 represents bank #2 (or mid bank) valve. This valve is the second valve opened during a dispensing operation. BNK3 represents bank #3 (or high bank) valve and is the last valve opened in a dispensing operation. RESC represents a condition known as “reset complete”. This condition occurs after a dispensing operation has been initiated and the dispenser gone through the process of resetting the volume and money counters and is ready to dispense gas. When this happens, a relay is closed which provides a voltage output to be used by other equipment (such as a card system). PRES is pressure and is the pressure is sensed on the vehicle side of the delivery valve. If this data is being displayed during a fueling operation, watch the pressure rise as the fill process takes place. FR represents flow rate. The gas is being dispensed in this rate. It is displayed in the same value as the unit of measure used for volume.

When 3 = DISPLAY UNIT OF MEASURE is selected, the following message will be displayed:

DISPLAY UNIT OF MEASURE IS

HOSE A

HOSE B

USGALLONEQUIVALENT@1000PP/LB USGALLONEQUIVALENT@1000PP/LB

GASOLINE GALLON EQUIVALENT  
 CUBIC FEET  
 POUNDS  
 KILOGRAMS  
 CUBIC METERS

The message displayed will depend on how your dispenser is set up.

When item 4 = DISPENSER TOTALS is selected the following message will be displayed:

DISPENSER HOSE TOTALS			
HOSE # 1		HOSE # 2	
VOLUME	MONEY	VOLUME	MONEY
00000162	000186.91	00000240	000200.61

This represents the total volume dispensed through each hose for all transactions on the hose. The volume shown is always in whole units of measure. Fractions of units of measure are never displayed.

When item 5 = LAST TRANSACTIONS is selected the following data will be displayed:

H#	QTY	MONEY	TEMP	PRES	YR	MO	DA	H	M	EC
2	002.203	0002.72	+070	+3442	15	04	13	09	21	09
1	003.024	0003.73	+070	+3418	15	04	13	09	21	09
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00
0	000.000	0000.00	+000	+0000	00	00	00	00	00	00

The meaning of the column headings follows. H# is the hose number. QTY (quantity) is the volume of gas dispensed during this transaction. MONEY is the value of the gas dispensed during this transaction. TEMP is the ambient temperature in degrees Fahrenheit. PRES is the ending pressure reading for this transaction. YR is the year portion of the date. MO is the month of the year. DA is the day of the month. H is the hour of the day (remember the clock is a 24 hour clock). M is the minute of the hour. In addition, EC is the ending code for the transaction. The ending code in this format is a numeric number. The meaning of those codes is in the following table:

- 1 = NO START FLOW
- 2 = EXCESS FLOW
- 3 = MINIMUM FLOW (NOT ENOUGH GAS IN STORAGE FOR A COMPLETE FILL)
- 4 = NORMAL
- 5 = STOP SWITCH PUSHED
- 6 = AUTHORIZATION REMOVED
- 7 = PRESSURE SWITCH ACTIVATED
- 8 = OVER PRESSURE (PRESSURE TESTED BY SYSTEM)
- 9 = POWER FAIL
- 10 = (A) PRESSURE TRANSDUCER FAILURE
- 11 = (B) EXCESS VOLUME DISPENSED
- 12 = (C) START SWITCH NEVER PUSHED
- 13 = (D) DEFECTIVE TEMPERATURE SWITCH
- 14 = (E) PUMP STOP (GILBARCO)
- 15 = (F) COMMUNICATION LINK NOT WORKING
- 66 = (G) CONFIGURATION SWITCH IN WRONG POSITION

YEAR MNTH DAY HOUR MIN

2015 JULY 06 15 42

Please keep in mind the clock is a 24 hour clock.

When item # 7 is selected, the following information will be displayed:

HOSE #1		HOSE #2	
TARGET	TCP	TARGET	TCP
3600	3748	3000	3186

The values listed for target is the pressure the vehicle would be filled to when the ambient temperature is 70° Fahrenheit. TCP is the TEMPERATURE COMPENSATED PRESSURE to which the vehicle will be filled when the temperature is something other than 70° Fahrenheit. The illustration above indicates the temperature is above 70°F.

The following data will be displayed when item # 8 is selected:

SYSTEM FLOWRATES											
A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6
02000	02000	02000	02000	01500	13000	02000	02000	02000	02000	01500	13000

Please refer to APPENDIX B (page 47) for the information on how the flow rates are used.

