JCA SYSTEMS
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APPLICATIONS GUIDE

P104 MDB INTERFACE

Version   4.0 Lumina

Date: 20 June 2005

Contents:

1. INTRODUCTION

This interface circuit board enables a standard 12 volt DC, parallel interface, Bill Acceptor / Note Reader to work in a vending machine that operates with the "Multi-Drop-Bus" (MDB) protocol.

The P104 board converts the MDB nominal 34 volt power to 12 volts for the Bill Acceptor, and handles the MDB serial interface communications with the vending machine. The board will work with up to 6 bill types and operate the escrow function of the bill reader if required.

This application note describes how to connect the P104 Issue G board between the Bill Acceptor and the Vending Machine.
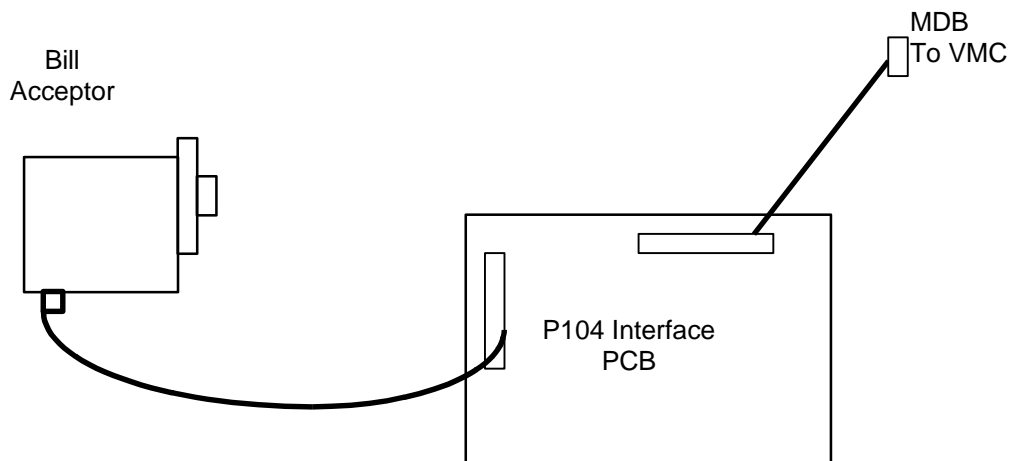
2. BOARD MOUNTING & LAYOUT

The interface board is 78.8 mm by 79.2 mm with a maximum height of 32mm. The board is mounted using the 4 mounting holes located on each corner. The mounting holes are 69.3mm by 67.3mm apart and are 3.2mm diameter to accept a conventional "stand-off".
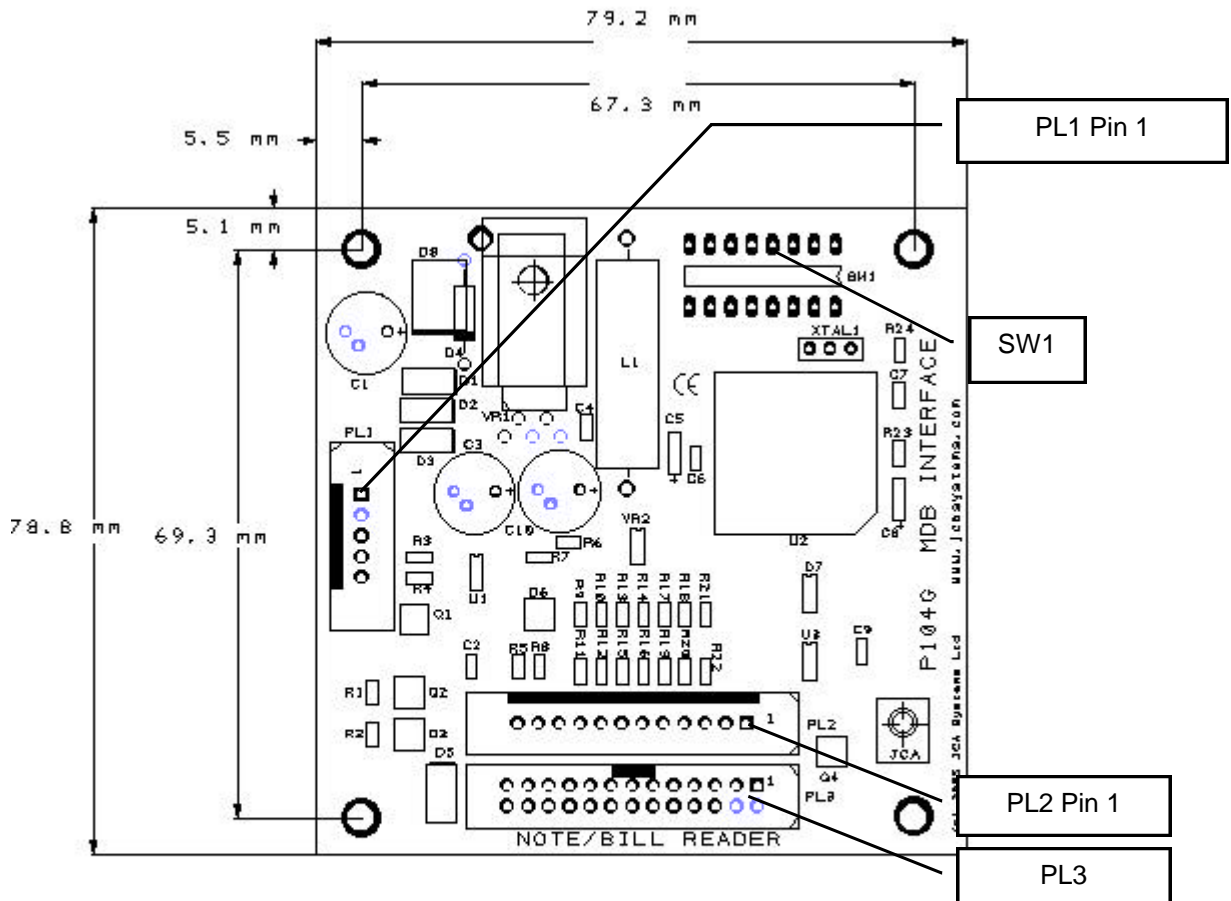
P104 Issue G   17 June 2005
Note Reader MDB Interface
Mounting Holes : 4 x 3.2mm

