Paylink Lite 2

Hardware User Manual

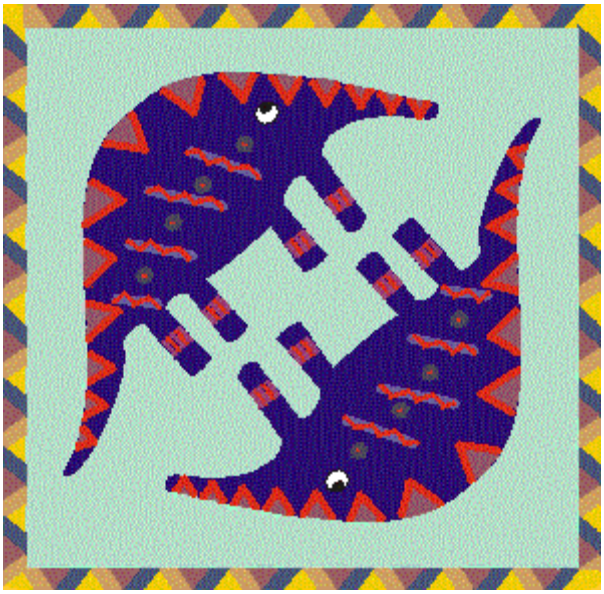

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Table of Contents

1 Introduction

The Paylink Lite 2 family comprises a set of interface boards, primarily intended to allow the connection of money handling peripheral equipment to PCs running a Windows operating system or Linux.

At time of writing, the Paylink Lite 2 family currently comprises the following boards.

- ccTalk
- MDB (and Aux)
- RS232

Paylink Lite 2 is designed to interface cctalk, MDB and RS232 money handling peripherals to a PC.

All variants of the Paylink Lite 2 have on-board circuitry designed to prevent “hanging” of the PC USB electronics due to noise.

This document serves as the user manual for the all three Paylink Lite 2 versions.

The RS232 standalone Paylink Lite is only available on special request. If you wish to combine an RS232 peripheral with one of the other Paylink Lite 2 units there is a Lite RS232 Aux, which is a simple RS232 / USB convertor and is not covered here.

1.1 Intended Audience

The document is intended as a product description to engineers intending to use the Paylink Lite 2 in their equipment.

The document gives full descriptions of the operation and physical connections to all three versions of Paylink Lite 2.

A description of the high-level Paylink Applications Program Interface (API) is outside the scope of this document, but see section 1.3, “Document References” for the document describing the Paylink API.

1.2 Revision History

Issue	Date	Auth	Description
1.0	31st July 2012	AJG	First complete issue.
1.1	3rd Aug 2012	AJG	Altered pin definitions of the 20-pin digital I/O connector to match the documentation of other Paylink boards.
2.0	28 March 2023	DB	Added MDB Lite 2 description

