JCA SYSTEMS
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APPLICATIONS GUIDE

P208A MDB SLAVE INTERFACE

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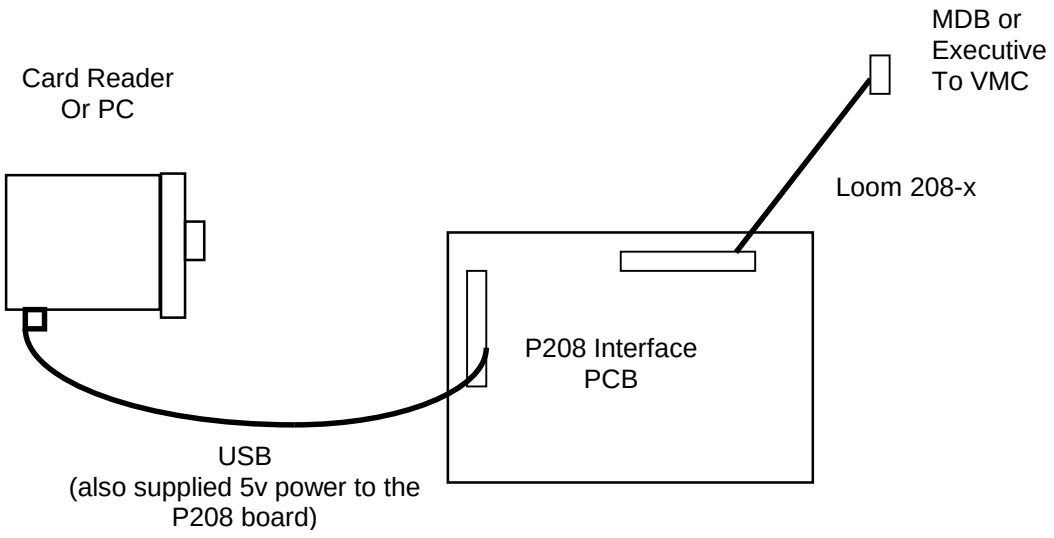
1. INTRODUCTION

This interface circuit board enables a stand-alone Card Reader system (Credit Card or “Cashless card”) or PC with a USB port to work in a vending machine that operates with the "Multi-Drop-Bus" (MDB) or the “Protocol-A” (Executive) protocol. Other payment systems can also make use of the RS232 protocols to load credit into a MDB or Executive based vending machine.

This application note describes how to connect the P208 board between the Card Reader/PC system and the Vending Machine.



Refer to the MDB Standard (available from NAMA, www.vending.org) for details of the MDB protocols and to the MEI Protocol ‘A’ specification for details of the “Executive” protocols.

Refer to the P208 CLINK specification document for the USB software interface protocols.

Standard looms are available for the connection to the vending machine:

- Loom 208-1 MDB
- Loom 208-2 Executive

2. USB interface to Card Reader

This interface is via a standard “type B” USB connector. The interface operates as a virtual COM port at 9600 baud, 8 bits, no parity and 1 stop bit . Refer to the www.ftdi.com website for appropriate interface drivers (reference FT232R device).

3. DIP Switch Settings – MDB mode only

	Function	OFF	ON
Switch 1	MDB Base Address	Card Reader # 1 (10H)	Card Reader # 2 (60H)
Switch 2	MDB Value Scaling Factor	1	10
Switch 3	Decimal Places	2	0
Switch 4	Country Code (ms)	See separate table	
Switch 5	Country Code (ls)		
Switch 6	Send Selection ROW/Column with Authorisation request	Selection Row/Column NOT SENT	Selection Row/Column SENT
Switch 7	Authorisation Time (ms)	See separate table	
Switch 8	Authorisation Time (ls)		

Country Code Settings

Switch 4	Switch 5	Country Code
OFF	OFF	UK (0044H)
OFF	ON	US (0001H)
ON	OFF	Euro (1978H)
ON	ON	Not Used (0044H)

