APPLICATIONS INFORMATION P115 PC-MDB INTERFACE

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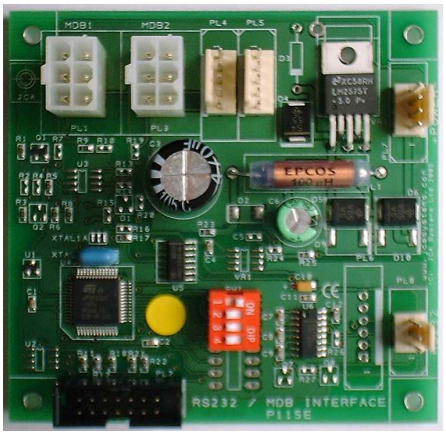


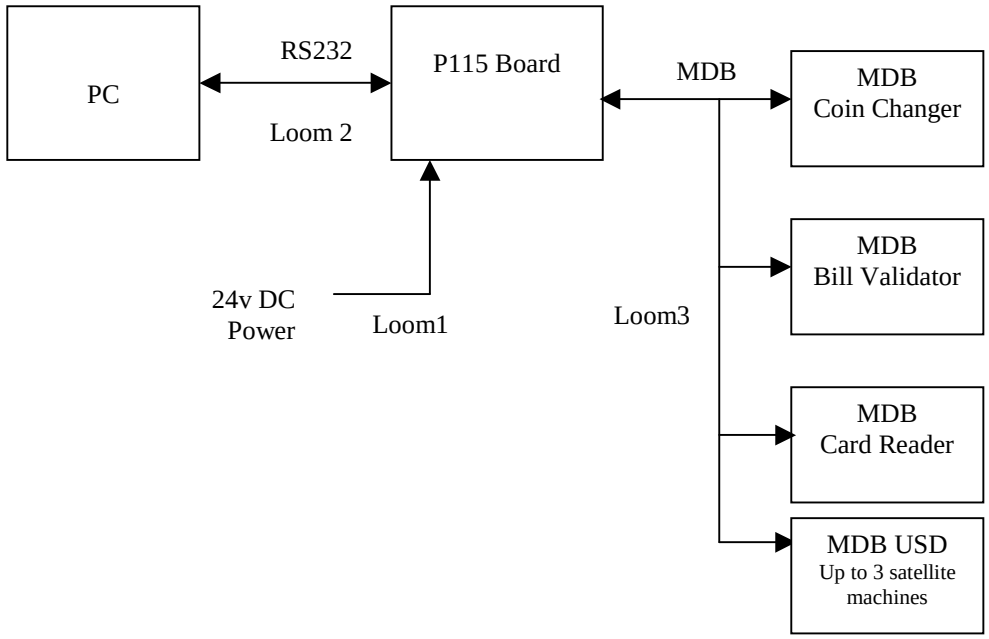
Change History

Document Issue	Date	Changes
5	22 April 2006	Supports Coin Changegiver and Bill Validator. P115 software version 2.x
6	24 April 2008	Card Reader Device added. P115 software version 3.x
7	30 May 2008	For version 3.1 software
8	29 April 2009	USD devices added – for software version 4.0

1. Introduction

This interface enables a Coin Changegiver and/or a Bill Validator and /or Card Reader with the vending industry standard MDB interface to be operated with a PC. Level 2 Coin Changegiver messaging and Level 1 Bill Validator / Card Reader commands are supported. The board may be used with higher level Coin Changegivers, Bill validators or card readers however the expansion commands will not be used. The command sequences are at a low level to permit maximum flexibility within the PC on pricing and vend sequencing.

The block diagram below shows the connections between the units:



The Coin Changer, Bill Validator, Card Reader and USD satellite machines can be operated simultaneously or in any combination.

Reference should be made to the MDB Standard (available from NAMA, www.vending.org) for details of the MDB protocols.

2. PC Interface

The PC interface is via a standard RS232 connection. The interface operates at 9600 baud, 8 bits, no parity and 1 stop bit.

The connection does not have flow control, it is the responsibility of the PC to ensure that commands are correctly completed with the acknowledge sequence from the P115 board. If the P115 board does not respond to a command, it is in a busy state servicing the MDB bus protocol. The PC must resend the command until acknowledged correctly.

The P115 board software operates in two distinct modes:

Slave Mode	this is the mode when powered up and is used to set up the P115 board, the Coin Changer, Bill Validator, Card Reader and satellite cabinets(USD).

