Manual

MultiPrice
Water Vend Controller
Model ESDI 050200

WARNING ! ELECTRICAL SHOCK HAZARD !

AUTHORIZED PERSONNEL ONLY.

EXPOSED 120 VAC ON CIRCUIT BOARD.

THE CIRCUIT BOARD HAS MANY EXPOSED AREAS THAT ARE AT 120 VAC. CONTACTING ANY OF THESE AREAS CAN CAUSE BODILY HARM OR DEATH.

DISCONNECT POWER BEFORE SERVICING.

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MultiPrice Water Vend Controller
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1.0. General Description:

The ESDI Model 050200 MultiPrice Water Vend Controller is an electronic assembly that controls all of the functions necessary to operate an unsupervised bulk water vending machine. It is designed to vend three volumes of water (three products), each having its own price. The volumes are factory set to 1, 3, and 5 gallons in a single vend. It interfaces to any MDB (Multi Drop Bus) coin acceptor, such as the COINCO 9302-GX, or MDB bill validator that is in compliance with NAMA's "International Multi-Drop Bus Interface Standard" (October 19, 1993)

The ESDI Model 050200 is expandable to up to 12 products, with the use of additional slave boards. Each slave board vends an additional three products, so the 12 inputs can be grouped as 4 vendors, each vending 3 volumes of water. These 4 vendors can control different vend stations, or one vend station selling different types of water, such as drinking water, de-ionized water, and fluoridated water. However, it only requires the use of one coin acceptor. Please see data sheet for a variety of vending possibilities & options.

A display board provides visual feedback to the customer through a four digit 7-segment LED display, and two discrete LED's, which indicate "Use Correct Change", and "Make Alternate Selection". This display is on a separate circuit board that mounts to the front of the machine. It is the ESDI Model 050500 Display board.

2.0. Features:

2.1. Maximum Run Timer:

The controller has an internal maximum run timer that measures the vending time for each gallon. The maximum run time is set to approx. 90 seconds per gallon. If this time is exceeded, the controller will stop vending, go "Sold Out", and will not accept coins. (See Note 1) The Status Display will indicate "E". A manual reset will restart the controller.

Note 1: The Coin acceptor may still accept coins, however, once all product selections have been tried, the display will read SOLD OUT and no more coins will be accepted. At any time, pressing the coin return will return coins & reset credit.

2.2. Metered or Timer Controlled Vend:

This controller allows the manufacturer the option of using either an in line water flow sensor, or an internal timer to accurately control the amount of water vended. The board can also accommodate two types of flow sensors, high count and low count.

By far the best method for achieving an accurate vend is to use an in line water flow sensor, however, It is possible to get an accurate vend using the internal timer, if the water flow always remains constant.

If you are a manufacturer that is looking to save money on the manufacturing of your vending machine, and some overflow is not a problem, then a timed vend might be the answer.

2.3. UV Flush Option:

A flush cycle is provided to discard any hot water that is left standing in the UV lamp assembly, and to periodically refresh the vending system in general. This water is discharged out the vend nozzle and into the drain. The flush cycle runs for a period of 3 seconds. When enabled, a flush cycle will occur as follows:

Upon each power-up and manual reset.
Upon returning from a Low Water condition.
Upon returning from a Lockout condition.
Periodically, every 30 minutes after the last vend.

The flush cycle will not run if there is credit pending, if the system is in the process of vending, during a Lockout, a Low Water condition, or a UV Lamp failure. During the flush cycle, the controller will go "Sold Out" and will not accept any coins. The Status Display will indicate "F" during the flush cycle.

3.0. Sales Mode of Operation:

3.1. Credit Accumulation:

Credit may be accumulated through a coin changer, bill acceptor or card reader mechanism. Card reader credit cannot be mixed with coin and bill credit during a single transaction or vend. Credit acceptance will be disabled when the accumulated credit equals or exceeds the highest priced item.

Cash box coins and bills are enabled on an individual basis according to the inventory coins available. Cash box coins and bills will be enabled if the coinage currently held in the changer's inventory tubes is greater than the coin or bill to be accepted, plus the credit currently accumulated by the controller.

