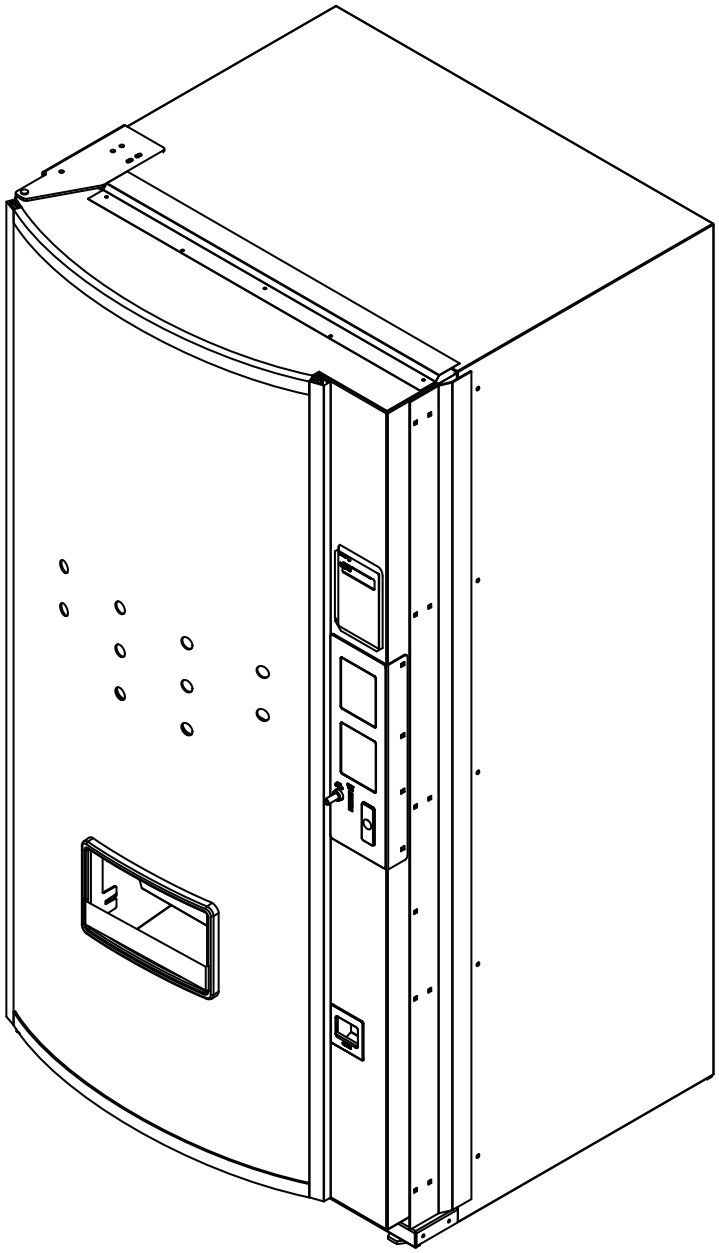
Royal Vendors, Inc.

Merlin IV Plus

Operation and Service Manual



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Safety Information

Royal Vendors' Commitment to Safety

Royal Vendors is committed to safety with all of our product designs. We are committed to notifying the user of a possible danger involving the improper handling or maintenance of our venders. The servicing of any electrical or mechanical device involves potential dangers, both to those servicing the equipment and to users of the equipment. These dangers can occur because of improper maintenance or usage. The purpose of this safety segment is to alert everyone servicing Royal equipment of potentially dangerous areas, and to provide basic safety guidelines for proper upkeep.

The service manual contains various warnings that should be carefully read to minimize the risk of personal injury. This manual also contains service information to insure that proper methods are followed to avoid damaging the vender or making it unsafe. It is also important to understand these warnings provide general guidance only. Royal could not possibly know, evaluate, or advise of all of the conceivable ways in which service might be done. Consequently, Royal cannot predict all of the possible dangerous results. These outlined safety precautions are the basis for an effective safety program. Use these safety measures, along with the service bulletins, helpful hints and product specification sheets, when installing or servicing Royal equipment.

We recommend that persons servicing our equipment maintain a similar commitment to safety. Only personnel properly trained should have access to the interior of the vender. This will minimize the potential dangers that are inherent in electrical and mechanical devices. Royal has no control over the vender once it leaves the premises. It is the owner or lessor's responsibility to maintain the vender in a safe condition. See installation insert located in the coin box of a new vender for proper installation procedures and refer to the service manual for recommended maintenance procedures. If you have any questions, please contact the Technical Service Department at +1 304 728 7056.

Safety Regulations

- Read the safety segment before installation or service.
- Test for proper grounding before installing to reduce the risk of electrical shock and fire.
- Turn off or disconnect power cord from power source before servicing.
- Only fully trained service technicians should service vender when vender has power.
- Remove any product before moving a vender.
- Use appropriate equipment when moving a vender.
- Always wear eye protection, and protect your hands, face, and body when working near the refrigeration system.
- Use only authorized replacement parts.
- Be aware of inherent dangers in rocking or tipping a vender.

Section I: Electrical Hazards General Advice

Careless or improper handling of electrical circuits can result in injury or death. Anyone installing, repairing, loading, opening, or otherwise servicing a vender should be aware of this precaution. Apply all of the normal precautions when handling electrical circuits, such as:

- Refrigeration servicing to be performed by qualified personnel only.
- Unplug the vender before servicing.
- Replace electrical cords if there is any evidence of fraying or other damage.
- Keep all protective covers and grounding wires in place.
- Plug equipment into outlets that are properly grounded and polarized (where applicable), and protected with fuses or circuit breakers of the correct size.
- All electrical connections must be dry and free of moisture before applying power.

WARNING: ALWAYS TEST TO VERIFY PROPER GROUNDING PRIOR TO INSTALLATION IN ORDER TO REDUCE THE RISK OF ELECTRICAL SHOCK AND FIRE.

Section II: Electrical Hazards

A. Servicing with Power Off

For maximum safety, unplug the power cord from the wall outlet before opening the vender door. This will remove power from the equipment and avoid electrical hazards. Service personnel should remain aware of possible hazards from hot components although electrical power is off.

B. Servicing with Power On

Some service situations may require access with power on. Only fully qualified service technicians should perform power-on servicing. Particular caution is required in servicing assemblies that combine electrical power and mechanical movement. Sudden movement (to escape mechanical action) can result in contact with live circuits and vice versa. It is therefore important to maintain maximum clearances from both moving parts and live circuits when servicing.

WARNINGS:

1. ONLY FULLY TRAINED PERSONNEL SHOULD ACCOMPLISH SERVICING WITH POWER ON. SUCH SERVICE BY UNQUALIFIED INDIVIDUALS CAN BE DANGEROUS.
2. LIGHTING CIRCUITS CAN BE HAZARDOUS. ALWAYS DISCONNECT FROM POWER SUPPLY BEFORE REPLACING A BULB OR SERVICING THE VENDER IN THAT AREA.
3. NEVER USE A HOSE, PRESSURE WASHER OR ANY CLEANING METHOD THAT COULD WET ELECTRICAL COMPONENTS. SEE CLEANING SECTION OF MANUAL FOR SUGGESTED CLEANING METHODS. IF WATER CONTAMINATION OF ELECTRICAL COMPONENTS IS SUSPECTED, USE QUALIFIED ELECTRICAL TESTING EQUIPMENT AND TEST METHODS TO ASSURE THAT VENDER IS NOT A HAZARD BEFORE APPLYING POWER FOR ANY REASON.

Merlin IV Plus Vender

General Information

Introduction

This manual contains installation, operation, and service instructions for the Royal Vendors Merlin IV Plus Vender. This manual also contains a parts catalog and electrical schematic for the Merlin IV Plus.

The Merlin IV is a microprocessor-controlled vender that permits pricing per selection from $0.00 to $99.95. The Merlin IV provides electronic space-to-sales programmability, and it will collect, store, and transfer MIS data fields to a hand-held computer (HHC) or on-line device through a DEX port.

Unpacking the Vender and Installing It On Location

Unwrap the Vender

Unwrap the vender and remove the padding. Check for any signs of damage. If the vender is damaged, contact the carrier immediately. They will instruct you on the procedure for filing a claim.

If the vender is being stored, remove the plastic stretch wrap, cardboard cover, and styrofoam cushioning first. The plastic stretch wrap and styrofoam cushioning can adhere to the exterior of the vender over an extended period of time, damaging the vender's finish.

Note: *The vender's keys are located in the coin cup.*

Remove the Shipping Skid

Separate (split) each section of the shipping skid by inserting a claw hammer, crowbar, or similar device into the slot of each section to break it apart. Tilt the vender slightly to remove the separated pieces. *(See Figure 1.1.)*

Remove the Door Block

After opening the vender's door, locate the wooden shipping block at the bottom right under the door. Lift the block straight up to remove it.

Place the Vender on Location

When placing on location, allow for a minimum of 4" (10 cm) of space at the back of the vender. This will ensure proper ventilation of the refrigeration system.

To level the vender, close and latch the vender's door. Using a spirit level, adjust the four leveling legs until the top of the vender is level left-to-right and front-to-back. Make sure all leveling legs are in contact with the floor.

Program the Vender

All programming of the vender is done in the Service Mode. For programming instructions, see the section entitled "Vender Programming," later in this book.

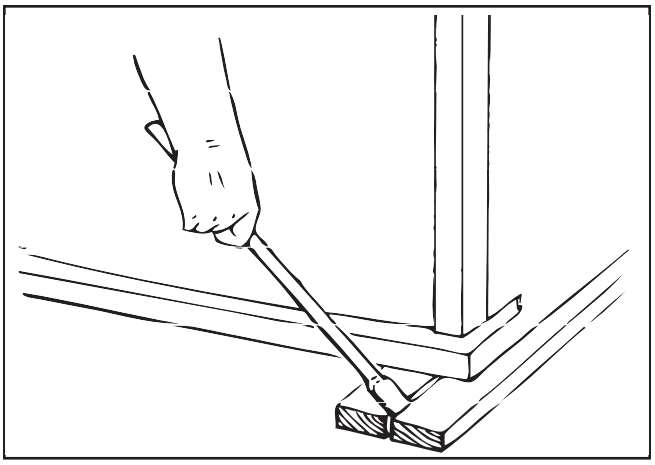


Figure 1.1: Removing the shipping skid.

Specifications

Model	768	650	542
Height	79.5" (202 cm)	72" (183 cm)	72" (183 cm)
Width	37" (94 cm)	37" (94 cm)	31" (79 cm)
Depth	34" (86.5 cm)		
Empty Weight	648 lbs (294 kg)	620 lbs (281 kg)	550 lbs (249 kg)
Operating Voltage	115 VAC, 60 Hz		
Amperage Rating	9 Amp		
Refrigerant Charge (R134a)	6.5 oz (0.18 kg)		
Construction	Steel cabinet, steel rack		
Capacity	768 cans (12 oz)	650 cans (12 oz)	542 cans (12 oz)

Voltage Requirements and Vender's Power Cord

The vender is designed to operate at a voltage of 115 volts AC, 60 Hertz. It requires the minimum of a 15 amp service, and it should be on a dedicated circuit. The service outlet voltage must not exceed 129 VAC or fall below 103 VAC.

The vender has a three-wire grounding cord. The vender must be plugged into a grounded electrical outlet to protect customers from electrical shock. If the outlet is not equipped with a grounded socket, have one installed by a qualified electrician. Do not use an extension cord, unless it has been authorized by a certified electrician. Extension cords are not recommended.

After plugging the vender's power cord into the AC voltage source, the following should be observed:

1. The fluorescent bulbs will illuminate (if the door is closed);
2. The refrigeration compressor will start to run after approximately 5-7 minutes *(with the door closed)*;
3. The evaporator fan will run; and
4. The display will light.

The control board is equipped with a battery back-up for use in the event of a power loss. The battery is used to retain important programming information, such as space-to-sales, prices, etc., so that it will not be erased if power is lost or the vender is unplugged.

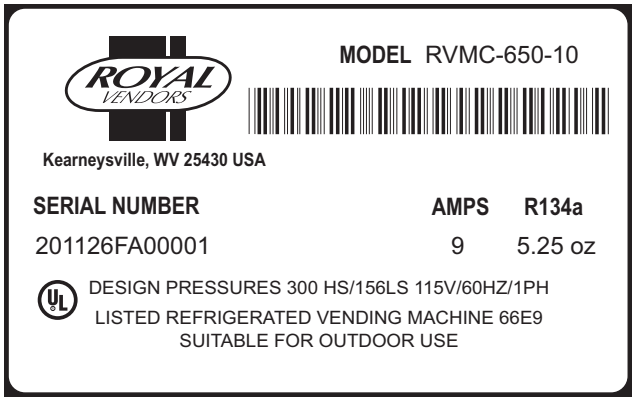


Figure 1.2: Vender serial plate.

Vender Identification

Vender Serial Plate

The vender's main serial plate (shown in Figure 1.2) is located on the exterior left side of the vender's main door and has the following information:

- Vender model number;
- Vender serial number;
- Amps required by vender;
- Unit charge of R134a; and
- Refrigeration design pressures.

The vender's model number contains three important pieces of information: the machine type, such as RVMC (Royal Vendors Magnum Curve); the vender model number, such as 650 (capacity of 650 cans); and the number of selections, such as 10.

How to read the serial number:

- The first 4 numbers represent the year the vender was produced;
- The fifth and sixth numbers represent the number of the week within that year the vender was produced;
- The first letter represents the style of the vender;
- The second letter represents the location where the vender was built; and
- The last five numbers represent the number of the vender built within that week.

Refrigeration Serial Plate

The refrigeration serial plate is located at the bottom of the vender's cabinet in front of the condenser coil. It is mounted to the refrigeration unit kick plate. It looks similar to the vender serial plate shown in Figure 1.2, with the exception that the model number specified is the refrigeration unit model number. One refrigeration unit model is used on the Merlin IV:

Model	Compressor size	Usage
8000W	Super 1/3 HP	All Merlin IV

Vender Component Explanation

Vender Control Board (including pinouts)

The control board is responsible for most vender operations. In most vender's, it is located in the upper left corner of the inside of the door. The control board is protected by a cover. Removing this cover will expose the control board, along with all wiring connections to the board.

IDENTIFICATION: The Merlin IV control board can easily be identified by noting the identification number printed on a small white decal on the control board's EEPROM chip.

OPERATION REQUIREMENTS: The control board requires approximately 24 volts AC from the low voltage transformer (described later in this section). This will allow the control board to function and to supply power to all the vender's components listed below.

OPERATION: Upon receiving the appropriate voltage from the transformer, the control board will issue information to some components, receive information from some components, and communicate both ways with some components.

- The control board issues instructions (and / or voltage) to:
  - Display
  - Vend motors
  - Refrigeration relay.
- The control board receives information (and / or voltage) from:
  - Select switches (logic level)
  - Door switch (logic level)
  - Delivery chute sensor
  - Temperature sensor.
- The control board communicates both ways with:
  - Coin mechanism
  - Bill validator (optional)
  - Card reader (optional)
  - Hand-held computer (optional).

CONTROL BOARD PINOUTS: The Merlin IV control board has several electrical pinouts, a setup mode button, a delivery sensor adjustment trimpot, a delivery sensor adjustment indicator lamp, and various other electronic components (all of which have designated position codes). The following section outlines all the control board's pinouts.

The word *key* refers to the small plastic insert plugged into a position of the connector. The purpose of the key is to prevent connecting the harnessing backwards or upside-down. The *keyed position* is a blank position within the pinout (no pin) in which a key is inserted. Some pinouts may have several blank positions with a key plugged into one or more of the positions. You can use the key to determine which end of the pinout is Pin 1.

Precautions to take when working with the control board

As with any printed circuit board, our electronics are very sensitive to Electrostatic Discharge (ESD). Simply walking across a tile or carpeted floor can generate a range of 30,000 to 50,000 volts of electricity. One ESD can be enough to seriously damage your control board or at least weaken it enough that erratic problems could occur in the future. Even a discharge surge under 100 to 200 volts is enough to create problems within the circuitry of the electronics. It is advised when storing the electronics that they be kept in anti-static bags, even if the electronics are thought to be defective. If a control board is thought to be defective and is really not, it soon will be after being charged with ESD. The ideal prevention against ESD is to use anti-static conductive wrist straps which earth you to the machine before touching the electronic boards. If it is not possible to use these, at least earth yourself before handling the electronic boards. Whatever method you use, always handle the electronic boards by the edges. Be careful not to touch the components on the control board.

Merlin IV Control Board

DISPLAY **(Position P1)**: The four-wire harness connecting to this pinout travels from the vender's LED to the control board. It allows the control board to send power to and communicate with the LED. If this harness is cut or disconnected, the LED will go blank. If this harness is pinched, broken segments may be seen on the LED, with various segments of the display lit.

PIN	WIRE COLOR	FUNCTION
1	YELLOW	5 VDC POWER
2	GREEN	CLOCK
3	BROWN	DATA
4	RED	COMMON
5	-	KEY
6	-	FUTURE USE
7	-	FUTURE USE

HS TEMP SENSOR **(Position P2)**: These pinouts are not currently used on the Merlin IV.

MDB **(Position P3)**: The five-wire serial harness connecting to this pinout provides power and communications to and from the control board for the coin mechanism, the optional 34 VDC bill validator, and / or the optional debit card reader. If this harness is cut, pinched, or disconnected, you will noticeably lose power to these items.

PIN	WIRE COLOR	FUNCTION
1	WHITE	24 VDC
2	BROWN	NEUTRAL
3	BLUE	
4	BLACK	RECEIVE
5	RED	TRANSMIT
6	GREEN	COMMON
7	-	NOT USED

CHUTE **(Position P4)**: The harness connecting to this pinout is a grey shielded cable harness. This harness is formed into the delivery impact sensor (mounted beneath the center of the delivery chute). It should never be cut, pinched, or spliced.

PIN	WIRE COLOR	FUNCTION
1	-	NOT USED
2	-	NOT USED
3	BLACK	2.5 VDC
4	RED	NEUTRAL RETURN
5	-	NOT USED
6	-	NOT USED

SELECTION SWITCHES (**Position P7**): The wiring harness connecting to this pinout carries a logic level (ground) signal from pin 11 of the control board to the common position of each select switch. Upon activation, the select switch will allow the logic level signal to travel back to the control board. This will tell the control board a particular switch is activated.

PIN	WIRE COLOR	FUNCTION
1	WHITE	SELECTION 9
2	YELLOW	SELECTION 8
3	ORANGE	SELECTION 7
4	GREEN	SELECTION 6
5	BLUE	SELECTION 5
6	BROWN	SELECTION 4
7	PURPLE	SELECTION 3
8	GREY	SELECTION 2
9	BLACK	SELECTION 1
10	-	KEY
11	RED	COMMON
12	-	NOT USED
13	-	NOT USED
14	-	NOT USED
15	-	NOT USED
16	-	NOT USED

VEND MOTORS **(Position P8)**: The fourteen-wire harness connecting to this pinout provides common power from the control board to each vend motor. There is one wire in this harness for each vend motor to provide each motor with 24 volts DC when a selection is made. Be sure that this harness is properly grounded.

PIN	WIRE COLOR	FUNCTION
1	GREEN	VEND MOTOR 1
2	RED	VEND MOTOR 2
3	YELLOW	VEND MOTOR 3
4	ORANGE	VEND MOTOR 4
5	BROWN	VEND MOTOR 5
6	BLUE	VEND MOTOR 6
7	GREEN / WHITE	VEND MOTOR 7
8	RED / WHITE	VEND MOTOR 8
9	YELLOW / WHITE	VEND MOTOR 9
10	-	KEY
11	ORANGE / WHITE	VEND MOTOR 10
12	BROWN / WHITE	VEND MOTOR 11
13	BLUE / WHITE	VEND MOTOR 12
14	BLACK	COMMON
15	GREEN / YELLOW	NEUTRAL
16	-	NOT USED
17	-	NOT USED

OPTIONS (**Position P9**): The wiring harness connecting to this pinout travels from the vender's door switch through the bottom of the vender's main door and to the control board. Pinout P9 is also used for the optional "free vend" and "no vend" key switch kits.

PIN	WIRE COLOR	FUNCTION
1	WHITE	DOOR SWITCH COMMON
2	-	KEY
3	(OPTIONAL)	FREE VEND INPUT
4	(OPTIONAL)	NO VEND INPUT
5	(OPTIONAL)	OPT SWITCH INPUT
6	PURPLE	DOOR SWITCH INPUT

HHC 1 (**Position P10**): The three-wire harness connecting to this pinout comes from the Hand Held Computer (HHC) jack, located inside the vender's main door (near the control board). The HHC plugs into this jack to read and write information from the vender's control board. If the HHC is not operating properly, check this harness for bad connections at the solder joints. Also check to ensure the insulator is not cracked from over-tightening.

PIN	WIRE COLOR	FUNCTION
1	RED	VMC RECEIVE / DEX TRANSMIT DATA (ring)
2	-	KEY
3	WHITE	VMC TRANSMIT / DEX RECEIVE DATA (tip)
4	GREEN	DEX COMMON (sleeve)

HHC 2 (**Position P11**): The three-wire harness connecting to this pinout comes from the external Hand Held Computer (HHC) jack located on top of the port assembly. The HHC plugs directly into this jack while the vender's main door is closed to read information from the vender's control board. Information cannot be written to the vender's control board unless the vender's door switch is in the "door open" position. If the HHC is not operating properly, check this harness for bad connections at the solder joints. Also check to ensure the insulator is not cracked from over-tightening.

PIN	WIRE COLOR	FUNCTION
1	RED	VMC RECEIVE / DEX TRANSMIT DATA (ring)
2	-	KEY
3	WHITE	VMC TRANSMIT / DEX RECEIVE DATA (tip)
4	GREEN	DEX COMMON (sleeve)

TEMP SENSOR **(Position P12)**: The wiring harness connecting to this pinout travels from the temperature sensor to the control board. The temperature sensor is mounted below the product chute in the vender's cabinet. This harness is moulded into the temperature sensor and should never be cut, pinched, or spliced together if cut. If the harness is cut, pinched, or improperly grounded, the sensor may give the control board false temperature readings. Refrigeration activity is based on the signal reported to the control board from this sensor.

PIN	WIRE COLOR	FUNCTION
1	RED	5 VDC POWER
2	WHITE	TEMP SENSOR SIGNAL
3	-	KEY
4	BLACK	RETURN TO COMMON

ENV CONTROLS (**Position P14**): The wiring harness connecting this pinout powers the refrigeration relay (to power the refrigeration unit). It is also responsible for powering any optional relays, such as the heater relay, evaporator fan relay, light relay, and a 24-volt DC counter. It powers each relay and counter by providing a constant 24 volts DC to each relay from pin 1. Upon activation, the control board will remain neutral for each relay, or counter, from either pins 2, 3, 4, 6, or 7.

PIN	WIRE COLOR	FUNCTION
1	2X1	24 VDC
2	2X2	HEATER RELAY
3	2X3	COMPRESSOR RELAY
4	2X4	FAN RELAY
5	-	KEY
6	2X6	LIGHT RELAY
7	-	IMPULSE COUNTER
8	-	24 VDC

24 VAC **(Position P15)**: The two-wire harness connecting to this pinout comes from the transformer. It is imperative the correct harness be connected to this pinout. If this harness is not connected (or if power is lost to the connection), the vender will noticeably lose all functions, including power to the LED display. The coin mechanism will not accept coins, and the refrigeration system will not run. With this connector, the wires can be in either position, without affecting the control board.

PIN	WIRE COLOR	FUNCTION
1	RED	24 VOLTS AC
2	BLACK	NEUTRAL

MODE SWITCH **(Position P16)**: This pinout is not currently used.

Low Voltage Transformer

The Merlin IV Vender uses a low voltage transformer which reduces 115 volts AC (conventional voltage) to 24 volts AC, to power the vender's control board. The transformer is a major contributor to the vender's operation. Without the transformer, the control board cannot function.

LOCATION OF TRANSFORMER: The transformer is located in the top of the vender's door, behind the top bulkhead. ***WARNING:*** *Before working on or near the transformer, remove power from the vender by unplugging the main power cord from the AC voltage source!*

CHECK THE TRANSFORMER AND FUSE: If upon arriving at the vender, the LED display is not lit and the coin changer does not take coins or pay out coins, make sure the vender is plugged in. Next, check the transformer's external 3-amp fuse for visual damage. Check for continuity across the fuse with a voltage meter or similar device. If defective, replace the external fuse.

1. Check the power going into the transformer at the connected red and black wires. It should register 115 volts AC. If not, check voltage coming out of the main wiring harness.
2. If 115 volts is registered in Step 1, measure voltage at the other end of the transformer. The two (2) pin connector leading to the control board should register approximately 24 volts AC. If so, check the control board; the transformer is good.
3. If 115 volts is registered during Step 1 and 24 volts AC is NOT registered during Step 2, you probably have a bad transformer. Unplug the vender, and unplug the connections at the transformer (115-volt side). Then, unplug the transformer from the control board and from the connector at the fuse box. Remove the transformer from the door. Replace it with a new transformer.

