EASYVEND Series 5

CONTROL BOARD SPECIFICATION

(P213)

ISSUE B

File : EasyVend Series 5 VMC Specification B.doc

Changes:

Issue	Date	Changes
A	18 May 2009	Initial Release
B	31 May 2009	Connector References corrected to match PCB

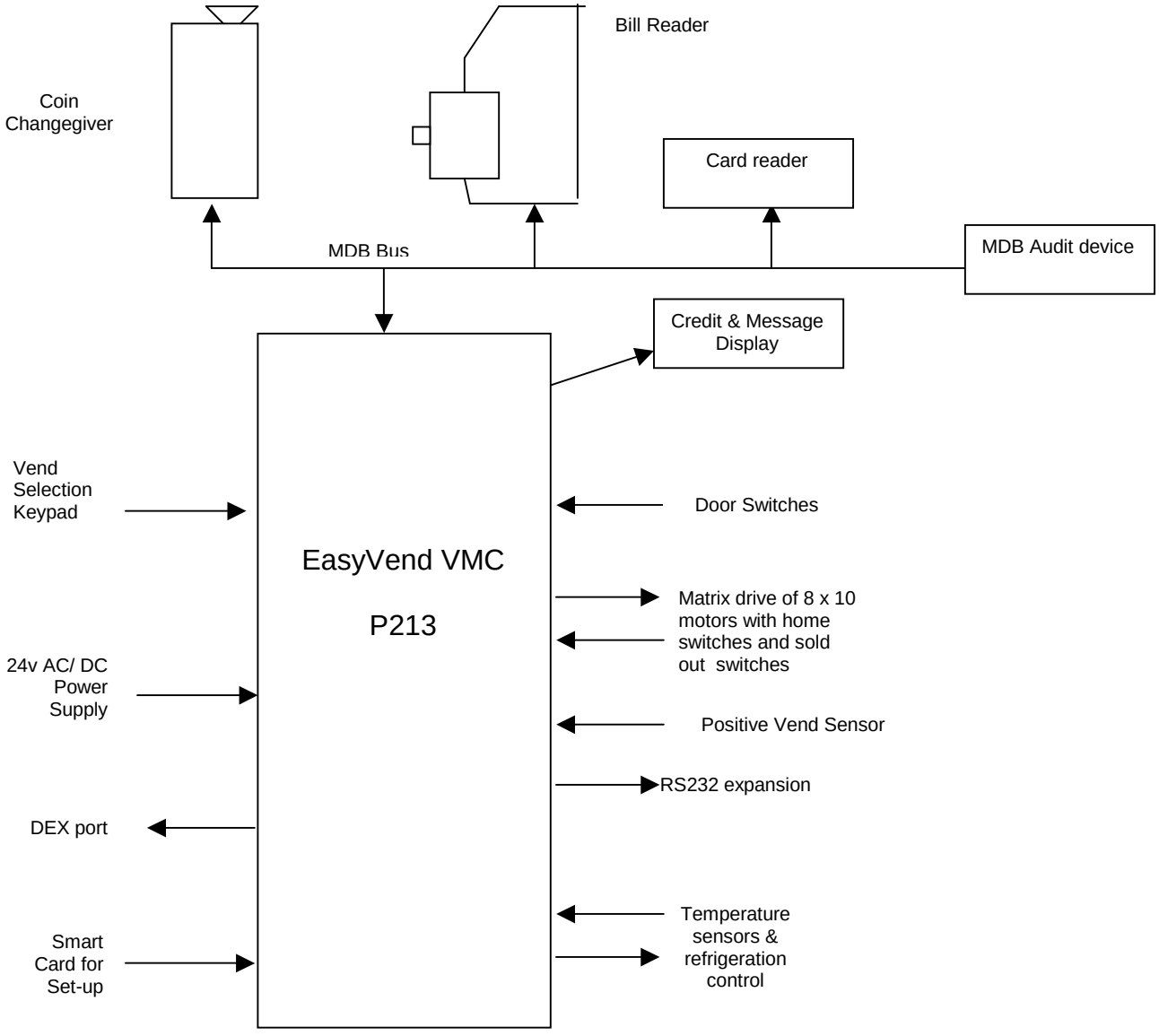
Associated Documents:

EasyVend Series 5 Storyboard
EasyVend Series 5 Menu Operation Guide
EasyVend Series 5 Setup Utility Guide
Updating EasyVend Series 5 Software

1. Introduction

This specification defines the EasyVend Series 5 VMC electronic circuit board (PCB) that provides the intelligent control, credit accumulation and vend sequencing for a range of vending machines.

The Vending Machine Controller (VMC) connects as shown in the block diagram below:



2. VMC Detailed Specification

2.1 Features and Functions

Payment
- MDB control interface for standard Coin Changegiver, Bill Reader and Card Reader
- Ability to accept Credit Card, Debit card, Tokens, Coupons, Chips etc. through the MDB devices

Power Supply
- 24V DC or AC Power input to the board - internally derived power for the motors. No other power supply required.

Consumer Interface
- Customer display – parallel interface to match a range of 20 character by 2 row displays (LCD with backlight or VFD). Recommended types :

VFD	Noritake U series CU20025ECPB-W1J or equivalent
LCD	Varitronix MDLS-20265-LV-LED04 or equivalent

- Matrix keypad, up to 4 cols x 7 rows – standard configuration : 4 cols x 5 rows
- On demand display of temperature
- Ability to display name of the product
- Database of product names held in the VMC, loaded by Smart Card, edit on PC.

Vend Columns
- Up to 80 motors in a 8 rows x 10 column matrix arrangement. Motors 24v DC at up to 500mA.
- Home switches and sold out switches for each column

Audit
- Real-time clock for time/date display, error logging, period lockout and audit logging of sales by time/date. Real time clock battery backed with a 10 year projected battery life.
- Standard on board tracking and display of cash, sales totals and individual vends.
- RS232/DEX serial port (for modem, telemetry, etc. and linking to third party Web-based inventory tracking and audit management facilities etc)
- MDB audit device
- EVA-DTS compatibility

Expansion
- Spare Code space memory for future Product Enhancements
- RS232 serial expansion port incorporated into the design to allow future enhancements such as GSM/GPRS Wireless Uploading/Downloading capability
- Field software upgrades through the smart card slot

Machine Set-up
- On board menus for standard items and diagnostics
- Smart card connection for full configuration (via a PC utility) and “in field” software upgrades.
- English messages and menus, with an “alternate” language in EE memory. Language selectable on entry to the menus.
- Selectable currency symbols and decimal places displayed
- Ability to set-up the price of all products at once, keeping the ability to set-up the individual selection price.
- Automated Discount pricing mode at pre-set times
- On/Off menu option for token / coupon acceptance

- Machine Serial number
- EEPROM non-volatile memory for all soft options and Audit Data with a minimum lifetime of 1,000,000 write cycles.

Refrigeration
- Two temperature zones – Dallas DS18S20 sensor + relay output each
- Temperature setting per zone and health lockout level.
- Timed operation of the chillers
- Automated Defrost mode at frequent intervals (On/ Off durations programmable)

Energy saving
- Auxiliary relay driver outputs for energy saving external control.
- Automatic shutdown of Lights and Auxiliary outputs at pre-set times

General
- 2 x Door switches
- Individual prices per motor selection
- Programmable exact change algorithm (applies when using Coin Changegiver)
- Vend cycle authorisation and processing
- ONE Program for all different type of machines; For example – The same program can be used to set-up a Snack machine and/or Can & Bottle machine by using the menu setting machine type.

Diagnostic functions
- Keypad test
- Motor test vend, current, home and stock switches.
- Positive vend sensor test
- Refrigeration Test – Compressor ON/OFF; FANS – ON/OFF
- On board log of machine error history – manually cleared.