There are three connectors on the board :

PL1	MDB Vending Machine Controller and Machine Power
PL2	Bill Acceptor
PL3	Not used / not fitted

There is one selection switch on the board (SW1) which is used to select the bill values and board functions.

3. BILL ACCEPTOR CONNECTIONS

Connect to PL2 on the Interface Board using a 12 way Molex Mini KK 6741 Series connector (Molex 22-01-2125, RS 479-169, Electrospeed 14-59342D, using crimps Molex 08-50-0032, RS 467-598, Electrospeed 14-59528L). This connector is pin compatible with the predecessor P104 Issue D board, but is now a right angle connector to fit the enclosure.

PL2 Pin	Signal / Function
1	12v Power Supply Return (GND)
2	+12v DC to Bill Acceptor
3	NOTE 1 Pulse
4	NOTE 2 Pulse
5	NOTE 3 Pulse
6	NOTE 4 Pulse
7	NOTE 5 Pulse
8	NOTE 6 Pulse
9	ALARM / FAULT Signal
10	No Connection
11	ESCROW CONTROL
12	INHIBIT

Signal Descriptions

NOTE Pulse - Active LOW input to the P104 board, connect to the corresponding an open - collector output from the Bill Acceptor. A minimum pulse width of 25 milli-seconds is required to identify an accepted/stacked bill.

ALARM/FAULT - Active LOW input to the P104 board.

INHIBIT - Open collector output from the P104 board. A LOW level enables Bill Acceptance. A HIGH level inhibits acceptance and is used to return any note held in Escrow.

ESCROW CONTROL - Open collector output from the P104 board. LOW level used to hold a bill in Escrow, HIGH level to Stack the bill.

The *NOTE Pulse* and *ALARM/FAULT* inputs have 10K ohm pull-ups to a 5 volts line. The *INHIBIT* and *ESCROW CONTROL* outputs have 4K7 ohm pull-ups to the 12 volt line.

4. STANDARD MDB CONNECTIONS TO VENDING MACHINE

This connection is for a standard MDB machine with a nominal 34v DC power supply. (The unit will operate with a power supply in the range 15v DC to 42v DC).