If all of the configured selections are sold out, credit acceptance will be disabled, the "Make Alternate Selection" LED will be lit and "Sold Out" will flash on the display. If the amount of card credit available exceeds the maximum displayable credit (dependent on the scale factor), the maximum credit will be displayed.

3.2. Display Activity:

3.2.1. Idle State:

The display will show the accumulated credit amount when no switch or vend activity is present. If no credit has been accumulated, zeros will be shown along with the designated decimal point. The format is dependent upon scale factor and decimal point position provided by the peripherals connected.

3.2.2. Switch Echo:

When a switch is pressed the display will show the selected item code. The item codes are as follows:

G1 = Main Control, 1 Gallon	H1 = Vend 3 Control, 1 Gallon
G2 = Main Control, 3 Gallon	H2 = Vend 3 Control, 3 Gallon
G3 = Main Control, 5 Gallon	H3 = Vend 3 Control, 5 Gallon
G4 = Vend 2 Control, 1 Gallon	H4 = Vend 4 Control, 1 Gallon
G5 = Vend 2 Control, 3 Gallon	H5 = Vend 4 Control, 3 Gallon
G6 = Vend 2 Control, 5 Gallon	H6 = Vend 4 Control, 5 Gallon

3.2.3. Vend Process:

After a switch entry is made the controller will determine if sufficient credit is available and the status of the selection. If the accumulated credit is greater than or equal to the selection price and the selection is available, a selection attempt will be made for that selection. During this time, the item code will be shown on the display. If credit is less than the selection price, the price will be flashed for 3 seconds or until a new selection switch is pressed. If the selection is not available the item code will flash for 3 seconds along with the "Make Alternative Selection" LED, or until a new selection is made.

3.2.4. Change Payment:

Depending on the status of the "Fast Change" option, change may be returned before or after a successful selection. The amount of change to be returned will be displayed until all coinage is paid back. A least coin payout algorithm will be implemented. The default setting is OFF.

3.2.5. Use Correct Change LED:

If the level of the changer's least value coin tube is below the lowest sensor, the "Use Correct Change" LED will be illuminated continuously.

3.2.6. Power-Up and Reset Initialization:

Following a power-up or reset condition, the display will show "----" until the peripherals and controller have been initialized.

3.2.7. Token Vends:

Following the acceptance of a token by an MDB peripheral, the display will show "FrEE" as the accumulated credit. Further credit acceptance is disabled and a single item may be selected to vend for the token credit.

3.3. Internal Vend and Cash Counters:

Following a successful vend, the vend counter will be incremented by one and the cash counter will be incremented by the price of the selection vended. Counter rollover occurs at 99,999,999 and $999,999.95 respectively. (Note: Test vends are not included in the counter totals.)

3.4. Options:

3.4.1. Force Vend:

The "force vend" option prevents escrow attempts of any credit accumulated by the controller. Once credit is deposited, the customer must choose a selection to vend. In the event that a vend fails on a selection, the force vend feature will be disabled. This will allow the customer to receive credit back if the item they desired cannot be vended properly. Force vend does not apply to credit accumulated by the card reader mechanism.

3.4.2. Bill Escrow:

Disabling the "bill escrow" option takes the current bill directly to the stacker regardless of the maximum selection price. The changer if desired may then escrow credit. This feature allows the controller to operate in a "bill changer" type mode. Enabling the "bill escrow" option allows the controller to operate in a normal manner by holding a bill in escrow as needed. In situations where multiple bills may be accepted, the last bill that puts the accumulated credit greater than or equal to the maximum price will be held in escrow.

3.4.3. Multi-Vend:

The "multi-vend" option allows the customer the option to vend multiple items without re-entering credit. Change will not be returned immediately after a vend and credit will remain on the display for up to 20 seconds. Escrow attempts will be valid at any time or change will be returned after 20 seconds of no vend activity. Multi-vend mode does not apply to credit accumulated by the card reader mechanism.

3.4.4. Free Vend:

The "free vend" option allows the customer to free vend items in the machine with no credit input. Any selection may be vended by entering its corresponding selection number, i.e. "G1".
The message "FrEE" will be shown on the display and all credit acceptance will be disabled whenever the "free vend" option is enabled. Disabling the "free vend" option will return the controller to the normal sales mode.