2.2 Major Electrical Interfaces

Motors:	24v DC operation at a maximum current of 0.5 Amp.
Relay Driver Outputs	24v, 500mA sink current, diode protected.
MDB	The VMC supports a Level 2 Coin Changegiver, a Level 1 Bill Validator, a level 1+ Card Reader and a Level 1 or 2 Audit device on the Multi-Drop-Bus in line with the NAMA published MDB Specification Version2.0 or as subsequently amended. For maximum compatibility no use is made of the optional expansion features that may be available on specific manufacturer's coin changegivers. Level 3 changegiving will be used where applicable if the attached Coin Changegiver supports this function. At power up the VMC will check for the enabled MDB devices. Any that do not respond, or have an error will, in line with the MDB specification, be re-tested after 5 seconds and re-enabled if they respond.

2.3 Power Supply

Nominally 24v DC or AC for board and peripherals.

Operating Voltage Range	20.0v – 40v DC 24v AC +/-10%

Current consumption

- VMC board +display when active TBA

2.4 Operating Environment & Standards

Operating Temperature	0°C to +45°C
Storage Temperature	-10°C to +60°C
EMC	The Control PCB is supplied as a component with no intrinsic function under the definition of the EU EMC Directive. The complete vending machine is subject to EMC conformance.
Safety	The Control PCB is a low voltage device. It contains an electronic fuse (Polyswitch) for self protection on the main power line.

3. "SOFT OPTIONS"

The tables below define which features can be configured using the various setup routes for the machine

Build Standard:

Feature	Normal Menus	Through Passcode Menus	Smart Card	EVA/DTS device	Software Reload Card
VMC Software					✓
Overall machine Type (Snack, chilled, frozen, Can, Combo)		✓	Implied by other settings		
Temperature Zones active		✓	✓		
Health & Safety Mode		✓	✓		
Number of Rows & Columns			✓		
Learn rows/columns		✓			
Configure Tray Type / Motor operation (Home switch, Sold out Sensor, Positive Vend sensor)			✓		
Motor timeout			✓		
Positive Vend sensor		✓	✓		
MDB Devices Fitted (Expected)	✓	✓	✓		
Change passcodes		✓	✓		

Diagnostics:

Feature	Normal Menus	Diag Passcode Menus	Smart Card	EVA/DTS device
Test keypad	✓			
Test Individual Motor (& home/sold out sensors)	✓			
Test Positive Vend Sensor	✓			
Display Logged Errors	✓			
Clear Logged Errors		✓		
Display logged temperatures		✓		

Operational Features:

Feature	Normal Menus	Passcode Menus	Smart Card	EVA/DTS device
Prices – set ALL (Bank 1 or Bank2)	✓ (main bank only)		✓	
Prices – set individual price (Bank 1 = standard, bank2 = discounted)	✓ (main bank only)		✓	✓
Product names			✓	
Times for discount prices			✓	
Token/Coupon Acceptance ON/OFF		✓	✓	
Individual Coin/Note Acceptance		✓	✓	
Period Lockout Expiry	✓			
Manual Lockout		✓		
Energy Saving Times			✓	
Select Language		✓	✓	
Language Files			✓	
Currency Symbol			✓	
Decimal Places (displayed)			✓	
Display Audit & Serial Numbers	✓			
Transfer Audit data				✓
Temperature Setting Zone 1 / Zone 2 : High/Low limits	✓		✓	
Auto Defrost ON/OFF and time	✓		✓	
Exact Change parameters			✓	
Single Vend / Multivend	✓		✓	
Forced Vend On/Off	✓		✓	
Current Time & Date	✓			

Appendix 1. Smart Card Operation

The VMC supports the following types of Smart Card directly inserted into the VMC board:

- Audit Collection – Summary cash and sales data
- Set-up Card – Full Feature
- Software update Card

Appendix 2. - Interface Connections –

- **PL1 (Power Supply Input)**
  4 way 0.156" pitch Molex locking header

Pin	Signal
1	+24V DC / AC1
2	AC2
3	POLARISING
4	0v (DC)