Vend Mechanism Assembly

The vend rack assembly, located in the cooling compartment of the vender, is composed of twelve product columns; six located in the front (columns one through six) and six in the rear (columns seven through twelve). Both front and rear columns are double-depth columns that can be adjusted to single-depth to accommodate packages other than 12-ounce cans. Different package types cannot be mixed within the same column.

Located in the bottom of each column is a single 12-volt DC vend motor. This motor is attached to a rotor, on which the product rests when in a normal ready position. When the control board sends power to the vend motor, the rotor rotates to drop a package and deliver it to the customer.

Delivery Chute Sensor

ADJUSTMENT: Located near the control board's chute sensor connector at position R126 is the sensor adjustment trimpot, which includes an adjustment screw. The trimpot is used to adjust and fine tune the sensor. It is capable of turning both clockwise and counterclockwise. Located adjacent to the trimpot is the sensor adjustment LED indicator light. The indicator light is mainly used to aid in adjusting the sensor but can also be used to test its operation during product impact.

1. Turn the adjustment screw clockwise until the indicator light comes on.
2. Turn the screw counterclockwise until the light just goes out.
3. Continue to turn the screw counterclockwise one (1) full turn. ***Note:*** *Slight adjustments may be needed outside the factory set one turn. Turning the adjustment screw clockwise makes the sensor more sensitive and counterclockwise makes it less sensitive. Test vend after every 1/4 turn.*

For multiple vending from all columns, make sure the sensor is adjusted to the factory specifications as listed above. Next, turn the adjustment screw clockwise 1/4 turn to increase sensitivity. Test vend columns 1 and 4, and watch light on the board for a good on and off flash. If still multiple vending, turn the adjustment screw an additional 1/4 turn clockwise until proper adjustment is made.

For dry vending (cancelled credit with no product delivery) from all columns, make sure the sensor is adjusted to the factory specifications as listed above. Next, turn the adjustment screw counterclockwise 1/4 turn to decrease sensitivity. Test vend all columns. If still dry vending, turn the adjustment screw an additional 1/4 turn counterclockwise until proper adjustment is made.

Note: *The minimum recommended setting for the chute sensor is 1/4 turn counterclockwise from the indicator light. The maximum setting is two (2) turns. If the sensor requires a setting outside the recommended 1/4 - 2 turn range, the sensor should be replaced.*

Refrigeration System

The vender's refrigeration system is responsible for the cooling of the cabinet and the products loaded within it. The refrigeration system comes as a completely sealed unit and should never be cut or tapped into, or the warranty will be voided.

Operation Requirements

The refrigeration system requires 115 volts AC from the main wiring harness for it to operate. The main wiring harness will get its voltage for the unit from the refrigeration relay.

Refrigeration Components

The refrigeration system is a sealed system. Described in this section are explanations of the refrigeration system's major components.

Compressor - The compressor is a hermetically-sealed unit located beneath (outside) the cooling compartment. The compressor is a pump, driven by the compressor motor which draws low-pressure vapor (refrigerant) from the evaporator coil, compresses it, and forces it into the condenser under high pressure. The motor is started and controlled by the refrigeration relay.

Condenser - The condenser is located beneath (outside) the cooling compartment next to the compressor. It can be seen from the front with the door open. The condenser removes heat from the high-pressure vapor discharged from the compressor and condenses it to a high-pressure liquid. The condenser and evaporator coils have aluminum fins attached to effectively increase heat exchange surfaces.

Starting Relay - The starting relay is mounted on the side of the compressor housing. The compressor motor has two windings (start winding and run winding). To give the motor torque when it first starts, the starting relay switches in the additional start winding. After the motor gets up to speed, the relay opens the start winding and the motor continues using only the run winding.

Thermal Overload - The thermal overload is a heat-sensitive device mounted on the side of the compressor housing. If the compressor motor gets too hot or draws an excessive amount of current, the thermal overload will open, breaking the circuit to the compressor. After the compressor cools to a safe operating temperature, the thermal overload will close, allowing the compressor and condenser fan motors to restart.

Condenser Fan and Motor - The condenser fan and motor, located beneath the cooling department, are a forced-air device using outside ambient air to cool the surface of the condenser coil. The condenser fan and motor run while the compressor operates.

Evaporator Coil - The evaporator coil is located in the cooling compartment. As low pressure liquid passes through the evaporator coil, it absorbs and removes heat from the compartment as it changes to vapor. The condenser and evaporator coil have aluminum fins attached to effectively increase their heat exchange surfaces.

Evaporator Fan and Motor - The evaporator fan and motor are a forced-air device circulating air throughout the cooling compartment and over the heat exchange surface of the evaporator coil.

Capillary Tube - The capillary tube is located in the refrigerant line, between the condenser and evaporator coils. The small diameter tube is used as a metering device to control the flow of liquid refrigerant to the evaporator coil. This creates low pressure causing the refrigerant to vaporize and absorb heat as it passes through the evaporator coil.

Drier - The drier is located in the refrigerant line between the capillary tube and condenser. It traps and removes moisture from the refrigeration system while allowing oil and refrigerant to pass through the system.

Accumulator - The accumulator is located in the refrigerant line between the evaporator coil and the compressor. The accumulator traps any liquid refrigerant which did not vaporize before it reaches the compressor.

Refrigeration Relay - The refrigeration relay is located in the lower left section of the vender's cabinet near the main wiring harness. The refrigeration relay is responsible for powering the compressor and condenser fan motors. The refrigeration relay consists of a coil powered by the control board (24 VDC) and a switch. When the control board completes the circuit to the refrigeration relay, the relay will energize, closing the contact between the common and the normally-open positions. When this happens, power (115 VAC) travels from the refrigeration relay to the main wiring harness for the refrigeration unit.

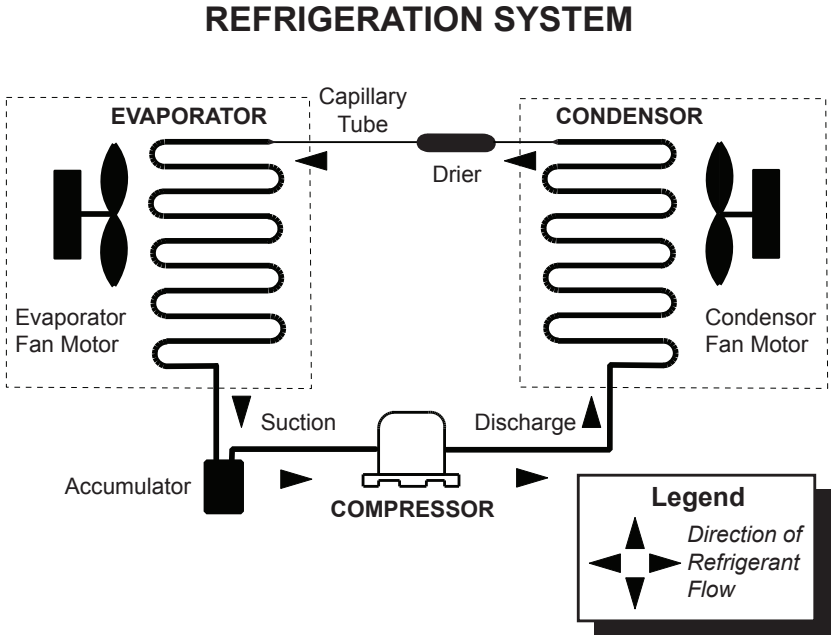


Figure 2.1: Refrigeration system flow.

Refrigeration Cycle

1. The rising temperature in the cooling compartment is reported to the control board through the temperature sensor.
2. The control board registers the current temperature inside the vender's cabinet. When it rises equal to or above the pre-programmed cut-in temperature, the control board will complete the circuit to the refrigeration relay to energize its coil.
3. The refrigeration relay coil closes the contact between the common and normally-open positions, allowing 115 volts to travel to the main wiring harness to start the compressor.
4. The compressor circulates refrigerant throughout the system by pulling low-pressure refrigerant vapor from the evaporator coil, compressing it, and forcing it into the condenser. The condenser, aided by the condenser fan motor, removes heat from the refrigerant as it flows through the condenser and releases it to the outside environment. The dropping of the refrigerant temperature changes the vapor to liquid.
5. The evaporator coil allows the liquid refrigerant to absorb heat from the cooling compartment as it evaporates in the coil.
6. The falling temperature in the cooling compartment is caused by the continual circulation of refrigerant through the system, removing heat from the cooling compartment and transporting it to the outside environment. When the temperature drops, the temperature sensor reports this to the vender's control board.
7. When the temperature drops below the preset cut-out temperature, the control board will disable the refrigeration relay, thus killing power to the refrigeration unit.

Testing the Refrigeration System

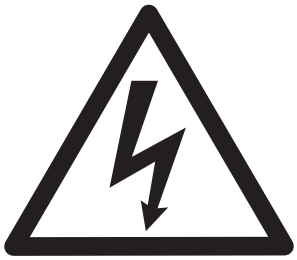
1. The sealed refrigeration unit can be tested by unplugging it from the top of the main wiring harness and plugging it directly into a power source. If the unit still does not operate, a problem exists within the sealed unit.
2. If the sealed unit runs when plugged into an external power source, the problem more than likely lies between the control board, the refrigeration relay, and the main wiring harness.

Ballast

The ballast acts as a transformer to convert conventional voltage (115 VAC) to a higher voltage required to energize the vender's fluorescent lights (upwards of 600 VAC). The ballast is located inside the vender's door. To remove the ballast from the door, use a Phillips screwdriver to remove the screws that mount the ballast to the door chassis.

WARNING: Before removing the ballast tray, remove power from the vender by unplugging the main power cord from the AC voltage source (wall outlet)!

Note: *Power to the ballast is controlled by a relay, which is in turn controlled by the logic of the vender's control board. See SECTION 3: VENDER PROGRAMMING for information on energizing this relay through the service menu for troubleshooting purposes.*



WARNING

ELECTROCUTION HAZARD

When plugging the refrigeration unit directly into a wall outlet or other external electrical source, the refrigeration unit MUST remain in the vender for proper grounding. If the unit is removed from the vender, an electrocution hazard exists.

Vender Programming

Introduction to Programming

It is very important that your vender is programmed properly. All programming of the vender options is done in the Service Mode. To enter the Service Mode, open the vender door, and press and release the service mode button that is located on the control board.

The first three selection switches are used to navigate through the service routines as follows:

Button	Meaning	Usage
1	UP	Increase, next, up
2	DOWN	Decrease, previous, down
3 (tap)	ENTER	Enter, accept, save
3 (hold)	EXIT	Exit, cancel, home

The controller will automatically return to the Sales Mode if:

- No response from the selection switches is received for approximately five minutes;
- The service mode button is pressed a second time;
- The Return to Sales mode is activated; or
- The door is actually closed.

If credit exists, the credit amount will be displayed after returning to the Sales Mode.

Button Schemes

The following illustrations show the button schemes for all Merlin IV Plus venders.

Live Display (RVDVE-650-10)

Buttons are counted from right to left, top to bottom, as shown below.

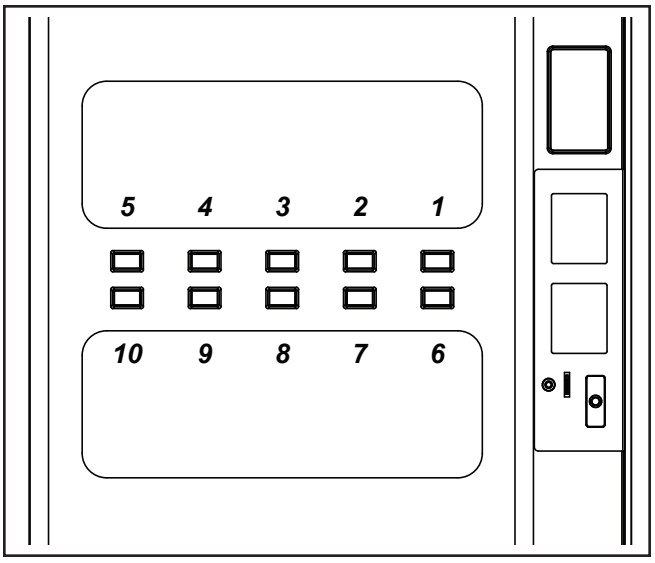


Figure 3.1: Live Display vender buttons.

All other Merlin IV Plus models

On all other Merlin IV Plus models, buttons are counted from left to right, top to bottom, as shown below. *(Note: Some models may have more or fewer buttons than this illustration.)*

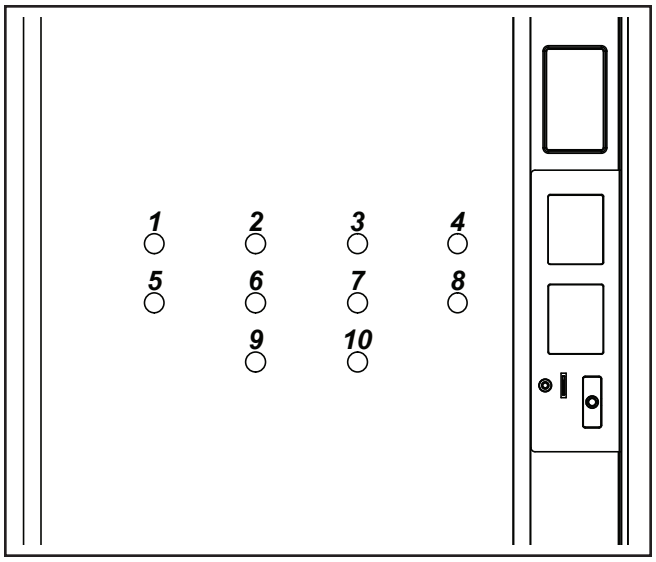


Figure 3.2: All other Merlin IV Plus vender buttons.

Menu System

When programming, you must first use the programming buttons listed above to maneuver through menus and sub-menus before you will be allowed to accomplish your task. Each menu consists of various items, or modes, such as Price Setting Mode or Space to Sales Programming Mode. There are two menus:

1. INTERNAL (Service) MENU - This menu is available only with the vender's door open. It is accessed upon pressing the control board's mode button.
2. EXTERNAL MENU - This menu is available by entering the proper external password with the vender's door closed. (See Password Preview Mode in the following section.) From this menu, cash / sales counts and vender errors can be read (but not cleared).

Note: *Programming flowchart located in rear of manual.*

Internal (Service) Menu

Opening the vender's main door and pressing the control board's service mode button will allow entry into the Internal (Service) Menu. This section outlines all the menu items.

CASH COUNTER DISPLAY MODE

If <enter> is pressed at the "CASH" prompt, the controller will enter the non-resettable cash display mode by displaying "CASH" / "XXXX" / "XX.XX," where the X's will represent total cash over the life of the vender's control board. A decimal point will be displayed in the appropriate position with the lower four digits. If the cash amount is less than five digits long, the upper four-digit set is not displayed. Using <up> or <down> will cycle through each selection as "CANN" / "XXXX" / "XX.XX," where the N's represent the appropriate selection number and the X's represent the resettable cash count for that selection. If <exit> is pressed at any time during this operation, the controller will return to the code level. Press the <up> button to proceed to the next prompt, "SALE."

CLEARING INDIVIDUAL COUNTERS: If the Configurations Mode is set to allow the individual counters to be reset, the individual counters will be reset upon reading at least one of them and closing the vender's main door.

SALE COUNTER DISPLAY MODE

If <enter> is pressed at the “SALE” prompt, the controller will enter the non-resettable vend count display mode by displaying “SALE” / “XXXX” / “XXXX,” where the X’s will represent total number of all paid vends over the life of the vender’s control board. If the sales amount is less than five digits long, the upper four-digit set is not displayed. Using <up> or <down> will cycle through each selection as “SLNN” / “XXXX” / “XXXX,” where the N’s represent the appropriate selection number and the X’s represent the resettable vend count for that selection. If <exit> is pressed at any time during this operation, the controller will return to the code level. Press the <up> button to proceed to the next prompt, “CArd.”

CLEARING INDIVIDUAL COUNTERS: If the Configurations Mode is set to allow the individual counters to be reset, the individual counters will be reset upon reading at least one of them and closing the vender’s main door.

CARD COUNTER DISPLAY MODE

If <enter> is pressed at the “CArd” prompt, the controller will enter the Card Counter Mode. The display will show “CASH” and the total historical amount of money made by sales using a debit or credit card (in the same fashion as shown in Cash Counter Mode, above). Press <up> or <down> to cycle to the card vend counter display, where the display will show “SALE” and the total historical amount of product sold using a debit or credit card. Note that individual counts for each selection are not available in the Card Counter Mode. If <exit> is pressed anytime during this operation, the controller will return to the “CArd” display. Press the <up> button to proceed to the next prompt, “toKn.”

TOKEN COUNTER DISPLAY MODE

If <enter> is pressed at the “toKn” prompt, the controller will enter the Token Counter Mode. The display will show “CASH” and the total historical amount of money made by sales using a vend token (in the same fashion as shown in Cash Counter Mode, above). Press <up> or <down> to cycle to the token vend counter display, where the display will show “SALE” and the total historical amount of product sold using a vend token. Note that individual counts for each selection are not available in the Token Counter Mode. If <exit> is pressed anytime during this operation, the controller will return to the “toKn” display. Press the <up> button to proceed to the next prompt, “FrEE.”

FREE VEND ACCOUNTING MODE

The Free Vend Accounting Mode is used to track cash counts, sales counts, and cost of all free vends. If <enter> is pressed at the “FrEE” prompt, the controller will enter the first of three sub-menus, “CASH.” If <exit> is pressed at any time during this operation, the controller will return to the code level. Press the <up> button to proceed to the next prompt, “Eror.”

If <enter> is pressed at the “CASH” prompt, the controller will enter the non-resettable cash value display mode by showing “CASH” / “XXXX” / “XX.XX,” where the X’s will represent the total equivalent value of all free vends over the life of the vender’s control board. A decimal point will be displayed in the appropriate position with the lower four digits. If the cash amount is less than five digits long, the upper four-digit set is not displayed. Using <up> or <down> will cycle through each selection as “CANN” / “XXXX” / “XX.XX,” where the N’s represent the appropriate selection number. The individual selection counts are resettable. If <exit> is pressed, the controller will return to the “CASH” prompt. Press <up> to proceed to the next prompt, “SALE.”

If <enter> is pressed at the "SALE" prompt, the controller will enter the non-resettable free vend count display mode by showing "SALE" / "XXXX" / "XXXX," where the X's will represent the total number of all free vends over the life of the vender's control board. Using <up> or <down> will cycle through each selection as "SLNN" / "XXXX" / "XXXX," where the N's represent the appropriate selection number. The individual selection counts are resettable. If <exit> is pressed, the controller will return to the "SALE" prompt. Press <up> to proceed to the next prompt, "CoSt."

If <enter> is pressed at the "CoSt" prompt, the controller will enter the free vend equivalent cost display mode by displaying "SLNN" / "XX.XX," where the N's represent the appropriate selection number. The X's represent the last saved price for that selection that is not 00.00. A decimal will be displayed in the appropriate position. Using <up> or <down> will cycle through each selection. If <exit> is pressed, the controller will return to the "CoSt" prompt. Press <exit> again to return to the "FrEE" prompt.

ERROR CODE DISPLAY MODE

This mode was designed to help diagnose vender problems. If <enter> is pressed at the "Eror" prompt, the controller will enter the error display mode. If no errors have occurred since the last error reset, the display will show "nonE." If an error has been detected since the last error reset, the display will show the first summary error code that has occurred, such as "UEnd," which would indicate a vend error. Pressing <up> or <down> will allow you to cycle through all of the summary error codes that are present. Pressing <enter> at the displayed summary error code will allow you to view the detailed error codes beneath the summary error heading. *(For a list of possible error codes, refer to "Section 6. Vender Troubleshooting.")* Pressing <up> or <down> at this point will allow you to cycle through all of the detailed error codes that are present beneath the summary error code. If the <exit> button is pressed anytime during this operation, the controller will return to the "Eror" prompt. Press the <up> button to proceed to the next prompt, "tESt."

If <up> or <down> is pressed and held for two seconds during the display of any detailed error code, that error will be cleared. If other errors exist that fall under the currently accessed detail type, the next error would be displayed. If no other errors of the current type exist, the next error summary code will be displayed, or "nonE" will be displayed if no other errors exist.

TEST VEND MODES

This mode will test the control board's ability to distribute 24 volts DC to the proper vend motor upon command. It will also test the mechanical part of the vending circuit, such as the vend motor and rotor. It does not test the control board's coin acceptance / credit / payout circuit.

Upon entry into this routine, the display will show "CO 1," indicating that a test vend from column 1 may be initiated. <Up> or <down> can be pressed to cycle through the available columns. Activation of <enter> at a displayed column will initiate a test vend on that column. Vends made while in this routine will not be added to the "SALE" mode totals. If <exit> is pressed at any time when "CONN" is displayed, the controller will return to the "tESt" prompt. Press <up> to proceed to the next prompt, "Pric."

Note: *Test vends will not affect cash or sale counters.*

PRICE SETTING MODE

If <enter> is pressed at the "Pric" prompt, the controller will enter the selection price setting mode. If multiple prices are enabled (at "C1" in configurations mode), the controller will display "ALL," for the universal selection price. If <up> is pressed, the controller will display "P 1," for the price of selection 1. The current set price for selection 1 will alternate with the "P 1" display. Using <up> or <down> will cycle through each individual selection price. If <enter> is pressed at "P XX" (where "XX" represents the selection number), the display will show the current price for the displayed selection. Use <up> or <down> to increase or decrease the price. When the desired price is on the display, use <exit> to save that price and return to the "P XX" display. If the "ALL" price is set and saved, all individual selection prices will be set to that value. Pressing <exit> while a selection is displayed will return the controller to the "Pric" prompt without saving. Use <up> to proceed to the next prompt, "StoS."

If single price mode is enabled, only the single price can be adjusted. In single price mode, "SPri" will be displayed after pressing <enter> at the "Pric" prompt. If <enter> is pressed at "SPri," the display will show the current price. Pressing <up> or <down> will increase or decrease this price. When the desired price is on the display, press <exit> to save that price and return to the "SPri" prompt, then press <exit> to return to the "Pric" prompt. Press <up> to proceed to the next prompt, "StoS."

StoS SPACE-TO-SALES PROGRAMMING MODE

The space-to-sales mode is used to determine which column(s) will vend for each selection. If <enter> is pressed at the "StS" prompt, the controller will enter the space-to-sales mode by displaying "CStS," if a custom space-to-sales configuration is currently used, or "OPtX," where "X" is the current option selected. Using <up> or <down> will cycle through the available space-to-sales options and "CStS." After setting space-to-sales and returning to the "StoS" prompt, use <up> to proceed to the next prompt, "SdEP."

There are two different types of settings available:

- Factory Standard Space-to-Sales: There are eight factory preset settings from which to choose. These settings depend on how "C12" (Configuration 12) is set *(for 12 or 10 columns)*.
- Custom Space-to-Sales: Allows you to custom-configure any column to any selection.

CStS (Custom Space-to-sales)
If <enter> is pressed at the "CStS" prompt, the controller will enter the custom space-to-sales option. Upon entry into this routine, the display will show "SLXX," followed by the current cell assignments for selection XX. If "SLXX" is flashing and not followed by a column number, there are no columns assigned to selection XX. Using <up> or <down> will cycle through all the available selections and their associated column assignments.

Pressing <enter> at the "SLXX" prompt will allow the assignment of columns to selection XX. The display will show "CoN," where "N" is the column number. If "CoN" if flashing, the column is assigned to the current selection; if "CoN" is steady (not flashing), the column is not assigned to the current selection. Using <up> or <down> will allow you to cycle through all the columns. Pressing <enter> when "CoN" is displayed will cause the column to flash (if not already assigned) or not flash (if it is already assigned). If <exit> is pressed, the display will return to the "SLXX" prompt. Once all space-to-sales assignments have been completed, press <exit> to return to the "CStS" display. Press <exit> again to return to the "StoS" prompt.

NOTE: *Selection pricing must be aligned with the space-to-sales assignments.*

OPt (Options)
When one of the options (OPtX) is on the display and <enter> is pressed, the display will begin displaying the space-to-sales assignments for that configuration. The display will show "SLXX" (where the X's represent the selection number), followed by either a blank display, indicating that no columns are assigned to that selection; or a sequence of numbers that represent the columns that are currently assigned to that selection. After each selection has been shown, the display will return to "StoS." From "StoS," press <up> to proceed to the next prompt, "SdEP."

SdEP SELECTION DEPTH SETTING MODE

If <enter> is pressed at the "SdEP" prompt, the controller will enter the by-selection column-depth setting mode by displaying "ALL." Using <up> or <down> will allow you to cycle through the individual selections. This is the selection level. If <exit> is pressed at any time during this operation, the controller will return to the "SdEP" prompt.

If <enter> is pressed the display will show "ALL" or "NN X", depending on whether the "ALL" mode is being used or an individual selection is being accessed. "NN" represents the number of the selection, and "X" represents the current column-depth setting of the selection. "X" will be "2" if set to double-depth mode (cans or other small packages) or "1" if set to single-depth mode (most bottles and other long packages). Using <up> or <down> will alternate "X" between "2" and "1." When the desired setting is on the display, pressing <exit> will save that setting and return to the selection level. If the "ALL" setting is used, all individual selections will be set to this depth. From the selection level, press <exit> to return to the "SdEP" prompt. Use <up> to proceed to the next prompt, "Con."