Event Mode — this is enabled if DIP Switch 4 is ON. In event mode, if the coin changer and/or bill validator and/or card reader are enabled for payment acceptance, the P115 board will POLL the MDB devices at a regular rate (either 200 or 400 milli seconds approximately, depending on the setting of DIP Switch 3). In this mode MDB bus traffic is high and the P115 board may not respond immediately to a command from the PC.

It is recommended that all set-up information is gathered in Slave Mode and the MDB devices are then enabled into event mode. The P115 board will then communicate all payments received, and any errors, as they occur. When sufficient payment is received the MDB devices should be disabled making the P115 board revert to Slave Mode to respond to changegiving activities once the vend is complete.

The alternative mode is to operate permanently in Slave Mode. The PC is then responsible for issuing individual Coin Changer, Bill Validator, Card Reader and USD POLL commands to collect payment etc.

The MDB specification recommends polling each device at least once every 200 milli-seconds.

3. Commands & Operation

Commands are sent from the PC to the P115 board and MDB devices. Events are sent from the P115 board to the PC. Events are sent under the following conditions:

Slave Mode

In response to a POLL command from the PC. (Poll commands need to be issued separately to the MDB devices - commands P1, P2 and P3).

Event Mode

Directly an event is detected by the P115 board which issues POLL commands to the MDB devices itself.

DIP SWITCH SETTINGS

The P115 board contains a 4 way DIP switch for configuration as follows:

Switch	OFF	ON
1	Coin Changer not fitted	Coin Changer fitted
2	Bill Validator not fitted	Bill Validator fitted
3	400ms Polling in event mode	200ms Polling in event mode
4	Slave Mode only	Event Mode enabled

Note: the Card Reader is automatically assumed to be fitted AFTER a R3 command has been issued. Similarly XnR commands enable USD cabinets

Message Sequence

All data is sent as ASCII Hex. Spaces are sent to delimit data, however these are ignored by the P115 board. The PC should do the same to data received from the P115 board. All commands or events are sent as complete lines terminated with a CR (hex 0D) character. If the P115 board received the command and CR it responds with a LF (Hex 0A). Once the command is actioned, the P115 board responds with either a Z <CR> to indicate no data to be sent, or a string of data terminated by a <CR>.

The PC is responsible for ensuring a correct command sequence and that each command is correctly acknowledged as detailed in the command tables below.

The PC must send complete ASCII-hex data including leading zeros. Hence two characters must be sent for 8 bit data values, and four characters for 16 bit values.

The basic transaction sequences are:

Command from the PC

PC		P115 Board	Notes
Command String <CR>	→		String terminated with <CR>
	←	<LF>	<LF> acknowledges that the string has been received (but not actioned yet)
	←	Z<CR> -OR- Data String <CR>	Command has been completed.

Event Message from PC

PC		P115 Board	Notes
	←	Data String<CR>	Event information string. No acknowledgement is expected from the PC

On power up the P115 board sends a string including the software version number to the PC. The string starts with * characters to enable it to be recognised and ignored.

Power up string : ***** JCA P115 PC-MDB Interface V4.0 *****

If there is no response to a command it may be because the device is not fitted or is not enabled. (Check that DPI Switches 1 and 2 are correctly set).

The commands and events for the Coin Changegiver and for the Bill Validator are given in the tables below:

COIN CHANGEGIVER COMMANDS

Command	Action	P115 Board Response	Notes
R1	Reset Coin Changegiver	Z	Disables coin acceptance. PC to re-initialise coins to accept, coins to manually dispense afterwards
S1	Get Coin Values	S1 followed by 16 coin values (coin types 0 to 15 in order)	Values to be multiplied by scaling factor to give true value.
S2	Get Scaling factor	S2 followed by scaling factor (8 bits) and decimal points (8 bits)	
S3	Get Coin Routing	S3 followed by 16 bits corresponding to coin routing. Bit set means corresponding coin routed to a tube. Coin type 0 is the least significant bit	
S4	Get Miscellaneous Data	S4 followed by Changer feature level (8 bits) and then the country code (16 bits, BCD encoded international telephone code)	
T1	Get Tube Full status	T1 followed by 16 bits corresponding to each coin type. Bit set means corresponding coin type tube is full. Coin type 0 is the least significant bit.	
T2	Get Tube Counts	T2 followed by 16 bytes of data indicating guaranteed number of coins in the corresponding tube (coin types 0 to 15 in order)	
N <2 bytes>	Individual Coin Inhibits. A bit set enables the acceptance of the corresponding coin. Coin type 0 is the least significant bit.	Z	Follow this with an E1 command to action the settings.