- **PL2 (Refrigeration Interface)**
  15 way Molex 0.1" header with locking ramp

Pin	Signal
1	Defrost Relay drive
2	0V (+24VDC)
3	Refrigeration Relay 2 drive
4	Refrigeration Relay 1 drive
5	+24VDC
6	Lights Relay Drive
7	Auxiliary Relay Drive
8	
9	Spare Relay Drive 1
10	
11	Spare Relay Drive 2
12	+5v (For temp sensors)
13	Temp Sensor 1 I/O
14	Temp Sensor 2 I/O
15	0V (5v)

- **PL3 (RS232) – Expansion**
  12 way Molex 0.1" header with locking ramp

Pin	Signal
1	+24V DC
2	Polarising
3	TXD (RS232)
4	RXD(RS232)
5	0v
6	GSM_ON
7	TXD (5v)
8	RXD (5v)
9	GSM_OK
10	+5v
11	SDA
12	SCL

- **PL4 (Home Switches)**
  9 way Molex 0.1" header with locking ramp

Pin	Signal
1	Tray A Home Switch
2	Tray B Home Switch
3	Tray C Home Switch
4	Tray D Home Switch
5	
6	Tray E Home Switch
7	Tray F Home Switch
8	Tray G Home Switch
9	Tray H Home Switch

- **PL5 (SMART CARD Connector) – mounted on rear of board**
  Set-up and Audit collection port

- **PL6 (Sold Out Switches)**
  10 way Molex 0.1" header with locking ramp

Pin	Signal
1	Tray A Sold Out Switch
2	Tray B Sold Out Switch
3	Tray C Sold Out Switch
4	Tray D Sold Out Switch
5	Tray E Sold Out Switch
6	Tray F Sold Out Switch
7	Polarising
8	Tray G Sold Out Switch
9	Tray H Sold Out Switch
10	0V

- **PL7 (JTAG)**
  7 way Molex 0.1" header with locking ramp – factory programming only

- **PL8 (Keypad) –**
  12 way Molex 0.1" header with locking ramp

Pin	Signal
1	Row 1
2	Row 2
3	Row 3
4	Row 4
5	Row 5
6	Polarising
7	Col 4
8	Col 1
9	Col 2
10	Col 3
11	Row 6
12	Row 7

- **PL9 (Exec) – not fitted**

- **PL10 (Door Switches / Status LED's) –**
  5 way Molex 0.1" header with locking ramp

Pin	Signal
1	Door Switch 1
2	0V
3	Door Switch 2
4	0V
5	+5v

- **PL11 (Positive Vend Sensor) –**
  4 way Molex 0.1” header with locking ramp

Pin	Signal
1	+24V
2	+5v
3	+ve Vend switch
4	0V

Pins 2 and 3 connected together when beam clear

- **PL12 & PL13 (MDB)**
  6 way Molex MDB header x 2

Pin	Signal
1	DC +24v / +34v Output
2	DC Return
3	NC
4	Master Receive
5	Master Transmit
6	Communications Common

- **PL14 (Motor Drives)**
  20 way 0.156” polarised header

Pin	Signal
1	Column 1 source
2	Column 2 source
3	Column 3 source
4	Column 4 source
5	Column 5 source
6	Column 6 source
7	Column 7 source
8	Column 8 source
9	Column 9 source
10	Column 10 source
11	Tray A sink
12	Tray B sink
13	Tray C sink
14	Tray D sink
15	Tray E sink
16	Tray F sink
17	Polarising
18	Tray G sink
19	Tray H sink
20	0V

- **PL15 (Display – VFD or LCD)**
  16 way 0.1” dual row ribbon cable header – wired for rear mounting to the LCD or VFD

