Paylink Technical Details Manual

Table of Contents

Revision History

Version	Date	Author	Description
1.18	28 October 22	D Bush	First Aardvark version

Introduction

Purpose of Document

This document describes the details of the Paylink hardware platform.

Intended Audience

The intended audience of this document is the engineers who will wiring up the Paylink unit in a complete system

Associated Document(s)

This document is one of a set that together cover creating and using a Paylink system. As well as this document, there are two more:

The companion document “Milan / Paylink Application Program Interface Manual” is written for the use of programmers and covers the details of how to write the programs that interface to Paylink.

The document “Milan / Paylink System Manual” is written for the use of the person who is possibly not a programmer, but is concerned with designing and setting up the system centred on a Paylink unit. That document also covers the configuration settings that are used to describe the units connected to Paylink, and the way in which such units are controlled.

Naming

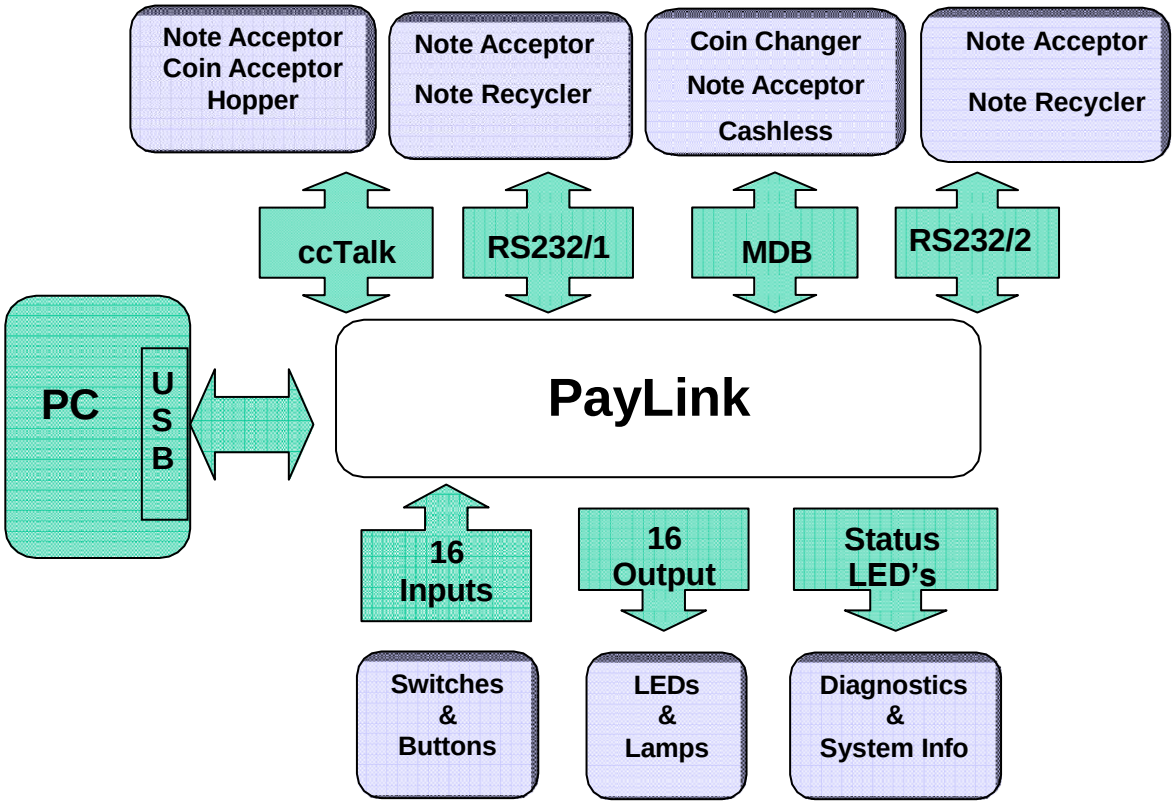
The system described here has a few names. This section attempts to explain them.

AES	Aardvark Embedded Solutions - us.	
IMHEI	Intelligent Money Handling Interface Equipment. This was the original name for the project, This was however difficult to say, and so was replaced in common use by Milan. It remains in the names in of the header files etc.	
Milan	This was originally the name of the first hardware build. It has however become the name of the overall project. Most documents from AES talk about Milan to cover the whole family of products that are used with this API	
Paylink	This is the name of the USB module. There are at present seven versions of Paylink hardware	
	Standard Paylink	The original, metal cased version.
	Paylink Lite	An old, smaller, plastic cased cctalk only version, with a reduced function set.
	uPaylink	(Micro Paylink) a PC software only version, for use with Crane PI USB peripherals.
	Paylink Lite V2	A smaller, plastic cased version supporting the full set of peripherals on a single connector, either cctalk or RS232 together with 4 input and 4 outputs
	Paylink MDB Lite	A smaller, plastic cased version supporting the full set of peripherals on a single MDB connector together with 4 input and 4 outputs
	Paylink MDB Aux	A version of the MDB Lite with no I/O that does not authorise Paylink to run
	Paylink RS232 Aux	A specially programmer USB to RS232 converter that does not authorise Paylink to run

