

3.0 VENDOR SYSTEMS AND COMPONENTS

3.1 SENSIT II SYSTEM THEORY OF OPERATION

1. The Sensit II system is comprised of three elements; the emitter, the detector, and the control logic. The emitter is a circuit board with infra-red emitting LED's located on one side of the hopper. On the opposite side of the hopper is a circuit board with infra-red detectors that measure the intensity of the light. The emitter, the detector and the control board controls the performance of the vending operation.
2. When a selection is made, the vend motor will begin to run. After several seconds, if no product falls in the hopper, the motor will be stopped, the credit will be maintained and the customer will be directed to "PLEASE MAKE ANOTHER SELECTION."
3. When the controller measures a variation in the light intensity during the vend cycle, it recognizes that a product has fallen through the light into the hopper. The controller stops the vend motor and removes the credit.
4. When the vendor is serviced with the door open, the protective lens on the detector can become fogged up, particularly in hot or humid locations. In these cases, the vendor will display "SENSIT BLOCKED – UNABLE TO VEND" until the fogging has cleared, usually within a minute after closing the door.

3.2 CONTROL BOARD

The control board contains a program chip which controls and monitors the vendor, DEX, and the mode switch used to enter service mode. The control board is located in the upper left hand corner of the open vendor door, behind an access door.

3.2.1 Program Chip

The program chip contains the software that controls vending and refrigeration (refer to Figure 3.1). The software can be upgraded by replacing the chip, but please note that all settings such as pricing and motor configuration will have to be reprogrammed. Refer to Section 8.0 for replacing the control chip.

3.2.2 Mode Switch

Pressing the mode switch (refer to Figure 3.1) allows the user to get in to the computer's service mode to change settings, access vend data, and check error codes for troubleshooting. Data is displayed on the front display panel, and entered at the front selection panel. Pressing the switch again or closing the door will automatically switch the computer back to vend mode.

3.2.3 DEX Jack

The DEX jack (refer to Figure 3.1) is provided for downloading detailed vend data, and uploading control chip software.

3.3 VEND SENSOR

3.3.1 Emitter

The emitter, inside a protective housing, is located on the right side of the hopper when viewing the back of the door. The emitter sends a beam of infra-red light across the top of the hopper to the detector.

3.3.2 Detector

The detector is located on the left of the hopper when viewing the back of the door. The detector, inside a protective housing, receives the beam of light from the emitter and sends a signal to the control board based on the intensity of the beam. When a product drops through the beam, it causes a change in intensity which is interpreted by the control as a successful vend. When servicing the detector board, be mindful of the seven black detector cells along the top of the board. These can be knocked out of alignment or damaged by rough handling.

3.4 DOOR

3.4.1 Changer Location

Three screws are installed in the door below the coin chute. These screws mate to the keyhole slots on the back of the changer. Refer to Section 4.2.4 Mounting And Connecting Coin Mechanism.

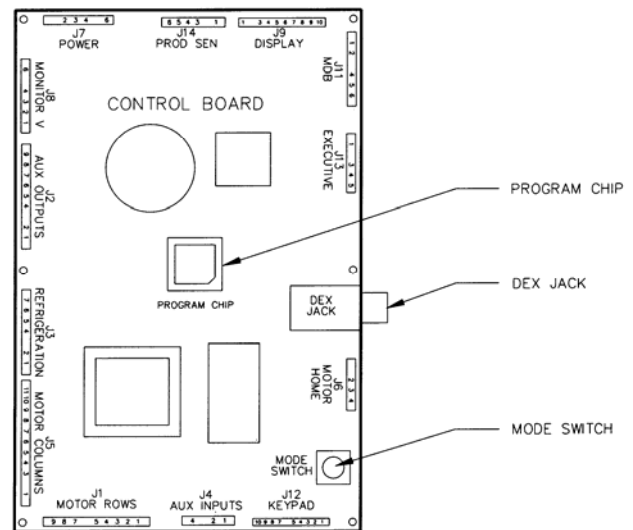


Figure 3.1 Control Board Components

3.4.2 Validator & Debit Card Reader Locations

There are two locations that will accept bill validators and debit card readers. The lower position meets the guidelines of the Americans with Disabilities Act (ADA) for access by handicapped persons. Refer to Section 4.2.3 Mounting and Connecting Bill Validators and Card Readers