Connect as shown below to PL1 using a 5 way Molex Mini KK 6741 Series connector (Molex 22-01-2055 using crimps Molex 08-50-0032)

P104 INTERFACE BOARD			MDB CONNECTION TO VENDING MACHINE
5 Way PL1			Molex 39-01-2060 with 39-00-0065 terminals
+34v DC	1		1
0v Supply Return	2		2
MDB Master RX	3		3
MDB Master TX	4		4
MDB Comms Common	5		5
			6
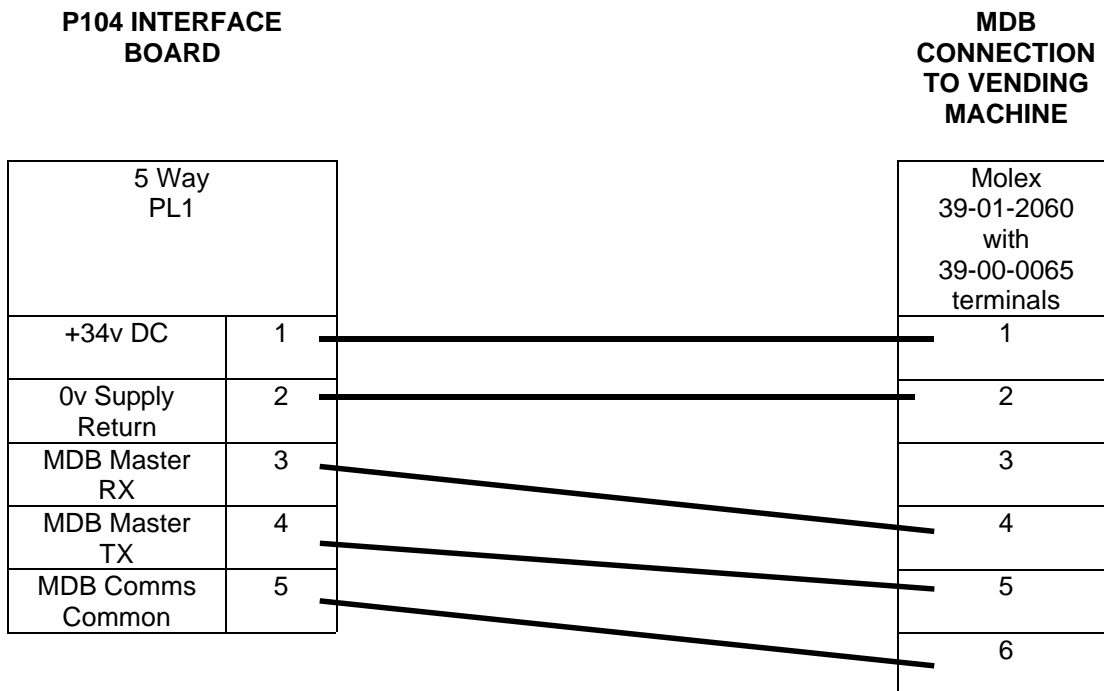
Appendix 1 - SPECIFICATION

- **OPERATING ENVIRONMENT**

Operating Temperature	+10°C to +40°C
Storage Temperature	0°C to +60°C
EMC	The Control PCB is supplied as a component with no intrinsic function under the definition of the EMC Directive. The complete vending machine is subject to EMC conformance. Measures have been taken to minimise EMC effects within the design.
Safety	The Control PCB is a low voltage device - Note, should a mains power supply be used with the VMC it is recommended that it should conform to a relevant standard such as IEC 950.

- **NOTE READER INTERFACE**

Inputs to P104	Internal 10K ohm pull up to 5 volts Logic Zero < 0.5 volts Logic One >4.0 volts, or open circuit
Outputs from P104	Logic One : open circuit Logic Zero : <0.5volts at 100mA sink current maximum
Power Output	12 volts DC +/- 0.5 volts at 1.25 Amps maximum

- **MDB VENDING MACHINE INTERFACE**

  Serial Interface (Peripheral Slave at 9600 baud)

Receive:	Maximum input current (active)	15mA @ 4 volts
	Maximum input current (inactive)	100uA
Transmit:	Minimum sink current (active)	15 mA @ 1 volt
	Maximum leakage current (inactive)	30uA

Power Input	Minimum 20v DC (rectified and optionally filtered) Nominal 34v DC (rectified and filtered) / 24v DC (rectified only) Maximum 42.5v DC (ripple upper voltage limit, absolute maximum 45v DC peak)
	Maximum current 2.0 Amps

Appendix 2 - CONFIGURATION SWITCH SETTINGS

1. GENERAL NOTE SETTINGS

8	7	6	5	4	3	2	1
ESCROW	ON	DP	SC1	SC0	NOTE VALUES (See separate table)		