Selecting item # 9 will cause the timer information to be displayed:

TV1	TV2	TV3	TV4	PT(MS)
03	03	03	90	04

TV represents TIMER VALUE. TV1, TV2, TV3, and TV4 are all in seconds. The range for timers 1 through 3 is one to thirty seconds. The range for timer 4 is ten to ninety seconds. PT represents PULSE TIMER. The pulse timer controls the “on” time of the pulse output measured in milliseconds. The range for this timer is one to twenty milliseconds. Please refer to APPENDIX C (page 48) for more information on the timers and their use.



## SYSTEM CONFIGURATION

When item B is selected from the main menu, the following sub-menu will be displayed:

\*\*\*\*\* SYSTEM CONFIGURATION MENU \*\*\*\*\*

1 = SET PRICE PER UNIT HOSE A

2 = SET PRICE PER UNIT HOSE B

3 = SET DATE AND TIME

4 = SENSORS CALIBRATION

5 = LOAD MIN & MAX FLOW RATES

6 = LOAD HOSE TARGET PRESSURES

7 = LOAD TIMER VALUES

8 = THIS ITEM NOT AVAILABLE

9 = THIS ITEM NOT AVAILABLE

A = THIS ITEM NOT AVAILABLE

B = THIS ITEM NOT AVAILABLE

C = THIS ITEM NOT AVAILABLE

D = LOAD DEFAULT SETUP VALUES

E = ENABLE PROLINK COMMUNICATIONS

F = LOAD MAX OPERATING PRESSURE FOR 3000 psi RANGE

G = LOAD MAX OPERATING PRESSURE FOR 3600 psi RANGE

H = ENABLE/DISABLE TEMPERATURE COMPENSATION

I = ENABLE/DISABLE DISPENSER SEQUENCING

J = ENABLE/DISABLE PRESSURE SWITCH INPUTS

K = THIS ITEM NOT AVAILABLE

SELECT A MENU ITEM

CTRL + X WILL CAUSE AN EXIT FROM ANY ROUTINE

When item # 1 or #2

is selected the following message will be displayed:

ENTER PRICE PER UNIT – UP TO 4 DIGITS

FOLLOWED BY THE ENTER KEY

You can now enter the price of the gas. When the desired price has been entered, pressing the ENTER key will cause the entered price to be stored in memory. Should a mistake be

made entering the price there are three ways to correct the error. One method is to press the ENTER key and then select this item from the menu and enter the correct data followed by the ENTER key. Another method is to enter at least four zeros, enter the correct data, and then press the ENTER key. The reason this second method is usable is the last four digits entered are the ones used. The third method is to press the CTRL key and while holding the key press the X key (the X can be either uppercase or lowercase). This will cause the SYSTEM CONFIGURATION MENU to be displayed and the same item can again be chosen. Once the ENTER key has been pressed the SYSTEM CONFIGURATION MENU will be displayed and another menu item can be selected.

Selecting item # 3 is selected from the SYSTEM CONFIGURATION MENU will display the following message:

ENTER YEAR YY, MONTH MM, DAY OF THE MONTH DD  
HOUR (24 HOUR CLOCK) HH, AND MINUTES MM  
IN THE FOLLOWING FORMAT - FOLLOWED BY THE ENTER KEY  
YYMMDDHHMM

When the date and time data has been entered and the ENTER key is pressed, the SYSTEM CONFIGURATION MENU will again be displayed. The date and time can always be checked for accuracy by exiting back to the main menu, selecting the display data menu and selecting date and time from the menu.

When item # 4 is selected from the SYSTEM CONFIGURATION MENU the following message will be displayed after moving SW1 switch to the left:

1 = HOSE 1 ZERO CALIBRATION VALUE  
2 = HOSE 1 SPAN CALIBRATION VALUE  
3 = HOSE 2 ZERO CALIBRATION VALUE  
4 = HOSE 2 SPAN CALIBRATION VALUE  
SELECT A MENU ITEM  
CTRL + X WILL CAUSE AN EXIT FROM ANY ROUTINE  
AFTER CURRENT VALUE IS DISPLAYED  
PRESS SPACE BAR TO NOT CHANGE CURRENT VALUE

When item 1, 2, 3, or 4 in this list is selected, the following type of information will be displayed.