COIN CHANGEGIVER COMMANDS (Continued)

Command	Action	P115 Board Response	Notes
M <2 bytes>	Individual Coin Manual Dispense Enables. A bit set enables the manual dispensing of the corresponding coin. Coin type 0 is the least significant bit.	Z	Follow this with an E1 command to action the settings.
G <type> <number>	Dispense <number> of coins of <type> from the tubes. <number> and <type> are 8 bit quantities but are limited to: 00 <= <type> <= 0F Hex 00 <= <number> <= 0F Hex	Z on completion	PC to check that the correct number of coins are in the tube first using a T2 command. If two coin types have the same value, the least significant coin type is to be dispensed first. Whilst the Changer is dispensing coins the "G" event will be sent. If this does not occur there is a fault with the dispense operation
P1	Poll Coin Changegiver	Z if no information, otherwise the respective Event codes are returned	Not necessary in Event Mode
E1	Enable Coin Acceptance	Z	Sets up the conditions previously configured with N and M commands. If a N 0000 command was previously sent this DISABLES acceptance!
D1	Disable Coin Acceptance	Z	Disables coin acceptance unconditionally (and stops automatic "event mode" polling of the changegiver)

BILL VALIDATOR COMMANDS

Command	Action	P115 Board Response	Notes
R2	Reset Bill Validator	Z	Disables bill acceptance. PC to re-initialise bills to accept, bills to use escrow, and bill security levels afterwards.
S5	Get Bill Values	S5 followed by 16 bill values (bill types 0 to 15 in order)	Values to be multiplied by scaling factor to give true value
S6	Get Scaling factor	S6 followed by scaling factor (16 bits) and decimal points (8 bits)	
S7	Get Stacker Info	S7 followed by 8 bits (00 if no escrow capability, FF if escrow available), then 16 bits corresponding to stacker capacity	**Caution**: This command must have been used after the reset sequence and BEFORE a K1 or K2 command is issued to avoid an "Invalid Escrow Request" error
S8	Get Miscellaneous Data	S8 followed by Bill Validator feature level (8 bits), country code (16 bits, BCD encoded international telephone code) and Bill Security Levels (16 bits). A bit set indicates high security level is available for the corresponding bill type. Bill type 0 corresponds to the least significant bit.	
L <2 bytes>	Individual Bill Inhibits. A bit set enables the acceptance of the corresponding bill type. Bill type 0 is the least significant bit.	Z	Follow this with an E2 command to action the settings.

BILL VALIDATOR COMMANDS (Continued)

Command	Action	P115 Board Response	Notes
J <2 bytes>	Individual Bill Escrow setting. A bit set enables the escrow for the corresponding bill type. Bill type 0 is the least significant bit.	Z	Follow this with an E2 command to action the settings. Not relevant if the Bill Validator does not have an escrow.
V <2 bytes>	Set the security levels for each bill individually. A bit set selects High security for the corresponding bill type. Bit 0 corresponds to Bill Type 0.	Z	
P2	Poll Bill Validator	Z if no information, otherwise the respective Event codes are returned	Not necessary in Event Mode
E2	Enable Bill Acceptance	Z	Sets up the conditions previously configured with J and L commands. If a L 0000 command was previously sent this DISABLES acceptance!
D2	Disable All Bill Acceptance	Z	Disables bill acceptance unconditionally (and stops automatic "event mode" polling of the bill validator)
K1	Stack Bill in Escrow	Z unless an error	In event mode a "Bill Stacked" event is sent. In slave mode this is detected on the next POLL command P2.
K2	Return Bill in Escrow	Z unless an error	In event mode a "Bill Returned" event is sent. In slave mode this is detected on the next POLL command P2.
Q	Get Stacker Status	Q followed by F or N (full or not) and the count of bills stacked (16 bits)	If the stacker is full it is recommended that the Bill Validator is disabled (D2 command)