Specification

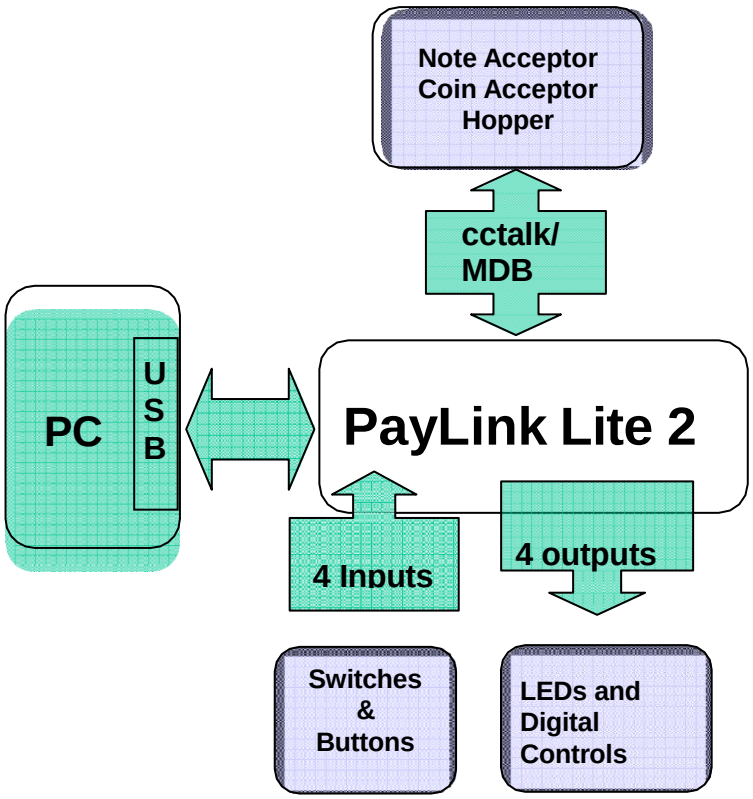
Paylink Functional block diagram

Figure 1: Functional block diagram



Paylink Lite 2 Functional block diagram

Figure 2: Functional block diagram



Connector Overview

*Below is an overview of each connector on **Paylink.***

Figure 3: Paylink Connector overview with examples

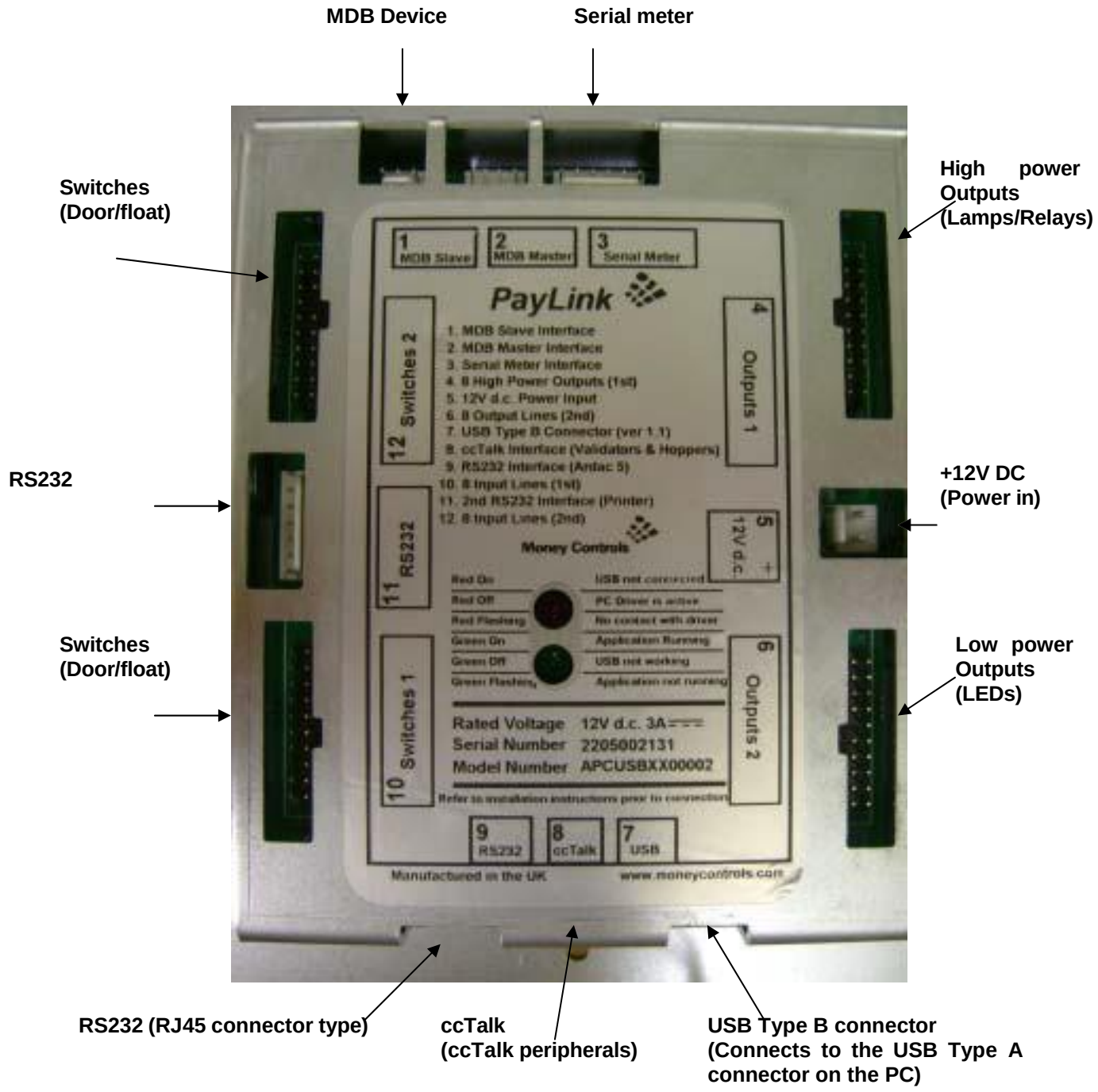
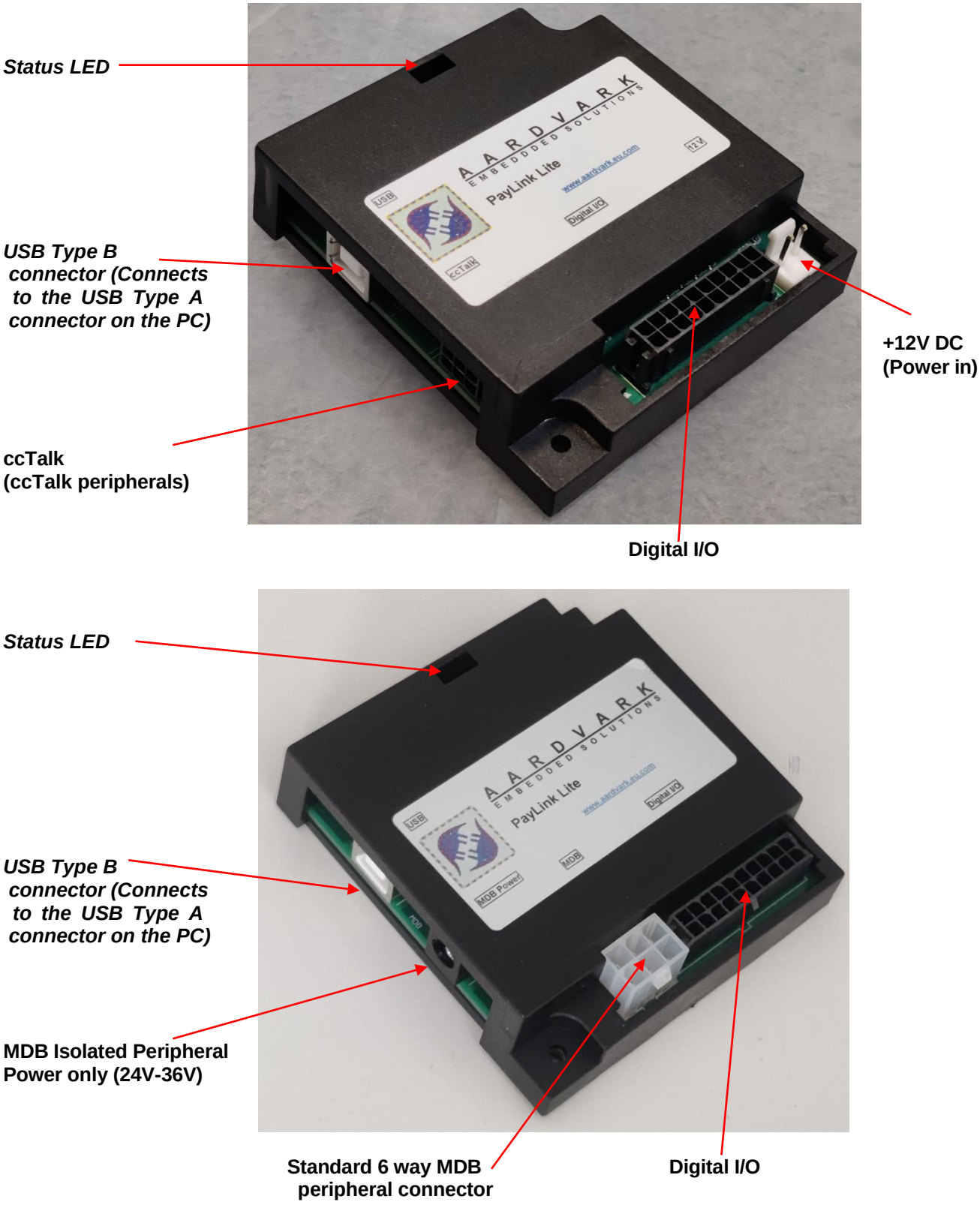


