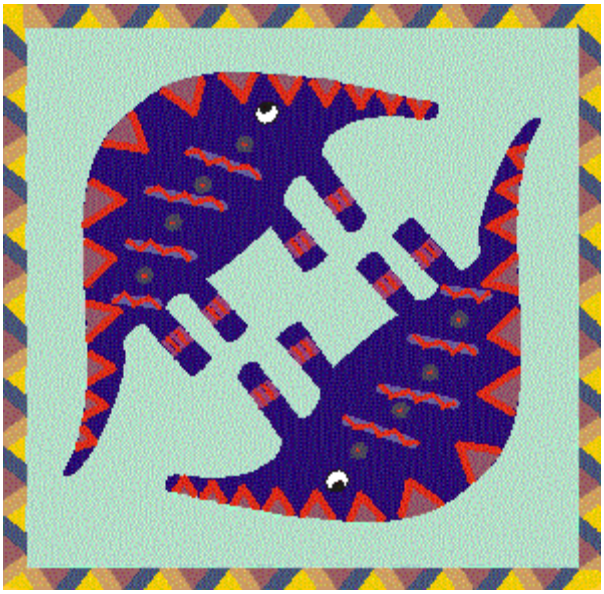
Paylink Lite 2

User Manual



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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 Standard
- RS232 Standard

Paylink Lite 2 is designed to interface either RS232 money handling peripherals *or* ccTalk peripherals to a PC.

An MDB interface variant is currently being considered, but is not available.

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

This document serves as the user manual for the ccTalk Paylink Lite 2.

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 the ccTalk 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.

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.

Use of this API means that the machine manufacturer’s software engineers have no communication protocol software to write. Instead, they make high-level calls into the API, that provide all necessary information regarding the arrival of cash and control of payment devices.

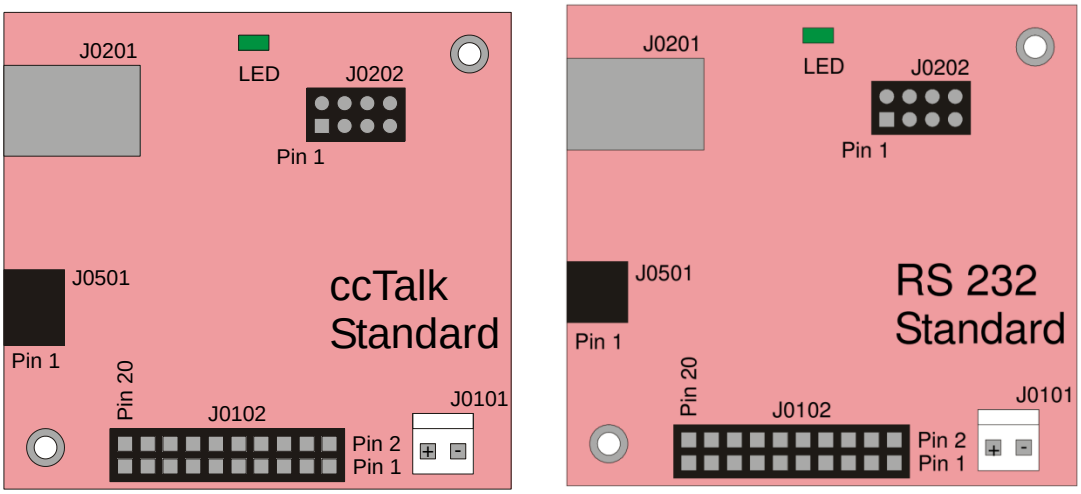
The description of the Paylink API is outside the scope of this document.

This document is therefore intended to be read in conjunction with the standard Paylink reference documents.

2 Table of Contents

3 Board Layout

The ccTalk Paylink Lite 2 circuit boards appear as in the following diagram.



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

Note that although a 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 onboard LED is illuminated, this does not necessarily mean that the board is correctly powered.

3.1 J0101 – Power Connector

The power connector on all variants 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 3.4, “J0501 – 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.)

3.2 J0102 – Digital I/O Connector

The pinout of the I/O connector on all Paylink Lite 2 boards is the same.

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	Signal Name	Description
1	+12 VF	Twelve Volt (Fused) signals for use with output signals.
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.
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.

3.2.1 Input Signal Operation

A switch across an input and its corresponding ground reference will be detected by Paylink Lite 2.

3.2.2 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).

3.2.3 Output Signal Operation

Each standard output is designed to drive a maximum 100 mA, non-inductive load.

3.3 J0201 – USB Connector

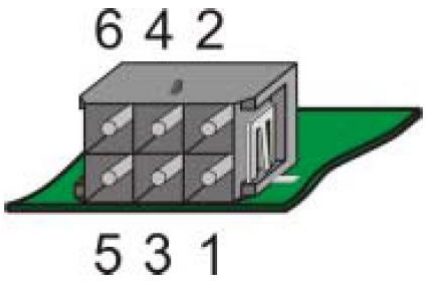
The connection from the PC to the Paylink Lite 2 board is though a standard “Type B” connector.

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		

3.4 J0501 – 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.

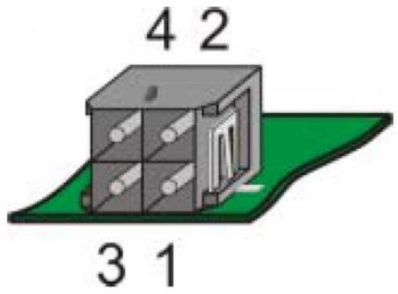
Note that this does not match the pin allocation described in the Molex Microfit documentation.

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.

3.5 J0501 – RS232 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	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

3.5.1 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

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 five-minute period where the microcontroller does not check for regular activity. If regular activity is detected, then no reset is applied to the FTDI device.

After that period, if no activity is detected, then the microcontroller enters a cycle of four timing patterns, with "off" and "on" timings as follows:

1. 5 seconds Off 30 seconds On
2. 10 seconds Off 60 seconds On
3. 15 seconds Off 90 seconds On
4. 20 seconds Off 120 seconds On

Whenever the microcontroller gets to the fourth timing pattern, it “sticks” there until activity is detected.

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.

- 90% Mark-Space Ratio

  When the LED is illuminated for 90% of the cycle, the microcontroller is indicating that the USB traffic is normal.

  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 the USB traffic 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 the USB traffic has failed for some time. It is attempting to reset the USB bus, but at a much longer cycle time than when the traffic first failed.