CARD READER COMMANDS

Command	Action	P115 Board Response	Notes
R3	Reset Card Reader	Z	Disables card acceptance. PC to re-enable card to accept afterwards.
S9	Get Miscellaneous Data	S9 followed by Bill Validator feature level (8 bits), country code (16 bits, BCD encoded international telephone code), scaling factor, decimal places, maximum response time and options(all in hex).	Values to be multiplied by scaling factor to give true value
E3	Enable Card Acceptance	Z	
D3	Disable Card Acceptance	Z	Disables card acceptance unconditionally (and stops automatic "event mode" polling of the card reader)
Annnn	Request Authorisation for an amount nnnn (in hex, must be 4 characters)	X 1B – no card inserted Annnn – Authorised – value nnnn D – amount denied X 1C – command not valid (card reader disabled)	Only valid when a card has already been inserted. At other times an error code is returned
F0	Vend successful	Z	Issue ONLY after an authorisation
F1	Vend failed	Z	Issue ONLY after an authorisation
B	Cancel authorisation request or eject card or complete card reader session at the end of a vend		
P3	POLL card reader	Cnnnn – card inserted with credit nnnn (hex) Annnn – Authorised – value nnnn D – amount denied L – Operation Cancelled H – card removed (end of session) X nn – error code	

USD COMMANDS

USD commands are all in the format ***XnCyyyyy*** where n is the satellite machine number 1, 2 or 3 (relating to USD addresses 40H, 48H and 50H respecively. C is the specific command which may have supporting data yyyyy In the command lists below the commands will be shown with the prefix X1 relating to satellite machine 1. For satellite machine 2 use the prefix X2 etc. Similarly, responses from the USD devices have the prefix Y1, Y2 or Y3.

Command	Action	P115 Board Response	Notes
X1R	Reset USD device	Z	Disables the cabinet. PC to re-enable USD to allow operation.
X1Sssssddtt	Setup USD device ssss= scaling (hex) dd= decimal places (hex) tt= authorisation time (secs, in hex)	Y1Snnpprrcctt	nn = USD level (01) pppp= max price (hex) – FFFF for no pricing held rr=number of rows(hex cc= number of cols (hex) tt= response time (secs-hex)
X1E	Enable USD	Z	Starts automatic “event mode” polling of the cabinet
X1D	Disable USD	Z	Disables USD cabinet (and stops automatic "event mode" polling of this cabinet)
X1P	Poll Usd	See separate list X nn – error code	
X1Vrrcc	Vend from row rr(hex) / column cc(hex)	Y1P – vend success Y1Frrccnnnn where n is the error code	See event list for error codes
X1Hrrcc	HOME row rr(hex) / column cc(hex)	Y1P – HOME success Y1Frrccnnnn where n is the error code	See event list for error codes
X1Qrrcc	Get status for row rr(hex) / column cc(hex)	Y1Yrrccnnnn where n is the status / error code	See event list for error codes
X1Yrrccpppp	Price response to Satellite	Z	Price pppp(hex) for row rr(hex), column cc(hex)
X1A	Approve satellite vend request	Z	
X1N	Deny satellite vend request	Z	
X1Fvvvv	Funds display value vvvv(hex)	Z	
X1I	Get USD peripheral ID	Y1Dnnnnnnnnnnnnn	34 bytes ID response in ASCII Hex. e.g. Y1D5347413030303030303030303031454C393036 20202020202020020000000000
X1Onn	Enable/disable optional features with byte nn(hex)	Z	nn relates to byte Y4 in the MDB spec

EVENT MESSAGES FROM P115 BOARD

Event	Description	Source	Notes
P1 <1 byte nn>	Coin type <nn> accepted	Coin Changer	
P2 <1 byte nn>	Coin type <nn> rejected	Coin Changer	For info only - do not issue credit
P3 <1 byte nn> <1 byte xx>	Manual dispense of <xx> coins of type <nn> from the change tubes	Coin Changer	For info only
X <1 byte nn>	Error Code <nn>	Coin Changer or Bill Validator	The PC should take appropriate action - see codes below
W	Coin Return Lever Pressed	Coin Changer	Cancel Vend / Refund request
Q1 <1byte nn>	Bill type <nn> accepted into Escrow	Bill Validator	Give credit of Bill Value
Q2 <1byte nn>	Bill type <nn> Stacked	Bill Validator	If escrow being used, this confirms that the bill has been stacked successfully and no further credit needs to be given. If the escrow is not being used, give credit on this event.
Q3 <1byte nn>	Bill type <nn> Returned	Bill Validator	Deduct credit of Bill Value
Q4 <1byte nn>	Disabled Bill type <nn> rejected	Bill Validator	For info only - do not issue credit
I 1	Coin Changer Reset OK		Use to confirm that the Changer is fitted
I 2	Bill Validator Reset OK	Bill Validator	Use to confirm that the Bill Validator is fitted
G	Coin Changer payout BUSY	Coin Changer	Use to confirm that dispensing is OK
C<2 bytes nnnn>	Card inserted with <nnnn> (hex) credit	Card reader	<nnnn>=FFFF indicated that the credit is unknown
A<2 bytes nnnn>	Vend Authorisation approved for amount <nnnn> (hex)	Card reader	Will only be in response to an authorisation request
D	Vend Authorisation denied	Card reader	Will only be in response to an authorisation request
L	Cancelled	Card reader	Card operation cancelled
H	Card removed – end of session	Card reader	