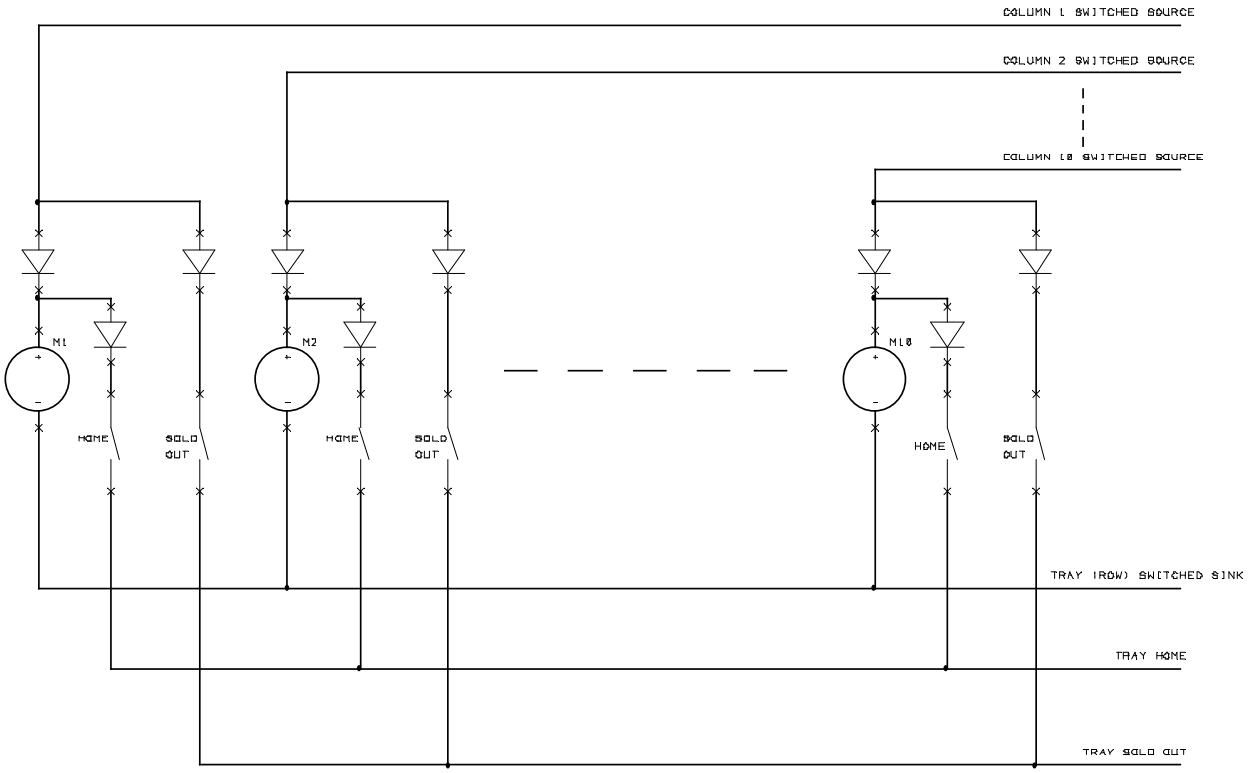
Pin	Signal
1	+5v
2	0v
3	A0
4	VE
5	Enable
6	A1
7	Data 1
8	Data 0
9	Data 3
10	Data 2
11	Data 5
12	Data 4
13	Data 7
14	Data 6
15	Backlight LED -
16	Backlight LED +

- **PL16 (DEX)**
  6 way Molex 0.1” header with locking ramp

Pin	Signal
1	TXD (5v serial)
2	RXD (5v serial)
3	TXD (RS232 levels)
4	0v
5	RXD (RS232 levelsl)
6	0v

Note: This connector is one serial port – use either the 5v OR the RS232 signals, not both.

Appendix 3 – Tray Motor Wiring Diagram



It is strongly recommended that each motor is fitted with a 100nF capacitor and back emf protection diode (cathode to +ve side of the motor) directly across the motor terminals.

Appendix 4 : Mechanical Dimensions

Board size : 114.4mm x 203.2mm

Refer to the separate drawing for the mounting positions.