Authorisation Time Settings

Switch 7	Switch 8	Time (seconds)
OFF	OFF	5
OFF	ON	15
ON	OFF	40
ON	ON	75

4. MDB Interface to Vending machine

The P208A emulates a standard Level 02+ Card reader as defined in the MDB Specification. Depending on the DIP Switch settings, it can respond to either MDB Card Reader #1 on addresses 10H – 17H or Card reader #2 on addresses 60H-67H

It responds to the following MDB Commands (addresses shown for Card Reader #1, add 50H for Card Reader #2):

MDB Command	Hex	Sub Commands	P208 Actions
Reset	10	-	Disables the Card reader, reloads set-up fields on the CLINK.
Set-up	11	00 – Config Data	Responds to the VMC with the settings from the DIP switches in the next POLL response
Set-up	11	01 – Max/Min Prices	Message acknowledged only
Poll	12	-	See table of responses
Vend	13	00 – Vend Request	Makes authorisation request Rnnnn on the CARD LINK protocol
Vend	13	01 – Vend Cancel	Sends a Card Reader disable F on the CLINK protocol – the card reader must abort any active transaction and credit any funds deducted
Vend	13	02H – Vend Success	Sends Vend OK K on CLINK
Vend	13	03 – Vend Fail	Sends Vend fail L on CLINK
Vend	13	04 – Session Complete	Closes the current action and disables the card reader (F on the CLINK protocol)
Vend	13	05 – Cash Sale	Message acknowledged only
Reader	14	00 – Reader Disable	Disables the card reader (F on the CLINK protocol)
Reader	14	01 – Reader Enable	Enables the card reader (G on the CLINK protocol)
Reader	14	02 – Reader Cancel	Returns a Cancelled 08H poll response
Revalue	15	00 – Revalue Request	Makes revalue authorisation request TRnnnn on the CLINK protocol.
Revalue	15	01 – Revaluation Limit Request	Makes request for revalue limit TL on the CLINK protocol.
Expansion	17	00 – Request ID	Returns standard data about the P208A

Expansion	17	FF - Diagnostics	Returns the last error code to the VMC
Expansion	17	03 – Write Time & Date	Sends VMC time and date via the TVnnnnnnnnnn message on the CLINK protocol.

MDB POLL RESPONSES

Poll response	**Hex**	**P208 Actions/conditions**
Just Reset	00	Just reset condition
Configuration	01	Returns Configuration data from the DIP switches
Begin Session	03	Returns “Not yet determined” amount of funds available when a card has been inserted
Session Cancel Request	04	Issued if the card is removed from the card reader unexpectedly
Vend Approved	05	Issued when authorisation received from the card reader
Vend Denied	06	Issued when no authorisation received from the card reader
End Session	07	Issued in response to a Session Complete message from the VMC
Cancelled	08	Issued in response to a Reader Cancel message from the VMC
Peripheral ID	09	Standard data issued in response to an Expansion – request ID command from the VMC
Error	0A	Error codes returned as appropriate
Out of Sequence	0B	Sent if an unexpected command is received from the VMC
Revalue Approved	0D	Sent on receipt of TA message on CLINK
Revalue Denied	0E	Sent on receipt of TD message on CLINK
Revalue Limit	0D	Sent with data nnnn on receipt of TMnnnn message on CLINK
Time/Date Request	11	Sent on receipt of TT message on CLINK

5. Executive Interface to Vending machine

The P208A emulates a standard coin change-giver as defined in the Protocol-A Specification.

The Executive mode interface generates the following Protocol-A VMC Command codes only:

Command	Hexadecimal Command	Attribute
1	31	Status
2	32	Credit
3	33	Vend
8	38	Accept Data
9	39	Data Sync
	20 .. 2F	Data bytes

Note: The ACCEPT DATA, DATA SYNC and raw data bytes are not accessible directly through CLINK. They are only used within the CLINK command Display Data (**N**).

The P208 board generates the correct sequence of Accept Data, 8 data bytes followed by a Data Sync command automatically in response to the CLINK Display Data command.

The Executive VMC response to the commands is returned to the Card Reader/PC in ASCII hex.

Refer to the related P208 CLINK Specification document for more details.