3.5. Switch Selections:

Switch selections are dedicated to item codes G1-G6 and H1-H6. Each selection will have its own dedicated sold out control to signal a sold out condition. The item codes are as follows:

G1 = Main Control, 1 Gallon	H1 = Vend 3 Control, 1 Gallon
G2 = Main Control, 3 Gallon	H2 = Vend 3 Control, 3 Gallon
G3 = Main Control, 5 Gallon	H3 = Vend 3 Control, 5 Gallon
G4 = Vend 2 Control, 1 Gallon	H4 = Vend 4 Control, 1 Gallon
G5 = Vend 2 Control, 3 Gallon	H5 = Vend 4 Control, 3 Gallon
G6 = Vend 2 Control, 5 Gallon	H6 = Vend 4 Control, 5 Gallon

4.0. Inputs and Outputs:

4.1. Flow Meter Input:

This input is for an external in line water flow meter. As water passes through the flow sensor it sends out pulses. The controller counts these pulses and compares it to the calibrated amount predetermined by the calibration switches. The controller can accommodate two different types of water meters, a high count, high flow rate water meter such as the GEMS Turbine Flow Sensor, FT-110 Series, P/N 173935 (3800 Pulses per Gallon max), and a low count, low flow water meter, such as the AMCO C700, with 200 pulses per gallon. Power in the form of +5VDC is provided to power the flow meter.

4.2. Low Water (Low Pressure) Input:

This input is connected to a water level sensor located at the lowest level of the reservoir. There must be at least 5 gallons of water left in order to complete any vend in progress. If a low water condition is detected when the controller is idle, the controller will go to "Sold Out", and will not accept coins. If a low water condition is detected while vending, the controller will complete the vend and then go "Sold Out". (See Note 1) The controller will automatically reset when the low water condition is no longer present. An open circuit on this input indicates a low water condition.

4.3. Lockout Input (UV Shut Down):

The lockout input allows an external device to disable the controller, such as an external water purity monitor, a flood switch, UV lamp, or any other device supervising the controller operation. A contact closure on this input will allow the controller to operate normally and an open will disable the controller. If this input is not used, place a jumper between Lockout and Common.

The Option-1 switch controls how this input will operate.

In the OFF position: If a lockout condition occurs while the controller is vending, it will first complete the vend and then go to lockout. If a lockout condition occurs when the controller is idle, it will lockout immediately. The controller will automatically reset and be ready to vend when the lockout is no longer present.

In the ON Position: If a lockout condition occurs, it will stop any vend immediately and go to lockout. The controller will NOT automatically reset and requires a manual reset from a technician. This is normally the position when a UV Lamp, or Flood Switch controls lockout.

When the controller is in lockout, it will go "Sold Out" and will not accept any coins. (See Note 1) The Status Display will indicate "U" when in lockout.

For UV lamp monitoring, choose a UV lamp assembly that comes with an internal circuit that monitors the lamp, and an isolated relay output to indicate a failure. This relay output should be connected to the Lockout Input, or in series with any other lockout device.

A +5VDC output is provided for low current use. However, do not make any contact with the +5VDC without first consulting the factory, as the board could be easily damaged.

4.4. Selector Switch Inputs:

The selector switch inputs are used to select the water product and quantity for vending. A contact closure to Common on any of these inputs will select that product. The switches are as follows:

Switch:	Selects The Following:	Slave Boards:
SW1	1 Gallon Vend, Station 1	None
SW2	3 Gallon Vend, Station 1	None
SW3	5 Gallon Vend, Station 1	None
SW4	1 Gallon Vend, Station 2	1 required
SW5	3 Gallon Vend, Station 2	1 required
SW6	5 Gallon Vend, Station 2	1 required
SW7	1 Gallon Vend, Station 3	2 required
SW8	3 Gallon Vend, Station 3	2 required
SW9	5 Gallon Vend, Station 3	2 required
SW10	1 Gallon Vend, Station 4	3 required
SW11	3 Gallon Vend, Station 4	3 required
SW12	5 Gallon Vend, Station 4	3 required

This input connects to the "Start Vend Switch". Once money is received, & selection is made, vending will commence upon activation of this switch.