Error Codes

Coin Changer Codes (Hex)	Description
01	Dispense error
02	Defective Tube Sensor
03	No Credit - coin validated but not fully accepted
04	Acceptor unplugged
05	Tube Jam
06	Changer ROM checksum error
07	Coin routing error
08	Coin Jam
1E	No response
1F	Checksum or other MDB data error

Bill Validator Codes (Hex)	Description
10	No bill in escrow / invalid escrow request
11	Defective Motor
12	Sensor problem
13	Bill Validator ROM checksum error
14	Bill validator jammed
15	Cashbox (stacker) out of position
1E	No response
1F	Checksum or other MDB data error

Card Reader Codes (Hex)	Description
80	Payment Media Error
81	Invalid payment Media
82	Tamper error
83	Manufacturer error
84	Comms Error
85	Reader Requires Service
86	Unassigned
87	Manufacturer error
88	Reader failure
89	Comms Error
8A	Payment media Jammed
8B	Manufacturer Error
8C	Refund error – internal credit lost

Card Reader Codes (Hex)	Description
1A	Out of sequence command
1B	No card inserted
1C	Command not valid – disabled
1D	Poll response error
1E	No response
1F	Checksum or other MDB data error

EVENT MESSAGES FROM P115 – USD Devices

Event	Description	Source	Notes
Y1I	Recent reset	USD satellite	
Y1Snnpprrcctt	Setup Command response		nn = USD level (01) pppp= max price (hex) – FFFF for no pricing held rr=number of rows(hex cc= number of cols (hex) tt= response time (secs-hex)
Y1Vrrcc	Satellite is requesting permission to vend row rr(hex), column cc(hex)	USD satellite	PC should respond with X1A or X1N
Y1P	Vend or Home success	USD satellite	
Y1Frrccnnnn	Vend or Home fail – row rr, column cc	USD satellite	nnnn is the hex reason code Bit 0 = selection sold out Bit 1 = motor jam Bit 2 = non existant motor (not fitted) Bit 3 = invalid selection Bit 4 = Health & Safety error
Y1Yrrccnnnn	Selection status response for row rr, column cc	USD satellite	nnnn is the hex reason code Bit 0 = selection sold out Bit 1 = motor jam Bit 2 = non existant motor (not fitted) Bit 3 = invalid selection Bit 4 = Health & Safety error
Y1Ennnn	Failure reportc	USD satellite	nnnn is the hex reason code Bit 0 = Health & Safety error Bit 1 = Positive Vend sensor error
Y1Dnnnnnnnnnnnnnnnnnnn	Peripheral ID Response	USD satellite	
Y1Crrcc	Price request – row rr, column cc	USD satellite	PC to respond with X1Yrrccpppp message

4. Suggested Command Sequences

INITIALISATION - at power up or if the RESET OK event occurs at any other timer. The initialisation sequence resets the peripheral, checks it has initialised correctly and then collects the set-up information from the device. Finally standard settings are applied to the device.

Coin Changer Initialisation sequence (assumes power up, or coin acceptance disabled first)