1

-0023

AFTER CURRENT VALUE IS DISPLAYED

PRESS SPACE BAR TO NOT CHANGE CURRENT VALUE

This example indicates item 1 was selected and the current data for Hose 1 zero value is a negative 23 psi. If this value needs to be changed then enter the new data followed by the ENTER key. If the data does not need to be changed, simply press the spacebar and the display will return to the calibration menu. The same philosophy holds true for all the calibration values. See APPENDIX A (page 46) for the calibration procedure.

When item # 5 is selected from the SYSTEM CONFIGURATION MENU the following message will be displayed:

HOSE # A (SIDE 1)

FLOWRATES TO USE WHEN HOSE PRESSURE IS LESS THAN TARGET

A1 = SEQUENCE FROM BANK # 1 TO BANK # 2

A2 = SEQUENCE FROM BANK # 2 TO BANK # 3

FLOWRATES TO USE WHEN HOSE PRESSURE IS GREATER THAN TARGET

A3 = SEQUENCE FROM BANK # 1 TO BANK # 2

A4 = SEQUENCE FROM BANK # 2 TO BANK # 3

FLOWRATES USED FOR ALL PRESSURES

A5 = FULL STOP FLOWRATE HOSE # 1

A6 = MAXIMUM FLOWRATE HOSE # 1 (OPEN HOSE CONDITION)

HOSE # B (SIDE 2)

FLOWRATES TO USE WHEN HOSE PRESSURE IS LESS THAN TARGET

B1 = SEQUENCE FROM BANK # 1 TO BANK # 2

B2 = SEQUENCE FROM BANK # 2 TO BANK # 3

FLOWRATES TO USE WHEN HOSE PRESSURE IS GREATER THAN TARGET

B3 = SEQUENCE FROM BANK # 1 TO BANK # 2

B4 = SEQUENCE FROM BANK # 2 TO BANK # 3

FLOWRATES USED FOR ALL PRESSURES

B5 = FULL STOP FLOWRATE HOSE # 2

B6 = MAXIMUM FLOWRATE HOSE # 2 (OPEN HOSE CONDITION)

SELECT A MENU ITEM

CTRL + X WILL CAUSE AN EXIT FROM ANY ROUTINE

When any item in this list is selected, the following type of information will be displayed:

A1

02000

This example indicates item A1 was selected and the current data for flow rate “A1” is 02000. If this value needs to be changed then enter the new data followed by the ENTER key. If the data does not need to be changed, simply press the spacebar and the display will return to the flow-rate menu. The same philosophy holds true for all the flow-rate values.

When item # 6 is selected from the SYSTEM CONFIGURATION MENU the following information will be displayed:

HOSE TARGET PRESSURES

1 = HOSE # 1 3600psi TARGET PRESSURE

2 = HOSE # 1 3000psi TARGET PRESSURE

3 = HOSE # 2 3600psi TARGET PRESSURE

4 = HOSE # 2 3000psi TARGET PRESSURE

SELECT ONE OF THE CHOICES

CTRL + X WILL EXIT THIS ROUTINE

When any of these items is selected, the information is stored and the menu is redisplayed.

When your selections are complete, CTRL + X will return you to the configuration menu.

When item #7 is selected from the CONFIGURATION MENU the following menu is displayed:

1 = TIMER VALUE # 1

2 = TIMER VALUE # 1

3 = TIMER VALUE # 1

4 = NO FLOW TIME DURATION

5 = PULSE TIME DURATION

SELECT A MENU ITEM

CTRL + X WILL CAUSE AN EXIT FROM ANY ROUTINE

When any item is selected from the menu, the item number and the current timer value will be displayed. The following example indicates item # 2 was selected and the current value is 03.

2

03

If the value is correct simply press the spacebar and the value will not be changed and the menu will again be displayed. If however a new value is needed, type the new value

followed by the enter key and the new value will be stored and the timer menu will be displayed again. The CTRL and X keys will take you back to the configuration menu.

**!!!! CAUTION!!!!**

Loading defaults is item "D" in the configuration menu, and should only be used with the advice of factory personnel. This item is for use by factory personnel when starting a dispenser for the first time or when there have been so many changes to the dispenser setup in the field and no one knows what is now in the setup.

Item D will load a set of default parameters burned into the program chip. If changes are made to the default setup, it is highly recommended to keep a record of those changes. Please note if this feature is used all changes made to the setup will be erased.

To enable the ProLink Communications for the Micro Motion from the SYSTEM CONFIGURATION MENU press "E". Access will be denied if the configuration switch is not active.