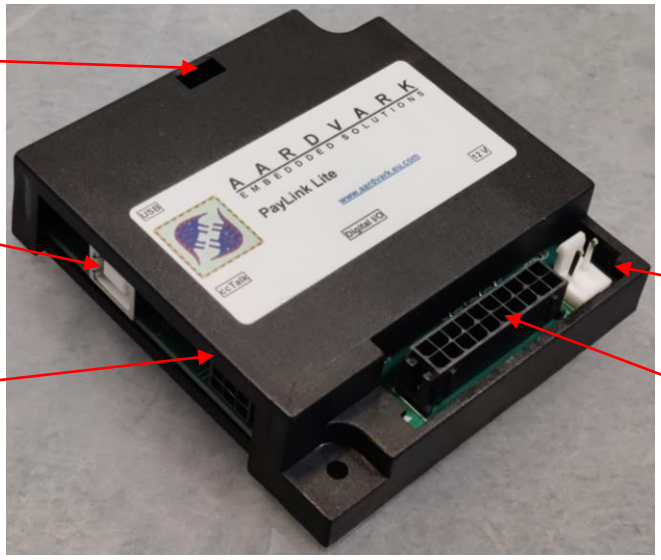
1.3 Document References

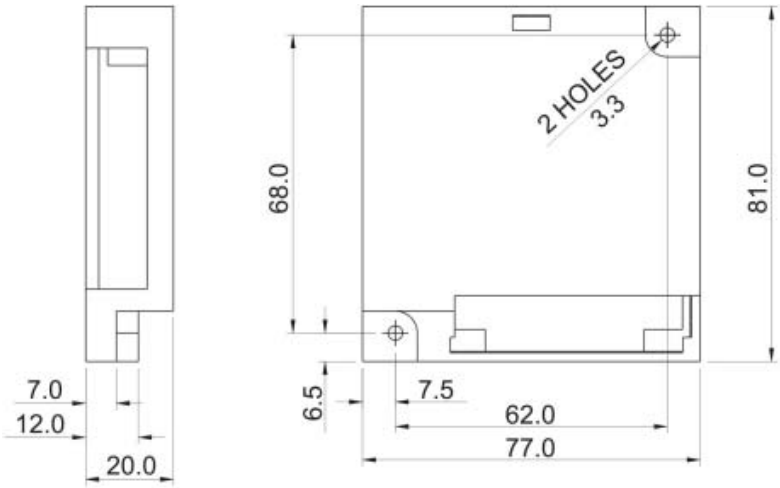
The Paylink Lite 2 family of interface boards implement a subset of the full Paylink API.

This API provides high-level, device-independent control of money handling peripherals and digital I/O signals.

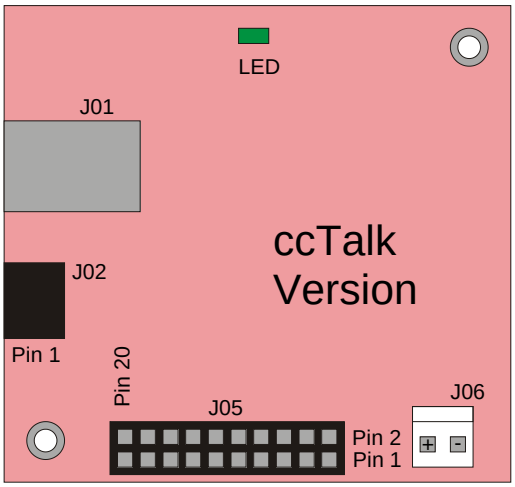
This document is therefore intended to be read in conjunction with the standard Paylink reference documents,
“Milan / Paylink Application Program Interface Manual” which is for the use of programmers and covers the details of how to write the programs that interface to Paylink and
“Milan / Paylink System Manual” which gives full details on the Paylink system and is intended for the use of a person who concerned with designing and setting up a system centred on a Paylink unit.

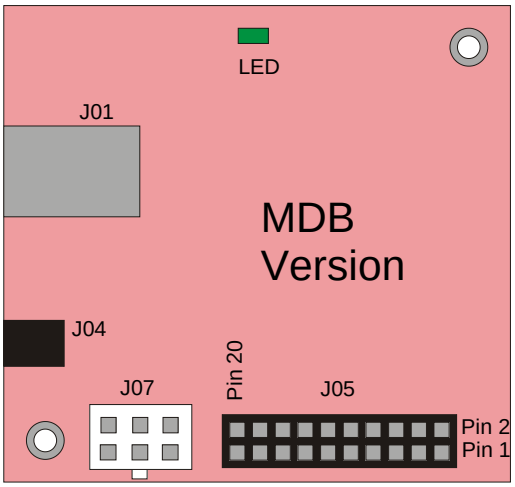
2 General Appearance

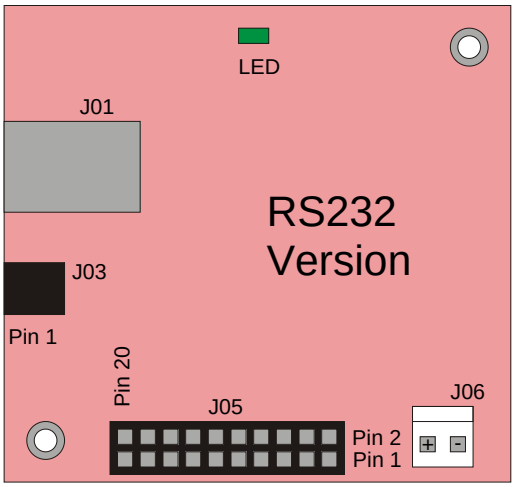




3 Board Layouts







Each connector will now be described in its own section, followed by a section describing the onboard LED operation.

3.1 J01 – USB Connector

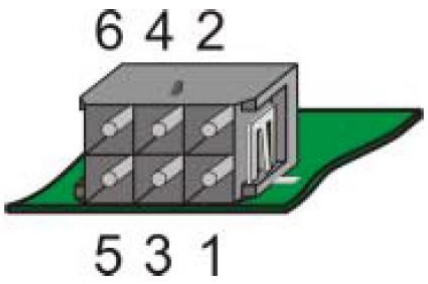
The connection from the PC to the Paylink Lite 2 board is through a standard “Type B” connector.