This switch needs to be a momentary pushbutton type suitable for low current operation. Connect switch between input and common.

4.6. Power Input:

This input should be connected to a 24 VAC transformer.

Operating voltage range is 22 VAC - 32 VAC, 3.0A, 50/60 Hz.

4.7. Pump Power Output:

This output will connect to either a vend pump or a vend valve, or both. It will turn on at the beginning of a vend and turn off when the vend is completed. A separate power input is provided for the pump. This circuit is rated for 120VAC, 5 amps maximum.

5.0. Switches & Indicators:

5.1. Reset Switch:

This miniature pushbutton switch is used to reset the controller, similar to a power-up condition. When pressed, vending will stop, all errors will be reset and all pending vends will be erased.

5.2. One Gallon Calibration DIP Switch:

An 8 bit DIP switch is provided to accurately calibrate a one gallon vend. Multiple gallons will use this same calibration. This calibration is used for both the metered and timed vend, whichever is selected.

The switch represents an 8 bit binary number. Switch number 1 is the most significant bit and switch number 8 is the least significant bit. Each switch doubles the amount of water of the next higher numbered switch.

1-Gallon Calibration DIP Switch

Switch No.	Binary Weight
Switch Bit 8:	1
Switch Bit 7:	2
Switch Bit 6:	4
Switch Bit 5:	8
Switch Bit 4:	16
Switch Bit 3:	32
Switch Bit 2:	64
Switch Bit 1:	128

A suggested method for calibrating a one gallon vend:

5.2.1. Start with all switches off. Beginning with switch number 1 and working up from there, vend one gallon of water into a calibrated container.

5.2.2. Find the first single switch that will vend the most amount of water, and still be less than one gallon without overflowing. Leave that switch on.

5.2.3. Now continue with the next switch in sequence. Find all switches that can be turned on without overflowing the container.

5.2.4. Continue until you find the combination of switches that will vend exactly one gallon.

5.2.5. In the future, begin with this setting, and modify it as required.

5.3. Programming Mode Select Switch:

This is a pushbutton switch that is located under the top circuit board. It is accessible through a clearance hole on the top board, and is used to switch the mode of operation between Run/Vend & Setup/Programming. In the programming mode the ESDI 050400 Multi-Price Programmer must be connected to J1 in place of the display board.

5.4. Power Indicator:

This LED will illuminate Green when power is applied to the circuit board.

5.5. System Status Display:

The System Status display is a single digit 7 segment LED that displays the system status and any error messages, as follows:

Display " 0 "	=	Waiting for customer.
Display " 1 "	=	Vend 1 gallon.
Display " 3 "	=	Vend 3 gallons.
Display " 5 "	=	Vend 5 gallons.
Display " 8 "	=	Tests all segments at start up & reset.
Display " E "	=	Excessive vend time.
Display " F "	=	Flush cycle in progress.
Display " L "	=	Low Water.
Display " U "	=	System is in Lockout.

5.6. Credit Lamp Output:

The Credit Lamp will turn ON when the coin acceptor has issued credit, and a selection has been made. It will remain ON until the vending is completed. Connect any LED, or bulb rated for 5VDC operation. Maximum current is 200ma. Note polarity.

6.0. Connectors:

All four terminal blocks on the board are pluggable and can be pulled from the board without having to remove the individual wires from the terminal block. For convenience, the pluggable terminal blocks can be oriented either vertically or at right angles to the circuit board headers.

It is recommended that all wiring be UL type 1015, 20 AWG, minimum. The power input and pump output should be 18 AWG minimum. The terminal blocks will accommodate up to a 16 AWG wire. The maximum current rating for the connector is 12 Amps.

6.1. TB1 Selector Switch Inputs:

Normally open, SPST momentary switches control these inputs. Individual switches, or a membrane overlay switch panel may be used. Signals are either open, or closed. DO NOT APPLY ANY VOLTAGES TO THESE INPUTS, OR CIRCUIT BOARD MAY BE DAMAGED.