Figure 4: Paylink Lite 2 Connector overview with examples



Mechanical Dimensions

Figure 5: Paylink mechanical dimensions

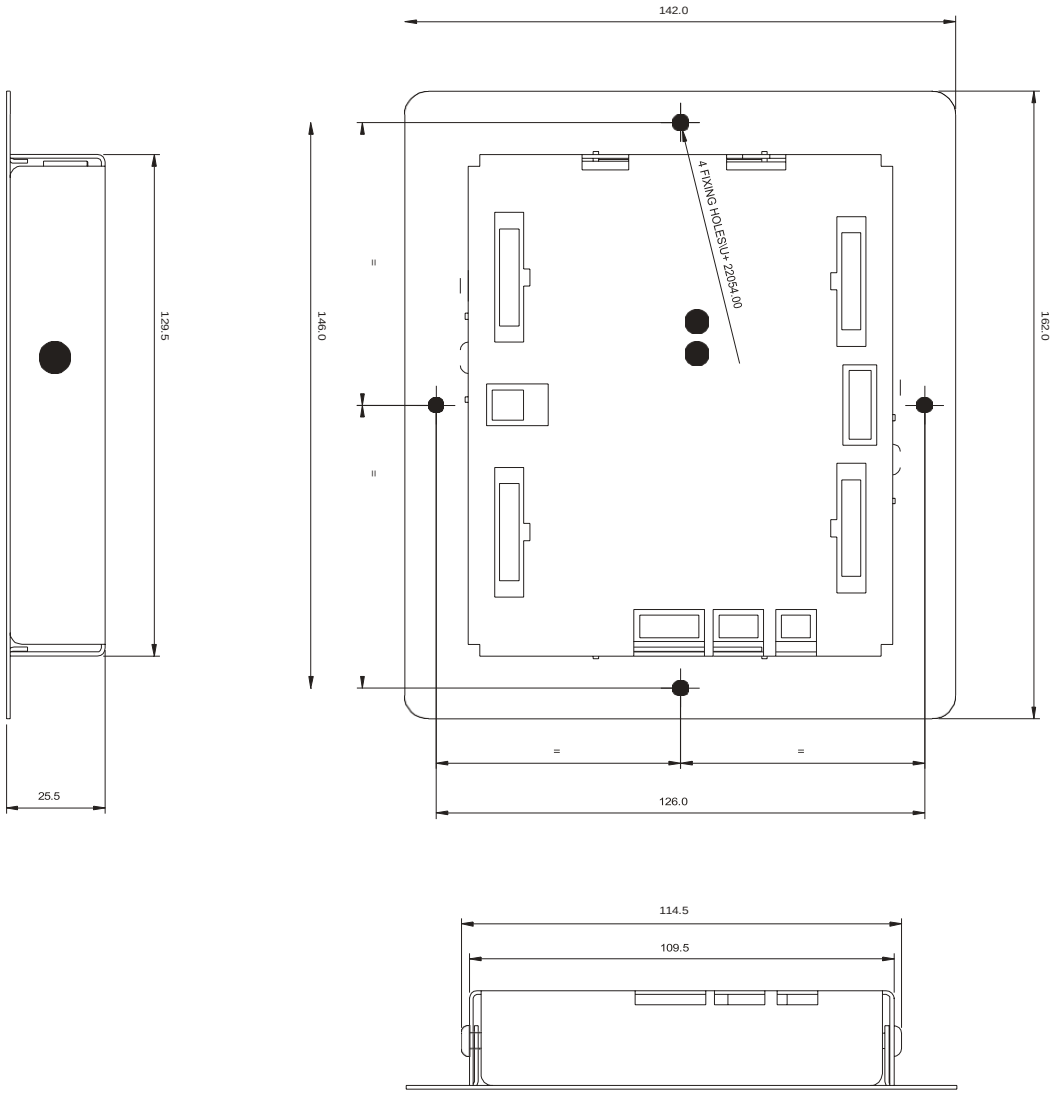
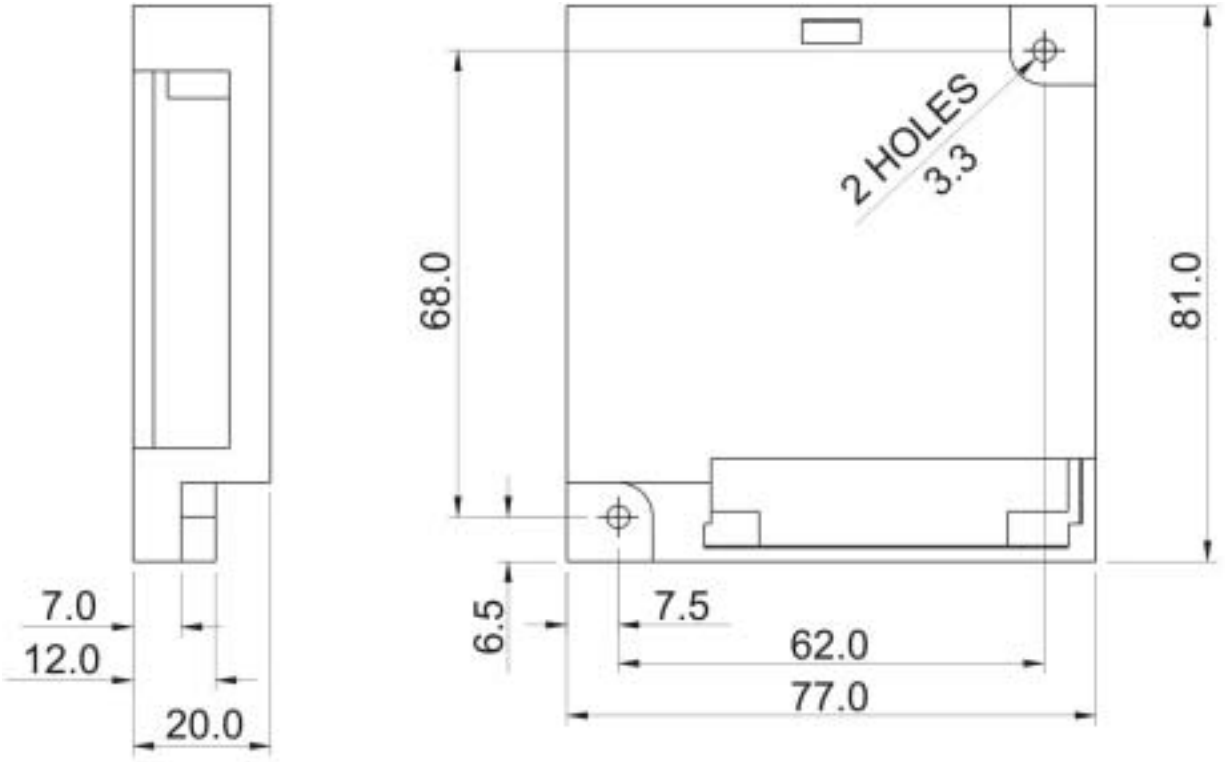


Figure 6: Paylink Lite 2 mechanical dimensions



Electrical Specification

Table 1: Electrical Specification (Paylink)

Environmental	
Operating temperature range	0°C to 55°C
Storage temperature range	-20°C to 70°C
Humidity range	Up to 75% RH non-condensing
Electrical – cctalk	
Signal Voltage	5V
Power (fuse protected) +12Vdc	2.5A continuous, 5A peak for 200ms
Power (fuse protected) +24Vdc	2.5A continuous, 5A peak for 200ms
Electrical – I/O Ports	
16 inputs	Switch inputs 3V3 CMOS thresholds with 3V3 pull-ups, 5mA max.
8 high power outputs	Open drain up to 300mA, max output 36V. (Inductive or resistive)
8 low power outputs	Open drain up to 30mA, max output 12V (resistive only)
PC Interface	USB Type B interface, V1.1 and above

Table 2: Electrical Specification (Paylink Lite 2 cctalk)

Environmental	
Operating temperature range	0°C to 55°C
Storage temperature range	-20°C to 70°C
Humidity range	Up to 75% RH non-condensing
Electrical – cctalk	
Signal Voltage	5V
Power (fuse protected) +12Vdc	2.5A continuous, 5A peak for 200ms
Power (fuse protected) +24Vdc	2.5A continuous, 5A peak for 200ms
Electrical – I/O Ports	
4 inputs	Switch inputs 3V3 CMOS thresholds with 3V3 pull-ups, 5mA max.
4 low power outputs	Open drain up to 30mA, max output 12V (resistive only)
PC Interface	USB Type B interface, V1.1 and above

Table 2: Electrical Specification (Paylink Lite 2 MDB)

Environmental	
Operating temperature range	0°C to 55°C
Storage temperature range	-20°C to 70°C
Humidity range	Up to 75% RH non-condensing
Electrical - MDB	
Signal Voltage	5V
Peripheral Power	24V – 36V Opto Isolated, direct from barrel connector
Electrical – I/O Ports	
4 inputs	Switch inputs 3V3 CMOS thresholds with 3V3 pull-ups, 5mA max.
4 low power outputs	Open drain up to 30mA, max output 12V (resistive only)
Communications Interface	USB Type B interface, V1.1 and above

Installation

Hardware installation

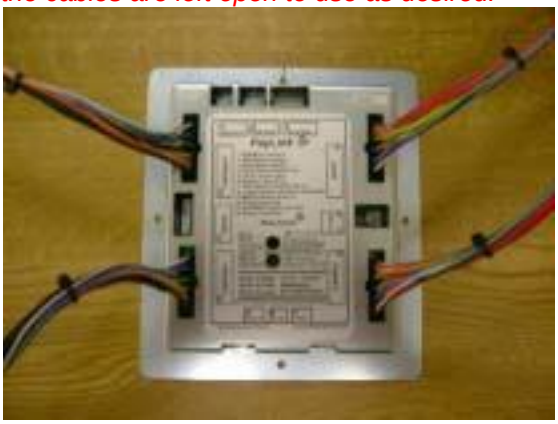
Paylink *connects to the PC via the USB Type A – Type B cable, during the installation process; the LED indicates the current status of* ***Paylink****.*