Con CONFIGURATIONS MODE

If <enter> is pressed at the "Con" prompt, the controller will enter the configurations mode by displaying "Cn X," where "n" is the configuration number and "X" is the current status. Using <up> or <down> will cycle through all available configuration options. If <exit> is pressed at any time during this operation, the controller will return to the "Con" prompt. From the "Con" prompt, use <up> to proceed to the next prompt, "rtn" (if "C2" is set to "0") or "ECO" (if "C2" is set to "1").

If <enter> is pressed, the display will flash "X" (the current status). Pressing <up> or <down> will cause the flashing status to toggle between "0" (disabled) and "1" (enabled). When the desired status is displayed, pressing <exit> will save that status and return the controller to the "Cn X" display.

- **C1 - Single price / multi-price**
  This option is used to toggle between the single-price and multi-price modes. In the single-price mode, one price will be used for all selections. In the multi-price mode, each selection may be set to a different price.

  If X = 0, single pricing is used.
  If X = 1, multi-pricing is used.

- **C2 - Optional menu enable**
  This option is used to enable the optional menu, which contains several more mode options than available in the standard service menu. If this configuration is set to "0," all optional menu items will be disabled.

  If X = 0, the optional menu items will not appear.
  If X = 1, the optional menu items will appear.

- C4 **- Open-door totals**
  This option is used to turn on the display of the total machine sales and total machine cash values in the open-door mode.

  If X = 0, only error codes or "nonE" are displayed.
  If X = 1, sales and cash totals will be displayed, and "Eror" or "nonE" will replace the error codes when the door is opened.

- C5 **- Door switch reset**
  This option is used to allow the door switch to reset all resettable MIS (resettable cash and sales counts, etc.).

  If X = 0, all resettable MIS registers are reset only when the "CF" command is received from the hand held device (HHC).
  If X = 1, all resettable MIS registers are reset when the door switch is sensed as open and at least one of the resettable MIS registers has been read (i.e., individual cash and sales counts).

- C6 **- Cheat mode**
  This option is used to prevent vending with insufficient change to pay back correct change after a purchase. If disabled and the correct change cannot be paid back, the vend is aborted and the deposited credit is returned if possible.

  If X = 0, the cheat mode is disabled.
  If X = 1, the cheat mode is enabled.

- C7 **- Bill acceptance**
  This option is used to allow higher order bills to be accepted without the risk of cheating the customer. If enabled, a bill is not accepted unless the controller verifies that it has enough change to cover the bill's value plus any accumulated credit.

  If X = 0, high order bill acceptance is disabled.
  If X = 1, high order bill acceptance is enabled.

- C8 **- Forced vend attempt**
  This option prevents the machine from becoming a change maker. When this mode is enabled, escrow of coins is allowed until any of the following three events occurs: 1. Any bill is inserted into the bill acceptor; 2. Any "cash box" coin is inserted into the changer; or 3. The maximum vend price is reached. Once any of these conditions are met, any accumulated credit must be used toward a vend attempt, and coins will not be dispensed for credit in response to an escrow request. If a sold-out selection, or if a valid selection that becomes sold-out, is made, this option will be overridden and an escrow will be honored.

  If X = 0, forced vend attempt is disabled.
  If X = 1, forced vend attempt is enabled.

  Note that forced vend attempt has no effect on the card reader. Once a card is inserted, it can always be returned to the customer via the escrow lever on the changer or return button on the card reader.

- C9 **- Multi-vend**
  This option will allow multiple purchases without re-entering coins. If enabled, instead of immediately returning the change after a vend, the credit will remain on the display to be used for another selection. An escrow request will be honored at any time. This option will take precedence over the forced-vend option after the first vend has been completed.

  If X = 0, multi-vend is disabled.
  If X = 1, multi-vend is enabled.

- C10 **- Bill escrow**
  This option will allow escrowing of bills. If enabled, and the current bill value inserted takes the accumulated credit over the maximum price, the bill will be held in the escrow position. If the rule is disabled, bills will always go to the cash box.

  If X = 0, bill escrow is disabled (bill sent to cashbox).
  If X = 1, bill escrow is enabled.

  Conflicting Options
  In order to avoid conflicts between options and potential cheating of customers, it is recommended that the following rule be followed:

  If the cheat mode is disabled (C6 = 0), then both bill acceptance checking and bill escrow should be enabled (C7 & C10 = 1). This is the only way to ensure the customer will never be cheated.

- C11 **- Error code display**
  This option is used to set the controller to restrict error code displays. When set to "1," only certain sets of error codes will be shown.

  If X = 0, all error codes will be displayed.
  If X = 1, only certain error codes are displayed.

- C12 **- Column quantity**
  This configuration is used to set the controller for 12-column operation (models 768 and 650) or 10-column operation (model 542). *It is imperative that this configuration be set correctly for the vender model.*

  If X = 0, the controller is set for 12 columns.
  If X = 1, the controller is set for 10 columns.

- C14 **- ENERGY STAR® Tier Setting**
  ENERGY STAR is a government-led program to promote energy-efficient products. All venders built for use in the USA and Canada since April 2004 are ENERGY STAR-compliant. Beginning with serial numbers 200724 and after, these venders are now ENERGY STAR Tier 2-compliant, which denotes even greater energy efficiency. Tier 2-compliant venders can be identified by the placement of the temperature sensor. In older venders, the temperature sensor was mounted on the rear cabinet wall behind the evaporator fan. On Tier 2-compliant venders, the temperature sensor is mounted in front of the evaporator, directly below the chute assembly.

  The features of ENERGY STAR Tier 2-compliant venders are:

  - Normal Mode (Energy Saving): When the main door is closed and the door switch is made, the controller will count the number of refrigeration cycles. When this number equals a stored counter, the refrigeration unit will convert from a pull-down mode, in which the evaporator fun runs continuously, to a normal mode, in which the evaporator fan runs only when the compressor is on.

  - Defrost Mode: The defrost feature is a 30-minute period in which the compressor is shut off and the evaporator fan is allowed to run. The defrost feature is initiated by a timer. The factory default is three hours, but this setting may be adjusted in the Refrigeration Control Mode from 3 to 24 hours.

  *IT IS **IMPERATIVE** THAT CONFIGURATION 11 BE SET CORRECTLY.* Possible problems due to incorrect setting of this configuration include:

  - TIER 1: If a Tier 1-compliant or non-Energy Star vender's controller is set for Tier 2 operation, the refrigeration unit could short-cycle, eventually shutting off the unit completely.

  - TIER 2: If a Tier 2-compliant vender's controller is set for Tier 1 operation, the refrigeration unit could freeze up and shut down. A "PULL" error will be shown in the vender's error codes.

  This configuration should be set as follows:

  If X = 0, the controller is set for Tier 1 operation.
  (NOTE: All venders built for use outside the USA and Canada should be set to "0.")
  If X = 1, the controller is set for Tier 2 operation.

RETURN TO SALES

If <enter> is pressed at the "rtn" prompt, the controller will return to the open-door mode. ***Note:*** *This item will only appear at this point in the menu if "C2" is set to "0."*

Optional Menu Items

Note: *The following items will only appear in the menu if "C2" is set to "1."*

EXACT CHANGE VALUE MODE

This mode controls the "Exact Change Only" light. If the machine cannot make change for the value (or lower) specified in this mode, the "Exact Change Only" light will be lit.

If <enter> is pressed when the display shows "ECO," the display will show the exact change value. Pressing <up> or <down> allows you to adjust the value. Pressing <exit> will save the currently displayed value and return the controller to the "ECO" display. From "ECO," press <up> to proceed to the next prompt, "CPO."

COIN PAYOUT MODE

If <enter> is pressed at the "CPO" prompt, the controller will enter the coin payout mode by displaying the lowest coin value that can be paid out. Pressing <up> will increase the display to show the next highest coin value, pressing <down> will decrease the display to show the next lowest coin value or wrap around. Pressing <enter> when a particular coin value is displayed will pay out the displayed coin type at half-second intervals until the button is released. All coins dispensed in this mode are counted in the MIS tube counts and the manual dispense mode counters. Pressing <exit> while a coin value is displayed will return the controller to the "CPO" prompt. Use <up> to proceed to the next prompt, "tUFL."

TUBE FILL MODE

If <enter> is pressed at the "tUFL" prompt, the controller will enter the coin tube fill mode. In this mode, you are allowed to deposit any coin that is routed to a tube. This provides total accountability. The tube inventory level for the deposited coin will be displayed after the coin is accepted. If a tube full status is detected, that coin will no longer be accepted. During this entire operation, MIS tube counts and manual fill mode counters will be updated accordingly. If <exit> is pressed at any time during this operation, the controller will return to the "tUFL" prompt. Use <up> to proceed to the next prompt, "rPO."

RECYCLER PAY OUT MODE

If <enter> is pressed at the "rPO" prompt, the controller will enter the bill payout mode by displaying the lowest bill value that can be paid out. Pressing <up> will increase the display to show the next higher bill value, if any; pressing <down> will decrease the display to show the next lower bill value or wrap around. Pressing <enter> when a particular bill value is displayed will pay out the displayed bill type. All bills dispensed in this mode are counted in the MIS manual dispense mode counters. Pressing <exit> while a bill value is displayed will return the controller to the "rPO" prompt. Use <up> to proceed to the next prompt, "dSAL."

DISCOUNTED SALE COUNTER MODE

This mode is very similar to the Sale Counter Display Mode. It permits manual extraction of the amount of product dispensed through the vender during the discounted sales periods (up to 99,999,999). This mode consists of a non-resettable total count and individual counts per selection which are resettable, depending upon the proper configuration setting.

If <enter> is pressed at the "dSAL" prompt, the controller will enter the non-resettable discount vend display mode by displaying "SALE" / "XXXX" / "XXXX," where the X's will represent total number of all discounted vends over the life of the vender's control board. If the discount sales amount is less than five digits long, the upper four-digit set is not displayed. Using <up> or <down> will cycle through each selection as "SLNN" / "XXXX" / "XXXX," where the N's represent the appropriate selection number and the X's represent the resettable discount vend count for that selection. If <exit> is pressed at any time during this operation, the controller will return to the "dSAL" prompt. Press the <up> button to proceed to the next prompt, "diFC."

CLEARING INDIVIDUAL COUNTERS: If the Configurations Mode is set to allow the individual counters to be reset, the individual counters will be reset upon reading at least one of them and closing the vender's main door.

DIFFERENTIAL CASH COUNTER MODE

This mode is comparable to the Cash Counter Display Mode. It permits monitoring of the difference between discounted prices and regular prices. This mode consists only of a non-resettable total count.

If <enter> is pressed at the "diFC" prompt, the controller will enter the non-resettable cash display mode by displaying "CASH" / "YXXX" / "XX.XX," where the X's will represent total discounted value of all discounted vends over the life of the vender's control board. If product is sold for less than the normal vend price, "Y" will be a negative sign ("-"); if product is sold for greater than the normal vend price, "Y" will be a blank. A decimal point will be displayed in the appropriate position with the lower four digits. If the discount amount is less than five digits long, the upper four-digit set is not displayed. If <exit> is pressed at any time during this operation, the controller will return to the "diFC" prompt. Press the <up> button to proceed to the next prompt, "SdiS."

SET DISCOUNT PRICING MODE

This mode is used to set discount prices for each selection. This mode works in conjunction with the built-in timer in the "tinE" mode. Before entering into the "tinE" mode, all selections to be discounted should be set to "1" in the "StCL" mode. Then, the time the discounted selections are to be activated should be set by using "dSCn," located under "dAY" in the "tinE" mode.

If <enter> is pressed at the "SdiS" prompt, the controller will enter the discount price setting mode. The display will alternately flash "ALL" and the last discount price set for all selections. If <up> is pressed, the controller will alternately display "P1" and the discount price of selection 1. Using <up> or <down> will allow the controller to cycle through each available individual discount price. This is the selection level. If <exit> is pressed at any time at this level, the controller will return to the "SdiS" prompt. Use <up> to proceed to the next prompt, "StCL."

If <enter> is pressed at the selection level, the display will continuously show the current discount price for the displayed selection. Using <up> or <down> will increase or decrease the discount price. When the desired discount price is on the display, press <exit> to save that price and return to the selection level. If the "ALL" discount price is set, all individual discount prices will be set to this value.

SET TIMER CONTROL MODE

This mode is used to choose which selections to turn off by either using the built-in timer or with the optional key switch kit. This mode must be set to enable one or all of the selections in order for the timer or key switch to operate. The timer or key switch will control any selections set to "1." Selections set to "0" will function normally.

If <enter> is pressed at the "StCL" prompt, the display will show "ALLX" or "tY X," depending on whether the "ALL" setting is being used or an individual selection is being accessed. "Y" represents the individual selection number, and "X" represents the status of "ALL" or the individual selection ("1" if enabled or "0" if disabled). The "X" character will be flashing. Using <up> or <down> will toggle "X" between "0" and "1." When the desired setting is on the display, pressing <exit> will save that setting and return the controller to the selection level. If "ALLX" is being used, all selections will be set to this value. If <exit> is pressed at the selection level, the controller will return to the "StCL" prompt. Use <up> to proceed to the next prompt, "tinE."

TIME SETTING MODE

If <enter> is pressed at the "tinE" prompt, the controller will enter the time setting mode by displaying "YEAr." Using <up> or <down> will cycle through all available time setting options. If <exit> is pressed at any time during this level of the operation, the controller will return to the "tinE" prompt. From the "tinE" prompt, use <up> to proceed to the next prompt, "FriG."

The following options can be selected in "tinE":

- "YEAr" - current year
- "dAtE" - current date (month, day)
- "hour" - current time (hours, minutes)
- "SEtd" - current day of week
- "StOP" - turn real time clock on / off*
- "dAY" - timer settings
- "dSt" - display current time
- "dLt" - daylight savings time enable / disable

** - **NOTE:** The "StOP" feature is used to conserve the control board's built-in lithium battery when the board is placed in storage for long periods of time. The shelf life of the battery is about three years with the clock turned on or about ten years with the clock turned off.*

- YEAr
  If <enter> is pressed at the "YEAr" prompt, the current year is displayed and will be flashing. Pressing <up> or <down> at this point will increase or decrease the year setting. Pressing <exit> at this point will save the displayed year setting and return the controller to the time selection level.

- dAtE
  If <enter> is pressed at the "dAtE" prompt, the current date is displayed. The left two digits of the display show the current month, and the right two digits show the current day. The month setting will be flashing. Pressing <up> or <down> at this point will increase or decrease the month setting. If <enter> is pressed, the day setting will flash. <Up> or <down> can now be used to set the day. Pressing <enter> again will cause the month setting to flash again. Pressing <exit> in this mode will save the displayed month and day settings and return the controller to the time selection level.

- hour
  If <enter> is pressed at the "hour" prompt, the current time is displayed in a 24-hour format. The left two digits of the display show the current hour, and the right two digits show the current minutes. The hour setting will be flashing. Pressing <up> or <down> at this point will increase or decrease the hour setting. If <enter> is pressed, the minute setting will flash. <Up> or <down> can now be used to set the minutes. Pressing <enter> at this point will cause the hour setting to flash again. Pressing <exit> in this mode will save the displayed hour and minutes setting and return the controller to the time selection level.

- SEtd
  If <enter> is pressed at the "SEtd" prompt, the current day of the week is shown. Pressing <up> or <down> will cycle through all days. When the desired day is selected, press <exit> to save the displayed day setting and return the controller to the time selection level.

- StOP
  If <enter> is pressed at the "StOP" prompt, the display will alternately show "CLOC" / "StOP". If <enter> is pressed at this point the system clock will be shut off, the display will show "OFF" for approximately 1/2 second, and then the display will return to the "StOP" prompt. If <exit> is pressed at the "CLOC" / "StOP" prompt, the controller will return to the "StOP" prompt without turning off the system clock. To restart the system clock, use the "hour" feature to reset the current time. When the current time is reset, the battery will be turned on automatically.

- dAY
  If <enter> is pressed at the "dAY" prompt, the controller will enter the time range programming function to allow the timer on / off times to be set for each day of the week. The display will show "ALL." From this point, there are two different options: "ALL," to allow the timer to function at the same time settings every day of the week; and individual day settings for using different time blocks for different days. Pressing <up> or <down> will cycle through "ALL" and each day of the week. If <enter> is pressed, either at "ALL" or an individual day, the controller will enter into that particular day. The display will show "SC-1" / "On," then the currently set *off-time*, as listed below. If <up> or <down> is pressed at this level, the display will cycle to all other available timer setting modes:

SETTING MODE	PROGRAM MEANING
"SC-1" / "On"	1st *off-time* for selections
"SC-1" / "OFF"	1st *on-time* for selections
"SC-2" / "On"	2nd *off-time* for selections
"SC-2" / "OFF"	2nd *on-time* for selections
"SC-3" / "On"	3rd *off-time* for selections
"SC-3" / "OFF"	3rd *on-time* for selections
"dScn" / "On"	*off-time* for discounting
"dScn" / "OFF"	*on-time* for discounting
"FriG" / "On"	*off-time* for refrigeration
"FriG" / "OFF"	*on-time* for refrigeration
"Lt-1" / "On"	1st *off-time* for illumination
"Lt-1" / "OFF"	1st *on-time* for illumination
"Lt-2" / "On"	2nd *off-time* for illumination
"Lt-2" / "OFF"	2nd *on-time* for illumination
"Lt-3" / "On"	3rd *off-time* for illumination
"Lt-3" / "OFF"	3rd *on-time* for illumination

To set "On" and "OFF" times for the timer, press <enter> upon reaching the desired timer setting mode. The controller will enter into that particular timer setting mode. The display will show the current setting, with the hour flashing. This indicates that the hour can now be changed. Pressing <up> or <down> will change the hour of this particular setting. Pressing <enter> will lock in the hour setting, and the minutes will begin to flash (which indicates that the minutes can now be changed). Pressing <up> or <down> will change the minutes of this setting. Pressing <exit> at any time during this operation will lock in the changes and bring the controller back to the timer setting mode, followed by the time set for that particular mode. (Example: "SC-1" / "On" / "0900.")

At this point, <up> or <down> will cycle through all timer setting modes listed previously. From this level, pressing <exit> will return the display to the day of the week. Pressing <exit> again will return the display to "dAY." Press <up> to proceed to "StOP."

Note: *If certain selections are being set to go off and come back on at a programmed time, first enter into "SC-1" / "On" to set the first off-time for selections. Then, program the first return on-time for selections by entering into "SC-1" / "OFF." For the timer to be able to control the selections, those selections must be set to "1" in the "StCL" mode.*

- dSt
  If <enter> is pressed at the "dSt" prompt, the display will show "dStX," where the 'X' will be flashing. If X = 0, this indicates that the current time is not being displayed in place of the POS message in sales mode. If X = 1, the time is being displayed in sales mode. Using <up> or <down> will toggle the value of "X." If <exit> is pressed at this point, the currently displayed value of "X" will be saved and the controller will return to the "dSt" prompt.

- dLt
  If <enter> is pressed at the "dLt" prompt, the display will show "dLtX," where the "X" will be flashing. If X = 0, this indicates that the controller will not adjust the time for daylight savings. If X = 1, the controller will adjust the time for daylight savings. Using <up> or <down> will toggle the value of "X." If <exit> is pressed at this point the currently displayed value of "X" will be saved and the controller will return to the "dLt" prompt. When enabled, the controller will advance the system time forward one hour at 2:00 AM on the first Sunday of April. It will back up the system time one hour at 2:00 AM of the last Sunday of October.

REFRIGERATION CONTROL MODE

If <enter> is pressed at the "FriG" prompt, the controller will enter the refrigeration control mode. Using <up> or <down> will cycle through the various refrigeration control settings ("Enb," "Strt," "StoP," "dEG," "SEtP," "Stor," "dSP," and "rELY"). If <exit> is pressed, the controller will return to the "FriG" prompt. Press <up> to proceed to the next prompt, "PAS."

- Enb
  If <enter> is pressed at "Enb," the controller will display "EnbX." "X" will be flashing, indicating that it can be edited. If X = 1, the energy conservation control will be enabled. This means the cabinet temperature will be allowed to rise to the programmed storage level during programmed time blocks. If X = 0, the energy conservation mode will be disabled, and the machine will function as normal. Pressing <up> or <down> will toggle "X" between "1" (enabled) and "0" (disabled). Pressing <exit> will save the displayed setting and return the controller to the "Enb" prompt.

- Strt
  If <enter> is pressed at the "Strt" prompt, the controller will enter the start energy conservation time setting routine. Upon entry into this routine, the display will show "dAY." Pressing <exit> at this point will return to the "Strt" prompt without saving any changes.

  If <enter> is pressed at the "dAY" prompt, the controller will enter the day of the week setting routine. Upon entry into this routine, the display will show "ALL," representing every day of the week. Pressing <up> or <down> will rotate through "Sun," "Mon," "tuE," "Wed," "thu," "Fri," "Sat," or "ALL." Pressing <enter> at any of these prompts will cause the controller to enter the hour:minute time setting routine for that day. The display will show the current four-digit hour and minute setting, in 24-hour format. The hour setting will be flashing to indicate that it can be modified. Pressing <up> or <down> will increase or decrease the hour. Pressing <enter> will stop the hour from flashing and cause the minutes to flash, indicating that they can be modified. At this point, pressing <up> or <down> will increase or decrease the minutes value. Pressing <exit> will save the hour and minute setting for the corresponding day value and will return to the prompt for that day. Pressing <exit> again will return the controller to the "dAY" prompt. Pressing <exit> one more time will return the controller to the "Strt" prompt.

- StoP
  If <enter> is pressed at the “StoP” prompt, the controller will enter the stop energy conservation time setting routine. Upon entry into this routine, the display will show “dAY.” Pressing <exit> at this point will return the controller to the “StoP” prompt without saving any changes.

  If <enter> is pressed at the “dAY” prompt, the controller will enter the day of the week setting routine. Upon entry into this routine, the display will show “ALL,” representing every day of the week. Pressing <up> or <down> will rotate through “Sun,” “Mon,“ “tuE,” “Wed,” “thu,” “Fri,” “Sat,” or “ALL.” Pressing <enter> at any of these prompts will cause the controller to enter the hour:minute time setting routine for that day. The display will show the current four-digit hour and minute setting in 24-hour format. The hour setting will be flashing to indicate that it can be modified. Pressing <up> or <down> will increase or decrease the hour. Pressing <enter> will stop the hour from flashing and cause the minutes to flash, indicating that they can be modified. At this point, pressing <up> or <down> will increase or decrease the minutes value. Pressing <exit> will save the hour and minute setting for the corresponding day value and will return the controller to the prompt for that day. Pressing <exit> again will return the controller to the “dAY” prompt. Pressing <exit> one more time will return the controller to the “StoP” prompt.

- dEG
  If <enter> is pressed at the “dEG” prompt, the controller will display “dEGX,” where “X” will be flashing “F” if the controller is currently in Fahrenheit mode, or “C” if the controller is currently in Celsius mode. Pressing <up> or <down> will toggle “X” between “F” and “C.” Pressing <exit> at this point will save the displayed temperature mode and return the controller to the “dEG” prompt.

- SEtP
  If <enter> is pressed at the “SetP” prompt, the controller will display the current set point temperature setting, “xx F” or xx C,” depending on the degree (“dEG”) mode setting. The cold set point default is 35°F (2°C). Pressing <up> or <down> will adjust the temperature value by 1°F (0.5°C). The set point temperature can be adjusted from 25°F through 45°F. Pressing <exit> at this point will save the displayed temperature and return the controller to “SetP.”

- Stor
  If <enter> is pressed at the “Stor” prompt, the controller will display the current storage (for energy conservation mode) temperature setting, “xx F” or xx C,” depending on the degree (“dEG”) mode setting. The default storage temperature is 60°F (14°C). Pressing <up> or <down> will adjust the temperature value by 1° (0.5°C). The storage temperature can be adjusted from 45°F through 75°F. Pressing <exit> at this point will save the displayed temperature and return the controller to “Stor.”

- dSP
  If <enter> is pressed at the “dSP” prompt, the controller will display “dSPX,” where “X” will be “0” if the controller is not currently displaying the cabinet temperature, or “1” if the controller is currently displaying the cabinet temperature in addition to the POS message. Pressing <up> or <down> will toggle “X” between “0” and “1.” Pressing <exit> at this point will save the currently displayed setting and return the controller to the “dSP” prompt.

- rELY
  If <enter> is pressed at the “rELY” prompt, the controller will enter the relay test mode by displaying “Fan.“ If <exit> is pressed in this mode, the user will return to the “rELY” prompt. Using <up> or <down> will toggle between the following submodes:

  - “FAn” - evaporator fan relay
  - “Li tE” - machine light control relay
  - “HEr” - heater kit relay
  - “CnPr” - compressor relay

  If <enter> is pressed at any of these prompts, the controller will alternately flash the prompt and the word “OFF,“ if that relay is currently off; or the word “On,“ if that relay is currently on. Pressing <up> or <down> will toggle the alternate display word between “OFF“ and “ON.“ Pressing <enter> at this point will override that relay’s current status until either the status is changed or until the “rELY” mode is exited completely. The display will return to the relay test mode. When the “rELY” mode is exited, all relays will return to the state they were in prior to entering the “rELY” mode.