TB1-1	COMMON		Switch Common
TB1-2	SW1	Main board	Vend 1 Gallon
TB1-3	SW2	Main board	Vend 3 Gallon
TB1-4	SW3	Main board	Vend 5 Gallon
TB1-5	SW4	Slave Vend Board 2	Vend 1 Gallon
TB1-6	SW5	Slave Vend Board 2	Vend 3 Gallon
TB1-7	SW6	Slave Vend Board 2	Vend 5 Gallon

TB1-8	SW7	Slave Vend Board 3	Vend 1 Gallon
TB1-9	SW8	Slave Vend Board 3	Vend 3 Gallon
TB1-10	SW9	Slave Vend Board 3	Vend 5 Gallon
TB1-11	SW10	Slave Vend Board 4	Vend 1 Gallon
TB1-12	SW11	Slave Vend Board 4	Vend 3 Gallon
TB1-13	SW12	Slave Vend Board 4	Vend 5 Gallon
TB1-14	COMMON		Switch Common

6.2. TB2 Inputs and Outputs:

All inputs are low voltage (+5VDC). Signals are either open, or closed. We recommend twisted pair shielded wire be used for the Flow Meter wires, with the shield connected to common.

DO NOT APPLY ANY VOLTAGES TO THESE INPUTS. CONTACT CLOSURES ONLY.

TB2-1	Flow Meter Input (+5VDC)
TB2-2	Flow Meter Input (Signal)
TB2-3	Flow Meter Input (Common)
TB2-4	Low Water Input (Signal)
TB2-5	Low Water Input (Common)
TB2-6	Lockout Input (+5VDC)
TB2-7	Lockout Input (Signal)
TB2-8	Lockout Input (Common)
TB2-9	Start Vend Input (Signal)
TB2-10	Start Vend Input (Common)
TB2-11	Credit Lamp + Output
TB2-12	Credit Lamp – Output

6.3. TB3 Pump Power Input and Output:

All output and power inputs may be at high voltage (120VAC). Disconnect power before handling this connector. Contacting any of these areas can cause bodily harm or death.

TB3-1	Pump (or Valve) Power Output (Hot)
TB3-2	Pump (or Valve) Power Output (Neutral)
TB2-3	Pump (or Valve) Power Input (24-120VAC Neutral)
TB2-4	Pump (or Valve) Power Input (24-120VAC Hot)

6.4. TB4 Circuit Board Power Input 24 VAC:

This circuit board operates from an external 24 VAC power source, and requires less than 1 Amp. The current requirement of the power source, however, depends largely on the MDB peripherals that are used and powered by this board. Therefore, to size the transformer, one must total up the current requirement for all 24VAC devices driven by this board. In most cases, a 24VAC transformer with a 40VA rating should work.

TB4-1	Power Input (24VAC)
TB4-2	Power Input (24VAC)
TB4-3	Power Input (Chassis Ground)

6.5. J1 Display Board / Programmer Interface:

This 26 Pin connector interfaces primarily to the display board which mounts on the front of the vending machine to communicate vending information to the customer. You can use either the ESDI Model 050400/PCB, or the ESDI Model 050500 Display board for this purpose. This connector is also used to program the MDB coin and/or bill acceptor.

To program the MDB coin and/or bill acceptor, disconnect the display board and connect the programmer in its place. For detailed programming instructions, please refer to section 10.0, "Programming Mode of Operation".

6.6. J2 Interface Connector to Vend Board 2:

This 4-pin connector interfaces the main control board to the ESDI Model 050300 Vend Slave Board. Using this slave board expands the vending machine, allowing it to sell three more products per board, up to 12 products maximum. This expands to S4, S5, and S6. Requires a modular plug cable, RJ11-4P4C (Telephone handset type, not reversed).

6.7. J3 Interface Connector to Vend Board 3:

This 4-pin connector interfaces the main control board to the ESDI Model 050300 Vend Slave Board. Using this board expands the vending machine, allowing it to sell three more products. This expands to S7, S8, and S9. Requires a modular plug cable, RJ11-4P4C (Telephone handset type, not reversed).

6.8. J4 Interface Connector to Vend Board 4:

This 4-pin connector interfaces the main control board to the ESDI Model 050300 Vend Slave Board. Using this board expands the vending machine, allowing it to sell three more products. Expands to S10, S11, and S12. Requires a modular plug cable, RJ11-4P4C (Telephone handset type, not reversed).