PC	P115 Example Response	Notes
R1	Z	Resets the Changer
P1	I 1	Poll for Reset OK - if there is no response, check Switch 1 is set correctly, and that the changer is fitted & working
S1	S1 01 02 05 0A 14 FF 00 00 00 00 00 00 00 00 00 00	Collect Coin values In this case coin type 0 is has a value of 1, coin type 1 has a value of 2 etc. Coin type 6 is a vend token (value FF Hex) and coin types 7 to 15 are not used
S2	S2 01 02	Collect scaling factor (SF) and decimal points (DP) In this case the scaling factor is 1 and 2 decimal points are expected.
S3	S3 000F	Collect Coin routing In this case coin types 0, 1, 2 and 3 are routed to tubes and are available for changegiving.
S4	S4 03 0044	Collect other information In this example the coin changer is a Level 3 machine and programmed for the UK (International telephone code 44)
T1	T1 0005	Check Tube full conditions. In this examples the tubes for coins 0 and 2 are full
T2	T2 14 1C 16 19 00 00 00 00 00 00 00 00 00 00 00 00	Check the number of coins in each tube. In this example there are 20 (14 Hex) coins of type 0, 28 of type 1, 22 of type2 and 25 of type 3. **Caution** - the numbers are the quantity that the coin changegiver has counted in and out, and may not match the actual number in the tube.
N 003F	Z	Enable the acceptance of individual coins. In this example coin types 0 to 5 are enabled.
M 000F	Z	Enable the manual dispensing of coins from tubes (service mode for the machine). In this example all the tube coins identified with the S3 command are enabled for manual dispensing .
E1	Z	Enable all coin acceptance, and set the interface into EVENT mode for the changer (if switch 4 is ON)

Bill Validator Initialisation sequence (assumes power up, or bill acceptance disabled first)

PC	P115 Example Response	Notes
R2	Z	Resets the Bill Validator
P2	I 2	Poll for Reset OK - if there is no response, check Switch 1 is set correctly, and that the bill validator is fitted & working
S5	S5 01 05 0A 14 32 64 00 00 00 00 00 00 00 00 00 00	Collect Bill values In this case bill type 0 is has a value of 1, bill type 1 has a value of 5 etc. A value of FF indicates a Vend Token. Bill types 7 to 15 are not used
S6	S6 0001 00	Collect scaling factor (SF) and decimal points (DP) In this case the scaling factor is 1 and 2 decimal points are expected. Note that the Bill scaling factor is 16 bits whereas the coin scaling factor is 8 bits as bills tend to have higher values
S7	S7 FF 0258	Collect Stacker Information In this case coin an escrow is fitted (FF) and the capacity of the stacker is 600 (Hex 0258).
S8	S8 01 0044 FFFF	Collect other information In this example the bill validator is a Level 1 machine and programmed for the UK (International telephone code 44). All notes support a high security mode (FFFF)
L 001F	Z	Enable the acceptance of individual bills. In this example bill types 0 to 4 are enabled.
V FFFF	Z	Set the security level for each bill type. In this example all bill types set to high security.
J 000F	Z	Enable the use of escrow on individual bills. In this example the 4 lowest value bills are to use the escrow.
E2	Z	Enable all bill acceptance, and set the interface into EVENT mode for the bill validator (if switch 4 is ON)

Note : If both coin and bill devices are being used it is recommended that the E1 and E2 commands are issued together after both devices have been initialised.

Card Reader Initialisation sequence

PC	P115 Example Response	Notes
R3	Z	Resets the Card reader. Z indicates OK
S9	S9 02 0044 01 02 05 0F	Collect Card Reader Settings In this case the card reader is "level 2", programmed for the UK (International telephone code 44), has a scaling factor of 1 (i.e all amounts are in pence), operates with 2 decimal places, has a maximum response time of 5 seconds and an options value of 0F hex. (Refer to the MDB standard document for the description of these options, but this card reader is multi-vend compatible, has its own display and is able to revalue the card.)
E3	Z	Card reader enabled – now ready for use

USD Satellite 1 basic Initialisation sequence

PC	P115 Example Response	Notes
X1R	Z	Resets the Slave machine. Z indicates OK
X1S00010214	Y1S01FFFF080A0F	Collect Satellite Machine Settings In this case the VMC is setting the scaling factor to 1 (amounts are in pence), decimal places to 2 and its maximum response time to 20 (14H). The USD device is responding that it is "level 1", does not hold price information (FFFF) has 8 rows of 10 columns (0AH) and a maximum vend time of 15 secs(0FH)
X1E	Z	Satellite enabled – now ready for use

Payment Acceptance Sequence Examples (Includes Coin and Bill Payment, and assumes operation in Event Mode with both coin and bill acceptance enabled)

PC	P115 Example Response	Notes
	Q2 04	Bill type 4 accepted and stacked - add value to credit
	P1 02	Coin type 2 accepted - add value to credit
	P1 03	Coin type 3 accepted - add value to credit
	Q1 01	Bill type 1 accepted into escrow
K1	Z	Stack the bill (type 1)
	Q2 01	Bill type 1 stacked (in response to K1 command)
	. . . . etc	Continue accepting until sufficient payment made
D2	Z	Disable bill acceptance
D1	Z	Disable coin acceptance

Once payment has been received the PC may vend its product, deduct the price from the accumulated credit and then give change.