Table 3: Status LED table

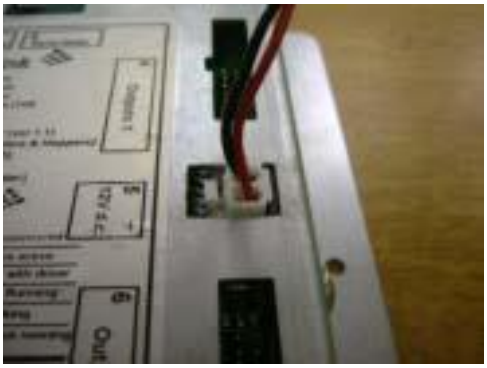
RED on	USB not connected (electrical)
RED off	PC driver is active
RED flashing	No contact with PC driver program
GREEN off	USB not working
GREEN flashing	Application not running
GREEN on	Application running & Peripherals Enabled

Connecting the ccTalk multi drop cable to ***Paylink***

Connecting the 4 X 20-way headers to the I/O connectors. *Note: Each 20 way header has a different 'key way' to correspond with the missing pin on the 20-way connectors. The ends of the cables are left open to use as desired.*



Connecting ***Paylink*** *to the 2-pin power cable*

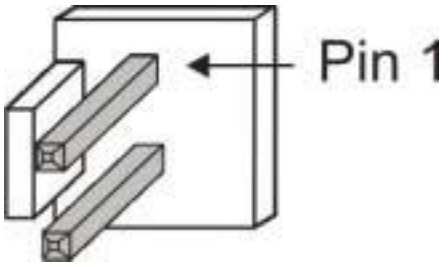


*Connecting the USB cable to **Paylink** and to the PC. The status LED will show **RED ON**.*

Interfaces

Power interface

Figure 7: Paylink power interface

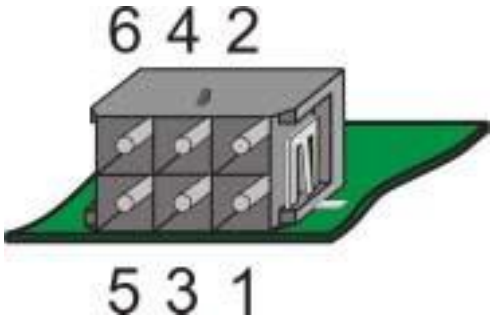


Pin	Function
1	GND
2	+12V dc

Matching Cable Plug: JST VHR-2M (3.96mm Pitch)

ccTalk interfaces

Figure 8: Paylink ccTalk interface



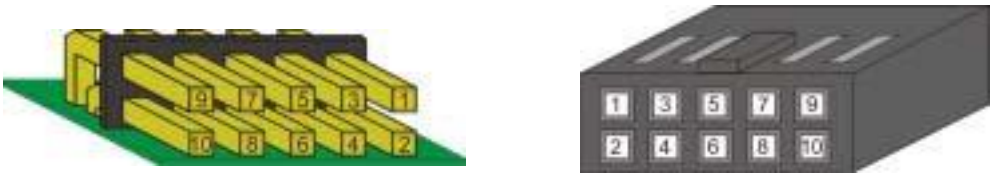
Pin	Function	Pin	Function
1	ccTalk data line	4	+24V Out
2	+12V Out	5	0V In
3	Serial Select / 0V	6	+24V In

Matching Cable Plug: Molex 43025-0600, Micro-Fit 3.0 (3mm Pitch)

IMPORTANT INFORMATION

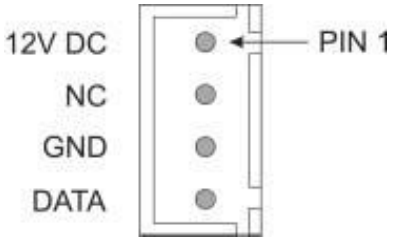
- **+12V Out is the supply which is provided to PayLink on the 2 pin connector via a polyfuse for protection.**
- **+24V In must be provided by the host machine (in the PayLink development kit, this is shown by orange and black power cables) and is passed through a polyfuse for protection, this becomes +24V Out.**
- **Under no circumstances can any more than 2.5A drawn through the card.**
- **Under no circumstances should PayLink be 'hot swapped'**

Figure 9: Standard 10 pin ccTalk interface



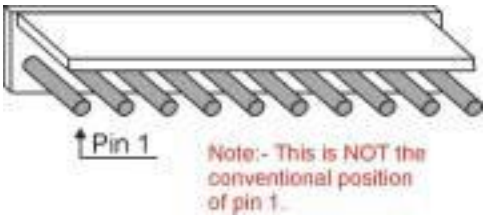
Pin	Description	Pin	Description	
1	ccTalk data line		**Lumina**	**SR5**
2,3,4,5,6	Not Used			
7	12V	**9**	Not Used	ccTalk select
8	0V	**10**	Not Used	

Figure 10: Standard 4 Pin ccTalk interface



Matching Cable Plug: JST XHP-4

Figure 11: Standard 10 pin Hopper ccTalk interface



Pin	Function	Pin	Function
1	Address select 3 - MSB	6,7	0V
2	Address select 2	8	ccTalk data line
3	Address select 1 - LSB	9	N/C
4,5	+Vs	10	/RESET

Matching Cable Plug: Molex 22-01-2101, KK 254, (2.54mm Pitch)

Figure 12: Standard "Cinch" ccTalk interface

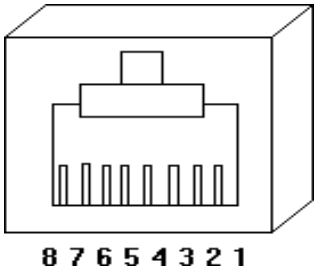
View of Base plate
Connector from Rear

Pin	Function	Pin	Function
1	0V	8	Address Select 2
2,3	N.C.	9	+Vs
4	Address Select 1 - LSB	10,11	N.C.
5	ccTalk data line	12	Address Select 3 - MSB
6,7	N.C.		

Matching Cable Plug: cinch R76-77849

RS232 / RJ45 interface

Figure 13: Paylink - RS232 / RJ45 interface

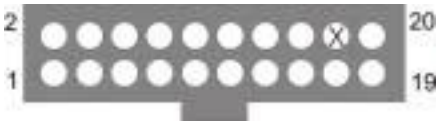


Pin (PayLink)	Function
3	Rx (Green/White)
4	TX (Blue)
2	GND (Orange)

Paylink Auxiliary input/output interface

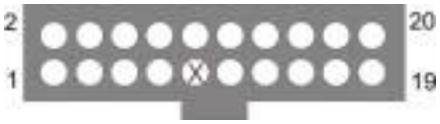
Matching Cable Plugs: Molex 90142-0020, C-Grid (2.54mm Pitch)

Figure 15: Connector 4 – High power outputs



+12V	+12V	N/C	+12V	+12V	+12V	+12V	+12V	Key	+12V
0	1	2	3	N/C	4	N/C	5	6	7

Figure 16: Connector 6 – Low power outputs

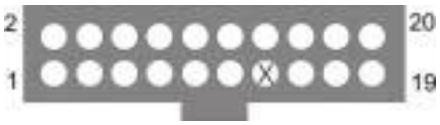


+12V	+12V	N/C	+12V	+12V	+12V	+12V	+12V	N/C	+12V
8	9	10	11	Key	12	N/C	13	14	15

Figure 17: Connector 10 – Switches / Inputs

0V	0V	Key	0V	0V	0V	0V	0V	N/C	0V
0	1	2	3	N/C	4	N/C	5	6	7

Figure 18: Connector 12 – Switches / Inputs



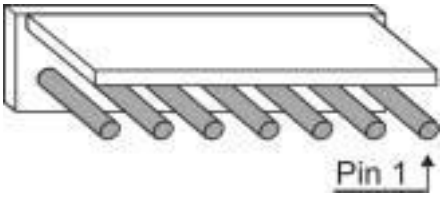
0V	0V	N/C	0V	0V	0V	0V	0V	N/C	0V
8	9	10	11	N/C	12	Key	13	14	15