Appendix 1 - SPECIFICATION

- **OPERATING ENVIRONMENT**

Operating Temperature	+10°C to +45°C
Storage Temperature	0°C to +60°C
EMC	The P208 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 P208 PCB is a low voltage device - Note, should a mains power supply be used with the VMC or PC it is recommended that it should conform to a relevant standard such as IEC 950.

- **CARD READER / PC INTERFACE**

Serial	USB virtual COM port (9600 baud, 8 bits, 1 stop bit no parity)
Power	Up to 150mA may be drawn from the USB port

- **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 No Power is taken from the MDB connection.

- **PROTOCOL-A (EXECUTIVE) VENDING MACHINE INTERFACE**

Serial Interface (Executive Master at 9600 baud)

Receive:	Sink Current maximum for “SPACE”	20mAs
	Leakage current (“MARK”)	100uA
Transmit:	Minimum source current (“SPACE”)	20 mA @ 4 volts

Power Input No Power is taken from the Executive 24vAC supply.

Appendix 2 - Connections

USB Connector (SK1)

Standard “Type B” USB connector

Pinouts

SK1 Pin	Signal
1	+5v (power)
2	USBDM
3	USBDP
4	0v (ground)

MDB / Executive Connector (PL2)

Connect as shown below to PL2 using a 10 way Molex Mini KK 6741 Series connector (Molex 22-01-2105 using crimps Molex 08-50-0032)

Pinouts

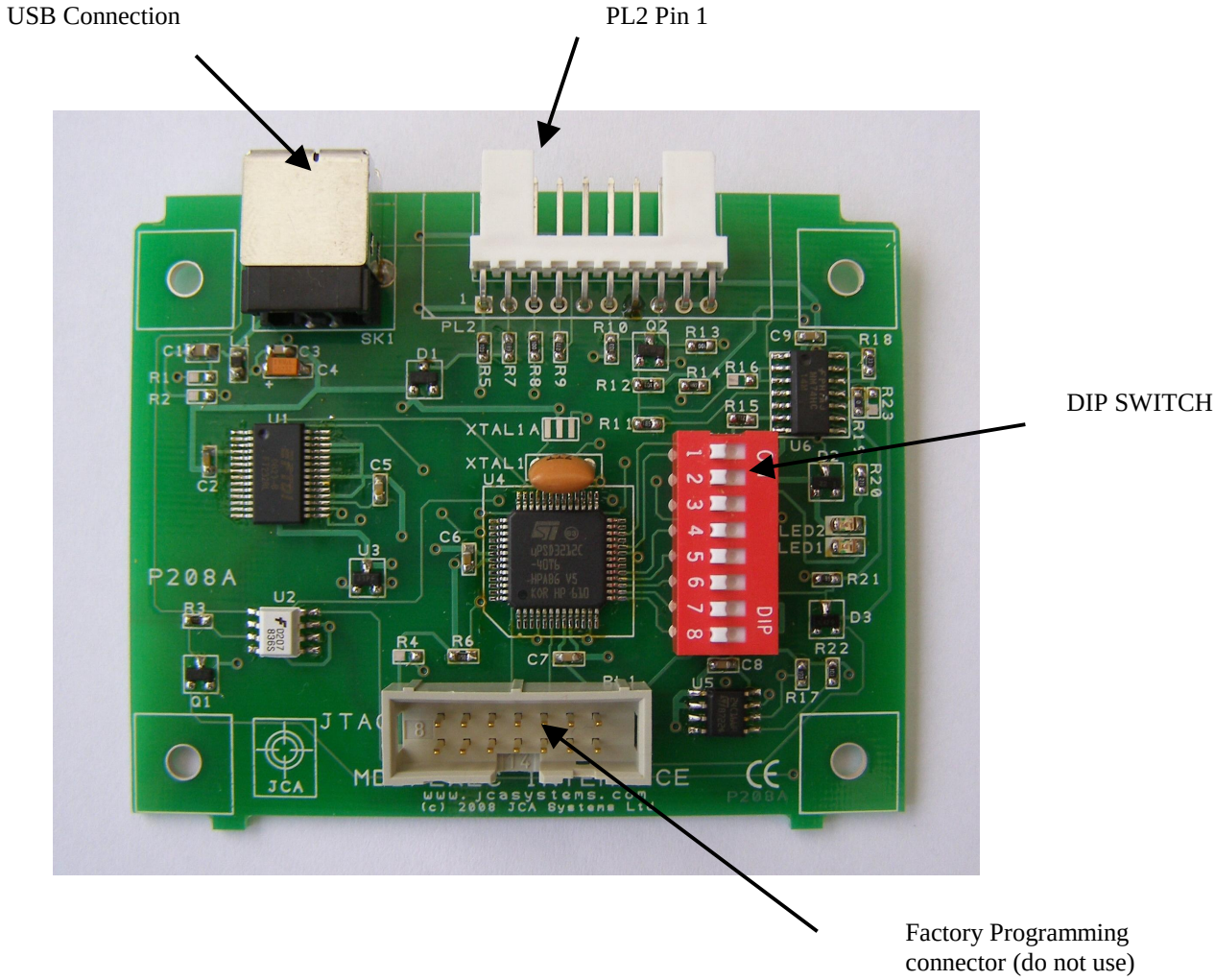
PL2 Pin	Signal
1	+5v (power)
2	SELECT (link to pin 10 for Executive operation)
3	MDB Master RX
4	MDB Master TX
5	MDB Comms Common
6	EXEC TX+
7	EXEC TX- (0v)
8	EXEC RX+
9	EXEC RX- (0v)
10	0v (power)