Changegiving sequence (Assumes that the interface is in Slave mode following disabling of coin and bill acceptance):

PC	P115 Example Response	Notes
T2	T2 14 1C 16 19 00 00 00 00 00 00 00 00 00 00 00 00	Check that there are sufficient coins for the change. In this example there are 28 (1C hex) coins of type 2
G 02 04	Z	Dispense 4 coins of type 2
P1	G	Check that payout occurs and wait until it is complete
P1	G	
P1	Z	Complete, nothing to report
		Vend is now complete …. Re-enable acceptance for next customer
E2	Z	Re-enable bill acceptance
E1	Z	Re-enable coin acceptance

Card Payment Sequence Examples (assumes that even mode is ON and that the card reader has been initialised and enabled)

Example 1 – successful vend

PC	P115 Example Response	Notes
	C07D0	Card inserted with a credit of 20.00
A0032	Z	Request for authorisation for a product of value 0.50
	A0032	Payment is authorised Vend can now take place
F0	Z	Indicates to the card reader that the vend was OK
B	Z	Complete the transaction (single vend modes only)
	L	User has removed their card – the session is cancelled (normally in multi-vend only)
	H	Card has been removed

Example 2 – failed vend

PC	P115 Example Response	Notes
	CFFFF	Card inserted with an unknown amount of credit (e.g. a credit card that requires on line authorisation)
A00C8	Z	Request for authorisation for a product of value 0.50
	A00C8	Payment is authorised Vend can now take place
F1	Z	Indicates to the card reader that the vend has failed – the card reader will restore the amount to the card
B	Z	Complete the transaction (single vend modes only)
	L	User has removed their card – the session is cancelled (normally in multi-vend only)
	H	Card has been removed

Example 3 – Card not authorised

PC	P115 Example Response	Notes
	C07D0	Card inserted with a credit of 20.00
A0032	Z	Request for authorisation for a product of value 0.50
	D	Payment is NOT Authorised – Do NOT Vend !!
	L	User has removed their card – the session is cancelled
	H	Card has been removed

Satellite machine – example sequences

Example 1 – check a selection (selection is not fitted)

PC	P115 Example Response	Notes
X1Q0205	Y1Y02050004	Check of selection row 2, column 5 (e.g. B5) Response of 0004 indicates that the selection does not exist

Example 2 – check a selection (valid selection)

PC	P115 Example Response	Notes
X1Q0205	Y1Y02050000	Check of selection row 2, column 5 (e.g. B5) Response of 0000 indicates that the selection is OK

Example 3 – valid vend

PC	P115 Example Response	Notes
X1V0205	Y1S	Vend selection row 2, column 5 (e.g. B5) Y1S indicates that the vend was successful

Example 4 – failed vend – motor jam

PC	P115 Example Response	Notes
X1V0205	Y1F02050002	Vend selection row 2, column 5 (e.g. B5) 0002 failure code indicates that the vend failed due to a motor jam

Example 5 – failed vend – selection sold out

PC	P115 Example Response	Notes
X1V0205	Y1F02050001	Vend selection row 2, column 5 (e.g. B5) 0001 failure code indicates that the vend failed due to the selection being sold out

Notes on Scaling Factors and Values

Coins, bills and cards have separate values and scaling factors. These examples show how they can be used to get the correct credit amounts to display.

Coin Example:

Coin Scaling factor	10 (decimal)	Note: this is an 8 bit value
Coin Decimal Points	2	
Coin Value	20	

Absolute coin value for credit = 20 x 10 = 200

Display as **2.00** (using 2 decimal places)

Bill Example:

Bill Scaling factor	100 (decimal)	Note: this is a 16 bit value
Bill Decimal Points	2	
Bill Value	5	

Absolute bill value for credit = 5 x 100 = 500

Display as **5.00** (using 2 decimal places)

Card Example:

Card Scaling factor	10 (decimal)	Note: this is an 8 bit value
Card Decimal Points	2	
Value on the Card	20	

Absolute card value for credit = 20 x 10 = 200

Display as **2.00** (using 2 decimal places)