3.4.3 Coin Box

The coin box is located below the changer, behind a separate door, and is used to hold overflow coins when the changer is full. It is removed by tilting slightly and pulling.

3.4.4 Door Switch

The door switch is mounted on the back of the door. The control uses the door switch to turn off the refrigeration unit when the door is open, and to switch from service mode to vend mode when the door is closed.

3.4.5 Display

The display is located on the front of the door. It serves as the interface for using and programming the machine. It will display the price of a selected item and the credit accumulated. When the machine is idle, it can display the time and a scrolling message. In service mode, it displays the active function and parameter values.

3.4.6 Keypad

The keypad is located below the display on the front of the door. A vending selection is made by keying in the letter and number combination that corresponds to the location of an item in the machine. The keypad is also used to enter data in operation and servicing of the vendor.

3.4.7 Coin Return Button

The coin return button is located next to the coin slot. Pressing the coin return button will release bent or irregular coins that are not accepted by the changer. If the machine fails to vend a selection that has been made, pressing the coin return will return the full credit. If the Force Vend option is disabled, it can also return the full credit before a selection is made. If the Bill Changer option is enabled, the coin return will return change for bills inserted in the bill validator.

3.5 REFRIGERATION (CHILLER) SYSTEM (OPTIONAL)

3.5.1 Refrigeration Cycle Theory of Operation

The compressor compresses refrigerant gas, which increases the pressure and temperature of the gas. As the hot, compressed gas passes through the condenser, it is cooled by the condenser fan and condenses to a liquid. The fan draws outside air in through a hole in the bottom of the cabinet, across the condenser where it picks up heat, and exhausts through the back of the cabinet. This part of the refrigeration system is isolated from the refrigerated part of the cabinet by the chiller housing. Driven by the pressurized gas entering the condenser, the liquid passes through a desiccant dryer and a capillary tube, then travels into the refrigerated part of the cabinet. The restriction created by the long, narrow capillary tube controls the rate at which the liquid refrigerant enters the evaporator. Lower pressures in the evaporator allow the liquid to evaporate, which lowers its temperature. The evaporator fan forces air across the evaporator, where it is cooled by transferring heat to the refrigerant. The warmed gaseous refrigerant is then sucked through an accumulator, which traps any liquid refrigerant and allows it to evaporate before entering the compressor. The refrigerant is then sucked into the compressor to be compressed, completing the cycle.

3.5.2 Temperature Control

The evaporator fan runs continuously to circulate air within the cabinet. A temperature sensor located near the evaporator measures the temperature of air entering the evaporator. When this temperature is above the temperature setting in the control, the compressor and condenser fan are turned on.

When the temperature falls to 4°F below the temperature setting, the compressor and condenser fan are turned off. Refer to Section 6.5 for setting the temperature.

3.5.3 Refrigeration Controls

1. The refrigeration system is operated through the control board. A temperature sensor in the cabinet relays the current temperature to the control.
2. If the temperature is above the setting that has been programmed in by the user, the control sends a 24VDC signal to the refrigeration relay. The energized relay closes to complete the high voltage circuit that powers the compressor and the condenser fan.
3. If the compressor should overheat, a thermal overload removes power to the compressor until it has cooled.
4. To protect against evaporator freeze-up, after one hour of continuous running the compressor will be shut off for 7.5 minutes to allow for defrosting.
5. When the temperature in the cabinet reaches 4°F cooler than the temperature setting, the control de-energizes the relay breaking the circuit powering the compressor.
6. The control will also shut off the compressor if the door is opened. This is to prevent the refrigeration unit from freezing up.
7. After the compressor has shut down, the control will wait until the compressor has been shut down 3 minutes and if applicable, the door has been closed 10 seconds before restarting the compressor. The delay allows pressure in the system to equalize.