Appendix 3 – Mechanical Mounting

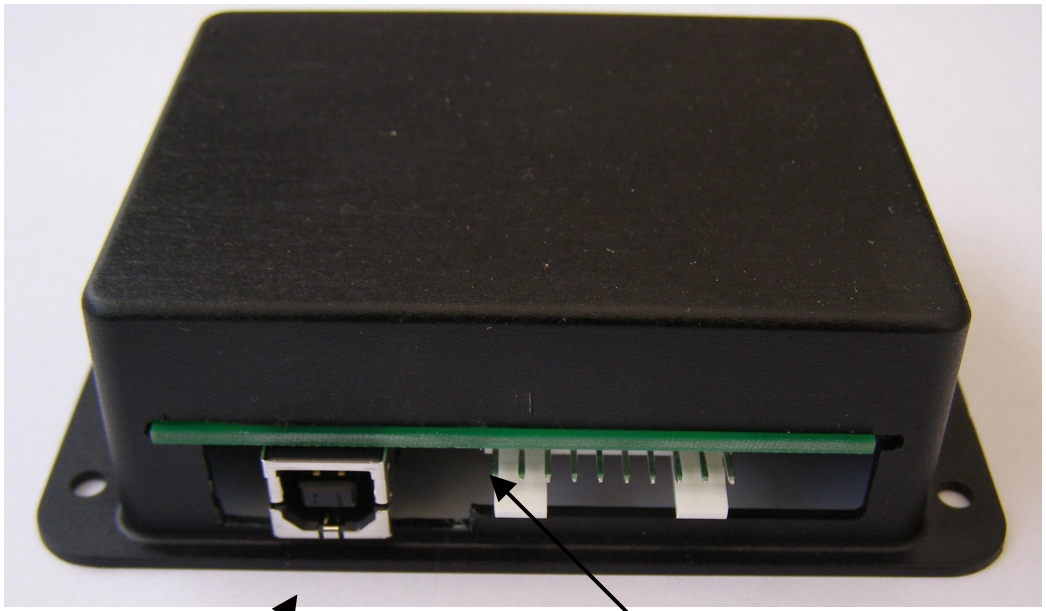
The P208 Issue E layout is shown below.

The board is 79.6mm by 65.4 mm. There are four mounting holes (3.1mm diameter) at each corner. These are suitable for standard 3.1mm “stand-offs”. The mounting holes are on a 68.0mm by 49.5 mm pitch.

The maximum height of the board is 20mm, a clearance of at least 5mm is recommended beneath the board.



The P208 can also be supplied in a protective plastic enclosure as shown in the pictures below:



USB Connection

PL2 Pin 1