## TESTING THE UNIT

1. Ensure all the wires are properly connected and the unit is properly grounded.
2. Apply power to the unit. The LCD displays should come on.
3. Remove the nozzle then push the start button. The unit should go through lamp test. (NOTE: Lamp test is when the displays go to all 8's and then to 0's.) The price display will show a price set at the factory. If you press the 'Start' button after you remove the nozzle there will be a short delay while the dispenser checks for all safety and pressures are ready to go.
4. Check valves for proper operation. You should hear the solenoid valves click when they are energized.
5. Check dispenser for leaks. The dispenser is checked for leaks in the factory but shipment may move things around and you should recheck for leaks.

### **In the event of a drive off and the hose breaks away from the dispenser:**

1. Make sure power is off.
2. Check for leaks and damage resulting from the drive off.
3. Depressurize the remaining short hose through the bleeder valve in the dispenser. Depressurize the long hose by moving the three-way valve from fill to vent until the pressure is gone.

Depressurize dispenser through bleeder in the dispenser. NOTE: Gauge on dispenser can be used to check for pressure. This gauge is downstream of the product valve.

4. Inspect hose for damage, retest according to hose manufacturer's suggested procedures, and reinstall.
5. Check nozzle for operation and seal.
6. Have a qualified technician inspect the hose breakaway device and reconnect using the manufacturer's instructions.

## SEQUENCE OF OPERATION FOR CNG DISPENSERS

On the dispenser termination board there is duplicate numbers for side A and side B. For this Sequence of Operation we will only be referring to the side 'A' so we will not have the letter 'A' or 'B' with the terminal number.

Before the dispenser can deliver gas there must be an authorize signal to the Authorize Input. This signal has to be either a jumper wire from terminal #L1 to #14 or you will need to loop #L1 thru a control device IE: card reader or console normally has an open (N/O) switch. When the control device decides it is OK to fuel it will close the N/O switch sending voltage back to #14 and the dispenser will reset after the nozzle switch is closed and the "Start" button is pushed.

The nozzle switch is located on a button behind the dummy nozzle holder. If the nozzle is in the rest position the switch is open, if you remove the nozzle from the rest position it will close the switch and arm the "Start" button. Pressing the "Start" button will start the reset sequence. At this time the dispenser displays will reset going to 88888 then to 00000, then as soon as the dispensers starts the reset sequence it will send a high voltage (120 VAC) to output #8. Output #8 will stay high (120 VAC) until the dispenser is finished either fueling or the nozzle switch is opened. Wire #8 is a 120 VAC output line used for an in-use indicator on card readers.

The vehicle valve will open as soon as the reset is complete. The vehicle valve will modulate as needed to control pressure to the vehicle. If at any time the dispenser sees it is full or the nozzle switch is open, the vehicle valve will shut off and stay off.

If during the fill, the minimum flow rate is reached for a given time Bank 2 valve will open. If during the fill Bank 2 valve is open and the minimum flow rate is reached for a given time Bank 3 valve will open.

If at any time, the dispenser sees the stop flow rate it will start monitoring the pressure closely by stopping flow and looking at the pressure. The flow will continue if more pressure is needed. The vehicle valve will modulate the pressure to allow the dispenser to look at vehicle pressure. If hose 'B' receives a start sequence it will independently sequence the gas without any input or consequences from side "A". The only place both hoses are tied together is at the inlet to the dispenser. If the supply tubing is not sized right or the pressure is not sufficient, it will have an effect of the dispenser rotating to high bank too fast. If the dispenser ever receives an over pressure the over pressure switch will stop flow. If the pressure drops, the switch will open and let flow continue. The over pressure switch setting is set just below the relief valve setting. A pressure transducer inside the dispenser sends the pressure signal to the head via 0 to 5 volt signal. This signal is proportional to the pressure.

**The LCD displays will have last sale value. Lift handle and the displays will blank out and reset to zero. Lifting Handle 1 closes Relay marked RL5, this relay stays on until the transaction is complete. The delivery valve is a relay marked RL8 is also turned on at the same time.**

### **REMOVING THE MAINBOARD**

1. From front of dispenser, open display panel.
2. If possible, read totals and record, using display menu from computer or keypad read and save as many of operating parameters as possible.
3. Disconnect all power to dispenser.
4. Close manual shut-off valve.
5. Open door to enclosure where main board is located.
6. Remove all cables from main board noting where each cable plugs in. Each cable should be marked to match label on control board.