  NOTE: *In this feature, the user has the ability to continuously turn the compressor on and off. Be aware that quickly restarting the compressor may result in serious damage to the compressor.*

PASSWORD PREVIEW MODE

On the Merlin IV Plus vender, the total historical and individual sales counts can be accessed externally, as well as the error mode, by entering the external password. Neither the sales counts nor the errors can be cleared externally. The Password Preview Mode allows the external password to be changed.

If <enter> is pressed at the "PAS" prompt, the controller will display the external password preview mode. The first digit of the number will be flashing. Pressing <up> or <down> will adjust the currently flashing digit up or down. Pressing <enter> will save the currently flashing digit and cause the next digit of the password to begin flashing. All digits may be modified in this manner. Pressing <exit> at any point in the procedure will save the currently displayed password and return the controller to the "PAS" prompt. Use <up> to proceed to the next prompt, "LAnG."

Note: *Password digits correspond to the selection switches. If a digit is set to "0" (zero), it will not be possible to enter the external password.*

LANGUAGE SELECTION MODE

The Merlin IV Plus vender has the ability to display vending messages ("ICE COLd," "SOLd Out," etc.) in any of several preset languages. The available languages are listed below.

If <enter> is pressed at the "LAnG" prompt, the controller will display the current language setting. Pressing <up> or <down> will sequence through the available languages:

- EnGL English
- FrEn French
- SPAn Spanish
- HEbr Hebrew
- GEr German
- CUSt Custom.

Pressing <exit> at any point in the procedure will save the currently displayed language setting and return the controller to the "LAnG" prompt. Use <up> to proceed to the next prompt, "rtn."

Note: *Custom language is present only if custom language has been uploaded using DEX.*

RETURN TO SALES

If <enter> is pressed at the "rtn" prompt, the controller will return to the open-door mode.

External Menu

Access the External Menu by entering your 4-digit password when the main door is closed (see "PAS" in the "Optional Menu Items" section).

Note: *Sales counters cannot be reset and error codes can not be cleared in the External Menu.*

SALE COUNTER DISPLAY MODE

If <enter> is pressed at the "SALE" prompt, the controller will enter the vend count display mode by displaying "SALE" / "XXXX" / "XXXX," where the X's will represent total number of all paid vends over the life of the vender's control board. If the sales amount is less than five digits long, the upper four-digit set is not displayed. Using <up> or <down> will cycle through each selection as "SLNN" / "XXXX" / "XXXX," where the N's represent the appropriate selection number and the X's represent the vend count for that selection. If <exit> is pressed at any time during this operation, the controller will return to the code level. Press the <up> button to proceed to the next prompt, "Eror."

ERROR CODE DISPLAY MODE

This mode was designed to help diagnose vender problems. If <enter> is pressed at the "Eror" prompt, the controller will enter the error display mode. If no errors have occurred since the last error reset, the display will show "nonE." If an error has been detected since the last error reset, the display will show the first summary error code that has occurred, such as "UEnd," which would indicate a vend error. Pressing <up> or <down> will allow you to cycle through all of the summary error codes that are present. Pressing <enter> at the displayed summary error code will allow you to view the detailed error codes beneath the summary error heading. *(For a list of possible error codes, refer to "Section 6. Vender Troubleshooting.")* Pressing <up> or <down> at this point will allow you to cycle through all of the detailed error codes that are present beneath the summary error code. If the <exit> button is pressed anytime during this operation, the controller will return to the "Eror" prompt. Press the <up> button to proceed to the next prompt, "rtn."

RETURN TO SALES

If <enter> is pressed at the "rtn" prompt, the controller will return to the sales mode.

Vend Cycle

Stand-By Condition

In a stand-by condition, the vender will show the greeting, the vend price (if set for a single price or if all prices are set the same), and a choice of other optional features on the LED display. If a select button is pressed prior to reaching the vend price (establishing a credit), the display will show the price for that selection. This will indicate to the customer that more money is needed for that selection.

Establishing Credit

As coins are inserted, a corresponding credit count will appear on the display. The coin mechanism will continue to accept coins until the highest vend price has been achieved. All coins in excess of the vend price will be returned to the coin cup. Once the vend price has been achieved, the control board enable a vend from any selection.

Valid Selection

The control board constantly sends a logic level signal to the common position of each select switch. When a selection is made, the switch closes. This allows the low-voltage signal to travel from the switch's common position through the switch and out its normally open position to the select switch's harness connection on the control board.

Vend Sequence

At this time (if there has not been a previous sold out), the control board distributes 24 volts DC through the door and cabinet wiring harnesses and directly to the coil of the chosen vend motor. Simultaneously the display will scroll. This is an indication to the customer a vend is in progress and to please wait. As the vend motor receives power, it will turn the rotor in an attempt to vend a product.

Product Delivery

As the product drops, the vibration from the impact allows the delivery sensor to send a low-voltage signal to the vender's control board, indicating that a product has been vended. After the control board receives the sensor's signal, it will take into account how the vender is programmed (set depth) and will act accordingly. If set for double-depth and the first package has just vended, the control board will kill all power to the vend motor at the exact same time that a product drop is registered (this avoids a multiple vend of the next product to the rear of the cabinet). As the next package vends, the control board will cycle the vend motor to pick up another load of product. This allows a quick vend, less than three seconds, for the next customer.

Note: *The control board will go through a Learning Mode. It will be reset either on power down / up or a door opening / closing. This allows the vender's controller to decide which is the front or rear product. The Learning Mode acts in conjunction with the depth setting to allow for an automatic reload after the rear package has vended. How it works: The controller will notice the first "long-timed out" vend cycle during the Learning Mode. From this, the controller will know the next vend will be the front product.*

Column Sequencing

If a selection has multiple columns assigned to it, the same column is vended each time the selection button is pressed until the number of times vended is equal to the depth setting of the selection. Then, that selection proceeds to the next column assigned. This is to allow the columns to vend evenly.

Sold-Out

Upon selection, the display will cycle to show the vend progress. After 10 to 12 seconds (if a drop of product is not detected), the display will show "SOLd OUt." A sold out may be due to:

1. The column attempted is jammed, therefore product does not drop;
2. The column attempted is genuinely sold out;
3. The sensor is out of adjustment and does not detect the product drop; or
4. If any selection does not have a column assigned to it, it will read "SOLd OUt."

The digital display will indicate "SOLd OUt." This signals to the customer to make another selection or push the coin return lever for a full refund. If set for forced attempt, the customer must make an initial selection. If the initial selection is sold out, the customer will be allowed a full refund or an alternate selection. If the vender is totally sold out of product, the "sold out" message on the digital display will be continuous. No money will be accepted into the vender in a total sold out condition.

Resetting Sold Out Selections

A sold-out condition is only cleared by the vender's door switch, by opening the vender's main door. If a sold out condition is not cleared, the controller will not attempt to vend from that selection. The display will not indicate a vend is in progress. It will automatically show "SOLd OUt" upon pressing the select button (after reaching a vend price).

Vender Maintenance

What to Clean

WARNING: Electrical and electronic components should NEVER be subjected to water. Do not use hoses or pressure washers to clean the interior of the vender.

Cabinet and Vend Mechanism: Steam clean as required. Never use petroleum cleaners.

Condenser and Evaporator Coils: For efficient operation, the condenser and evaporator coils must be kept clear of any dirt or foreign materials. Clean dirt and debris from the condenser and evaporator coils with a small light-bristled brush, vacuum cleaner, or compressed air. This will help to ensure an extended unit life.

Control Board: The vender's control board should always be enclosed by its cover to protect it. Routine cleaning is not necessary but, if desired, the controller's area may be blown out with compressed air.

What to Lubricate

Inner Door Gasket: The door gasket comes from the factory pre-lubricated but should be lubricated periodically with a silicone-based grease. Apply to the vertical piece of gasket on the hinged side of the inner door which touches the vender's main door. This will help prevent any peel-back of the gasket which can cause air leaks into the sealed cabinet, resulting in freeze-ups.

Latch Strike Nut: The latch strike nut should be lubricated as needed.

Refrigeration Unit: The refrigeration unit is a sealed system that does not require any lubrication. Also, the condenser and evaporator fan motors do not require any lubrication.

Anti-friction Sheets: The anti-friction sheets should be lubricated with a thin layer of food-grade silicone. The sheets should be kept clean and free of debris, and they should not be peeling.

Preventive Maintenance

Vender Leveling: Make sure that the vender is level when placed on site. If the vender is not properly leveled it can begin to accumulate standing water, which over a period of time may begin to freeze and will eventually freeze the evaporator. Another problem that may occur from an unleveled vender will be improper vending, which would include but not be limited to product not vending from column, product vending slow from column, product not sliding or rolling down to the delivery port, or product jamming.

Lighting System: The lighting system contains high voltage. Power MUST be disconnected when working with or around this portion of the vender. Light bulbs should be replaced whenever one or more of the bulb ends are blackened or discolored, or when the lights are flickering or are not lit, and it has been determined that the ballast is good. Replace these bulbs as soon as it is determined they are bad. If it is decided not to use the lighting system, the ballast MUST be unplugged. **DO NOT** remove the bulbs and leave the ballast plugged in. Doing so can cause the ballast to generate a very high amount of electrical noise, which can cause problems for or permanently damage electronic components.

Product Chute: Bottles or cans should never be placed under the product chute. Bottles can prevent air flow and may hinder the proper performance of the chute sensor.

WARNING:
ELECTRIC SHOCK DANGER
Power MUST be disconnected when working with or around the lighting system.

Vender Troubleshooting

Using the Vender's Error Code System

The Merlin IV Plus has a built-in error code diagnostic system that will help in troubleshooting and solving problems. This system is best used in conjunction with the following section, *Troubleshooting*. These errors are not a replacement for knowledge of the vender or its operation, but they will lead in the general direction of the problem. Most vender parts are independent of one another, so most problems can be confined to the item in question (such as an LED, coin changer, or select switch), the harnessing connecting it to the control board, or the control board itself. See *Section 3. Vender Programming* for detailed instructions on how to use and access the vender's error codes.

Note: *It is recommended the error codes be cleared after correcting any problem(s) to prevent confusion and unnecessary work in the future.*

MAIN	DETAILED ERROR	CORRECTIVE ACTION
door	(door switch - no detailed error)	Check and / or replace the door switch or door switch harnessing.
SELS	SS01 thru SS10 (selection switch closed)	Fix stuck button / switch or replace switch.
CHAr	CC (changer communication)	Check changer harness connections.
	tS (changer tube sensor)	Consult changer manufacturer.
	IC (inlet chute blocked)	Check vender's coin chute for blockage.
	tJ (changer tube jam)	Check changer's coin tubes / tube sensors.
	CrCH (changer ROM checksum)	Consult changer manufacturer.
	CSF (invalid changer scale factor)	Consult changer manufacturer.
ACCE	EE (excessive escrow)	Check for stuck coin return lever.
	nJ (acceptor coin jam)	Check for blockage or dirty sensor in acceptor.
	LA (low acceptance rate)	Consult changer manufacturer.
bUAL	bC (bill validator communications)	Check bill validator harness connections.
	bFUL (bill validator cash box full)	Remove bills from cash box.
	biLL (bill validator motor)	Consult bill validator manufacturer.
	bJ (bill jam)	Remove jammed bill or clean bill sensors.
	brCH (bill acceptor ROM checksum error)	Consult bill validator manufacturer.
	bOPn (bill validator cash box open)	Close bill acceptor cash box.
	bS (bill validator sensor)	Remove obstruction or clean sensors.
	bSF (invalid bill acceptor scale factor)	Consult bill validator manufacturer.
CArd	rC (card reader communications error)	Check card reader harness connections.
	rSF (invalid card reader scale factor)	Consult card reader manufacturer.
	CrXY (other card reader error)	Consult card reader manufacturer.
CHUt	CS (chute sensor always on)	Adjust chute sensor.
StS	UAxx (unassigned column)	Correct space to sales setting, if necessary.
FriG	SEnS (temperature sensor)	Check for a cut or disconnected temperature sensor.
	CoLd (sensing temperature 3°F [1.5°C] below cut-out)	Check for a welded contact in refrigeration relay or shorted wire from board to refrigeration relay.
	CnPr (not cooling within 30 minutes of cut-in)	Check "FrG" in programming and check all wiring connections from board to refrigeration unit.
	ACLo (less than 95 VAC from outlet for greater than 30 minutes)	Check voltage at wall outlet during the peak of the load with all units (if any others are present in circuit) running.

Troubleshooting

Use the following section to troubleshoot the Merlin IV Plus vender in the event there is a problem in one of the following areas: power, acceptance (coin or bill), vending, or refrigeration. Listed below are the problems that are most likely to be encountered. If the Merlin IV Plus displays a problem not listed here, please contact a Royal Vendors service representative.

TROUBLE	POSSIBLE CAUSE	CORRECTIVE PROCEDURE
COIN ACCEPTANCE		
Coin mechanism will not accept coins	No power to vender's main door (lights not lit) or no power to transformer / control board	Check to make sure the LED and the sign lighting are lit. If not, check power at transformer.
	Coin mechanism harness to control board is cut or disconnected	Repair or replace changer harness.
	Short in coin mechanism	Unplug all harnessing from the control board except the transformer (power) connection and the coin mechanism connection, and test acceptance. If it accepts, replug each connection one at a time, and test acceptance after each.
	Defective control board	After a new coin mechanism has been tried and the harness has been checked for continuity, replace control board.
No acceptance or rejects a percentage of good coins	Coin return lever	Make sure changer is mounted correctly and the coin return lever is in the proper position.
	Acceptor is dirty or foreign matter is in the path	Check to ensure that the coin mechanism's acceptor is clean.
	Coin changer is improperly tuned (if tunable)	Contact coin changer manufacturer.
	Defective control board	Replace the control board and test.
Accepts coins but gives erratic / no credit	Erratic or no credit: Acceptor (coin mechanism)	Replace coin mechanism (acceptor) and test.
	No credit: Defective harness between coin mechanism and control board	Check harness for cut wires or wrong connections. If defective, replace it.
	No credit: Defective control board	Replace control board and test.
Changer will not pay out coins	Defective harness between coin mechanism and control board	Check harness for cuts or wrong connections. If defective, replace it.
	Defective coin mechanism	Replace coin mechanism and test. If it pays out, test the control board.
	Defective control board	Test vender's manual coin payout. If vender pays out using the CPO mode but not during sales, check the coin mechanism or coin mechanism harness. The control board is more than likely not the problem.

Section 6. Vender Troubleshooting

TROUBLE	POSSIBLE CAUSE	CORRECTIVE PROCEDURE
BILL ACCEPTANCE		
Validator will not pull in a bill	Make sure that the validator harnessing is correct for the style of validator being used and that it is plugged in properly.	Replace defective or wrong validator harness.
	Acceptance disabled by coin mechanism or bad harnessing (validator status light is on)	Make sure changer is plugged in (accepts coins) and the tubes are full of coins.
	Changer harnessing not properly connected	Repair or replace faulty harnessing.
	If validator accepts, replace changer and test.	Replace defective validator. If problem persists, replace control board.
Validator pulls in the bill but won't establish credit	Defective (wrong, cut, or miswired) validator harnessing.	Make sure the validator harnessing is correct for the style of validator being used and it is plugged in / wired properly.
	Defective validator	Replace validator and test.
	Defective control board	Replace control board and test.
Validator takes a bill but is not erasing credit	Validator switch settings (if any)	Refer to validator's service manual or validator representative.
	Defective validator interface harness	Refer to validator's service manual or validator representative.
	Defective validator	Replace validator and test.
	Defective control board	Replace control board and test.
Validator takes a bill and allows payback of coins without making a selection	Control board's configurations not set properly	Access the vender's configurations mode and check the C8 ("forced attempt") setting.
VENDING PROBLEMS		
Multiple vending	If from all selections: delivery sensor cut, not properly grounded, disconnected, or improperly set	Set vender's delivery sensor by turning the adjustment screw: 1. Clockwise until the indicator lights; 2. Counterclockwise until it goes out; and 3. Counterclockwise one and a half turns. If no progress is made by adjusting, replace the sensor.
	Control board sending power to motor when not supposed to	Check power at vend motor during multiple vend (24 VDC). If power is present, the control board is at fault.
	Mechanical error	Check the vend motor to ensure the gearing within it is OK.

Section 6. Vender Troubleshooting

TROUBLE	POSSIBLE CAUSE	CORRECTIVE PROCEDURE
Wrong product vending upon selection	Misloaded vender	Ensure all products within each column are the same.
	Space-to-sales not properly set	Enter space-to-sales. Make sure the columns are set correctly according to the buttons.
	Miswired motor	Check wiring at each vend motor, at the vend motor connection in the bottom of the door, and at the control board vend motor connection.
	Miswired selection button	Check the wiring at each selection switch and at the selection switch harness connection at the control board.
No vend upon selection / dry vend (no refund)	Delivery sensor	Check to see if the delivery sensor adjustment LED is constantly on. If so, turn the adjustment screw counterclockwise until the adjustment LED goes off.
	Cuts or pinches in delivery sensor harness (adjustment LED constantly on)	Replace defective sensor.
	Defective control board	Unplug the sensor connection from the control board. If the adjustment LED light stays on, replace the control board.
No vend from some, but not all, columns (allows refund or second choice)	Selection switch	Make sure the LED acknowledges each selection switch. If not, check the selection switch. Trace the selection switch harness all the way up to the control board. Replace if necessary.
	Wiring from motor connection on control board all the way to the vend motor of the defective column	Check wiring all the way from the control board to the vend motor for cuts, pinches, or backed out wires.
	Control board	Measure voltage at vend motor's connection on the control board. Measure it on the individual wire for the motor attempted and the common (neutral) wire. A selection must be made and the LED should be displaying as if a vend is in process ("scrolling down"). 24 VDC should be registered. If not, replace control board.

Section 6. Vender Troubleshooting

TROUBLE	POSSIBLE CAUSE	CORRECTIVE PROCEDURE
REFRIGERATION PROBLEMS		
Refrigeration unit runs constantly	Cut-out temperature not properly set	Check cut-out setting in the “FriG” mode. Correct if necessary.
	Temperature sensor not reading correctly	Test the temperature sensor by setting the temperature to be displayed on the LED and measuring the actual inside cabinet temperature with a thermometer or by opening / closing door to see if the temperature changes. Replace if defective.
	Short in wiring harness from control board to refrigeration relay	Unplug one of the two wires coming from the control board to power the relay. If the unit cuts off, locate the shorted wire to be either on the door side or the cabinet side of the harness and correct or replace defective harness.
	Refrigeration relay contacts welded together	Unplug one of the two wires (with pink connectors) coming from the control board to power the relay. If the unit continues to run, replace the relay.
Refrigeration unit will not run	Defective refrigeration unit	Unplug the refrigeration unit from the top of the main wiring harness and plug it into a direct power source (wall outlet or extension cord). If it does not run, replace the refrigeration unit.
	Master control disabled	Check “FrG” setting in the refrigeration control mode (“FriG”) to make sure it is set to “1.” If it is set to “0,” change it to “1.”
	Cut-in / cut-out not set properly	Check cut-in and cut-out settings. If set incorrectly, reprogram them.
	Temperature sensor not reading correctly	Test the temperature sensor by setting the temperature to be displayed on the LED and measuring the actual inside cabinet temperature with a thermometer or by opening / closing door to see if the temperature changes. Replace if defective.
	Short in wiring harness from control board to refrigeration relay	Unplug one of the two wires coming from the control board to power the relay. If the unit cuts off, locate the shorted wire to be either on the door side or the cabinet side of the harness and correct or replace defective harness.
	Defective refrigeration relay	Test the relay by making sure all connections are made for the refrigeration unit, the refrigeration relay, and the control board. Next, go into “FriG” mode. Scroll to “rELY,” press <enter>, and go to “CnPr.” Press <enter>, change it to “On,” and press <enter> again. If the unit does not come on, replace the relay.

Section 6. Vender Troubleshooting

TROUBLE	POSSIBLE CAUSE	CORRECTIVE PROCEDURE
MISCELLANEOUS PROBLEMS		
LED not working	No power to control board	Check for 24 VAC at control board's main power connection, coming from the transformer. If no power, replace transformer.
	LED harness	Check the LED harness for pinches, cuts, or backed out wires. If any found, replace harness.
	LED	Check for 5 VDC on pins 1 and 4 of the harness at the LED. If power is present, replace the LED.
Display shows "SOLd OUt" immediately upon pressing a selection (column full of product and sold-out not clearing)	Door switch wiring improperly connected, cut, or pinched	Check for cuts on the two door switch wires going from the switch to the control board. Also, check for bad connections at the door switch, the plug at the bottom of the vender's main door, and at the control board's connection. If no problems found, check door switch.
	Door switch	Check the door switch for defects (stuck shut, etc.). If defects found, replace the door switch.
	Control board	Check the control board by shorting across the two pins for the door switch wiring (white and purple wires). If the sold-out condition is still not cleared, replace the control board.

Training Guide

Troubleshooting Technique

Objective: Understand sequence of operation, identify what vender is doing, and compare to what it should be doing.

- Find defective component, confirm failed component, repair / replace component, test to confirm fix;
- Identify source, path, or load;
- Distinguish between software and hardware;
- Repair the problem, not the symptom.

Simple circuit

- Power supply (source - *example: control board*)
- Line (path - *example: display harness*)
- Device (load - *example: LED display*)
- Failure of any one results in service call.
- Skill required is systematical, logical process of elimination.
  1. Do I have power?
  2. Can the power get to where I want it?
  3. Does the device work?
- Confirm through use of volt / ohm meter.
- Understand the impact of software on hardware.
- Test to confirm repair.
- Low-voltage circuits are affected by harness connections, insulation, line noise, polarity, and ground.
- The meter is <u>not</u> an option when checking low-voltage circuits.

Component Highlights

Control board

- "Brains" of vender
- Controls all vending operations
- See *Chapter 2: Vender Component Explanation* for full explanations of control board pinouts and functions.

Power Supply *(See Figure 7.1)*

- Supplies 24 VAC (±10%) to control board
- Only AC voltage at control board
- Check for primary voltage to transformer at lamp ballast harness
- Check for secondary voltage across position P15, pins 1 and 2
- Secondary is protected by a 3-amp fuse
- Ohm-out fuse holder

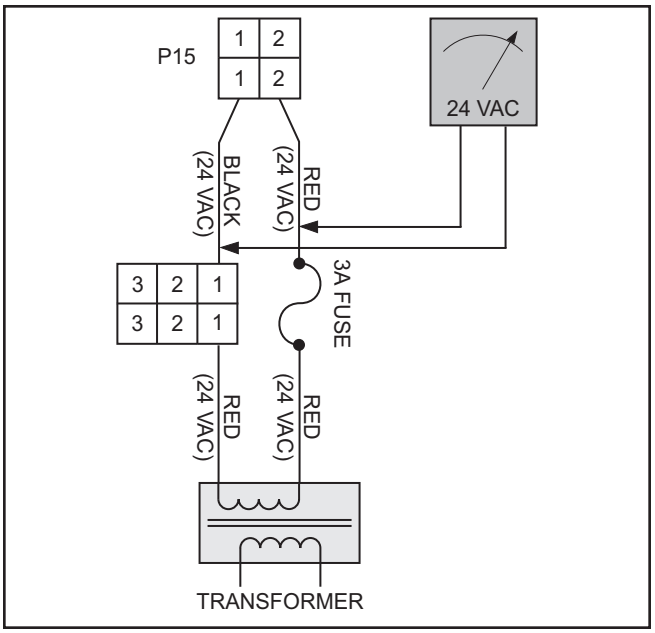


Figure 7.1: Power supply.

LED Harness *(See Figure 7.2)*
- Supplies 5 VDC to LED
- Check for 5 VDC across position P1, pins 1 and 4
- Ohm-out harness

Multi-Drop Bus (MDB) Harness *(See Figure 7.3)*
- Supplies 24 VDC to changer, validator, and / or card reader from position P3, pins 1 and 6
- Data transmitted and received by control board
- Confirm with changer, LED on; payout works
- Multiple harnesses may be connected in series for more peripherals - check all harnesses

Chute Sensor *(See Figure 7.4)*
- Position P4 on control board
- Low-voltage (5 mV @ 500 µSeconds) impact sensor
- Voltage returned from chute sensor, signaling control board to cancel credit and reset
- Trimpot (R19 on control board) is used to increase or decrease sensitivity

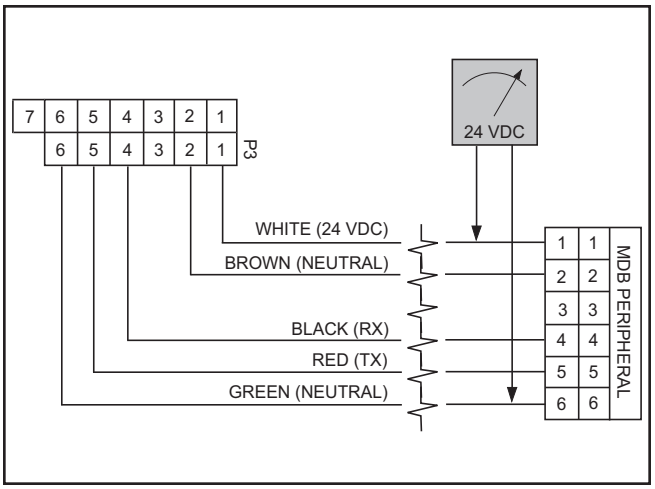


Figure 7.3: MDB harness.