Although an entirely standard connector, for completeness, its pin out is included here.

Pin	Signal Name	Description
1	+12 Volts	12 Volt supply to Paylink Lite 2
2	USB Data -	Negative USB data signal.
3	USB Data +	Positive USB data signal.
4	0 Volts	0 Volt supply to Paylink Lite 2
5		
6		

3.2 J02 – ccTalk Connector

The ccTalk connector on the ccTalk Paylink Lite 2 is a six-pin Molex Microfit connector, with the same pinout as the original Paylink.



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.

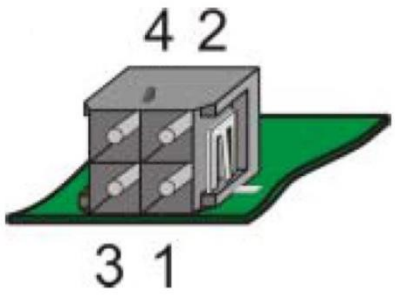
Note that this does not match the pin allocation described in the Molex Microfit documentation.

Pin	Signal Name	Description
1	ccTalk Data	This is the bidirectional ccTalk data signal.
2	+12 VF	This is the fused twelve volt supply to the ccTalk peripherals.
3	Ground	This is the ground connection to the twelve Volt peripherals.
4	+24 VF	This is the fused twenty-four volt supply to the ccTalk peripherals.
5	Ground	This is the ground connection to the twenty-four Volt peripherals.
6	+24 Volts In	This is the *incoming* twenty-four Volt supply to the ccTalk peripherals.

Note that both the outgoing twelve volt and twenty-four volt supplies are fused at 3A onboard the Paylink Lite 2.

3.3 J03 – RS232 Connector

The RS232 connector on the RS232 Paylink Lite 2 is a four-pin Molex Microfit connector.



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	Signal Name	Description
1	Transmit Data	This is the transmitted RS232 data *from* Paylink Lite 2 *to* the peripheral device.
2	Ground	Ground reference.
3	Receive Data	This is the received RS232 data *to* Paylink Lite 2 *from* the peripheral device.
4	Ground	Ground reference

3.3.1 Connecting to a 9-Pin Male D-Type

A common connection standard for RS232 peripherals is for the peripheral to be fitted with a 9-way, female, D-Type connector.

Thus a cable from the Paylink Lite 2 to a male D-Type is commonly required. This needs to be wired as follows:

Molex Microfit Connector	Signal Name	Description	9-Way Male D Type Connector
1	Transmit Data	RS232 data *from* Paylink Lite 2 *to* the peripheral device	3
3	Receive Data	RS232 data *to* Paylink Lite 2 *from* the peripheral device.	2
3 *or* 4	Ground	Ground Reference	5

3.4 J04 – MDB Power Connector

This is a standard DC power barrel connector, compatible with many power supplies.

Connector	Diameter	Description
Inside Contact	2 mm	V+ Peripheral Supply
Outside Contact	6.5 mm	V- Peripheral Supply

This DC power barrel connector is rated at 8A and is *only* connected to the peripheral power pins on the MDB Peripheral connector, with no internal fuse

The MDB specification calls for opto-isolated communications on all MDB peripherals.

Where the peripherals in use follow this specification, an isolated power supply used with this connector will mean that the peripheral system ground is completely isolated from the PC, with the associated immunity to electrical noise.

3.5 J05 – Digital I/O Connector

The pinout of the I/O connector on all Paylink Lite 2 boards is the same. The view is looking down onto the connector and board.
(This is not fitted on the MDB Lite Aux.)

Connector latch on this side

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 standard pin allocation described in the Molex Microfit documentation.

Pin	Signal Name	Description
1	+12 VF	Twelve Volt (Fused) signals for use with output signals On The MDB board these are the 5V USB supply, with a 500mA fuse
2	+12 VF	
3	+12 VF	
4	+12 VF	
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, without using an external power supply
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

3.5.1 Input Signal Operation

As with a standard Paylink, a switch or external electronics connecting an input and its corresponding ground reference will be detected by Paylink Lite 2 as an active input.

3.5.2 External LED Driver Operation

The board is designed to drive LEDs directly, using the USB supply. The current limit resistors fitted to each board are such that a nominal 10 mA is supplied to each LED when the output is driven.