### **PNEUMATIC (AIR) OPERATED PRODUCT VALVE (optional)**

1. Disconnect all power.
2. Close the manual shut off valve upstream of the dispenser.
3. Remove the pressure on the dispenser by opening the bleeder valve on the tubing for the appropriate side.
4. Close the air supply valve before the air enters the dispenser. Bleed the air off at a fitting slowly. **NOTE:** This pressure could be as high as 120 psi.
5. Disconnect the air tubing to the operator.
6. If you are sure there is no pressure on the piping to the dispenser loosen the nuts the hold the ferrules tight on the tubing. To reinstall the Swagelok fittings see the Swagelok manual for the proper procedure to retighten the fittings.

### **MICRO MOTION® SENSOR**

1. Disconnect all power.
2. Close the manual shut off valve upstream of the dispenser.
3. Remove the pressure on the dispenser by opening the bleeder valve on the tubing for the side being serviced.
4. Disconnect the wires from the terminals.
5. Remove the conduit fitting from the junction box.
6. Remove the tube fittings at the base of the sensor making sure to use a backup wrench on the tube fittings.

Reverse this process for reinstallation. The sensor and transmitter are a matched set and reprogramming of the sensor will be required if a different sensor is installed in the same place. (Call TGT for help with reprogramming.)



## **MICRO MOTION TRANSMITTER**

Contact the factory or local distributor for these changes. Micro Motion Transmitters communicate through a hand held unit called Rosemont 275 or Micro Motion software called Pro Link. The software and Rosemont 275 can be purchased from the local Micro Motion sales representative or Tulsa Gas Technologies.

Call TGT or the local distributor for help. Major reprogramming is required for this step. This should only be attempted by factory-trained technicians.

## **DISPLAY FACE**

Use a dispenser key to open the door of the display enclosure. The display is bolted to the inside of the door. Use the plastic standoffs provided to give proper spacing and isolation on the board.

## **HOSES**

1. Disconnect all power.
2. Close the manual shut off valve upstream of the dispenser.
3. Remove the pressure on the dispenser by opening the bleeder valve on the tubing for the side being serviced.
4. Remove the hose from the base.
5. Disconnect vent hose by uncoupling the JIC connector at hose base on side of dispenser.
6. Disconnect retractor ball.  
To reinstall, reattach coupling and make sure the hose is positioned so the vent hose can attach to the vent hose connector. Close bleed valve and reapply pressure by holding hose in position. Apply pressure slowly to maintain the position best for the hose. Check for leaks.
7. Fueling system must be properly grounded in accordance with NFPA 70 (NEC) to avoid static discharges, which may cause fire or explosion. Check the electrical continuity of the hose assembly monthly or before each use. The total resistance, measured from end to end must not be less than 1 M $\Omega$  for assemblies up to 15 ft. in length and less than 5 M $\Omega$  for any length or combination of lengths greater than 18 ft.

## **FILTER**

1. A filter is optional. If a filter is installed, a tag is provided stating "**WARNING - Disconnect electrical power and vent gas before servicing filter.**"
2. Bleed the pressure off the dispenser using the valve at the bottom of the filter bowl. Make sure to check and recheck pressure before trying to remove filter bowl.
3. **!!!!WARNING!!!! Serious injury or death can result from taking the filter bowl off with pressure still on the system.**

## **NOZZLE**

1. Depressurize the hose, vent any pressure in the nozzle and valve and unthread nozzle using a backup wrench on the nipple or hose to the nozzle attached. Check the O-ring in the end of the hose inserted to the treads of the nozzle and replace as needed. Any time you remove the nozzle check for corrosion on the threads. Good electrical connection at this point is necessary for a ground path back to earth ground.

## **MAINTENANCE**

1. Visual inspection of the hose assembly weekly.
2. Filter element needs to be replaced on the demand of the station.
3. Keeping the dispenser clean will prolong appearance of stainless steel and all moving parts. A compressor making oil will build up at the dispenser hose. This should be kept clean at all times.
4. A filter is optional. If a filter is installed, a tag shall be provided stating "**WARNING - Disconnect electrical power and vent gas before servicing filter.**"
5. If the system has control air, the water separator must be drained on a frequent basis.
6. The nozzle jaws should be looked at daily for wear and replaced as needed.
7. There are very few moving parts on a CNG dispenser; but, as the system is used, small leaks will appear now and then from the expansion and contraction of tubing and fitting. Check for leaks at the dispenser on a regular basis. **DO NOT USE ANY AMMONIA BASED SOAP.** This will cause corrosion to the stainless steel used in the dispenser.
8. The pneumatic operated ball valves located in the valve panel will require some attention to the stem packing now and then. Slightly snugging the packing nut will stop any leak from this area.