Decimal Point
OFF - 0
ON - 2

Escrow
OFF - Disabled
ON - Enabled

Scaling factor

SC1	SC0	Scaling
OFF	OFF	X 1
OFF	ON	X 10
ON	OFF	X 100
ON	ON	X 1000
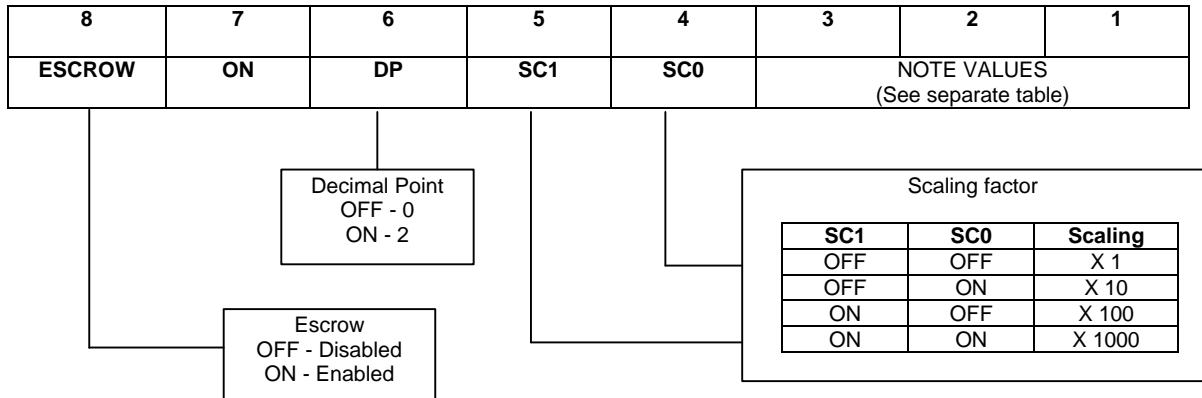
Note Values:

Switch 3	Switch 2	Switch 1	Note 1	Note 2	Note 3	Note 4	Note 5	Note 6
OFF	OFF	OFF	1	5	10	20	50	100
OFF	OFF	ON	5	10	20	50	100	200
OFF	ON	OFF	2	5	10	20	50	100
OFF	ON	ON	1	5	10	50	100	200
ON	OFF	OFF	1	2	5	10	50	100
ON	OFF	ON	2	5	10	50	100	200
ON	ON	OFF	1	2	5	10	20	50
ON	ON	ON	1	2	5	10	20	100

2. STANDARD NOTE SETS

8	7	6	5	4	3	2	1
ESCROW	OFF	OFF	SET	Switch Settings as in Appendix 5			

Escrow
OFF - Disabled
ON - Enabled

Select Note Set
OFF - NOTE SET 1
ON - NOTE SET 2
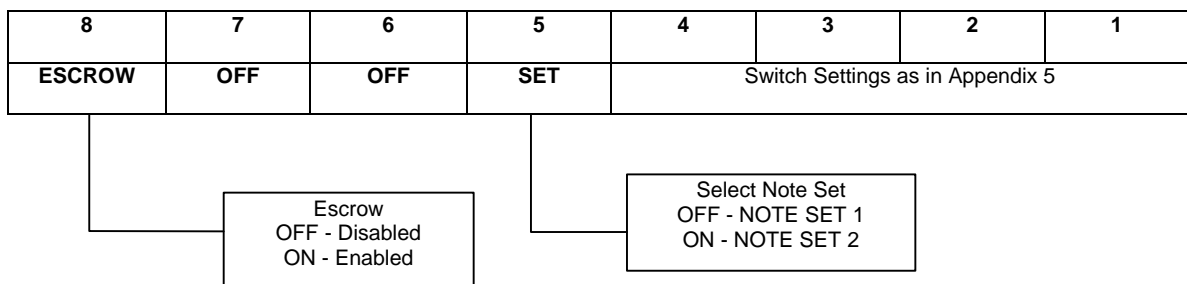
3. RESERVED SWITCH SETTINGS (FOR FUTURE EXPANSION)