Table 4: I/O Interface

Pin	Conn 4	Conn 6	Conn 10	Conn 12
1	Output 0	Output 8	Input 0	Input 8
2	+12V	+12V	0V	0V
3	Output 1	Output 9	Input 1	Input 9
4	+12V	+12V	0V	0V
5	Output 2	Output 10	Input 2	Input 10
6	N/C	N/C	KEYWAY	N/C
7	Output 3	Output 11	Input 3	Input 11
8	+12V	+12V	0V	0V
9	N/C	KEYWAY	N/C	N/C
10	+12V	+12V	0V	0V
11	Output 4	Output 12	Input 4	Input 12
12	+12V	+12V	0V	0V
13	N/C	N/C	N/C	KEYWAY
14	+12V	+12V	0V	0V
15	Output 5	Output 13	Input 5	Input 13
16	+12V	+12V	0V	0V
17	Output 6	Output 14	Input 6	Input 14
18	KEYWAY	N/C	N/C	N/C
19	Output 7	Output 15	Input 7	Input 15
20	+12V	+12V	0V	0V

RS232 printer interface

Figure 20: Paylink – RS232 Serial Printer Interface

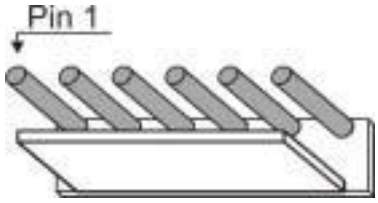


Pin - Paylink	Function	Pin – Serial Printer
1	+24V DC	6
3	TX (from Paylink)	11
5	RX (to Paylink)	12
7	GND	5

Matching Cable Plug: Molex 22-01-2071, KK 254, (2.54mm Pitch)

Serial meter interface

Figure 21: Paylink serial meter interface



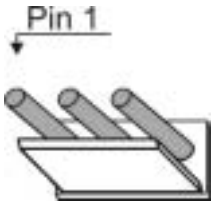
*This is a 1 to 1 connection between **Paylink** and the Serial meter.*

Pin (Meter)	Function	Pin (Meter)	Function
1	SPI Data Output	4	SEC Reset
2	SPI Clock Input	5	+12V Supply
3	SPI Data Input	6	0V Supply

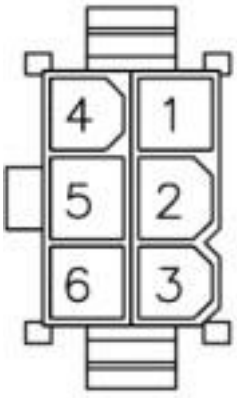
Matching Cable Plug: Molex 22-01-2061, KK 254, (2.54mm Pitch)

MDB Device interface

Figure 22: MDB Slave interface



Pin (PayLink)	Function	Pin (MDB)
1	Rx (to PayLink)	5
2	TX (from PayLink)	4
3	Signal GND	6
	0V DC	2
	+V DC	1



Matching Cable Plug: Molex 22-01-2031, KK 254, (2.54mm Pitch)

Paylink Lite Digital I/O

Figure 22: Lite V2 Digital I/O

Board Edge

In order to maintain compatibility with earlier versions of Paylink, the pin allocation of this connector is as shown in the diagram to the left.

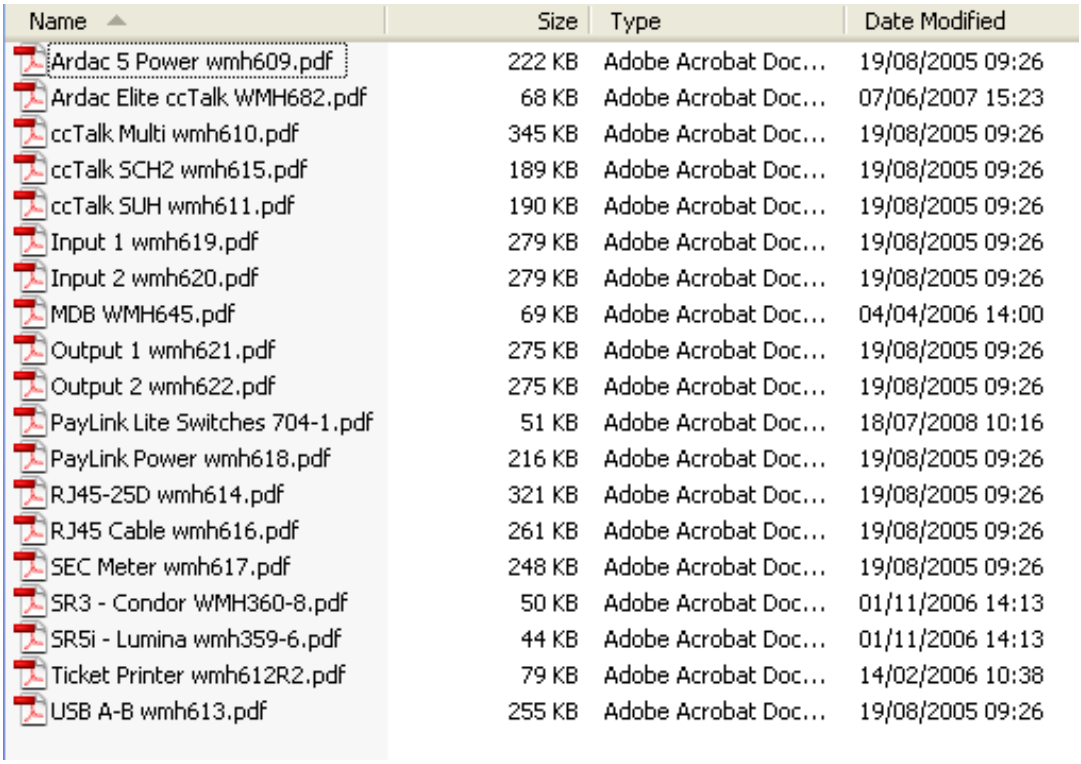
Note that this does not match the pin allocation described in the Molex Microfit documentation.

Pin (Paylink)	Function	Comment
1	+12V	Twelve Volt (Fused) signals for use with output signals
2	+12V	
3	+12V	
4	+12V	
5	Output 0	Output signal 0 (Active Low)
6	Output 1	Output signal 1 (Active Low)
7	Output 2	Output signal 2 (Active Low)
8	Output 3	Output signal 3 (Active Low)
9	Pull-Up 0	Pull-ups to the USB 5V to allow the direct driving of LEDs
10	Pull-Up 1	
11	Pull-Up 2	
12	Pull-Up 3	
13	Ground	Ground reference signals for use with input signals
14	Ground	
15	Ground	
16	Ground	
17	Input 0	Switch input 0
18	Input 1	Switch input 1
19	Input 2	Switch input 2
20	Input 3	Switch input 3

Matching Cable Plug: Molex 43025-2000, Micro-Fit 3.0 (3mm Pitch)

Connector details

Full drawings and connector details are provided within the \PaylinkLooms section of the Distribution.