To attach an LED, the *Anode* (+) of the LED should be connected to an appropriate “Pull Up” (on pins 9, 10, 11 or 12) and the *Cathode* (-) of the LED should be connected to the drive output (on pins 5, 6, 7 or 8).

3.5.3 Output Signal Operation

As with a standard Paylink, when an output is activated it will connect the output signal to ground. Each output is capable of sinking a maximum of 30 mA (non-inductive).

3.6 J06 – Power Connector

Note that although a 12V power connector is provided, most of the electronics on the Paylink Lite 2 board will operate from the USB power supply.

Thus, even though the on-board LED is illuminated, this does not necessarily mean that the board is connected to 12V power.

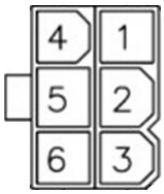
The power connector on the cctalk and RS232 of the Paylink Lite 2 is a two-pin JST connector. This should be connected to a twelve volt supply.

Pin	Signal Name	Description
1	+12 Volts	12 Volt supply to Paylink Lite 2
2	0 Volts	0 Volt supply to Paylink Lite 2

This 12 Volt supply is *primarily* used to supply power to the (12 Volt) ccTalk *peripherals*; the 12 Volt supply passes through a 3A fuse and is made available at the ccTalk connector. See section 3.2, “J02 – ccTalk Connector”. It is also connected to allow simple supply to the digital outputs. If neither are in use, then there is no need to connect this.

For RS232 this can be connected to a suitable power supply for use in supplying digital outputs. If no outputs (or only LED outputs) are being driven, then there is no need to connect this.)

3.7 J07 – Standard MDB connector



Note that this is the standard connector as specified and used on all MDB peripherals. This means that there is no need for any cables, the (first) MDB peripheral just plugs directly into the Paylink Lite

Pin	Signal Name	Description
1	+V DC	***Only*** connected to the V+ power pin on J04
2	0V DC	***Only*** connected to the V- power pin on J04
3	N/C	
4	TX (from Paylink)	Standard MDB serial communications
5	Rx (to Paylink)	Standard MDB serial communications
6	Signal GND	Connected to Paylink (and the PC) Ground

Most MDB peripherals come with two cables ending in MDB standard six way plugs. These can plug directly into each other making a “daisy chain” of peripherals along the bus.

This connector is identical to the outgoing connector on the peripheral, so there is no need to create any cables to use this Paylink.

4 USB Reset and LED Operation

4.1 USB Reset Strategy

Each variant of the Paylink Lite 2 family is fitted with a very simple microcontroller.

The primary purpose of this microcontroller is to manage the USB connection to the PC.

PC USB circuitry is “fragile” and the connection of physical peripherals through a USB link can induce noise within the PC. This noise can cause the PC operating system to “hang”.

The approach that Paylink Lite 2 takes is to detect failures in the USB communications system. On detecting these failures, the Paylink Lite 2 automatically disconnects itself from the USB bus and reconnects itself a short time later.

This technique, effectively resetting the USB, has shown itself to be very effective in fixing any USB link hanging.

At start of world, there is a 5 minute period where the microcontroller does not check for the Paylink driver. Once the Paylink driver is detected, or after this 5 minute period, Paylink expects the driver to be connected continuously.

If over 30 seconds passes without the Paylink driver being detected, then the microcontroller resets the USB connection, using 4 initial patterns, with "off" and "on" timings as follows:

1. 5 seconds Off 40 seconds On
2. 10 seconds Off 70 seconds On
3. 15 seconds Off 100 seconds On
4. 20 seconds Off 130 seconds On

If the microcontroller gets to the fourth timing pattern, and has still not detected the driver program, it continues to reset the USB link on this pattern.

4.2 Onboard LED Operation

The onboard LED flashes at a nominal 1 Hz, and the different mark-space ratios serve to indicate what the microcontroller is doing.

- On Continuously
  The unit is starting up and has not yet detected the Paylink driver

- 90% Mark-Space Ratio
  When the LED is illuminated for 90% of the cycle, the microcontroller is indicating that the USB traffic is normal and The USB device is free to run normally

- 50% Mark-Space Ratio

  When the LED is illuminated for 50% of the cycle, the microcontroller is indicating that Paylink driver activity has “just” ceased and that it is attempting to reset the USB bus

- 10% Mark-Space Ratio

  When the LED is illuminated for 10% of the cycle, the microcontroller is indicating that Paylink driver activity has not been seen for some time. It is attempting to reset the USB bus, but at a much longer cycle time than when the traffic first failed