8	7	6	5	4	3	2	1
	OFF	ON					

Appendix 3 - STANDARD NOTE SETS

NOTE SET 1

Set	Switches				Scaling Factor	Dec Pl	C Code	Note Value (0 – 255)					
	4	3	2	1				1	2	3	4	5	6
1	OFF	OFF	OFF	OFF	1	0	44	1	5	10	20	50	100
2	OFF	OFF	OFF	ON	100	2	44	5	10	20	50	100	200
3	OFF	OFF	ON	OFF	1	0	44	2	5	10	20	50	100
4	OFF	OFF	ON	ON	10	0	44	2	5	10	20	50	100
5	OFF	ON	OFF	OFF	100	2	44	1	5	10	50	100	200
6	OFF	ON	OFF	ON	1	0	44	1	2	5	10	50	100
7	OFF	ON	ON	OFF	1000	2	44	1	2	5	10	50	100
8	OFF	ON	ON	ON	10	0	44	1	2	5	10	20	50
9	ON	OFF	OFF	OFF	10	0	44	5	10	20	50	100	200
10	ON	OFF	OFF	ON	1	0	44	25	50	100	0	0	0
11	ON	OFF	ON	OFF	5	0	44	2	5	10	20	50	100
12	ON	OFF	ON	ON	10000	2	44	5	10	25	50	100	0
13	ON	ON	OFF	OFF	100	2	44	1	2	5	10	50	100
14	ON	ON	OFF	ON	100	2	44	1	2	5	10	20	0
15	ON	ON	ON	OFF	10	0	44	2	5	10	50	100	0
16	ON	ON	ON	ON	500	2	44	1	2	4	10	20	100

NOTE SET 2

Set	Switches				Scaling Factor	Dec Pl	C Code	Note Value (0 – 255)					
	4	3	2	1				1	2	3	4	5	6
1	OFF	OFF	OFF	OFF	1	0	1978	1	5	10	20	50	100
2	OFF	OFF	OFF	ON	100	2	1978	5	10	20	50	100	200
3	OFF	OFF	ON	OFF	1	0	1978	2	5	10	20	50	100
4	OFF	OFF	ON	ON	10	0	1978	2	5	10	20	50	100
5	OFF	ON	OFF	OFF	100	2	1978	1	5	10	50	100	200
6	OFF	ON	OFF	ON	1	0	1978	1	2	5	10	50	100
7	OFF	ON	ON	OFF	1000	2	1978	1	2	5	10	50	100
8	OFF	ON	ON	ON	10	0	1978	1	2	5	10	20	50
9	ON	OFF	OFF	OFF	10	0	1978	5	10	20	50	100	200
10	ON	OFF	OFF	ON	1	0	1978	25	50	100	0	0	0
11	ON	OFF	ON	OFF	5	0	1978	2	5	10	20	50	100
12	ON	OFF	ON	ON	10000	2	1978	5	10	25	50	100	0
13	ON	ON	OFF	OFF	100	2	1978	1	2	5	10	50	100
14	ON	ON	OFF	ON	100	2	1978	1	2	5	10	20	0
15	ON	ON	ON	OFF	10	0	1978	2	5	10	50	100	0
16	ON	ON	ON	ON	500	2	1978	1	2	4	10	20	100

All Note Sets report a "Stacker Capacity" of 600.

Country codes (C Code) are as follows:
44H	UK	(Default)
1978H	Euros	

Appendix 6 - LUMINA NOTE READER CONNECTIONS

This appendix shows the connections for use with a Money Controls/Coinco Lumina Note Reader.

Connect the Lumina to PL2 on the P104 board using a 12 way connector as shown in the table below

PL2 Mating connector : Molex Mini KK 6741 Series Socket (Molex 22-01-2125, RS 479-169, Electrospeed 14-59342D)

Crimps: Molex 08-50-0032, (RS 467-598, Electrospeed 14-59528L)

PL2 Pin	Connect to Lumina 15 way pin nos.	Wire colour	Signal
1	12	Black	12v Power Supply Return to Lumina
2	11	Red	+12v DC to Lumina
3	1	Grey	NOTE 1
4	2	Blue	NOTE 2
5	3	Violet	NOTE 3
6	4	Yellow	NOTE 4
7			No connection
8			No connection
9	10	Orange	ALM
10			No Connection
11	9	White	ESCROW CONTROL
12	5, 6, 7, 8	Green	INHIBIT

Lumina Switch Settings:

DIP Switches 1 – 7 OFF, Switch 8 ON

Recommended P104 switch settings:

For Euro operation   Switches 1, 5 and 8 ON, Switches 2, 3, 4, 6, 7 OFF

For UK operation   Switches 1 and 8 ON, Switches 2, 3, 4, 5, 6, 7 OFF