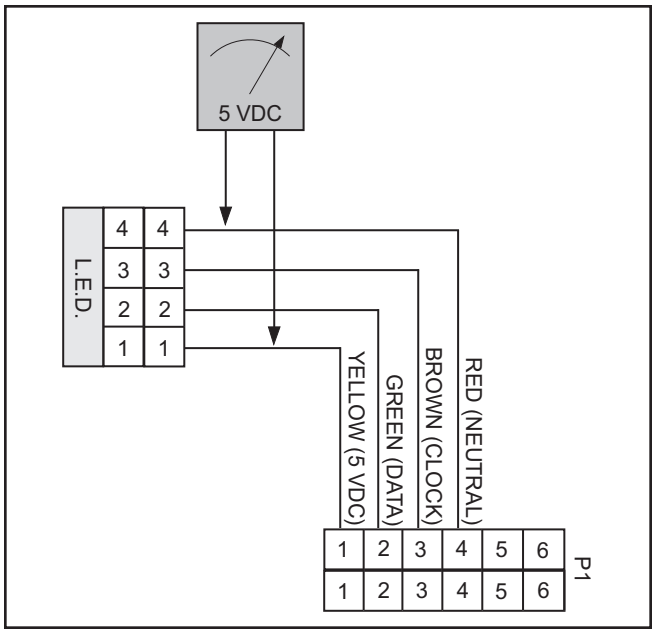


Figure 7.2: LED harness.

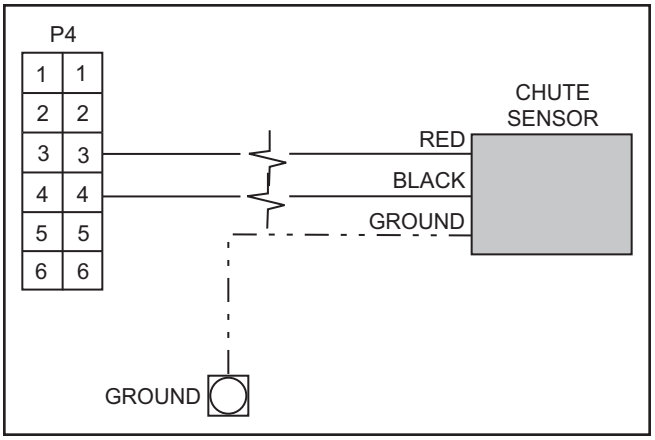


Figure 7.4: Chute sensor harness.

Select Switch Harness *(See Figure 7.5)*

- Supplies 5 VDC to select switches from position P7, pin 11
- Press select button and watch LED reset
- Signal from switch via N.O. terminal
- Check with ohm-meter

Vend Motor Harness *(See Figure 7.6)*

- Vend motor power supply - 24 VDC from pin 14 at position P8
- Neutral side is closed, cycles vend motor
- If vend motors to right do not vend, check black wire (24 VDC) from last working vend motor
- If one single motor does not work, check neutral

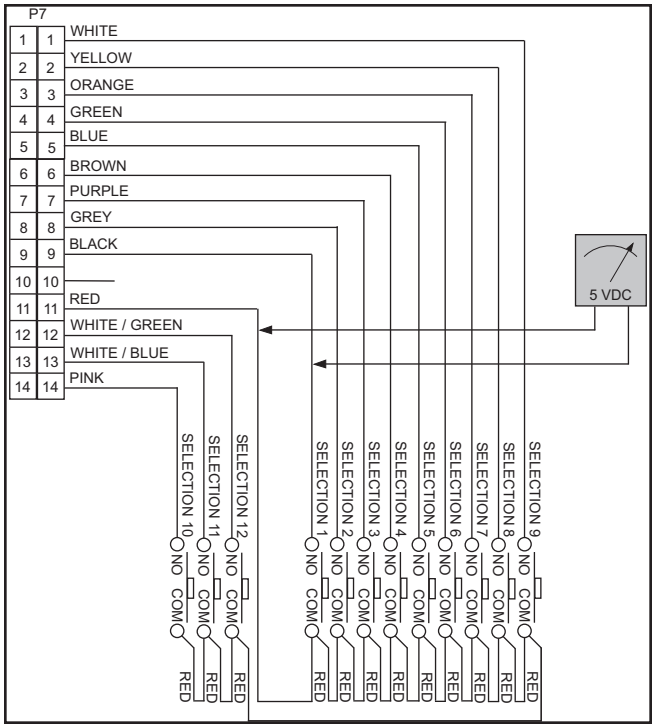


Figure 7.5: Select switch harness.

Door Switch / Options Harness *(See Figure 7.7)*

- Supplies 5 VDC from position P9 to door switch (pins 1 and 6) and to options harnesses (free-vend switch, no-vend switch, etc.)
- Door switch:
  1. Updates door status to control board (open / closed)
  2. Depress switch, check to see if LED resets
  3. Check wires at switch for correct positions
- Options switches:
  1. Allow free-vend, no-vend, etc.
  2. 5 VDC on pins 6 and pin for option switch (see wiring diagram)

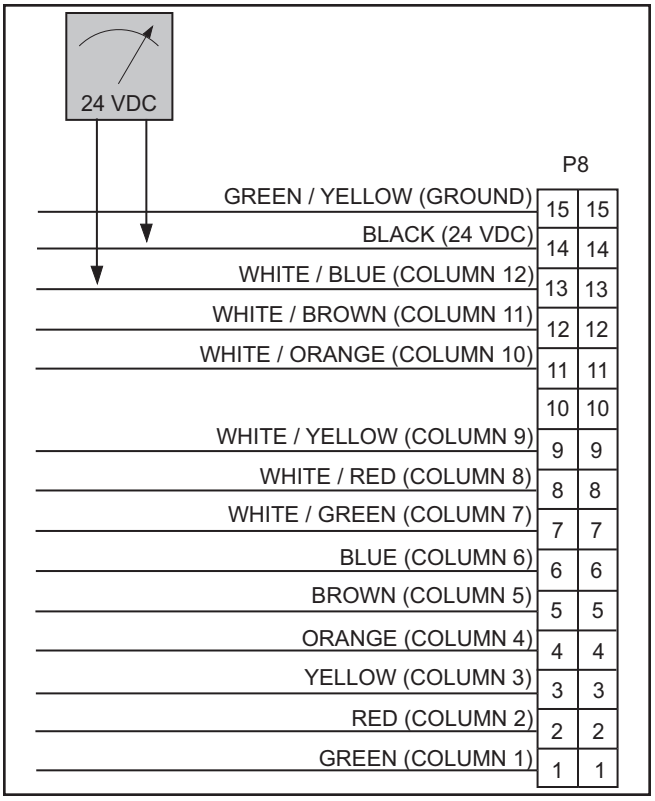


Figure 7.6: Vend motor harness.

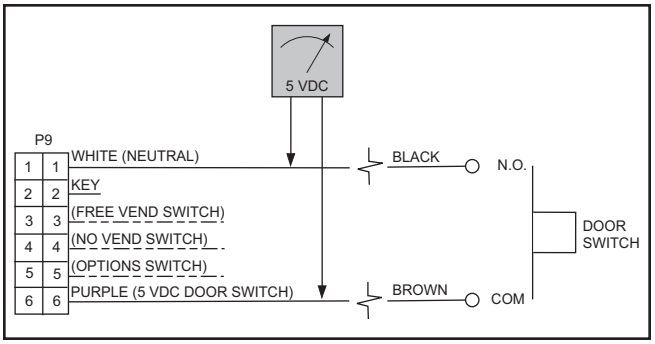


Figure 7.7: Door switch / options harness.

DEX / UCS Harness *(See Figure 7.8)*
- Located at positions P10 (Internal) and P11 (External)
- Computer access point
- Internal: read / write anytime; standard item
- External: read anytime; can only write when door switch is open; optional item

Temperature Sensor Harness *(See Figure 7.9)*
- Supplies 5 VDC to temperature sensor from position P12, pins 1 and 4
- 5 VDC from pins 1 and 4
- <5 VDC return resistance across pins 1 and 2
- Set to display temperature on LED, compare to thermometer
- Temperature sensor mounted on rear of cabinet

Environmental Control (Refrigeration) Harness *(See Figure 7.10)*
- Supplies 24 VDC to refrigeration relay from position P14, pins 1 and 3
- Check for 24 VDC in relay test mode
- Harness also used for connections to evaporator fan relay, heater relay, and light relay
- Allows relay to energize and close contacts to complete 110 VAC hot circuit

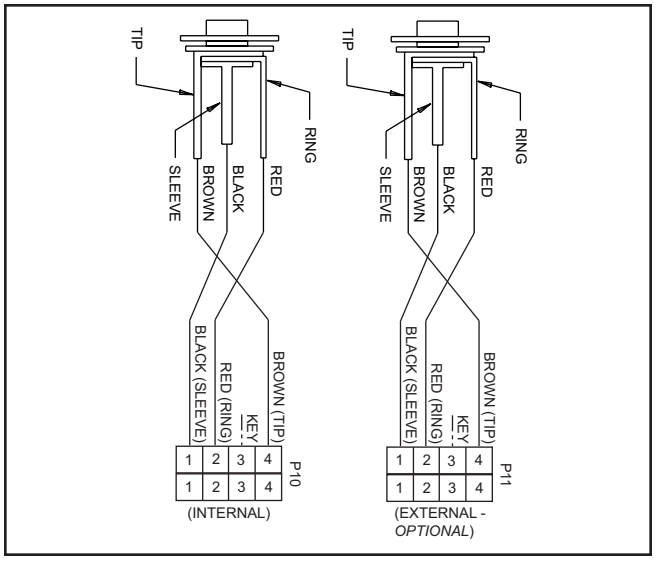


Figure 7.8: DEX / UCS harness.

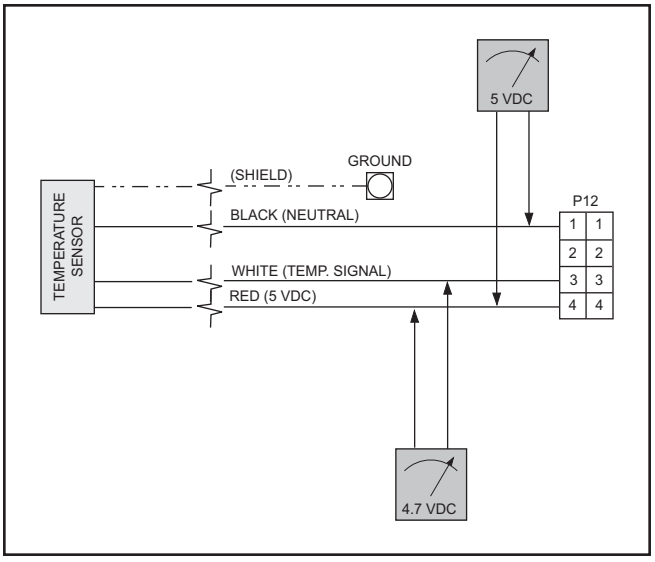


Figure 7.9: Temperature sensor harness.

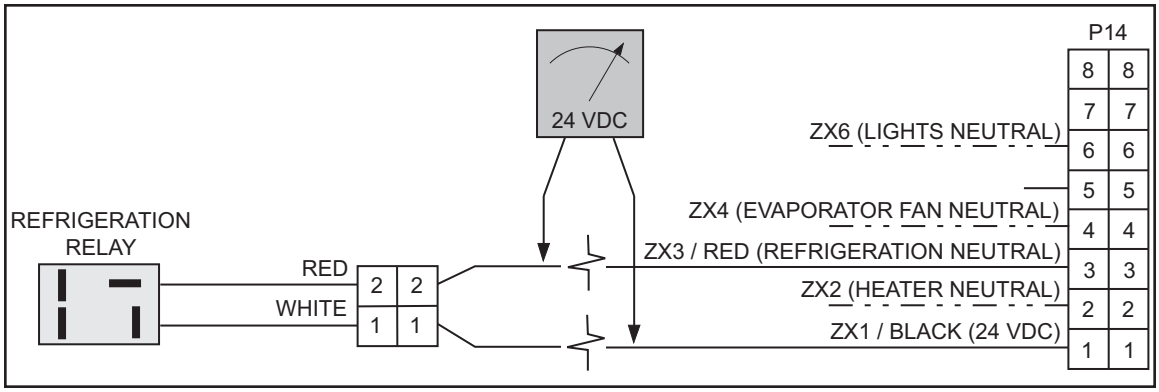
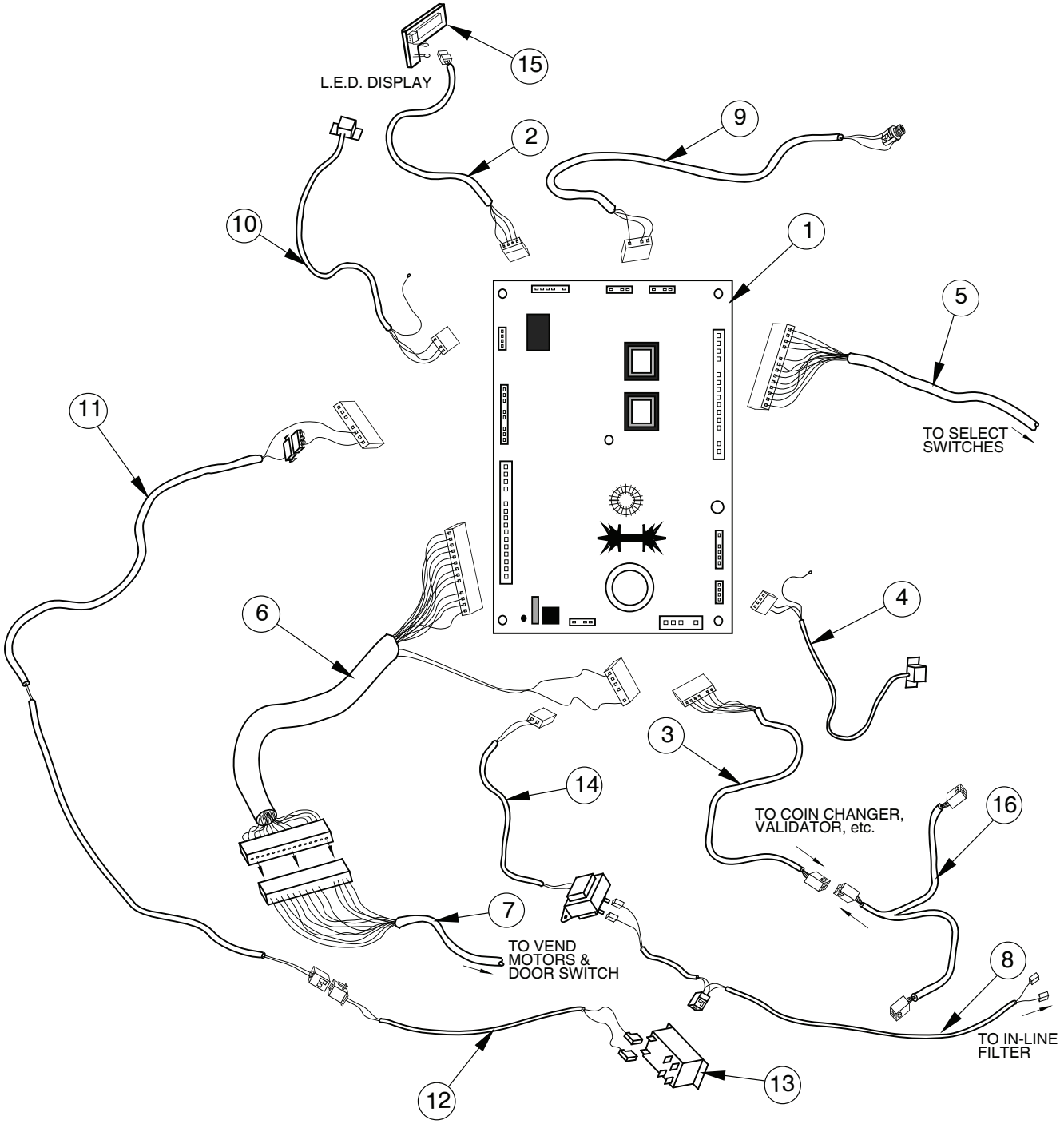


Figure 7.10: Environmental control harness.

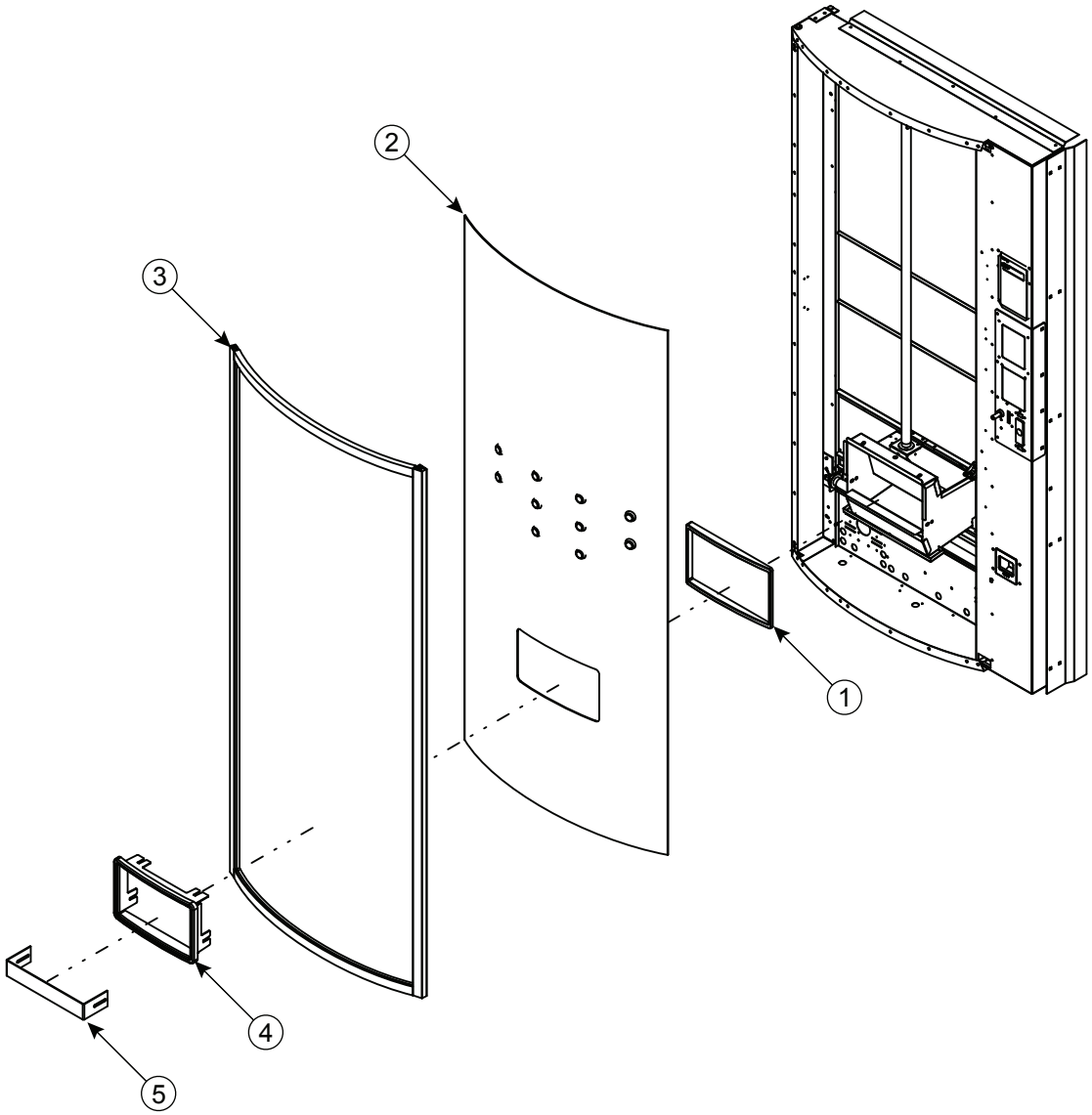
Control Board and Wiring



Control Board and Wiring

ITEM NO.	DESCRIPTION	PART NO.
1	Control Board	836182
2	LED Display Harness	842081
	- LED Harness, Dr. Pepper	842326
3	Serial Changer Harness	842079
4	Delivery Sensor (includes harness), Piezo	210121
5	Select Switch Harness, Pepsi Cola 10 Select	842190
	Select Switch Harness, Live Display Vender	842192
	Select Switch Harness, Dr Pepper Vender	842201
6	Main Door Harness (vend motor / door switch wiring)	842169
7	Cabinet Harness, 12 Column Mechanism (Wide)	842230
	Cabinet Harness, 10 Column Mechanism (Narrow)	842231
8	Merlin IV Harness 117V Line	842151
9	Internal DEX Harness	842099
10	Temperature Sensor (includes harness)	822030
	- Temperature Sensor Mounting Bracket *(below chute assembly)*	286002
11	Relay Harness, Refrigeration, Door Side	842236
	- Evaporator Fan, Door Side	842281
12	Relay Harness, Refrigeration, Cabinet Side	842237
	- Evaporator Fan, Cabinet Side	842623
13	Refrigeration Relay	836130
14	Transformer Assembly	842147
	Merlin IV Harness, Transformer and Fuse to Board	842210
	Fusebox Assembly	842219
15	LED Display	836012
16	MDB Harness	842116

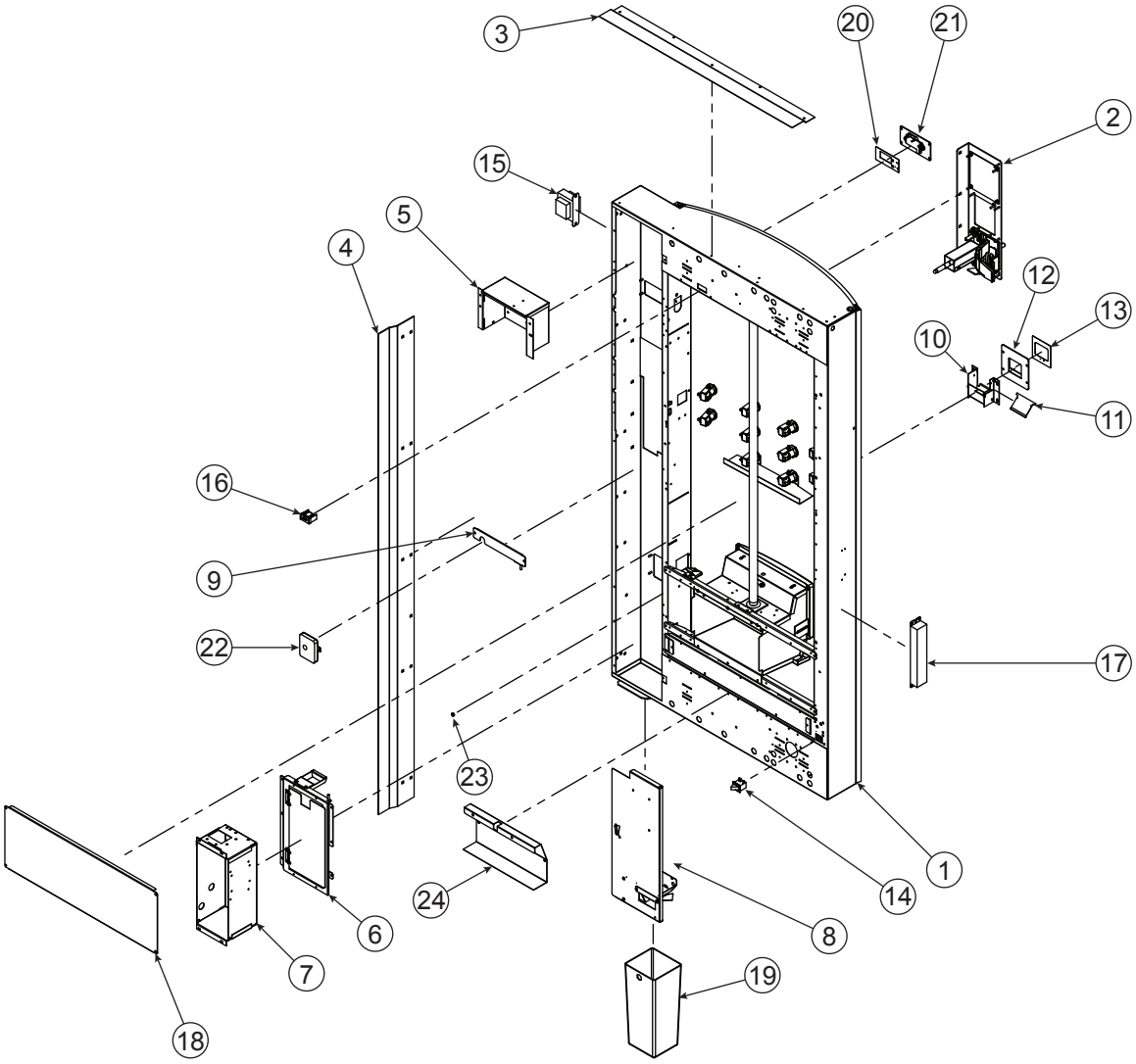
Cold Drink / Dr Pepper Door Assemblies, Front