Name	Size	Type	Date Modified
Ardac 5 Power wmh609.pdf	222 KB	Adobe Acrobat Doc...	19/08/2005 09:26
Ardac Elite ccTalk WMH682.pdf	68 KB	Adobe Acrobat Doc...	07/06/2007 15:23
ccTalk Multi wmh610.pdf	345 KB	Adobe Acrobat Doc...	19/08/2005 09:26
ccTalk SCH2 wmh615.pdf	189 KB	Adobe Acrobat Doc...	19/08/2005 09:26
ccTalk SUH wmh611.pdf	190 KB	Adobe Acrobat Doc...	19/08/2005 09:26
Input 1 wmh619.pdf	279 KB	Adobe Acrobat Doc...	19/08/2005 09:26
Input 2 wmh620.pdf	279 KB	Adobe Acrobat Doc...	19/08/2005 09:26
MDB WMH645.pdf	69 KB	Adobe Acrobat Doc...	04/04/2006 14:00
Output 1 wmh621.pdf	275 KB	Adobe Acrobat Doc...	19/08/2005 09:26
Output 2 wmh622.pdf	275 KB	Adobe Acrobat Doc...	19/08/2005 09:26
PayLink Lite Switches 704-1.pdf	51 KB	Adobe Acrobat Doc...	18/07/2008 10:16
PayLink Power wmh618.pdf	216 KB	Adobe Acrobat Doc...	19/08/2005 09:26
RJ45-25D wmh614.pdf	321 KB	Adobe Acrobat Doc...	19/08/2005 09:26
RJ45 Cable wmh616.pdf	261 KB	Adobe Acrobat Doc...	19/08/2005 09:26
SEC Meter wmh617.pdf	248 KB	Adobe Acrobat Doc...	19/08/2005 09:26
SR3 - Condor WMH360-8.pdf	50 KB	Adobe Acrobat Doc...	01/11/2006 14:13
SR5i - Lumina wmh359-6.pdf	44 KB	Adobe Acrobat Doc...	01/11/2006 14:13
Ticket Printer wmh612R2.pdf	79 KB	Adobe Acrobat Doc...	14/02/2006 10:38
USB A-B wmh613.pdf	255 KB	Adobe Acrobat Doc...	19/08/2005 09:26

Inputs

- 16 (4 for Paylink Lite V2) Individual external switches are supported by the unit, and are easily accessible by the user's application.
- Provision is made for the user's application to easily use switches in two modes:

    1. Key Press - Where a button may be pressed several times and it is important to know how many times
    2. State - Where the switch changes over a long time frame and all the application needs to know is where the switch is at any instant.

Outputs

- 8 (4 for Paylink Lite V2) Individual external LED's are supported by the unit, and are easily accessible by the user's application.
- 8 high power (lamp) outputs are supported by the unit, and are easily accessible by the user's application.

Serial meter

- One external meter with an SPI interface corresponding to that defined by Starpoint is supported.
- The Paylink board fully supports all 31 of the Starpoint's counters.
- Provision is made to allow the user's application to easily support the BACTA standard for displaying counter values, as well as to implement any other scheme.
- The Paylink board continually checks that the meter is operation.

Using Paylink

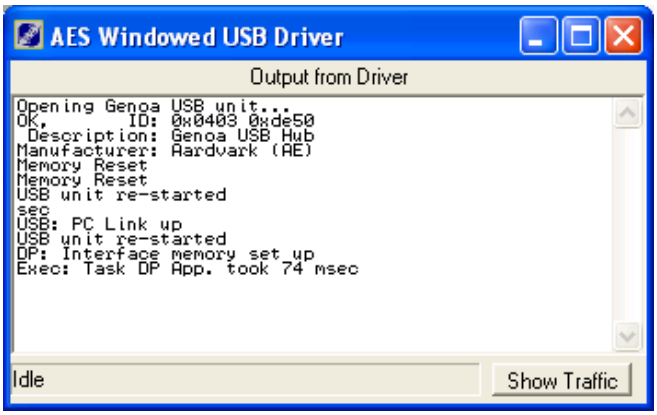
This section shows how to run and use various programs, all of which are provided on the **Paylink** distributio.

- **Paylink.exe** (the Paylink driver)
- **MilanDiag.exe** (diagnostics program)
- **Demo.exe** (API example)
- **Firmware.exe** upgrade program

Paylink.exe

Paylink.exe is found in the ***Paylink*** *directory. When the application is run, the following screen will be shown.*

You can output to a log file by adding a parameter to AESWDriver start line. This will generate a time stamped log that will show driver and Paylink events. There will be no GUI when this is performed.



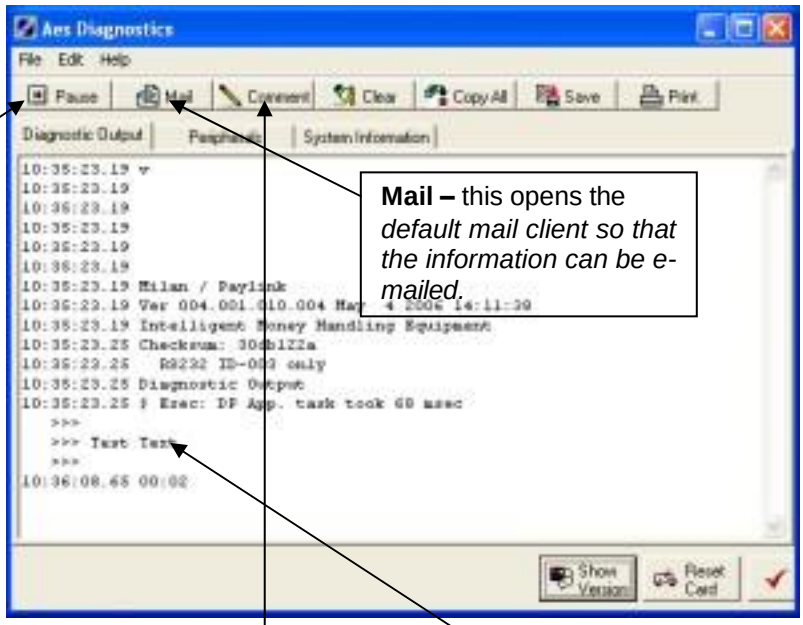
The contents of this screen should be similar to the one shown above. The status LED on ***Paylink*** *will now* ***Flash GREEN*** *to indicate that the driver is working correctly.*

Refer to Table 3: Status LED table for information.

This driver ***MUST*** *be run before running the demo software.*

MilanDiag.exe

*This is a Diagnostics program, which shows various information about **Paylink**, such as the peripherals, which are connected and the version number of Paylink firmware. Diag.exe is found in the following directory: **Paylink\SDK** When the application is run, the following screen will be shown:*



Pause – This pauses the application.

Mail – this opens the *default mail client so that the information can be e-mailed.*

Clear – clears the screen.

Copy all *– this copies the shown text to clipboard.*

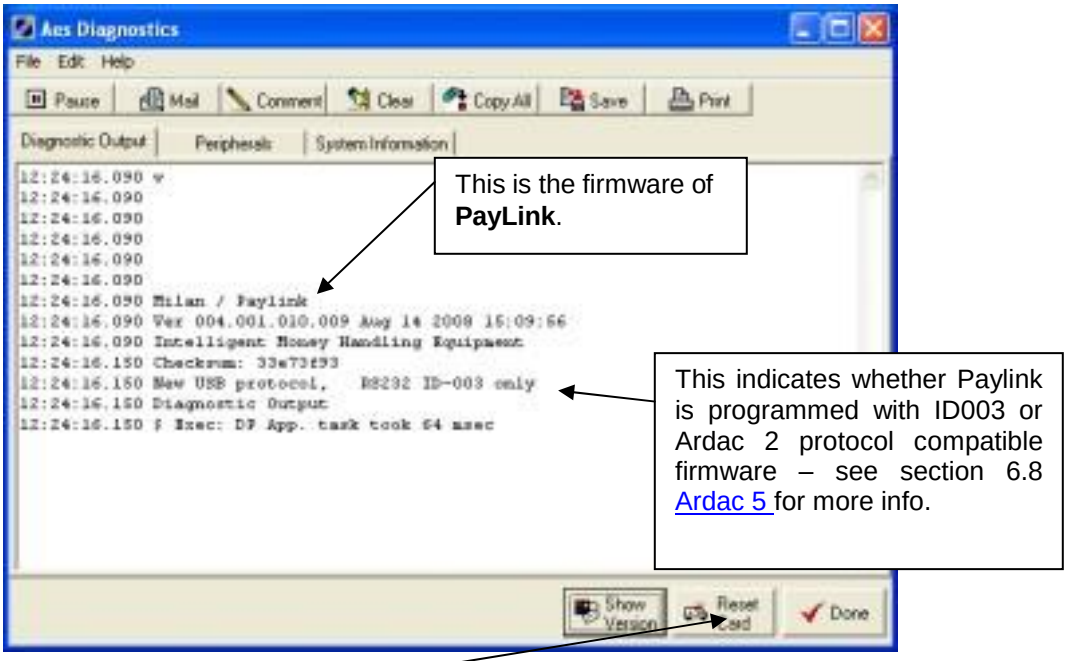
Save – *This saves the text in a log file.*

Print – This prints the current text.