## TROUBLESHOOTING

**Gas leak inside the dispenser:** Use non-ammonia soap or SNOOP© (From Swagelok) to locate the leak. Replace or tighten the fitting that is loose. Depressurize dispenser before attempting to retighten any tube fitting or pipe fitting.

**Dispenser has display but will not reset:** Wire #14 AWG is the reset signal to the dispenser. If you are using a POS controller, it MUST send 120 V ac to #14 to reset the dispenser. If you have 120 V ac at #14, check the handle switch for correct operation. If the handle switch is working properly, contact the local service technician for help troubleshooting the motherboard.

**Dispenser will reset, but no gas will flow:** First, check to see if the manual shut off valves under the dispenser and on the side of the dispenser are on. You should hear the solenoid valve "click" after reset. (Some card readers control the solenoid valve. The card reader must be in the bypass mode for this test.) If you hear a click, make sure the sequence valve panel is sending you gas. If you are sure of gas pressure, remove solenoid valve and see if any debris is in the valve.

**NOTE: You do not have to remove the solenoid valve coil to inspect for debris, simply unscrew the nut on top of the coil and remove the valve from the bottom. HOWEVER, DO NOT energize the solenoid valve coil without the valve in place. This will permanently damage the coil.**

On a unit with a pneumatic operated ball valve, visually see if the valve pointer is moving when the valve is energized. If the pointer is not moving, check air supply. If it is established the valve is bad, you may send it to TGT for repair, or order a valve repair kit from TGT.

**Hose leaking oil through the jacket:** The CNG hoses are made of a thermoplastic and oil will permeate the hose in low quantities. The outer jacket is pin pricked to let the oil escape, along with any pressure leaking between the jackets. This is not a failure of the hose, but you will need to replace the hose if the oil becomes too much to handle the hose safely.

**Dispenser is locked up, i.e.; no response from anything:** Sometimes, in an electrical storm, the dispenser will not respond favorably to the sudden off/on electrical surge. If this happens, cycle the power off for 30 seconds, and then restart. If no response, call TGT for assistance.

**Dispenser resets and flows gas, but no pulser signal to a POS device.** Check polarity on pulser. The pulser is an optocoupler and should be wired per info on page 11 of this manual.

Use a pulse counter on the pulse output to see if you are getting the pulses out, or an analog voltmeter can be used by watching the deflection of the needle for a pulse indication.

Without a pulse will cause the dispenser to not deliver fuel. After 90 seconds the missing pulse detector will cut off the flow. In addition, a low flow rate of less than the rated low flow cutoff rate will cause no pulse out of the dispenser.

If there is no response from any test, call TGT or the local service technician for further help with troubleshooting the motherboard.

## **APPENDIX A**

### **PRESSURE TRANSMITTER CALIBRATION PROCEDURE**

1. Set zero offset value to zero.
2. Set span value to the pressure range of transmitter.
3. Vent pressure port of transmitter to atmosphere
4. Take pressure reading. Make note of reading whether it is positive or negative.
5. Enter this reading into zero offset value. If reading is negative, a minus sign must be entered preceding the value. It is a positive value by default.
6. Close vent port to transmitter and pressurize system.
7. Check pressure reading and compare to gauge reading.
8. If reading is less than gauge, increase span value and recheck reading.
9. If reading is greater than gauge, decrease span value and recheck reading.

**APPENDIX B**  
**FLOWRATE VALUES AND HOW THEY ARE USED**

**FLOWRATES FOR HOSE # 1**

Flow rates used when hose pressure is less than target

Flow rate "A1" = sequence from bank # 1 to bank # 2

Flow rate "A2" = sequence from bank # 2 to bank # 3

Flow rates used when hose pressure is greater than target

Flow rate "A3" = sequence from bank # 1 to bank # 2

Flow rate "A4" = sequence from bank # 2 to bank # 3

Flow rates used for all pressures

Flow rate "A5" = full stop flow rate

Flow rate "A6" = maximum flow rate (open hose condition)

**FLOWRATES FOR HOSE # 2**

Flow rates used when hose pressure is less than target

Flow rate "B1" = sequence from bank # 1 to bank # 2

Flow rate "B2" = sequence from bank # 2 to bank # 3

Flow rates used when hose pressure is greater than target

Flow rate "B3" = sequence from bank # 1 to bank # 2

Flow rate "B4" = sequence from bank # 2 to bank # 3

Flow rates used for all pressures

Flow rate "B5" = full stop flow rate

Flow rate "B6" = maximum flow rate (open hose condition)

## **APPENDIX C TIMER VALUES**

There are four adjustable timer values. These timer values are identified as TIMER VALUE # 1, TIMER VALUE # 2, TIMER VALUE # 3, and TIMER VALUE # 4.