6.9. J5 Comm. Port Interface (Optional Feature):

This is an optional feature that is not currently available.

6.10. J6 Test Connector (Do not use):

This is for factory use only.

6.11. J7 MDB Coin/Bill Acceptor Interface:

This 7-pin connector (.156" centers) interfaces to the MDB compatible peripherals. The protocol will be in compliance with NAMA's "International Multi-Drop Bus Interface Standard". Use ESDI 050210 MDB Interface Cable.

7.0. Options (DIP Switch Selectable):

7.1. OP-1:

The Option-1 switch controls the operation of the Lockout Input. See section 4.3 for further details.

7.2. MTR / TIMER Option:

This switch selects the method used to control the water quantity during vending. In the OFF position the water is metered through an in-line water flow sensor that sends out pulses related to water flow. The pulses are counted and calibrated using S3 for a precise one gallon vend.

In the ON position, water vending is controlled by an on board timer and no flow sensor is required. In order for the time vend to be accurate, however, the water flow must be constant. The timer is calibrated using DIP switches S3 for a precise one gallon vend.

7.3. WM HI / LO Option:

This option allows the user to select between two different types of water flow sensors, high count or low count. When the switch is OFF the controller will interface with a high count, high flow rate water sensor such as the GEMS Turbine Flow Sensor, FT-110 Series. When the switch is ON the controller will interface with a low count, low flow water meter, such as the AMCO C700 Flow meter with a 200 ppg output.

7.4. UV Flush Option:

A flush cycle is provided to discard any hot water that is left standing in the UV lamp assembly, and to periodically refresh the vending system in general. This water is discharged out the vend nozzle and into the drain. The flush cycle runs for a period of 3 seconds. When this switch is ON, the flush cycle will be enabled.

8.0 Specifications:

8.1. Coin / Bill Acceptor Interface:	COINCO 9302-GX, or equal with MDB (Multi-Drop Bus) interface.
8.2. Pump / Valve Interface:	Any Voltage up to 120 VAC, 5 Amps Max.
8.3. Water Sensor Interface:	GEMS Turbine Flow Sensor, FT-110, Part No. 173935 (3800 Pulses per Gallon). Or AMCO #C700 (200 Pulses per Gallon).
8.4. Vend Accuracy / Repeatability:	± 0.5 %.
8.5. Power Requirements:	
Board & MDB Peripheral:	24 VAC, 60/50 Hz, 2.5 Amp Nominal. (Note some MDB peripherals may require more current, up to 4 Amps max)
Vend Pump & Valve:	24-120 VAC 60/50 Hz, 5 Amps Max.
Operating Voltage Range:	22 VAC - 32 VAC, 50/60 Hz.
8.6. Circuit Board Assembly Size:	7.5" X 7.5".
8.7. Operating Temperature:	32° F to 150° F (0° to 65° C)
8.8. Storage Temperature:	-22° F to 167° F (-30° to 75° C)
8.9. Relative Humidity:	20% to 95% non-condensing

9.0. Radiated Frequency Protection:

It is recommended that the controller board be shielded from radiated frequencies using a metal cover. It is further recommended that service personnel or persons gaining access to the internals of the machine, observe proper ESD control measures to prevent damage to the machine.

It may be necessary for the OEM to place a line filter in the machine if external or internal sources cause conducted noise levels.

10.0 Programming (or Service) Mode of Operation:

Price setting is accomplished in the programming mode of operation. The following section tells how to setup and program all aspects of the MDB coin acceptors.

The programming can be accomplished without the use of a separate dedicated programmer, by using the display board and the 12 switch inputs. Keys 1-12 refer to switch inputs S1-S12. Keys G & H are the same as keys 11 and 12. To facilitate the programming, however, ESDI offers a separate dedicated programmer, ESDI Model 050400, with its own display and keypad. This connects to J1, in place of the display board.

The Programming Mode is entered by pressing and releasing the mode button located through a hole on the component side of the controller. A second depression of the mode button will exit the programming mode and return the controller to the Sales mode. If a period of no keypad activity occurs for 25.5 seconds, the controller will automatically revert to the Sales mode. Upon entering the programming mode, diagnostics will be displayed by the controller until an additional programming mode function has been selected. Diagnostics include the number of configured items, Multi-Drop Bus errors if configured, and defective or jammed controllers.