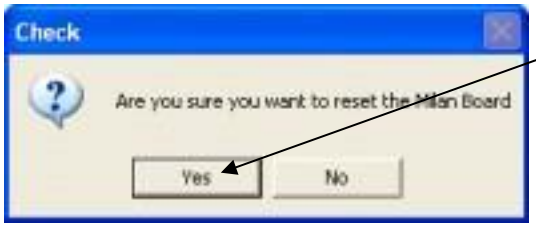
*Clicking the **Comment** button, allows a comment to be added, the following screen will appear.*

A comment will then appear in the diagnostics window.

*Clicking on the **Show Version** button will show the following screen.*

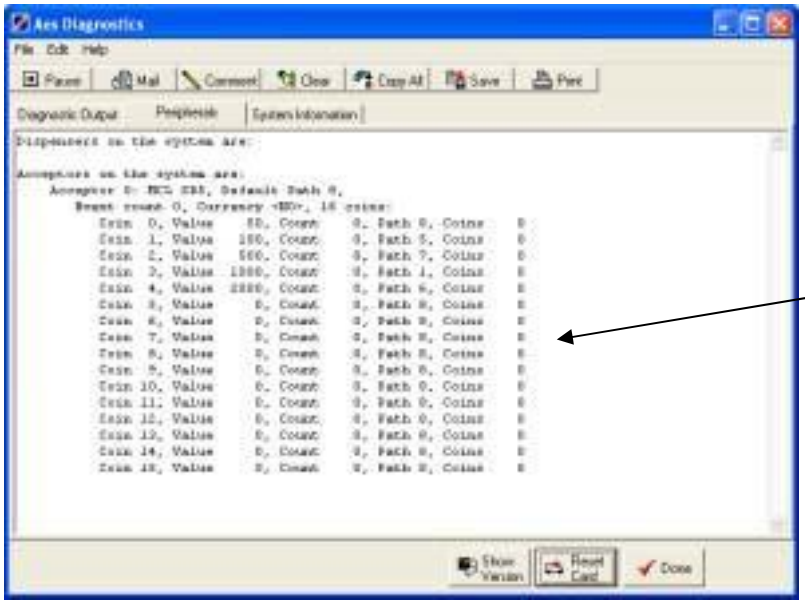


*Click on the **Reset Card** button will show the following screen.*



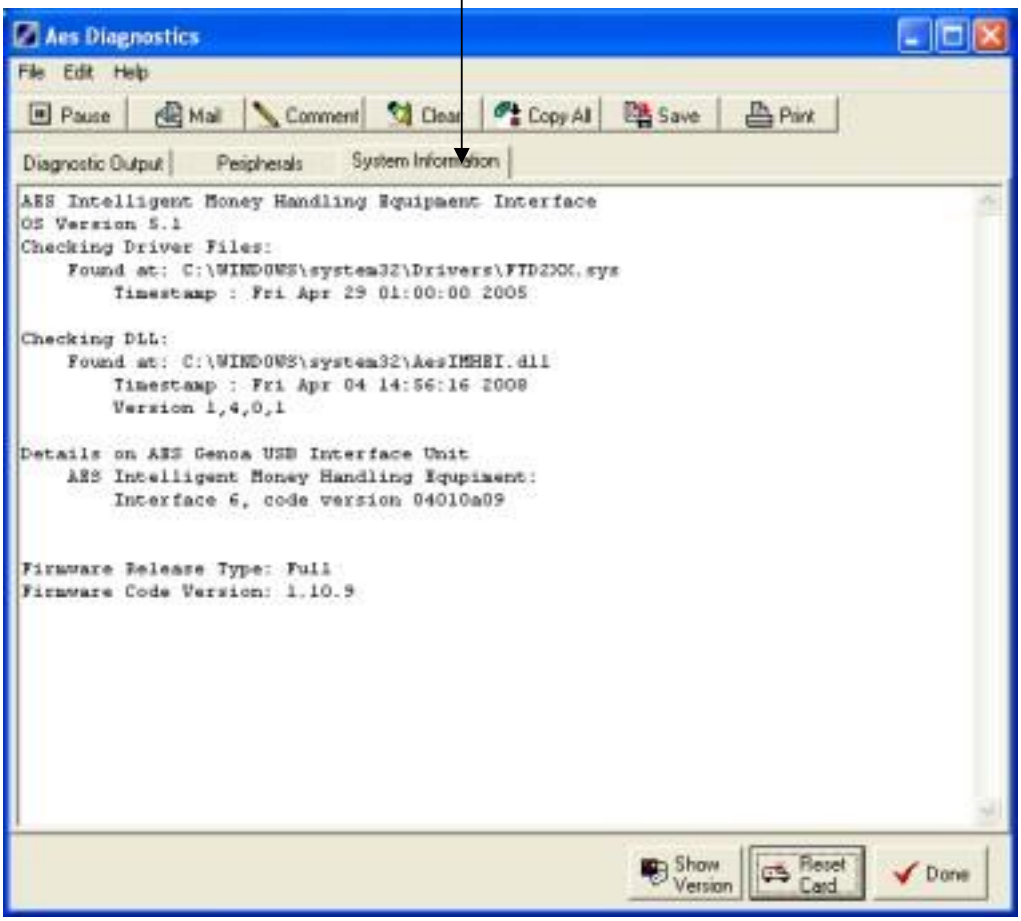
Choose **Yes** to reset **Paylink**.

*Click on the **Peripherals** tab to see which peripherals are connected.*



This example shows an SR5 coin acceptor, and information about the coin paths and values etc.

Click on the **System Information** tab to display various system information about **Paylink**.



*Click **Done** to close the Diagnostics application.*

Demo.exe

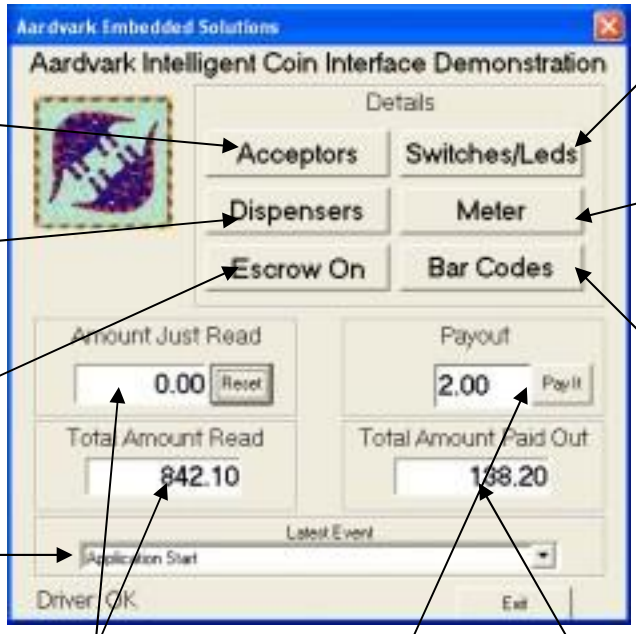
*This is an API example, which also doubles up as a quick and easy way to test/demo **Paylink** before the software writing can begin. The application is called Demo.exe and is in the following location: **Paylink\SDK***

*Click **Acceptors** to show the current connected Coin/Note acceptors*

Click **Dispensers** to show the current connected Hoppers

*Click **Escrow** for the Escrow control*

The **Latest Event** *notifies the application of events that are not to do with money. Faults, misreads etc.*



Click **Switches/LEDs** to control the Inputs/outputs

*Click **Meter** to show the current connected Serial Meter*

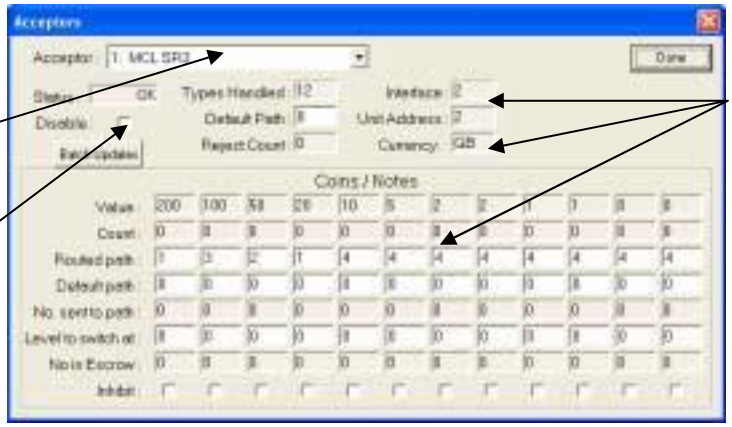
*Click **Barcodes** to control the barcode features (Ardac 5/Serial ticket printer)*