Cold Drink / Dr Pepper Door Assemblies, Front

ITEM NO.	DESCRIPTION	PART NO.
1	Port Spacer	815248
2	Sign Assembly	*See exploded view elsewhere in Parts Catalogue*
3	Trim, All, Wide Vender, 72”	013580
	- Wide Vender, 79”	012597
	- Narrow Vender, 72”	------
	- Top / Bottom only, Wide Vender, 72” / 79”	012553
	- Top / Bottom only, Narrow Vender, 72”	040811
	- Left only, 72”	142502
	- Left only, 79”	141553
	- Right only, 72”	013507
	- Right only, 79”	012554
4	Port Trim	815249
5	Package Stop	273508

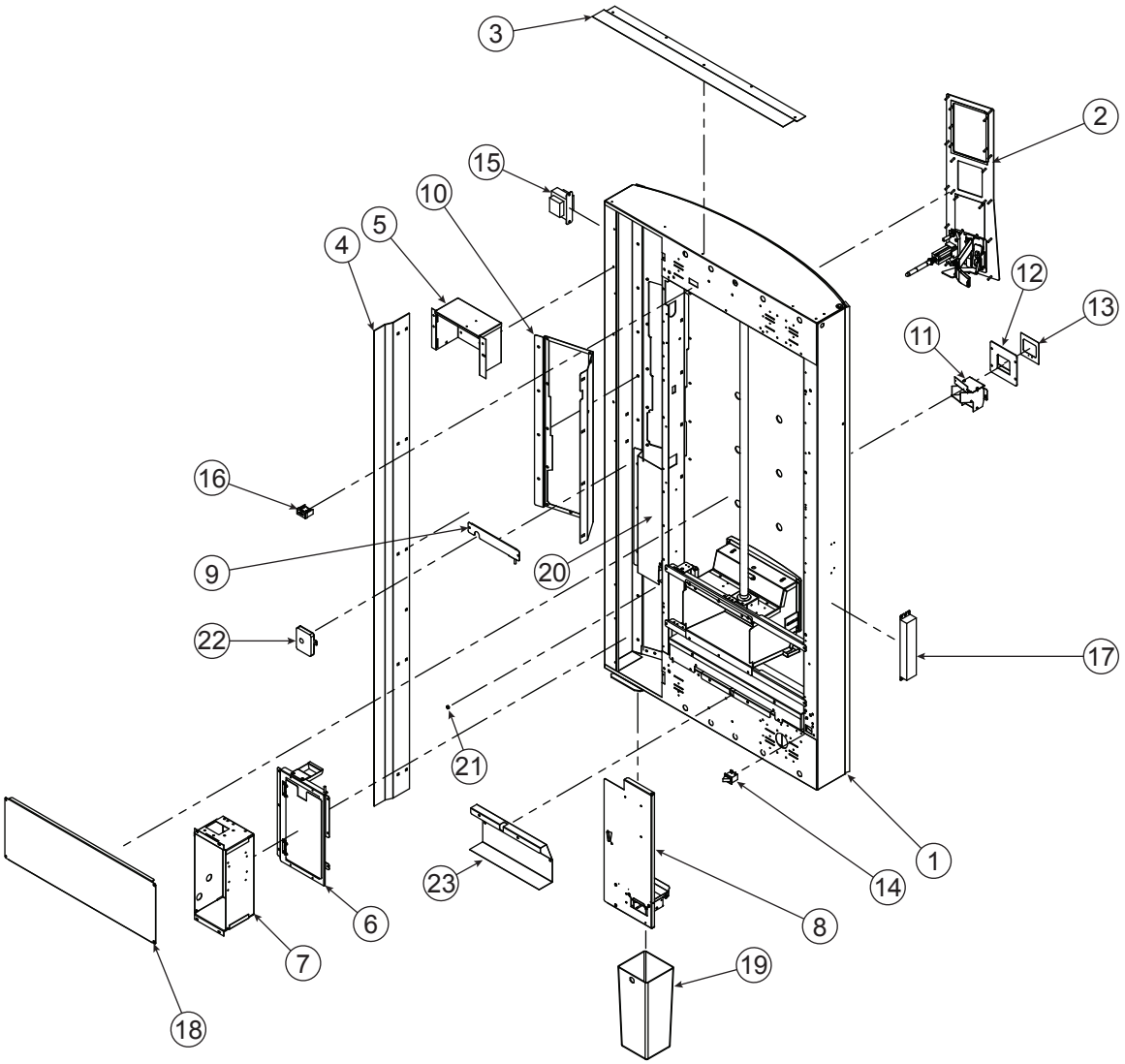
Cold Drink Door Assembly, Rear



Cold Drink Door Assembly, Rear

ITEM NO.	DESCRIPTION	PART NO.
1	Door Weld Assembly, Cold Drink, Wide Vender, 72”	385510
	- Wide Vender, 79”	386510
	- Narrow Vender, 72”	387510
2	Security Plate Assembly	385540
3	Rain Guard, Wide Vender	010518
	- Narrow Vender	258504
4	Vandal Panel, Right, 72”	011501
	- 79”	010519
5	Control Board Housing	261570
6	Coin Box Housing Panel Assembly	385591
7	Coin Box Housing CDC	273503
8	Changer Door Assembly	385570
9	Selection Panel Strap Weld Assembly	378592
10	Coin Cup Weld Assembly	385590
11	Coin Cup Door	385512
12	Coin Cup Plate Weld Assembly	385580
13	Coin Cup Plate Decal	831856
14	Door Switch	835019
15	Transformer Assembly	842147
16	Fuse Holder Assembly	842219
17	Ballast	838053
18	Lamp Guard, Wide Vender	378517
	- Narrow Vender	380502
19	Coin Box	815347
20	Display Plate Decal	831855
21	Display Plate Assembly	385560
22	Latch Pocket Plate	380505
23	Keps Nut, #8-32	E905001
24	Harness Cover	378542

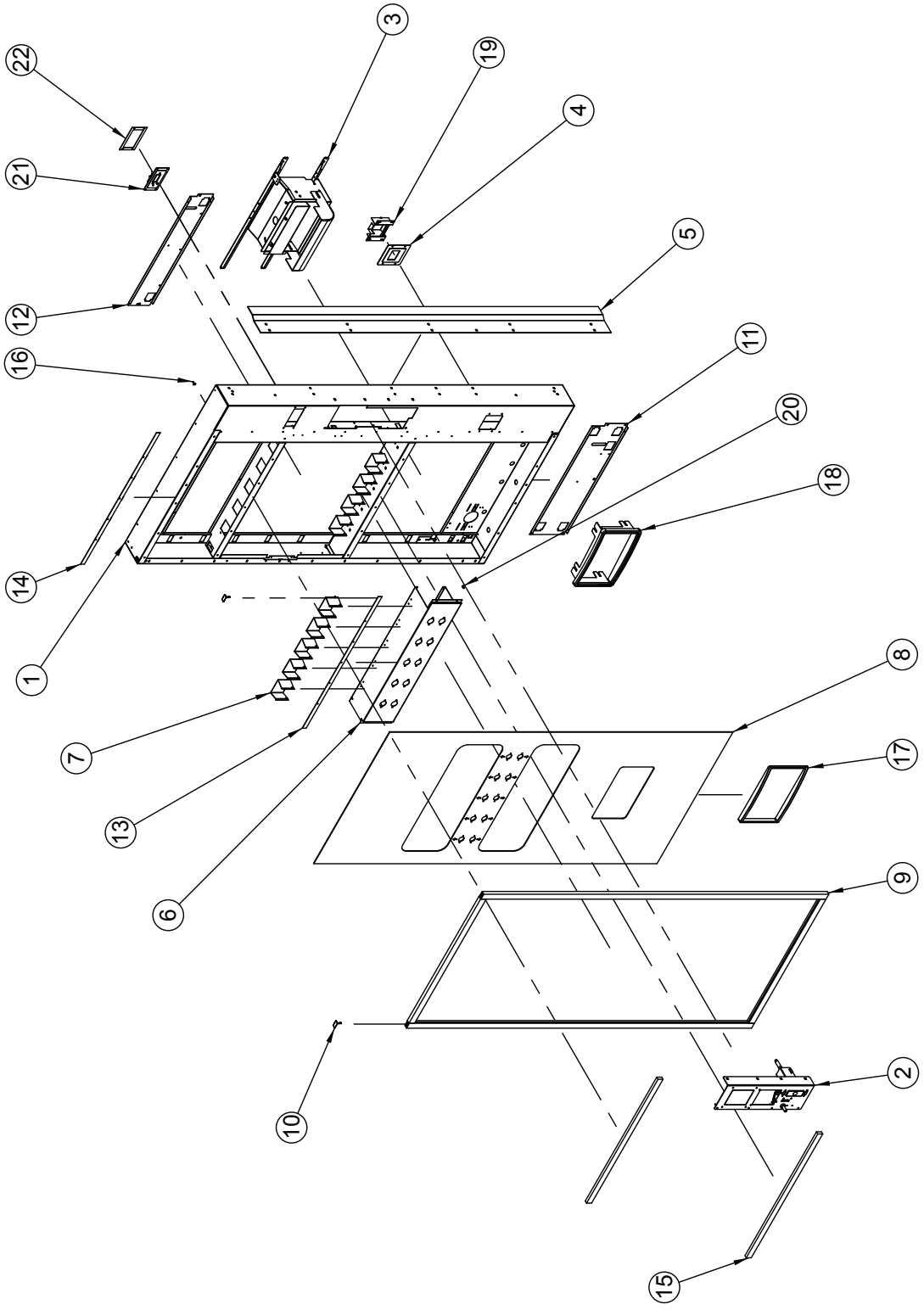
Dr Pepper Door Assembly, Rear



Dr Pepper Door Assembly, Rear

ITEM NO.	DESCRIPTION	PART NO.
1	Door Weld Assembly, Dr Pepper, Wide Vender, 72”	374510
	- Wide Vender, 79”	375510
	- Narrow Vender, 72”	376510
2	Security Plate Assembly, Dr Pepper	374530
3	Rain Guard, Wide Vender	010518
	- Narrow Vender	258504
4	Vandal Panel, Right, 72”	011501
	- 79”	010519
5	Control Board Housing	261570
6	Coin Box Housing Panel Assembly	378596
7	Coin Box Housing CDC	273503
8	Changer Door Assembly, Dr Pepper	374550
9	Selection Panel Strap Weld Assembly	378592
10	Validator Vault, Dr Pepper	374503
11	Coin Cup Assembly, Dr Pepper	374580
12	Coin Cup Plate	378595
13	Coin Cup Plate Decal, Dr Pepper	831918
14	Door Switch	835019
15	Transformer Assembly	842147
16	Fuse Holder Assembly	842219
17	Ballast	838053
18	Lamp Guard, Dr Pepper, Wide Vender	374509
	- Narrow Vender	376504
19	Coin Box	815347
20	Changer Guard, Dr Pepper	374515
21	Keps Nut, #8-32	E905001
22	Latch Pocket Plate	380505
23	Harness Cover	378542

Live Display Door Assembly, Front

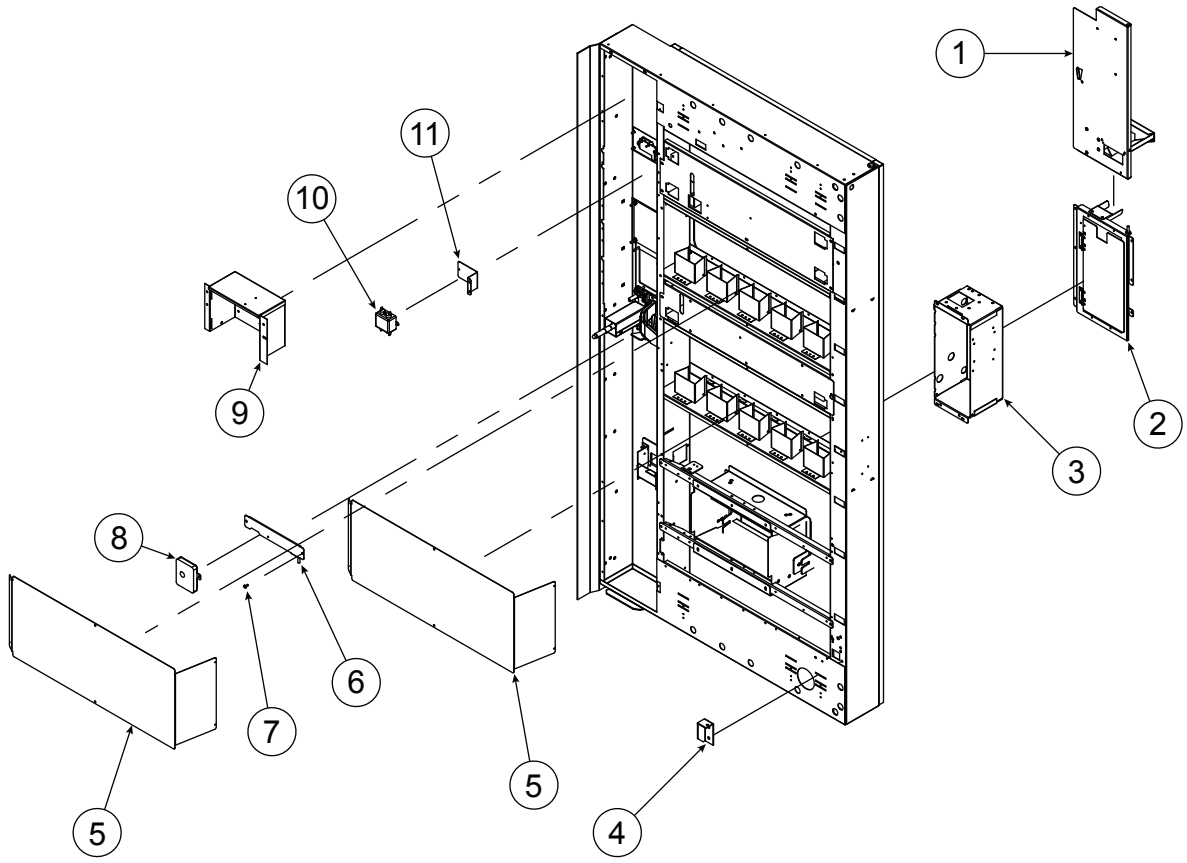


Live Display Door Assembly, Front

ITEM NO.	DESCRIPTION	PART NO.
1	Door Weld Assembly, 72”, Live Display	384510
2	Security Plate Assembly	385540
3	Port Assembly, Live Display	*See exploded view elsewhere in Parts Catalogue*
4	Coin Cup Plate Weld Assembly	385580
5	Vandal Panel, Right, 72”	011501
6	Button Panel	278532
7	Display Product Holder	023107
8	Sign	*See note below*
9	Trim	
10	End Cap, Flat Trim	815364
11	Lamp Panel, Top	278506
12	Lamp Panel, Bottom	278507
13	Price Label Strip, Top	278512
14	Price Label Strip, Bottom	278538
15	Foam Strip	829051
16	T-bolt, #8-32 x 1/2”	E901054
17	Port Spacer	815248
18	Port Trim	815249
19	Coin Cup Weld Assembly	385590
20	Screw, #8-32 x 3/8”	E901011
21	Display Plate Assembly	385560
22	Display Plate Gasket	829065

Note: *Please call Royal Vendors’ Service Parts Department for all sign part numbers.*

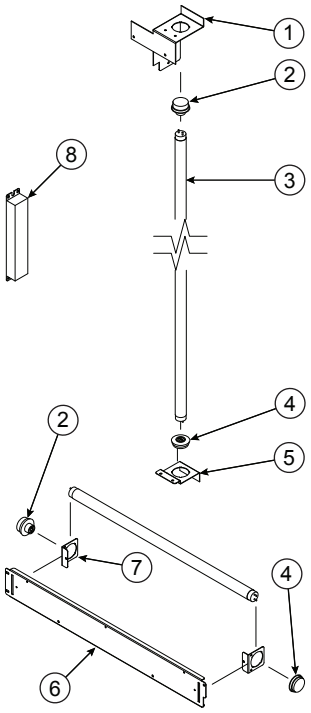
Live Display Door Assembly, Rear



Live Display Door Assembly, Rear

ITEM NO.	DESCRIPTION	PART NO.
1	Changer Door Assembly	385570
2	Coin Box Housing Panel Assembly	385591
3	Coin Box Housing	273503
4	Bottom Inner Door Hinge	010543
5	Display Back	278505
6	Selection Panel Strap Weld Assembly	378592
7	Screw, #8-32 x 3/8”	E901011
8	Latch Pocket Plate	380505
9	Control Board Housing Assembly	261570
10	EMI Filter	842676
11	Filter Mounting Bracket	381531

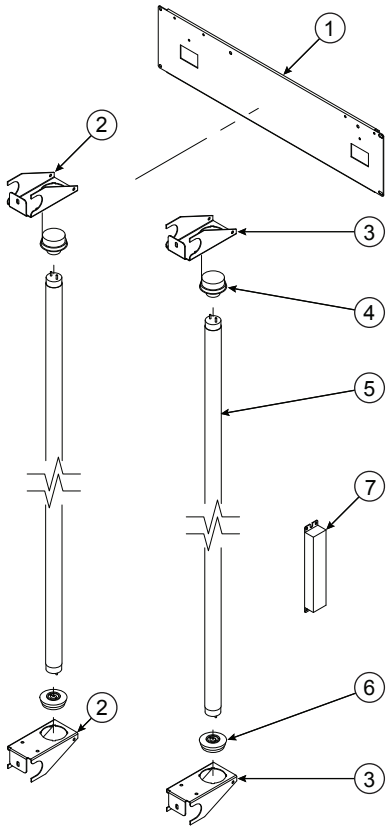
Lighting Assemblies



COLD DRINK ADA MODELS 650 AND 768

ITEM NO.	DESCRIPTION	PART NO.
1	Lamp Bracket, Top, Model 650	381511
	- Model 768	382508
2	Lamp Socket, Top *(spring-loaded)*	842512
3	Fluorescent Tube	*See note below*
4	Lamp Socket, Bottom *(static)*	842513
5	Lamp Bracket, Bottom, Model 650	381512
	- Model 768	382502
6	Bottom Lamp Panel	378516
7	Bottom Lamp Bracket	378538
8	Ballast	838053
•	Harness, Lower Lamp	842754
	- Upper Lamp	842755

Note: *Fluorescent tubes are not available for purchase from Royal Vendors.*

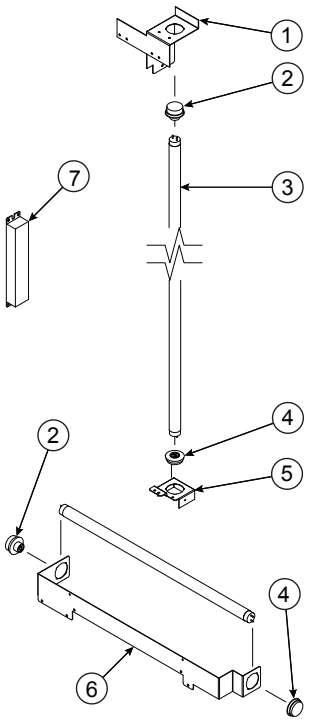


COLD DRINK / DR PEPPER ADA MODEL 542

ITEM NO.	DESCRIPTION	PART NO.
1	Lamp Panel, Narrow, Cold Drink	380501
	- Dr Pepper	376505
2	Lamp Bracket, Magnum, Left & Right / Dr Pepper, Right	380507
3	Lamp Bracket, Dr Pepper, Left only	380506
4	Lamp Socket, Top *(spring-loaded)*	842512
5	Fluorescent Tube	*See note below*
6	Lamp Socket, Bottom *(static)*	842513
7	Ballast	838053

Note: *Fluorescent tubes are not available for purchase from Royal Vendors.*

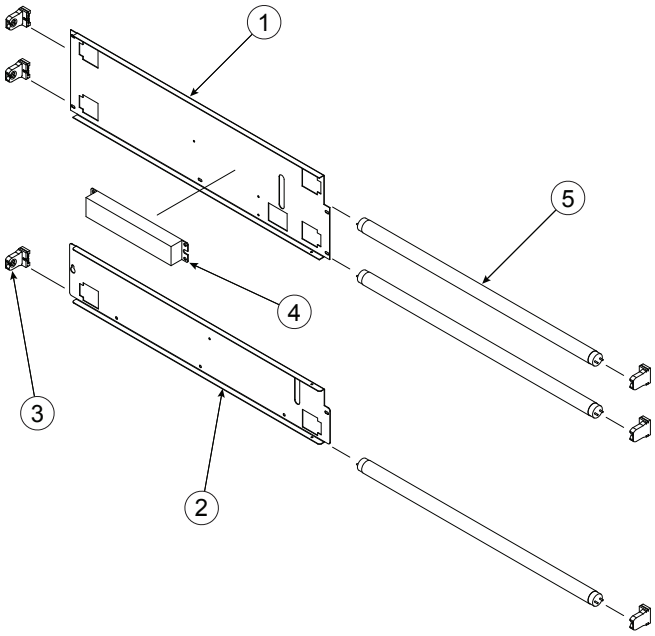
Lighting Assemblies



DR PEPPER ADA MODELS 650 AND 768

ITEM NO.	DESCRIPTION	PART NO.
1	Lamp Bracket, Top, Model 650	381511
	- Model 768	382508
2	Lamp Socket, Top *(spring-loaded)*	842223
3	Fluorescent Tube	*See note below*
4	Lamp Socket, Bottom *(static)*	842224
5	Lamp Bracket, Bottom, Model 650	381544
	- Model 768	382507
6	Bottom Lamp Panel, Dr Pepper	374517
7	Ballast	838053
•	Harness, Lower Lamp	842754
	- Upper Lamp	842755

Note: *Fluorescent tubes are not available for purchase from Royal Vendors.*

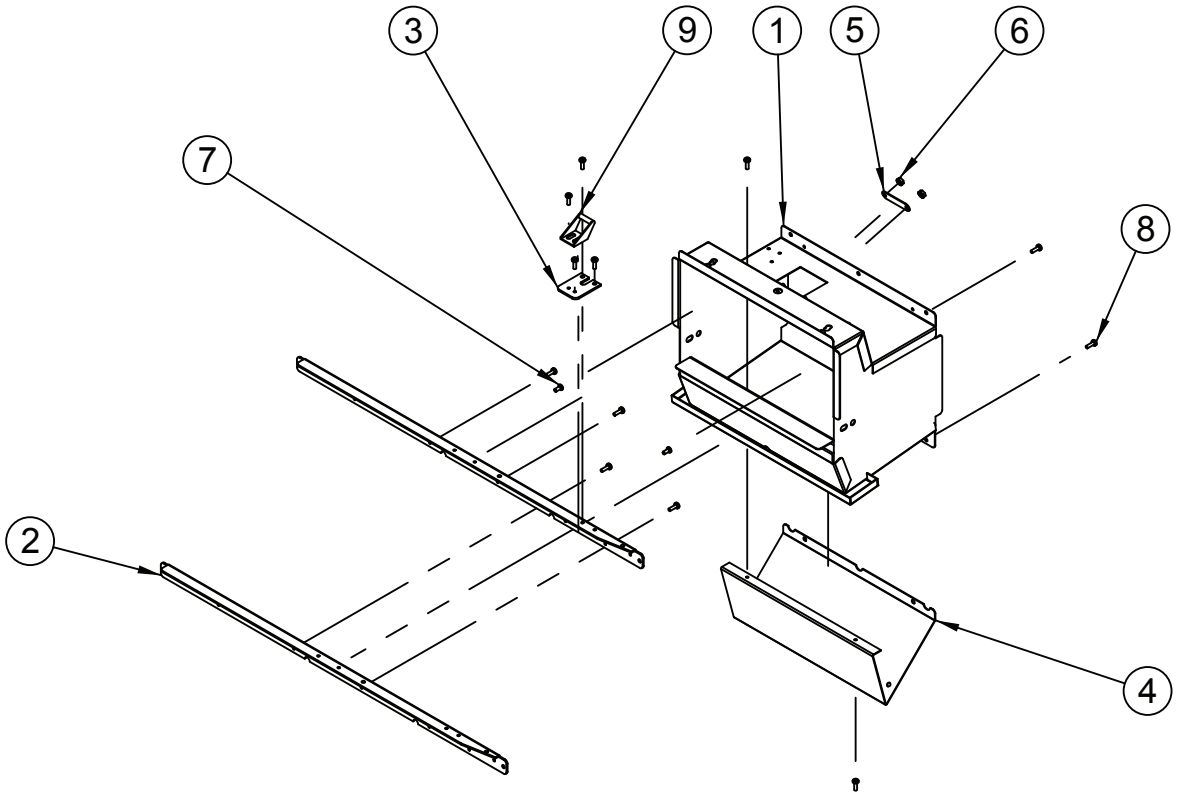


LIVE DISPLAY MODELS

ITEM NO.	DESCRIPTION	PART NO.
1	Lamp Panel, Top	278506
2	Lamp Panel, Bottom	278507
3	Lampholder	842011
4	Ballast	838031
5	Fluorescent Tube	*See note below*
•	Ballast Assembly, Live Display, 2-bulb	122529