3.6 TRAY RAILS

The rails are located inside the cabinet and are used to support the trays. The rails are adjustable up and down in 1" increments. Refer to Section 5.3 Tray Vertical Positions.

3.7 TRAYS

3.7.1 Vend Motors

The vend motors are snapped into mounting holes on the back of each tray. Each column has one vend motor which is driven by 24 VDC from the control board. Motors on snack trays do not have a conventional home position switch which would normally stop the motor after a 360° rotation. Instead, they will stop when the sensor has detected a vend, whether the rotation has been more or less than 360°. Refer to Section 4.2.6 and Section 5.11.

3.7.2 Helixes

There are typically three sizes of helixes in a vendor, approximately 2 5/8", 3", and 4" in diameter. There are several pitches available in each size. The pitch is determined by counting the number of product openings in the helix. Refer to Section 1.5 Standard Helix Configurations and also in Section 5.

3.7.3 Divider

The divider separates product columns on the tray. Two horizontal slots in the divider allow for the installation of a candy pusher. To remove the divider, push rearward and lift. To install, insert the rear tab in the desired slot, push rearward and then down. Make sure the locking tabs on the bottom have engaged their respective slots and pull forward.

3.7.4 Candy Pusher Bar

The candy pusher bar keeps candies pushed to one side of the column. This is typically used with tall candy bars. The candy pusher bar is removed by pulling the bar free from the plastic clips. To reinstall, it is easiest to press the bar into the clip using pliers. Refer to Section 5.16 Pusher Bar Installation.

3.8 ELECTRICAL PANEL

The electrical panel is located in the recess formed by the right rail mount on the right side of the cabinet, behind an access panel.

3.8.1 Fuse Holder

The fuse holder is located on the outside of the right rail mount near the refrigeration unit power outlet. Fuse holders for older models can be located in the middle of the service door on the back of the main door. It contains a 3 amp fast-blow fuse to protect the 24 VAC power supply to the control board. A spare fuse is located in the front of the fuse holder. The fuse holder is opened by pressing on the indicated side and pulling.

The fuse holder can be used to disconnect power to the control board when MDB devices are being connected or disconnected, when the board is being serviced, or before any wiring harness is connected or disconnected.

3.8.2 Transformer

The transformer reduces the input voltage to 24 volts AC for the control board.

3.8.3 RF Filter

The filter removes electrical noise from the power supplied to the 24VAC transformer to prevent interference with operation of the control board and software.

3.8.4 Relay

The relay uses a 24 VDC signal from the control board to close the relay and supply power to the refrigeration unit.

3.8.5 Ballast

The ballast provides the necessary power to the fluorescent lamp in the door.

3.8.6 Power Distribution Harness

The power distribution harness splits the incoming power into individual leads for the high voltage components.

3.8.7 Ground

Ground is made through the use of grounding studs or screws at the lower back wall of the right mount. Earth ground and individual ground wires from the high voltage components are attached here.

3.9 POWERED VENTILATION SYSTEM (OPTIONAL)

On vendors equipped with a powered ventilation system, a continuously running fan circulates air through the vendor and exhausts through the back of the cabinet.

3.10 1.5" HELIX TRAY (OPTIONAL)

The 1.5" Helix Tray is mounted below the bottom snack tray. To load the tray with small products such as gum and mints, grasp the tray and pull forward to unsnap the catches. After loading, push the tray to the rear until the catches snap in place.

The motors in the 1.5" Helix Tray operate in the same way as snack or bottle tray motors and do not have a home position switch. Refer to Section 3.7.1. Vend Motors.