5. Power Supply

A standard 24v DC power supply is recommended for the units. This supply will power the P115 Board, the Coin Changegiver and the Bill Validator.The rating of this supply should be sufficient to cater for the simultaneous operation of the coin changer **Coin Acceptance** and bill validator **Bill Transport** as specified below (extracts from the MDB Specifications), plus 100mA for the P115 board:

MDB Power supply Voltage:	=	20v DC minimum, 42v DC maximum (24v DC +/- 1v recommended)
Coin Changer:		
Idle mode	=	200 mA. (max.) continuous
Coin acceptance	=	1.8 A. (max.) for up to 2 seconds (For coin changers using solenoid based payout mechanisms - typical of 3 tube changers sold in the US market. Vending machines sold into the US market are required to supply this power.) 1.0 A. (max.) for up to 2 seconds (For coin changers using motorised payout mechanisms - typical of 4 tube changers.)
Coin payout	=	3.6 A. (max.) for 100 ms. with 400 ms. idle current between pulses. (For coin changers using solenoid based payout mechanisms - typical of 3 tube changers sold in the US market. Vending machines sold into the US market are required to supply this power.) 1.5 A. (max.) for 100 ms. with 400 ms. idle current between pulses. (For coin changers using motorized payout mechanisms - typical of 4 tube changers.)
Bill Validator:		
Idle mode	=	200 mA. (avg.) continuous
Bill transport	=	2.5 A. (max.) up to 10 seconds
Card Reader:		
Idle mode	=	300 mA. (avg.) continuous
Card transport	=	1.5 A. (max.) at 50% duty cycle for up to 5 seconds

Satellite machines:
These normally have their own power supplies and require only a 3 wire connection (MDB TX, MDB RX and MDB COMM) for communication.

Hence for operation with both Coin and Bill modules a power supply capable of supplying 4.5 Amps peak is suggested. This would also cater for a card reader which is unlikely to be used simultaneously with the other two payment devices.

6. Looms/Connections

- **Loom 1 - Power input**

  - connects to PL7 (Marked "POWER") on the P115 board

From	SK1 (4 way Molex)	Signal
Power Supply +24v	1	MDB Power +ve
Power Supply 0v	2	MDB Power +ve
	3	MDB Power -ve / return
	4	MDB Power -ve / return

SK1 - 4 way Molex 6741 series connector, Molex Part Number 22-01-2045, using crimps 08-50-0032

- **Loom 2 - PC Connection**

  - SK1 connects to PL8 (Marked "RS232") on the P115 board and the 9 way D socket to the PC serial port.

SK1 (3 way Molex)	9 way D socket	Signal
1	1	No connection
2	2	PC RXD
3	3	PC TXD
	4	DTR
	5	GND
	6	DSR
	7	RTS
	8	CTS
	9	No connection

SK1 - 3 way Molex 6741 series connector, Molex Part Number 22-01-2035, using crimps 08-50-0032

- **Loom 3 - MDB Connection**

MDB Devices may be connected directly to either PL1 or PL3, or alternatively if a longer cable is required connection can be made to PL4 or PL5 using the loom connections below:

SK1 (5 way Molex)	6 Way MDB Plug	Signal
1	1	MDB Power +ve
2	2	MDB Power return (0v)
3	3	
4	4	Master RX
5	5	Master TX
	6	Comms Common

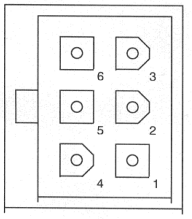
SK1 - 5 way Molex 6741 series connector, Molex Part Number 22-01-2055, using crimps 08-50-0032

PL-MDB - Molex mini fit connector, Molex part number 39-01-2001 with pins 39-00-067

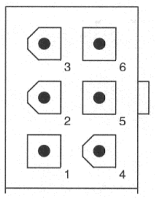
Standard MDB Connections are:

Connector Pin-out:

Line 1 - 34 VDC
Line 2 - DC Power Return
Line 3 - N/C
Line 4 - Master Receive
Line 5 - Master Transmit
Line 6 - Communications Common



Peripheral Connector
Face View
(Sockets)



VMC / Bus Connector
Face View
(Pins)

Omit the power connections (pins 1 and 2 for USD devices)

7. Mechanical Mounting

The P115 Issue E layout is shown below. (The P115E is physically and electrically fully interchangeable with the earlier P115D version)

The board is 89mm by 86 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 76.2mm by 78.8 mm pitch.

The maximum height of the board is 35mm, a clearance of at least 5mm is recommended beneath the board.