Entrance to the programming mode clears the current credit and disables all credit acceptances. Selections are automatically configured upon power-up and reset, and will be re-configured upon exiting the programming mode if status has been changed. Multi-Drop Bus errors are cleared upon exiting the programming mode. The following table lists the Multi-Drop Bus errors that may be displayed in the diagnostics mode.

Multi-Drop Bus Error	Display
Invalid changer scale factor	“CScF”
Defective coin tube sensor	“tSnS”
Coin jam detected	“CJAM”
Coin tube jam detected	“tJAM”
Coin acceptance problem detected	“CnEr”
Acceptor unplugged	“AcEr”
Coin changer ROM checksum bad	“ChEr”
Invalid acceptor scale factor	“bScF”
Defective bill sensor	“bSnS”
Bill jam detected	“bJAM”
Bill stacker is full	“StFL”
Bill cash box is out of position	“CShb”
Bad bill motor detected	“bMtr”
Bill acceptor ROM checksum bad	“bLEr”
Invalid card reader scale factor	“rScF”
Card error detected	“CdEr”
Invalid card detected	“bCrd”
Card reader jam detected	“rJAM”
Communications error detected	“CoEr”
Card reader failure	“brdr”

The following functions are available while in the programming mode.

10.1 Coin Dispensing:

Coins are dispensed from the inventory tubes by pressing key "1". The controller will display "Coin" and wait for an additional key to be pressed as follows:

KEY "7":	dispenses the lowest value coin tube
KEY "8":	dispenses the next highest coin tube
KEY "9":	dispenses the next highest coin tube
KEY "10":	dispenses the highest value coin tube (if available)

Coins will be paid out at a rate of approximately 2 per second as long as a key is pressed. To exit this mode press another function key or exit the programming mode.

10.2. Item Count:

The total number of items configured will be displayed by pressing key "2". The controller will test each item in the configuration to determine if a valid item is connected. The number will then be displayed in the two center most digits of the display. Empty selections will not be included in the motor count. To exit this mode press another function key or exit the programming mode.

10.3. Accountability:

Vend count and cash total accountability will be displayed by pressing key "3". The controller will display "Acct" and wait for an additional key to be pressed as follows:

KEY "7":	displays the vend count
KEY "8":	displays the cash total

The counters will be eight digit numbers displayed as the upper four for 2 seconds followed by the lower four (with decimal point) for 2 seconds. These two fields will alternate every 2 seconds until this mode is exited. To exit this mode press another function key or exit the programming mode.

10.4. Single Item Test Vend:

To test vend a single selection, press key "5". The controller will display "SLct" and wait for a selection to be entered. Once the selection is entered, press the START switch and a vend will be attempted. If the vend is successful, the controller will blank the display and exit the test vend mode. If the selected item fails, the controller will display "FAiL" for 2 seconds and then exit. To exit this mode without vending, press another function key or exit the programming mode.

Note: Test vending a selection that has been flagged as bad will reset the flag if there is a successfully completed vend.

10.5. Price Setting:

Price setting is accomplished in the programming mode of operation. To begin the price setting procedure press key "4". The controller will display "Prc " and wait for a selection to be entered.

VENDOR PRICE SETTING		
TO SET PRICE FOR:	**USING PROGRAMMER:**	**USING SELECTION SWITCH:**
Vendor 1 - 1 Gallon	Enter "G" then Enter "1"	Press sw "11" then sw "1"
Vendor 1 - 3 Gallon	Enter "G" then Enter "2"	Press sw "11" then sw "2"
Vendor 1 - 5 Gallon	Enter "G" then Enter "3"	Press sw "11" then sw "3"
Vendor 2 - 1 Gallon	Enter "G" then Enter "4"	Press sw "11" then sw "4"
Vendor 2 - 3 Gallon	Enter "G" then Enter "5"	Press sw "11" then sw "5"
Vendor 2 - 5 Gallon	Enter "G" then Enter "6"	Press sw "11" then sw "6"
Vendor 3 - 1 Gallon	Enter "H" then Enter "1"	Press sw "12" then sw "1"
Vendor 3 - 3 Gallon	Enter "H" then Enter "2"	Press sw "12" then sw "2"
Vendor 3 - 5 Gallon	Enter "H" then Enter "3"	Press sw "12" then sw "3"
Vendor 4 - 1 Gallon	Enter "H" then Enter "4"	Press sw "12" then sw "4"
Vendor 4 - 3 Gallon	Enter "H" then Enter "5"	Press sw "12" then sw "5"
Vendor 4 - 5 Gallon	Enter "H" then Enter "6"	Press sw "12" then sw "6"