Timer value #1 is used in the sequencing process from low bank (bank 1) to mid bank (bank 2) and from mid bank (bank 2) to high bank (bank 3) when the hose pressure is less than the target pressure. The time allowed for this value is from 1 to 60 seconds.

When the hose flow rate becomes equal to or less than the value of FLOWRATE (A1 for hose # 1) or (B1 for hose # 2), a timer is started using timer value # 1. When the flow rate has remained below the value of flow rate “A1” or “B1” consistently for the length of timer value # 1, the system will sequence from bank # 1 to Bank # 2. Timer value # 1 is also used in the same manner with FLOWRATES (B for hose # 1) or (H for hose # 2) to sequence from mid bank (bank 2) to high bank (bank 3).

Timer value # 2 is used instead of timer value # 1 when the measured vehicle pressure is higher than the target pressure. The time allowed for this value is from 1 to 60 seconds.

Timer value # 3 is used when the system has detected a vehicle full condition. The system will wait the time before retesting the vehicle for a full condition. The time allowed for this value is from 1 to 60 seconds.

Timer value # 4 is used to set the pulser output time duration. The time allowed for this value is from 1 to 20 milliseconds.

**TULSA GAS TECHNOLOGIES, INC.  
TULSA, OK**

**WARRANTY**

TULSA GAS TECHNOLOGIES, INC. WARRANTS ALL PARTS OF ITS EQUIPMENT FOR 1 YEAR, ALL TGT ELECTRONICS FOR 2 YEARS AND 6 MONTHS LABOR (**not including travel to and from the site**) FROM THE DATE OF INVOICE AGAINST DEFECTIVE MATERIAL OR WORKMANSHIP WHEN INSTALLED IN ACCORDANCE WITH OUR SPECIFICATIONS. TULSA GAS TECHNOLOGIES WILL REPAIR OR REPLACE DEFECTIVE PARTS PRE-AUTHORIZED FOR RETURN TO ITS FACTORY, TRANSPORTATION CHARGES PREPAID. THIS WARRANTY DOES NOT APPLY WHERE EQUIPMENT IS DAMAGED BY ACCIDENT, ABUSE, FAULTY INSTALLATION OR ACT OF GOD. THIS WARRANTY DOES NOT COVER ANY COSTS OF DIRECT OR INDIRECT DAMAGE TO OR LOSS OF PROPERTY OF VALUE; INJURY TO PERSONNEL REGARDLESS OF THE SEVERITY AND INCLUSIVE OF LOSS OF LIFE, DIRECTLY OR INDIRECTLY RESULTING FROM ANY OF ITS PRODUCTS WHICH HAVE BEEN SUBJECTED TO ONE OR MORE OF THE FOLLOWING:

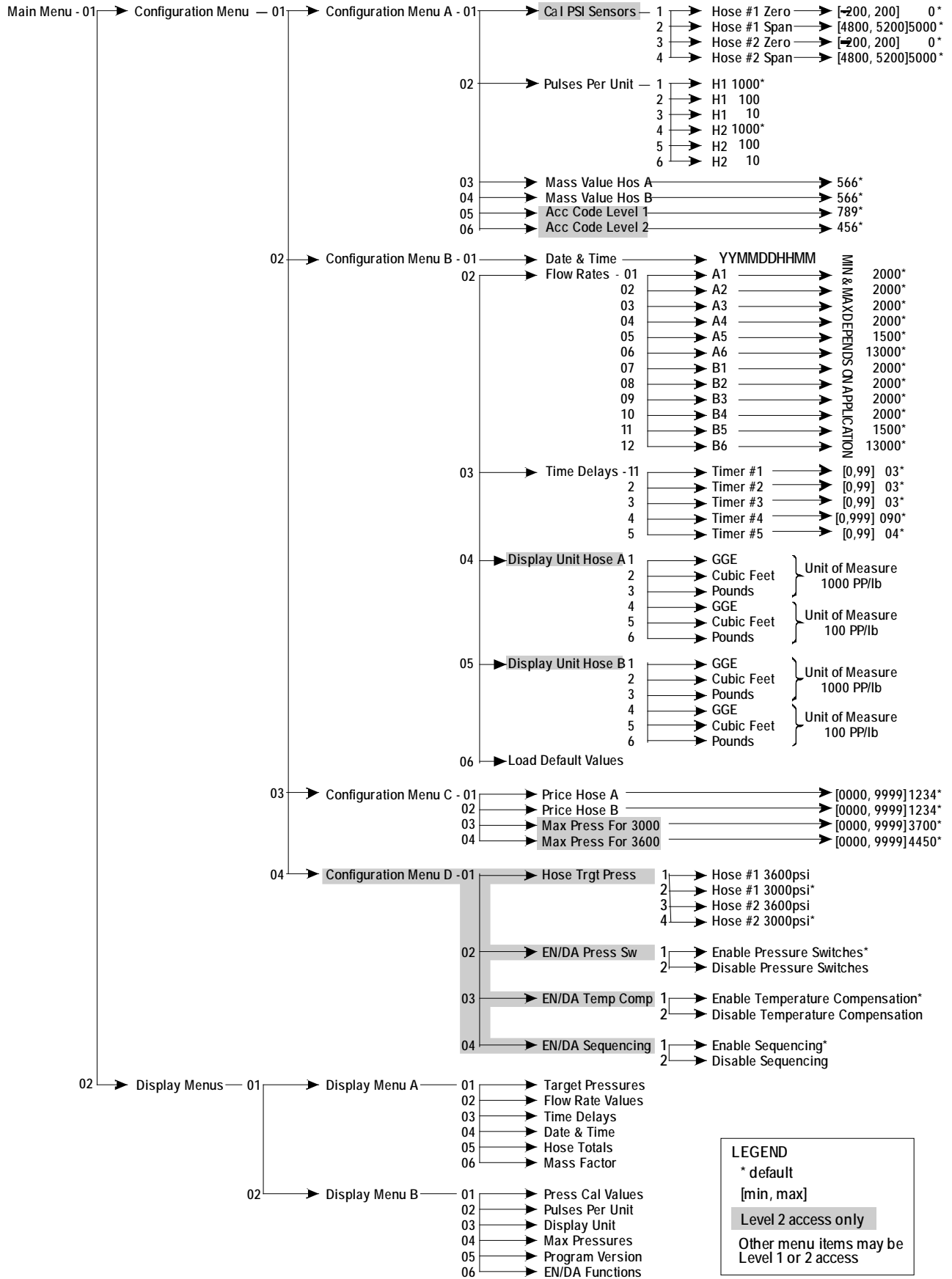
1. Improper installation or installation by unqualified personnel;
2. Misapplication, misuse or neglect;
3. Maintenance, repair, modification or adjustment by other than Tulsa Gas Technologies authorized personnel or their authorized agents;
4. Improper environments, excessive or inadequate heating or air conditioning;
5. Electrical power failures, surges or other irregularities of the electrical power line including interference generated by related or non-related electrical devices elsewhere on the power line system
6. Interference from radio frequency or microwave transmitting devices;
7. Lightning, flooding, or any other uncontrollable acts of nature; and/or
8. Operation by unauthorized personnel.

PARTS NOT SUPPLIED BY TULSA GAS TECHNOLOGIES, INC. AND CONSIDERED "WEAR ITEMS", I.E. 3-WAY VALVES, NOZZLES, ETC., ARE WARRANTIED AT THE DISCRETION OF THE MANUFACTURER.

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TULSA GAS TECHNOLOGIES MODEL 7000 DISPENSER PROGRAMMING OPTIONS MAP



**STANDARD DISPENSERS  
END / ERROR CODES FOR DISPENSER PROGRAMS**

1 = NO START FLOW

2 = EXCESS FLOW

3 = MINIMUM FLOW

4 = NORMAL

5 = STOP SWITCH

6 = AUTH. REMOVED

7 = PRESSURE SWITCH

8 = OVER PRESSURE

9 = POWER FAIL

10 = PRESSURE TRANSDUCER FAILURE

11 = EXCESS VOLUME DISPENSED

12 = START SWITCH NEVER PUSHED

13 = DEFECTIVE TEMPERATURE SENSOR

66 = CONFIGURATION SWITCH IN WRONG POSITION