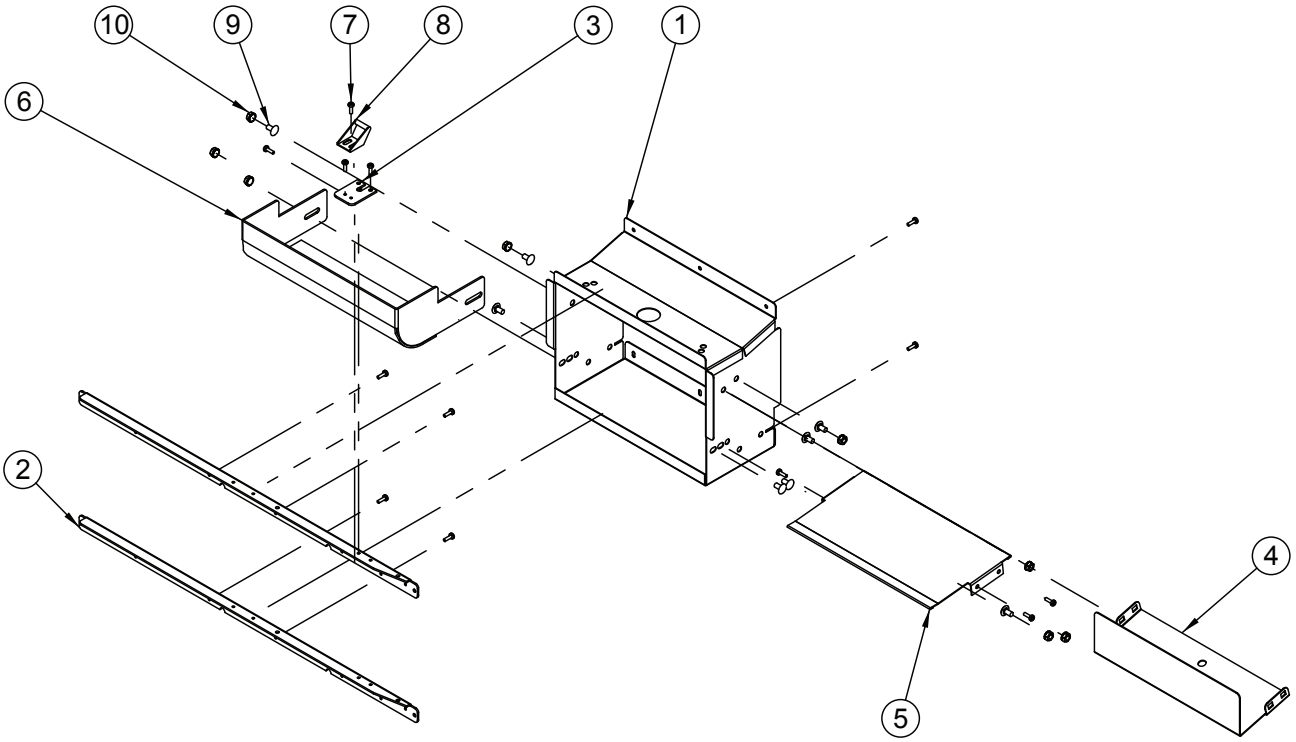
Note: *Fluorescent tubes are not available for purchase from Royal Vendors.*

Port Assembly, Cold Drink / Dr Pepper Door



ITEM NO.	DESCRIPTION	PART NO.
1	Port Body Weld Assembly	378540
2	Port Brace, Wide Vender, Cold Drink	369524
	- Wide Vender, Dr Pepper	374508
	- Narrow Vender, Cold Drink	380508
	- Narrow Vender, Dr Pepper	376503
3	Latch Roller Bracket	010516
4	Anti-theft Plate	378521
5	Motion Detector Cover	385516
6	Keps Nut, #8-32	E905001
7	Screw, #8-32 x 3/8”	E901011
8	Sems Screw, #8-32 x 1/2”	E901002
9	Burst-open Latch	912003

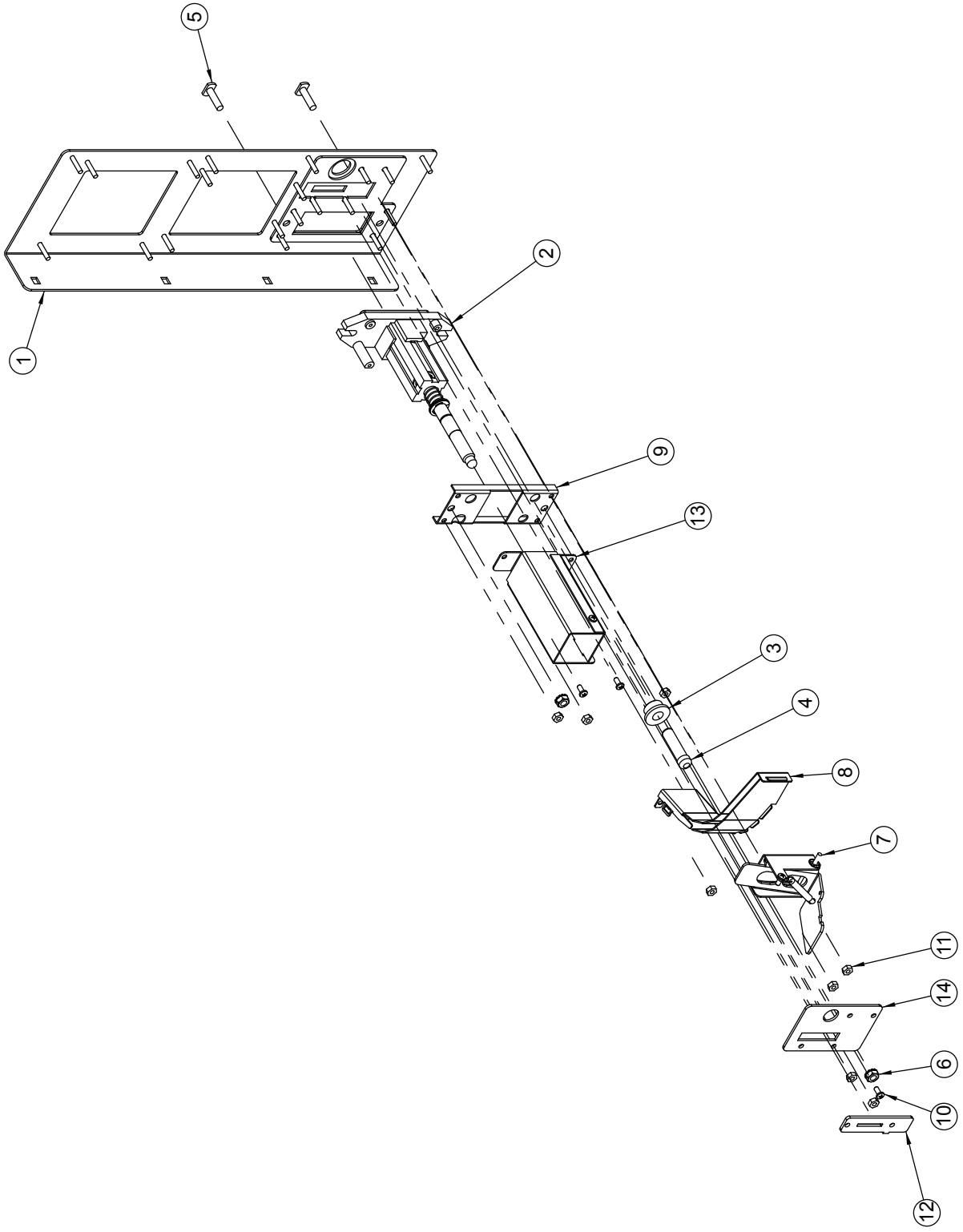
Port Assembly, Live Display



ITEM NO.	DESCRIPTION	PART NO.
1	Delivery Port Weld Assembly	384520
2	Port Brace, Wide Vender	369524
3	Latch Roller Bracket	010516
4	Anti-theft Plate	384505
5	Port Bottom Plate	384507
6	Bottle Stop	384506
7	Sems Screw, #8-32 x 1/2”	E901002
8	Burst-open Latch	912003
9	Carriage Bolt, 1/4”-20 x 1/2”	E901007
10	Keps Nut, 1/4”-20	E905002

Security Plate Assembly, Cold Drink / Live Display

385540



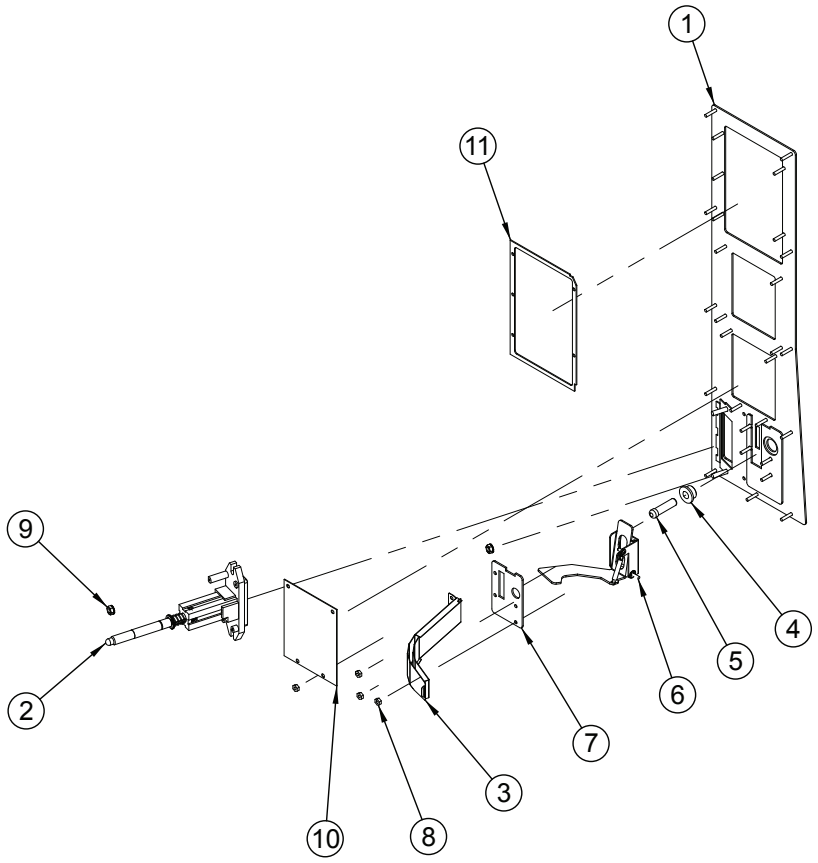
Security Plate Assembly, Cold Drink / Live Display

385540

ITEM NO.	DESCRIPTION	PART NO.
1	Security Plate Weld Assembly	385530
2	T-handle Assembly	812428
3	Coin Return Bushing	803059
4	Coin Return Button	803031
5	T-bolt, 1/4”-20 x 1”	E901037
6	Keps Nut, 1/4”-20	E905002
7	Coin Return Lever Assembly	369570
8	Coin Chute Assembly	369580
9	T-handle Brace	337583
10	Screw, #8-32 x 3/8”	E901011
11	Keps Nut, #8-32	E905001
12	Coin Plate	815651
13	T-handle Cover Assembly	303145
14	Coin Plate Bushing Retainer	378533
•	Top Validator Filler Plate W/A	381522
•	Display Plate Assembly, LED, 4-character *(not part of Security Plate Assembly, includes the following five items)*	378598
	- LED Display	836012
	- LED Lens	916032
	- LED Window	815121
	- LED Display Shroud	929031
	- LED Display Cover (4-character Display)	378541

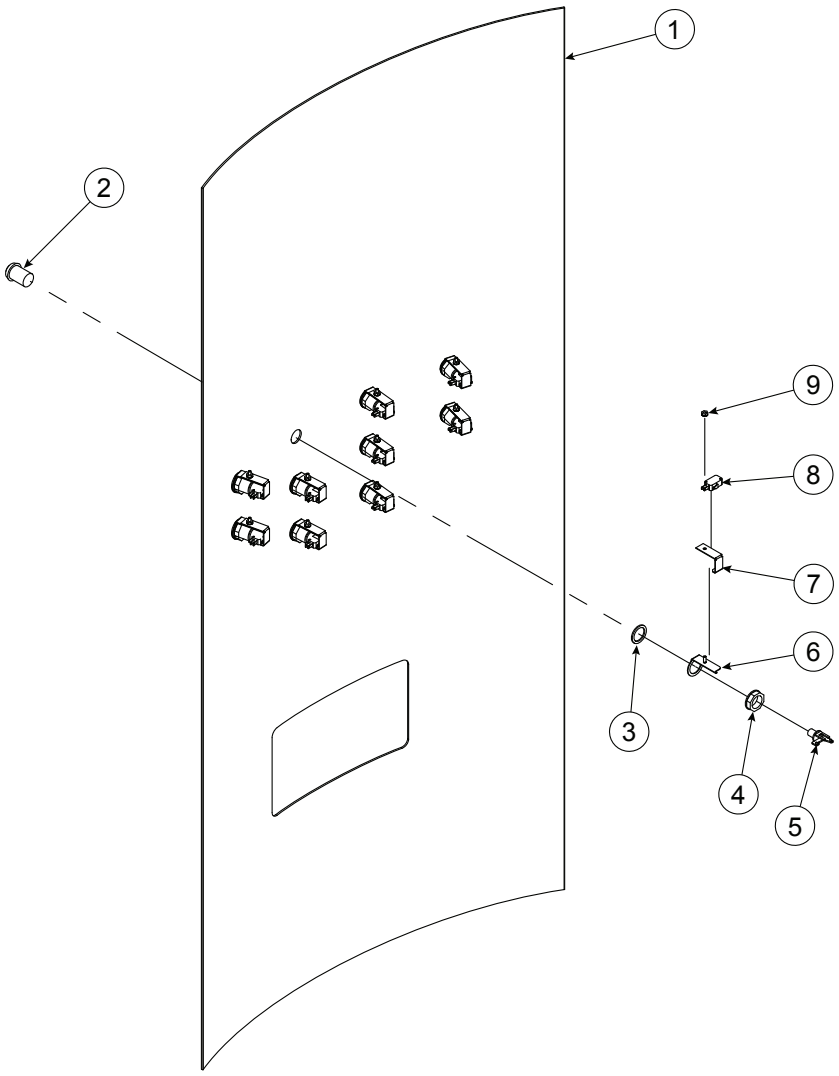
Security Plate Assembly, Dr Pepper

374530



ITEM NO.	DESCRIPTION	PART NO.
1	Security Plate Weld Assembly, Dr Pepper	374520
2	T-handle Assembly, Dr Pepper	812440
3	Coin Chute Assembly, Dr Pepper	374540
4	Coin Return Bushing	803059
5	Coin Return Button	803031
6	Coin Return Lever Assembly	369570
7	Coin Plate Bushing Retainer	378533
8	Keps Nut, #8-32	E905001
9	Keps Nut, 1/4”-20	E905002
10	Bottom Validator Filler Plate Weld Assembly	381523
11	Display Plate Gasket	829067
•	Display Plate Assembly, LED, 4-character *(not part of Security Plate Assembly, includes the following five items)*	378598
	- LED Display	836012
	- LED Lens	916032
	- LED Window	815121
	- LED Display Shroud	929031
	- LED Display Cover (4-character Display)	378541

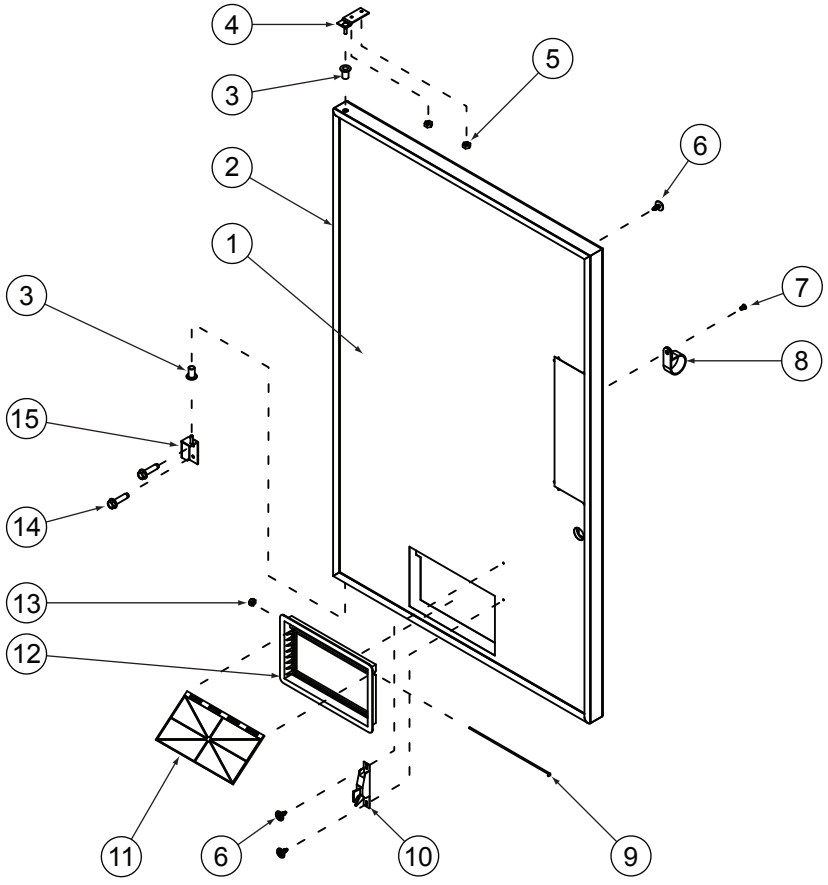
Sign, Cold Drink / Dr Pepper Door



ITEM NO.	DESCRIPTION	PART NO.
1	Sign	*See note below*
2	Selection Button *(includes items 3, 4, and 5)*	816152
6	Switch Retainer, Front	357513
7	Switch Retainer, Rear	357512
8	Selection Switch	835001
9	Keps Nut, #8-32	E905001

Note: *Please call Royal Vendors' Service Parts Department for all sign part numbers.*

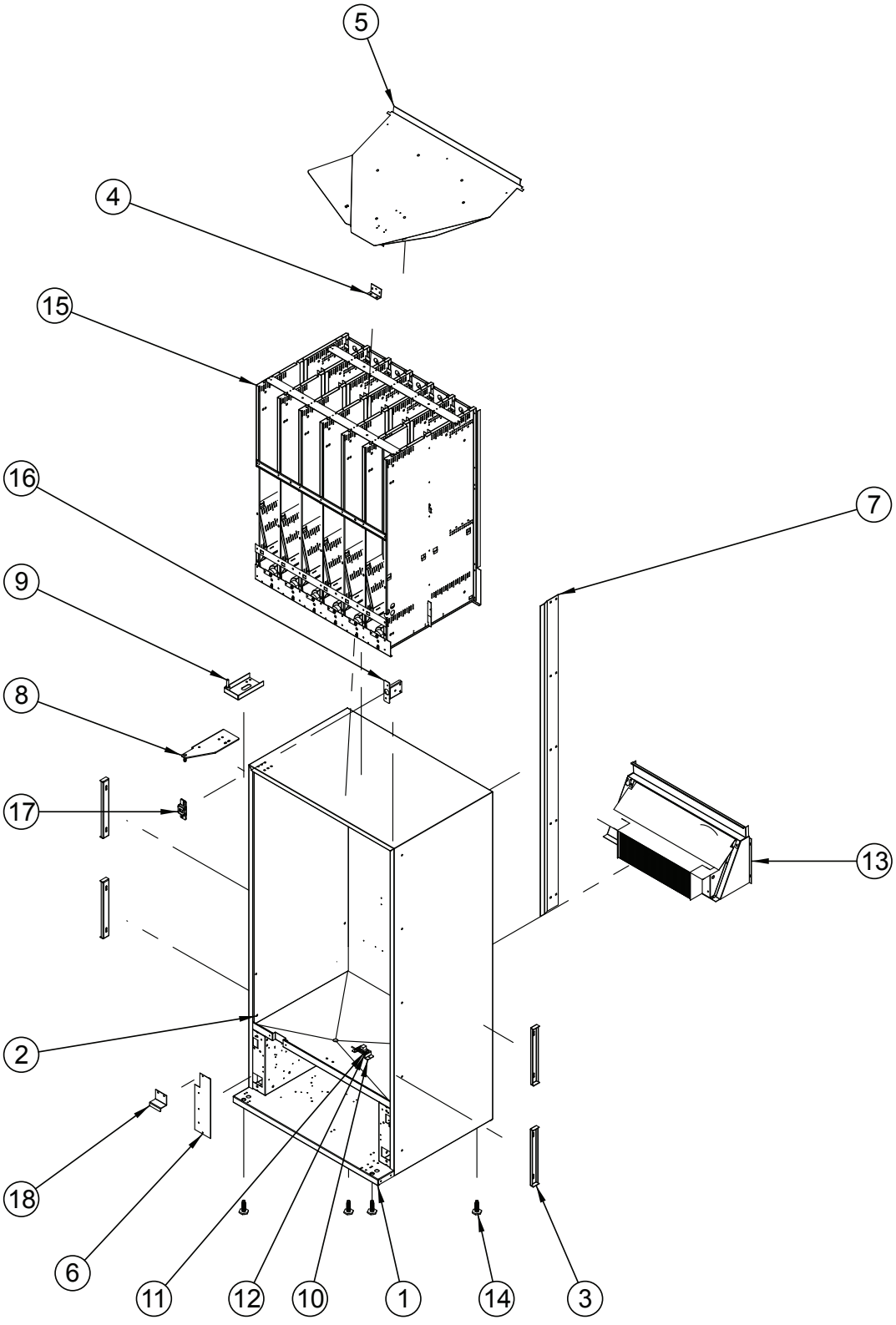
Inner Door Assembly



Inner Door Assembly

ITEM NO.	DESCRIPTION	ROYAL NO.
1	Inner Door Assembly, Wide Vender, Cold Drink / Live Display, 72”	378610
	- Wide Vender, Dr Pepper, 72”	374610
	- Wide Vender, Cold Drink / Live Display, 79”	379610
	- Wide Vender, Dr Pepper, 79”	375610
	- Narrow Vender, Cold Drink / Live Display, 72”	380610
	- Narrow Vender, Dr Pepper, 72”	376610
2	Door Gasket, Wide Vender, 72”	815032
	- Wide Vender, 79”	815033
	- Narrow Vender, 72”	815219
3	Bushing, Inner Door Hinge	815026
4	Top Inner Door Hinge W/A	010520
5	Keps Nut, #8-32	E905001
6	Screw, Self-drilling, with Washer	E902001
7	Pop Rivet	E908002
8	Cable Clamp, 1”	E916004
9	Port Door Rod, Wide	811028
10	Burst Open Latch	812002
11	Inner Door Port	815192
12	Frame, Inner Door Port	815191
13	Elastic Stop Nut Assembly, #6-32	E905006
14	Serrated Screw, 1/4”-20 x 1”	E901003
15	Bottom Inner Door Hinge	010543