Coins and notes entered into the peripherals will be displayed in the **Amount Just Read** box. The **Total Amount Read** box is the amount read over the lifetime of the Paylink

*The **Payout** box shows the value to be paid out. Click the **Pay It** button to pay out the desired value. **Paylink** will decide how to pay out the value depending on which value hoppers are connected. The **Total Amount Paid Out** shows the amount paid over the lifetime of the Paylink*

This drop down menu shows the acceptors connected

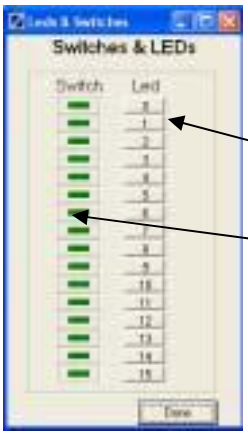
*Click **Disable** to disable the acceptor selected*



Various information about the selected acceptor such as currency, coins programmed etc

*Click **Done** to return to the front screen.*

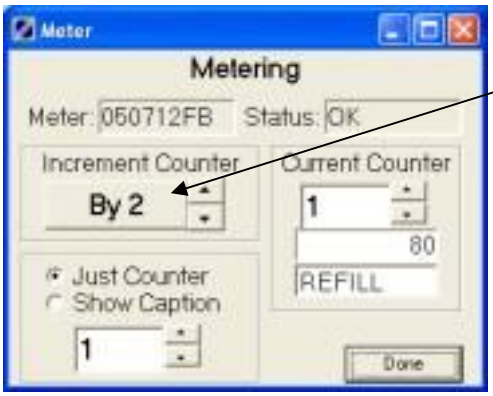
*Click on the **Dispensers** button and this screen will be shown. Various information about the connected **Dispensers** is shown.*



Click on the Switches/LEDs button to see the following screen.

Click on the Led buttons to drive the LED output.

The switch box will light when the switch inputs are activated.



Click on the **Meter** button to show this screen. The counter can be incremented using the **Increment Counter** button.

*Click on the **Barcodes** button to show the following screen.*

When a barcode is inserted, the number will be shown here. Click **Accept ticket** or **Return ticket** to proceed.

The barcodes screen can be exited using the **Bar Codes Off** button

Upgrading Paylink firmware

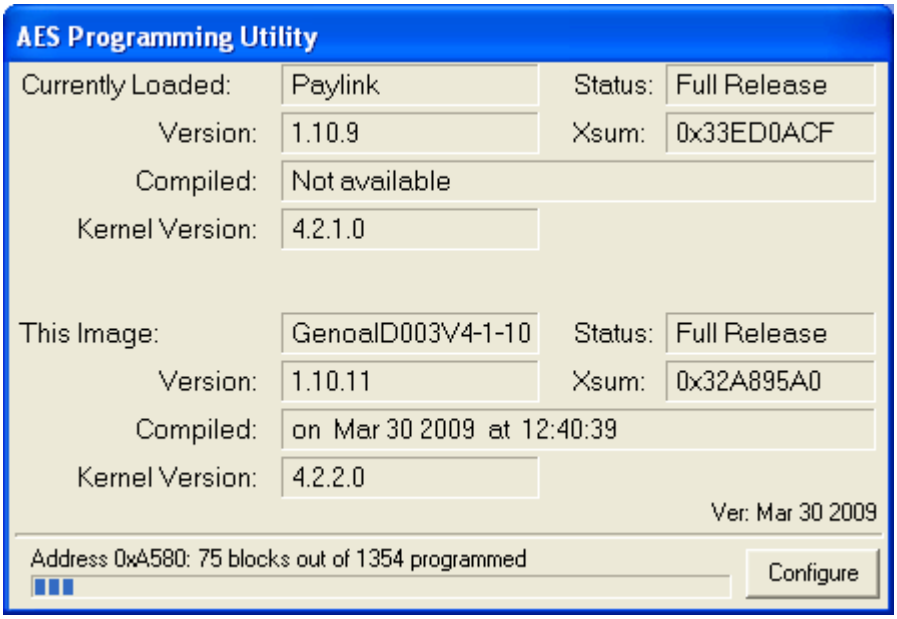
Paylink *has an on board flash device, which can be reprogrammed using a small application through the USB link. The application is found in the following directory* ***Paylink\Paylink Firmware***

The following parameters can be added to the file name to provide enhanced functionality.

/Force *- will automatically re-program the Paylink even if the images match.*

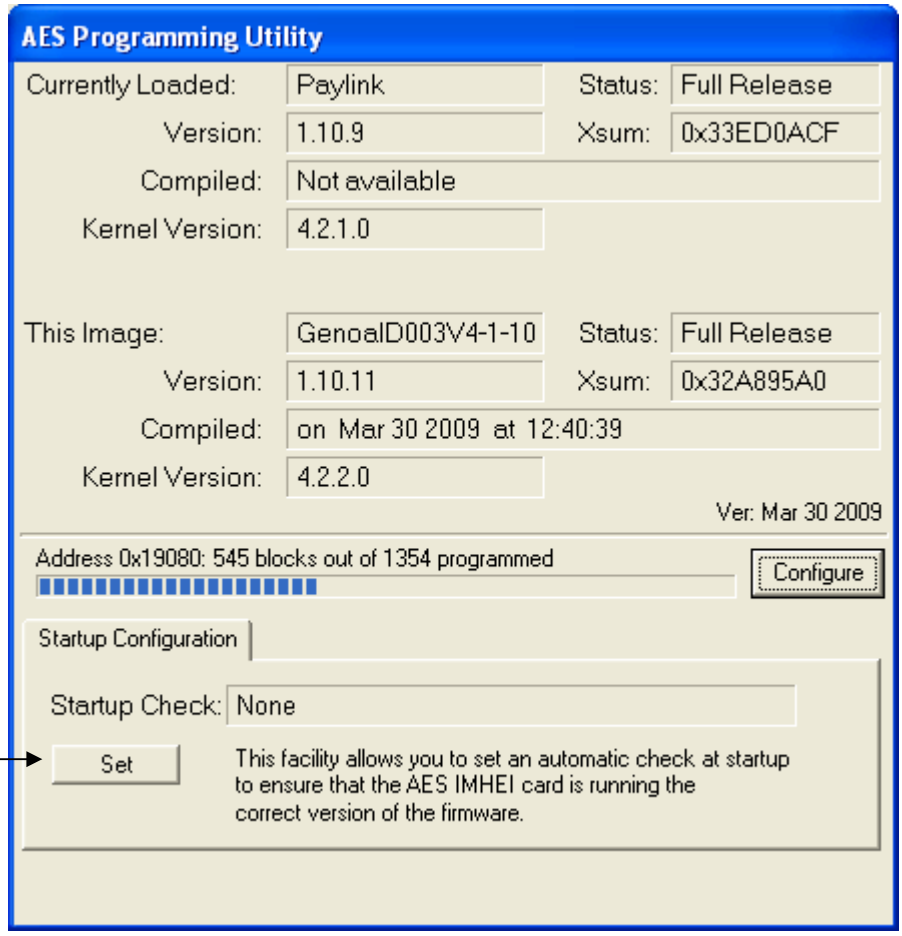
/Check *- will cause the loader to exit without showing a window if the Paylink firmware matches, and has no errors.*

/Nogui *- will never display anything on the screen and will report progress to stdout or a console window if either is available.*



Once complete, the **AES Programming Utility** will self terminate.

While running a "Configure" button is accessible. This can be used to access advanced features.



"Startup Configuration" *provides the ability to "Set" and "Clear" an entry in the Windows registry that will silently run this copy of the programming utility at system Startup*

Disclaimer

This manual is intended only to assist the reader in the use of this product and therefore Aardvark Embedded Solutions shall not be liable for any loss or damage whatsoever arising from the use of any information or particulars in, or any incorrect use of the product. Aardvark Embedded Solutions reserve the right to change product specifications on any item without prior notice