Once the selection is entered, the current price will be displayed. The price is then incremented or decremented using the key of the current selection. Each time the key is released and then pressed, the direction of change is reversed. Pressing the key for longer than 4 seconds accelerates the price setting by a factor of 10. To save the price and exit this mode, press another function key or exit the programming mode. Pressing a key for another selection saves the current selection price and allows the price of the next selection to be set. The maximum price is set at $99.99 (maximum price is dependent on the scaling factor).

10.6. Vend Pulse Programming:

To program the vend pulse timing, press key "9". The controller will display "PuLS" and wait for the "9" key to be pressed again. The controller will then display the current pulse length as a three-digit value (i.e., "010"). This value is the vend pulse length in hundredths of a second. The range of time extends from (005 to 255) or 50 mS. to 2.55 seconds in 50 mS. increments. The default value is set for "050" or 500 mS. To increment or decrement the value, the "9" key is used for incrementing and decrementing. Each time the key is pressed and released, the direction of change is reversed. To exit this mode, press another function key or exit the programming mode.

10.7. Coin-to-Bill Ratio Programming:

To program the coin-to-bill ratio, press key "10". The controller will display "biLL" and wait for the "10" key to be pressed again. The controller will then display the current bill credit factor as a three-digit value (i.e., "020"). This value times the current credit scale factor equals the least value bill. For domestic use, the default value is "020" (20 x 0.05 = 1.00). The "10" key is used for incrementing and decrementing. Each time the key is pressed and released; the direction of change is reversed.) To exit this mode, press another function key or exit the programming mode.

Note: The ratio is automatically determined upon configuration of the MDB peripherals present in the system.

10.8. Vend Options:

To enable or disable the vend options, press key "11". The controller will display "OPtn" and wait for an additional key to be pressed as follows: Factory default settings are underlined.

KEY “7”:	toggles the “Force vend”	option ON/OFF
KEY “8”:	toggles the “Bill escrow”	option ON/OFF
KEY “9”:	toggles the “Multi-vend”	option ON/OFF
KEY “10”:	toggles the canned drink	option ON/OFF
KEY “12”:	toggles the “Free vend”	option ON/OFF
KEY “1”:	toggles the “pulse vend”	option ON/OFF
KEY “2”:	toggles the “fast change”	option ON/OFF

Feature	Display
Force vend enabled	“Frcy”
Force vend disabled	“Frcn”
Bill escrow enabled	“EScy”
Bill escrow disabled	“EScn”
Multi-vend enabled	“NULy”
Multi-vend disabled	“NULn”
Canned drinks enabled	“CAny”
Canned drinks disabled	“CAnn”
Free vend enabled	“FrEy”
Free vend disabled	“FrEn”
Pulse vend enabled	“PLSy”
Pulse vend disabled	“PLSn”
Fast change enabled	“FChy”
Fast change disabled	“FChn”

To exit this mode, press another function key or exit the programming mode.

11.0. Fuses:

F1 Board Fuse, 3 Amp SloBlo, 24VAC, Type 5X20 mm.
F2 Pump Fuse, 5 Amp, SloBlo, 120VAC, Type 5X20 mm.

12.0. MDB Interface Cable

ESDI 050200 to MDB Bus

PCB Pin Number:	Wire Color:	MDB Pin Number:
Pin 1	BLK	Pin 1
Pin 2	Key	
Pin 3	RED	Pin 2
Pin 4	GRN	Pin 4
Pin 5	BRN	Pin 5
Pin 6	WHT	Pin 6
Pin 7	Not Used	Empty