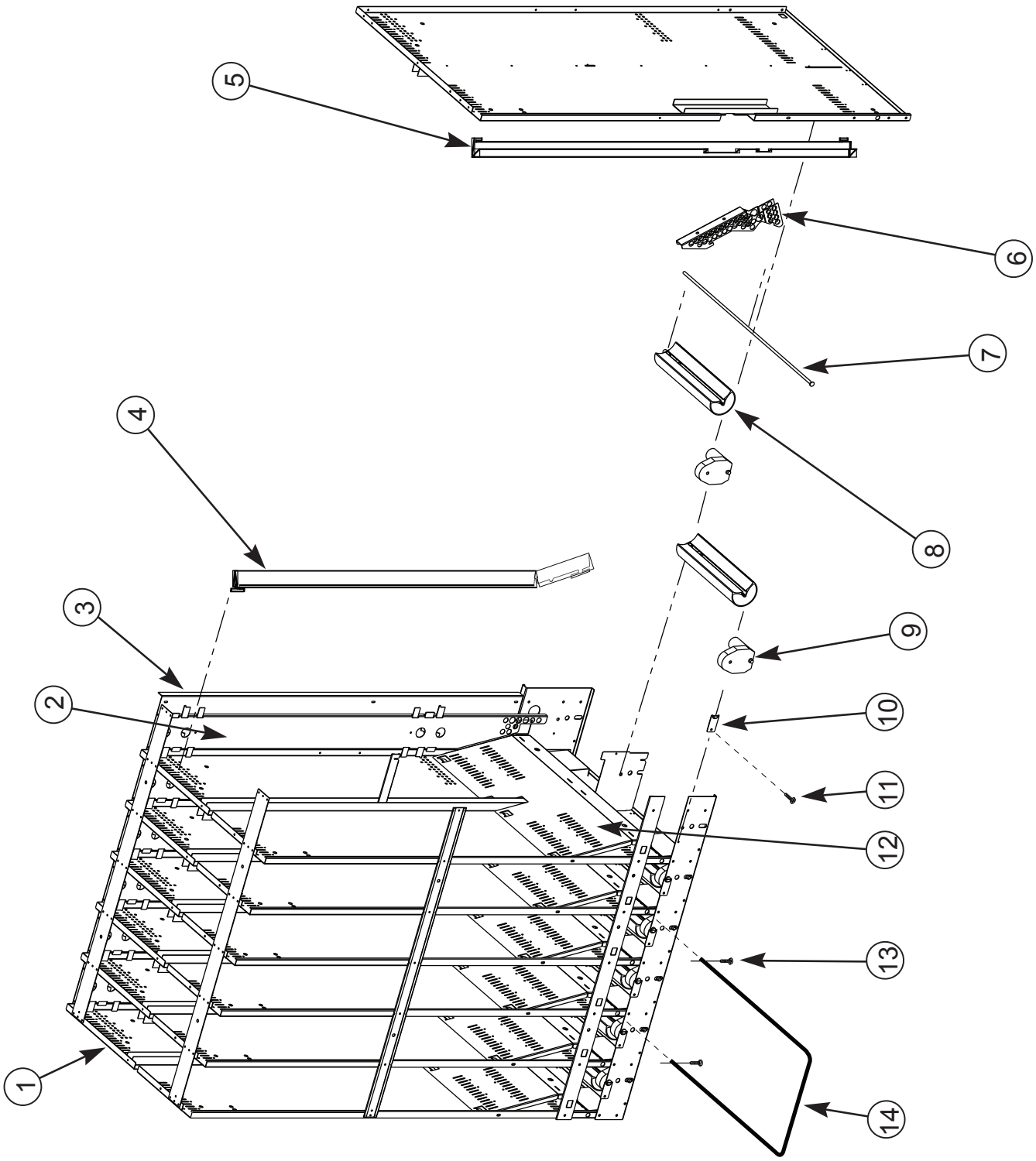
Cabinet Assembly



Cabinet Assembly

ITEM NO.	DESCRIPTION	PART NO.
1	Cabinet Weld Assembly	257260
2	Right Column Wall	257350
3	Vend Mechanism Support	058001
4	Product Chute Tie Bracket	010017
5	Product Chute Assembly	256070
6	Harness Splash Shield	385002
7	Left Vandal Panel, 72”	142022
8	Hinge Top, Universal	810075
9	Bottom Hinge Weld Assembly	256082
10	Temperature Sensor Mounting Bracket Clip	286002
11	Temperature Sensor	822030
12	Temperature Sensor Bracket	810085
13	Evaporator Fan Housing Assembly	256035
14	Levelling Leg	E803002
15	Vend Mechanism Assembly, Wide, 72”	385710
	- Wide, 79”	386710
	- Narrow, 72”	387710
16	Latch Strike Mounting Plate Weld Assembly	385010
17	Latch Strike Assembly	378010
18	Door Switch Activator	231009

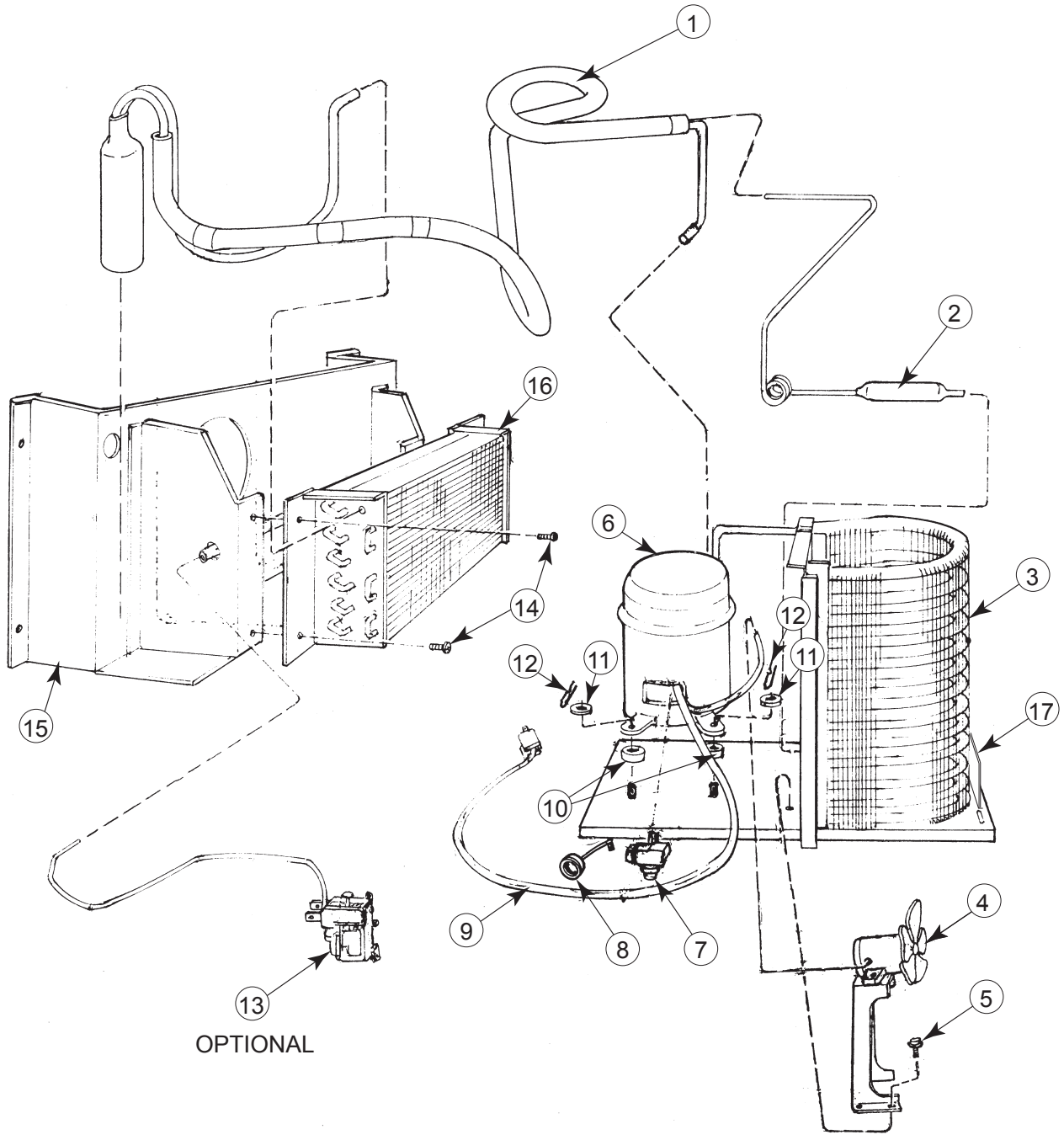
Vend Mechanism Assembly



Vend Mechanism Assembly

ITEM NO.	DESCRIPTION	ROYAL NO.
1	Vend Mechanism Assembly, 72” Vender, 12 column	385710
	- 79” Vender, 12 column	386710
	- 72” Vender, 10 column	387710
2	Backspacer Assembly, Airflow, 79” Vender	261720
	- 72” Vender	262750
3	Backplate, Airflow Stack, 79” Vender	261711
	- 72” Wide Vender	332704
	- 72” Narrow Vender	264732
4	Product Retainer, Left, 79” Vender	810093
	- 72” Vender	810095
5	Product Retainer, Right, 79” Vender	810092
	- 72” Vender	810094
6	Funnel Angle, Airflow	810243
7	Rotor Rod	803035
8	Rotor	813027
9	Vend Motor	839031
10	Rod Retainer	256714
11	Screw, #8-32 x 3/8”	E901011
12	Product Funnel	332702
13	Self Drilling Screw	E902004
	- Hitch Pin Clip *(some venders may have pins)*	906023
14	Case Support	811026
•	Front Rotor Bearing	915156
•	Rear Rotor Bearing	915222
•	Front Rotor Assembly *(incl. rotor, front rotor bearing, and motor)*	332730
•	Rear Rotor Assembly *(incl. rotor, rear rotor bearing, and motor)*	332740
•	Anti-bridging Spacer, Front	815392
•	Anti-bridging Spacer, Rear	815393
•	Anti-friction sheet	915197
•	Rubber Retainer Strip	915217
•	Rear Can Retainer (Anti-tilt Spring)	810054

Refrigeration Assembly

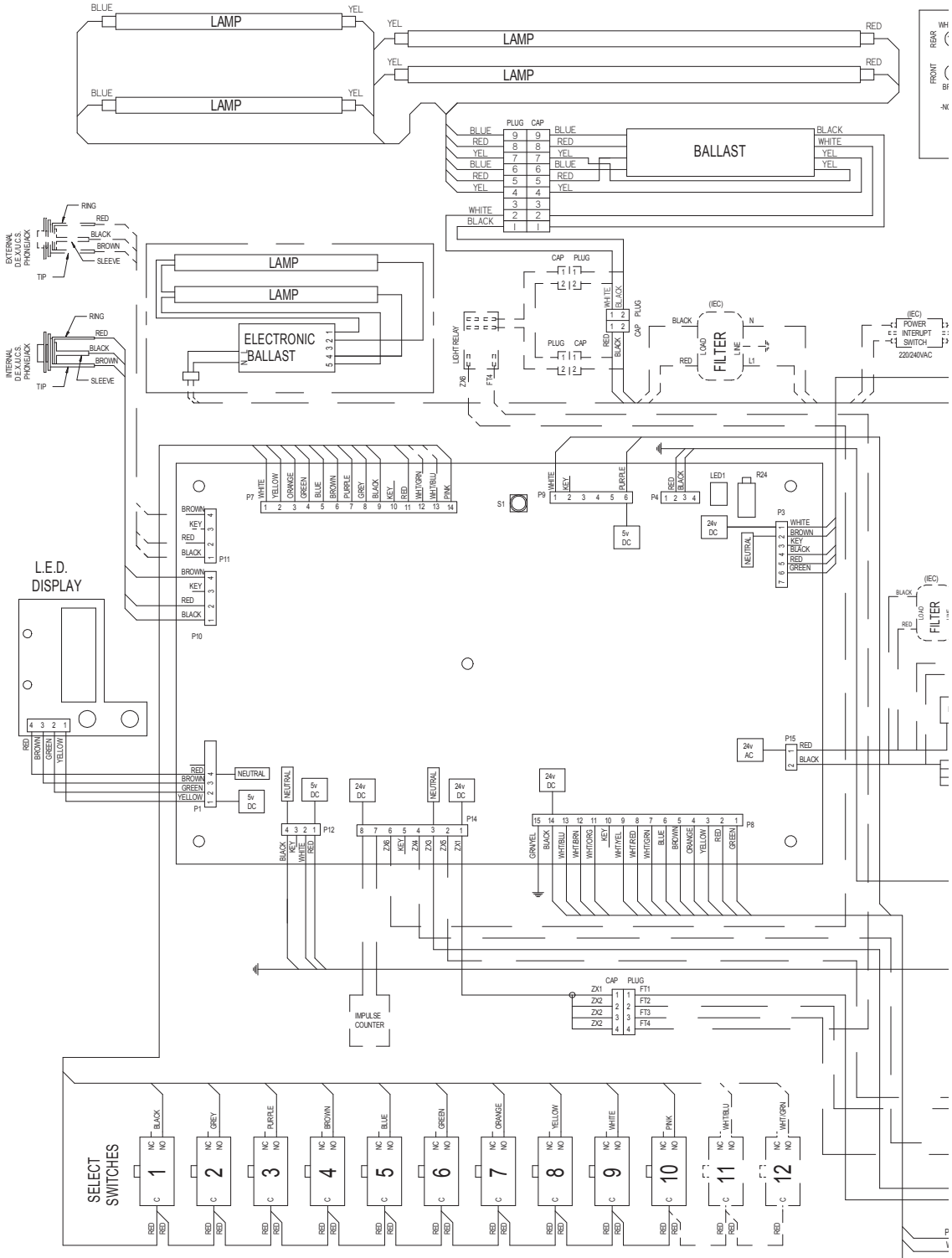


Refrigeration Assembly

ITEM NO.	DESCRIPTION	ROYAL NO.
1	Heat Exchange	210425
2	Dryer	824005
3	Condenser	820007
4	Condenser Fan Motor	839010
	Condenser Fan blade	810014
	Condenser Fan Motor Bracket	810006
5	Screw, #8-32x1/2”	901006
6	1/3+ H.P. Capacitor Start Compressor	819028
7	Compressor Relay 1/3+ H.P. (Tecumseh Only)	822042
8	Compressor Overload 1/3+ H.P. (Tecumseh Only)	822010
9	Compressor Lead	*SEE NOTE*
10	Grommets, Compressor	916015
11	Grommets Plugs	815017
12	Clip, Compressor	914002
13	Thermostat	822001
14	Screw, #8x1/2”	902004
15	Evaporator Fan Shroud Assembly, Airflow, Wide	256035
	Evaporator Fan Shroud Assembly, Wide (prior to 200422)	256080
	Evaporator Fan Shroud Assembly, Airflow, Narrow	264030
	Evaporator Fan Shroud Assembly, Narrow (prior to 200422)	258070
16	Evaporator Coil	820002
17	Refrigeration System, Merlin IV 1/3+ H.P.	256420
•	Evaporator Cover	256004
•	Condensor Shroud	095401

NOTE: *This part is not available individually. It must be ordered as an assembly.*

Section 9. Wiring Diagram



Merlin IV Wiring Diagram

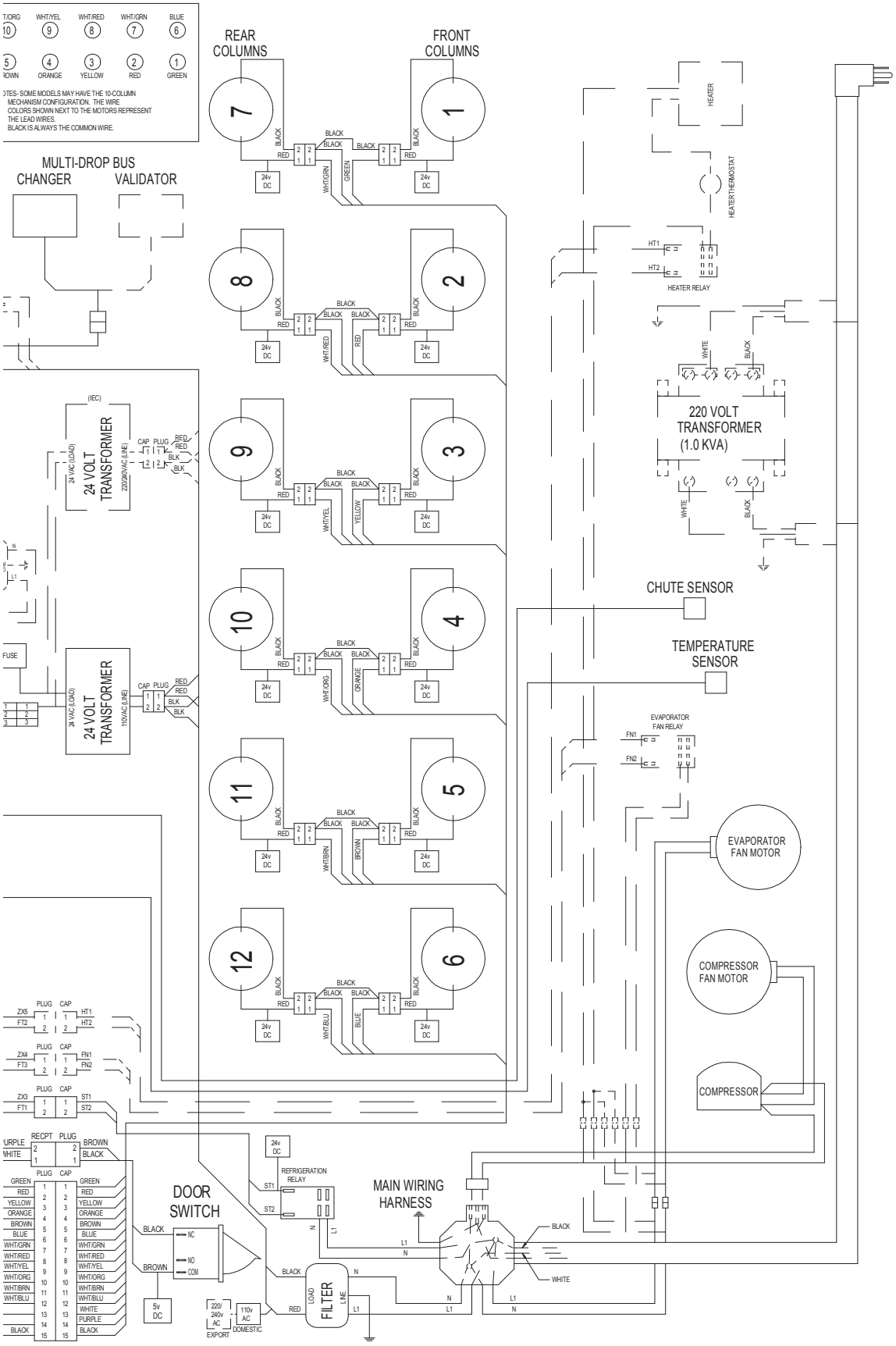
POSITION	CONNECTION NAME
P1	L.E.D. DISPLAY
P3	MULTI-DROP BUS
P4	CHUTE SENSOR
P7	SELECT SWITCHES
P8	VEND MOTORS
P9	OPTIONS/FEATURES
P10	PRIMARY D.E.X./U.C.S.
P11	SECONDARY D.E.X./U.C.S.
P12	PRIMARY TEMPERATURE SENSOR
P14	ENVIROMENTAL CONTROL
P15	24 VOLT AC
S1	CONTROLLER MODE BUTTON
LED1	SENSOR ADJUSTMENT L.E.D.
R24	SENSOR ADJUSTMENT TRIMPOT

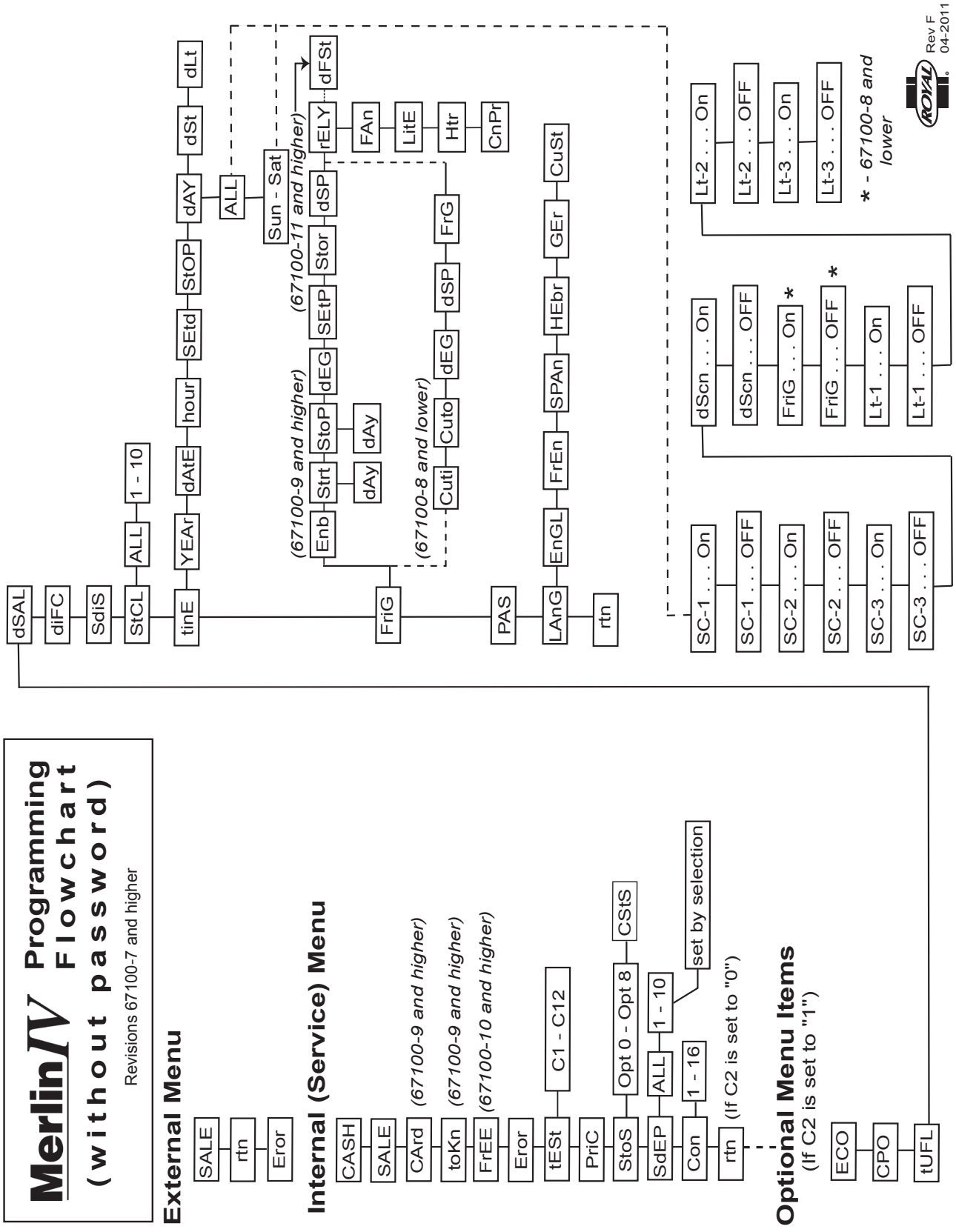
-NOTES-
1- SOME MODELS MAY HAVE THIS TYPE OF SELECT SWITCH.
2- SOME MODELS MAY HAVE FEWER SELECT SWITCHES.
3- SOLID COLORS CAN BE SUBSTITUED FOR STRIPED WIRES INDICATED.

ROYAL VENDORS ®

BARDANE INDUSTRIAL PARK
426 INDUSTRIAL BLVD
KEARNEYSVILLE WV 25430 • USA
+1 304-728-7056

Section 9. Wiring Diagram




Merlin IV Programming Flowchart
(without password)
Revisions 67100-7 and higher
External Menu
SALE
rtn
Eror
Internal (Service) Menu
CASH
SALE
(67100-9 and higher)
CArd
toKn
(67100-9 and higher)
FrEE
(67100-10 and higher)
Eror
tESt
C1 - C12
PriC
StoS
Opt 0 - Opt 8
CStS
SdEP
ALL
1 - 10
Con
1 - 16
set by selection
rtn
(If C2 is set to "0")
Optional Menu Items
(If C2 is set to "1")
ECO
CPO
tUFL
dSAL
diFC
SdiS
StCL
ALL
1 - 10
tinE
YEAr
dAtE
hour
SEtd
StOP
dAY
dSt
dLt
ALL
Sun - Sat
(67100-11 and higher)
rELY
dFSt
FAn
LitE
Htr
CnPr
(67100-9 and higher)
Enb
Strt
StoP
dEG
SEtP
Stor
dSP
dAy
dAy
(67100-8 and lower)
Cuti
Cuto
dEG
dSP
FrG
FriG
PAS
LAnG
EnGL
FrEn
SPAn
HEbr
GEr
CuSt
rtn
SC-1 . . . On
SC-1 . . . OFF
SC-2 . . . On
SC-2 . . . OFF
SC-3 . . . On
SC-3 . . . OFF
dScn . . . On
dScn . . . OFF
FriG . . . On *
FriG . . . OFF *
Lt-1 . . . On
Lt-1 . . . OFF
Lt-2 . . . On
Lt-2 . . . OFF
Lt-3 . . . On
Lt-3 . . . OFF
* - 67100-8 and lower
Rev F
04-2011

CREDIT AND REPLACEMENT POLICY

Credits or replacements will be issued on warranty items if the proper procedures are followed:

1. ROYAL VENDORS will pay shipping charges on all parts covered under this warranty when transportation has been made the most economical way. (Example: within the continental USA, regular ground UPS). An A.R.S. (Authorized Return Service) sticker will be sent with all warranty parts. This method of shipping is preferred for returning parts to Royal.
2. Credits will only be issued to warranty parts that have been ordered in advance, not for parts ordered as stock. (NO EXCEPTIONS.)
3. When ordering warranty parts in advance, please have the full vender, refrigeration unit, and / or control board serial numbers.
4. A copy of the Packing Slip, the correct serial number and complete Return Material Tag (provided with part) are required for sending back parts. Please fill out the Return Material Tag completely, keeping the white copy for your records and sending the yellow tag back with the attached part. Make sure you have your company name, address, phone number, serial number, and model number, along with a brief explanation of the problem.
5. If the item returned is not under warranty, it will be sent back to you at your expense along with a US$10.00 handling fee or it will be scrapped.
6. All warranty parts should be properly wrapped and packed securely to avoid further damage. Parts that are returned from the field and have been tapped into, tampered with, not packaged properly or have had the serial plate or label removed, will void the warranty.
7. If parts are not returned within 15 working days, the invoice will be due in full.

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January 2013

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