

# Pluto

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## **User Manual Pluto RS485 Interface Boards 01-14533-3 (Non-Isolated) 01-14536-1 (Isolated)**

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## 1 OVERVIEW

The 2 Pluto RS485 Interface Boards allow a Pluto 1 or Pluto 5 Controller to drive a bi-directional RS485 bus.

The RS485 Interface Board is available in two versions, the Non-Isolated Interface, Part No. 01-14533-3 and the Isolated Interface, Part No. 01-14536-1, which has electrical isolation between the controller interface and the RS485 Bus. In general, subject to the Electrical Specifications given below, these two RS485 Interface Boards are functionally and mechanically interchangeable.

## 2 SPECIFICATION

### 2.1 Mechanical

Both versions of the RS485 Interface are implemented as a single sided PCB, dimensions 80mm x 61mm. Mounting is via four 4mm diameter mounting holes.

### 2.2 Electrical – Non-Isolated Interface

Please refer to **Figure 5 Non-Isolated Interface Board Schematic**.

The Interface Board connects to the RS232 port of the host controller via Connector P2.

RS232 Transmit Data (**FROM** the host controller) should connect to P2, Pin 2. RS232 Receive Data (**TO** the host controller) should connect to P2, Pin 3.

The RS485 Transmitter Enable signal on P2, Pin 1 controls the RS485 Transmitter as shown in **Table 1** below. Note that this signal has an internal pull-up resistor and may be driven by a TTL or Open Drain output if an RS232 signal is unavailable.

| P2 Pin 1     | RS485 Transmitter |
|--------------|-------------------|
| Open Circuit | Disabled          |
| >2.4V        | Disabled          |
| <0.8V        | Enabled           |

**Table 1 - RS485 Transmitter Enable Truth Table (Non-Isolated Board)**

Interface to the RS485 Bus is provided by the SN75176B RS485 Transceiver, U1. Components D1-D6 protect the SN75176B in the event of faults or transients on the bus.

If JP1 & 2 are fitted, a 150Ω termination resistor (R3) is connected across the bus, along with failsafe bias resistors R2 & R4 which ensure the bus goes to a consistent logic state when undriven.

### 2.3 Electrical – Isolated Interface

Please refer to **Figure 7 Isolated Interface Board Schematic**. The operation of this board is basically the same as the Non-Isolated Board with the following differences.

Operation of P2, the RS232 Interface to the host controller is the same as on the Non-Isolated board, but because a 74HC14 device is used instead of a MAX232, there is a slight change to the threshold levels, as shown in **Table 2 - RS485 Transmitter Enable Truth Table (Isolated Board)** below.

| P2 Pin 1     | RS485 Transmitter |
|--------------|-------------------|
| Open Circuit | Disabled          |
| >3.5V        | Disabled          |
| <1.0V        | Enabled           |

**Table 2 - RS485 Transmitter Enable Truth Table (Isolated Board)**

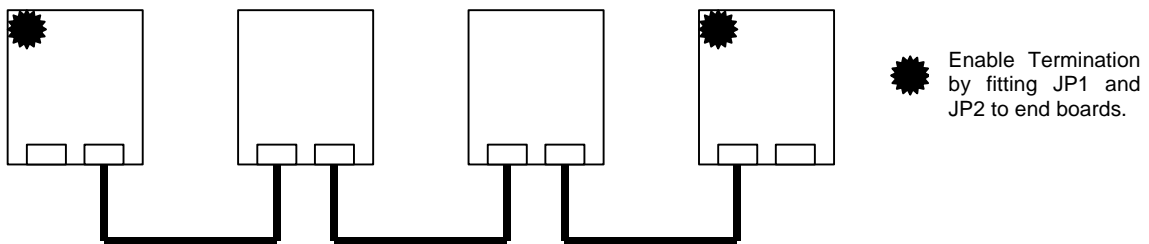
The 2 Data and 1 Control Signals are isolated by opto-isolators U3-U5. U6 is a DC-DC Converter with isolation between input and output that provides the power for U7, the SN75176B RS485 Transceiver.

## 2.4 RS485 Bus Connection and Termination

Figure 1 shows how a number of boards should be linked together. 4 wires should be used to connect from P1A of 1 board to P1B of the next, Pin 1 to Pin 1, Pin 2 to Pin 2, etc. To minimise EMC Emissions and Susceptibility, the RS485 wires, Pins 2 & 3, should be a twisted pair.

The boards must be connected in a "line" with a board at each end. The connections must **NOT** form a loop.

The boards at each end of the bus should each have JP1 and JP2 fitted to enable the termination resistors.



**Figure 1 RS485 Bus Topography**

## 2.5 Selection of Board Type

The Isolated Board is more expensive than the Non-Isolated, so to avoid unneeded costs, it is important to choose the correct board for the application.

Generally, we would recommend the following guidelines.

- If the RS485 bus is connected between boards in a single cabinet with a single mains power supply, the Non-Isolated Board may be used.
- If the RS485 bus connects together a closely coupled group of up to 3 or 4 adjacent machines under a common Top or Feature Box, the Non-Isolated Board may be used.
- If the RS485 Bus is routed outside the Machine Cabinet, either to other machines or to Data Capture or Display Equipment, the Isolated Board should be used.
- Consult Technical Support at Heber for advice if in doubt.

### 3 CONNECTOR PIN ALLOCATIONS

The board has 3 connectors, configured as follows:

#### 3.1 P2 – RS232 Controller Connector

**Reference:** P4  
**Type:** Header 6W AMP MTA-100  
**Description:** RS232 Lines to Controller, +12V Supply Input

|   |       |   |
|---|-------|---|
| 1 | TX_EN | Enable RS485 Transmitter (Input to Interface Board) |
| 2 | TXD   | RS232 Transmit Data (Input to Interface Board)      |
| 3 | RXD   | RS232 Receive Data (Output from Interface Board)    |
| 4 | GND   | Controller/RS232 Ground                             |
| 5 | nc    | No Connection                                       |
| 6 | +12V  | +12V Supply In                                      |

Figure 2 – P2, RS232 Controller Connector Pin Out

#### 3.2 P1A – RS485 Connector A

**Reference:** P1A  
**Type:** Header 4W AMP MTA-100  
**Description:** RS485 Bus Connector

|   |        |              |
|---|--------|--------------|
| 1 | GND    | RS485 Ground |
| 2 | RS485+ | RS485 Bus    |
| 3 | RS485- | RS485 Bus    |
| 4 | GND    | RS485 Ground |

Figure 3 – P1A, RS485 Connector A Pin Out

#### 3.3 P1B – RS485 Connector B

**Reference:** P1B  
**Type:** Header 4W AMP MTA-100  
**Description:** RS485 Bus Connector

|   |        |              |
|---|--------|--------------|
| 1 | GND    | RS485 Ground |
| 2 | RS485+ | RS485 Bus    |
| 3 | RS485- | RS485 Bus    |
| 4 | GND    | RS485 Ground |

Figure 4 – P1B, RS485 Connector B Pin Out

Figure 5 Non-Isolated Interface Board Schematic

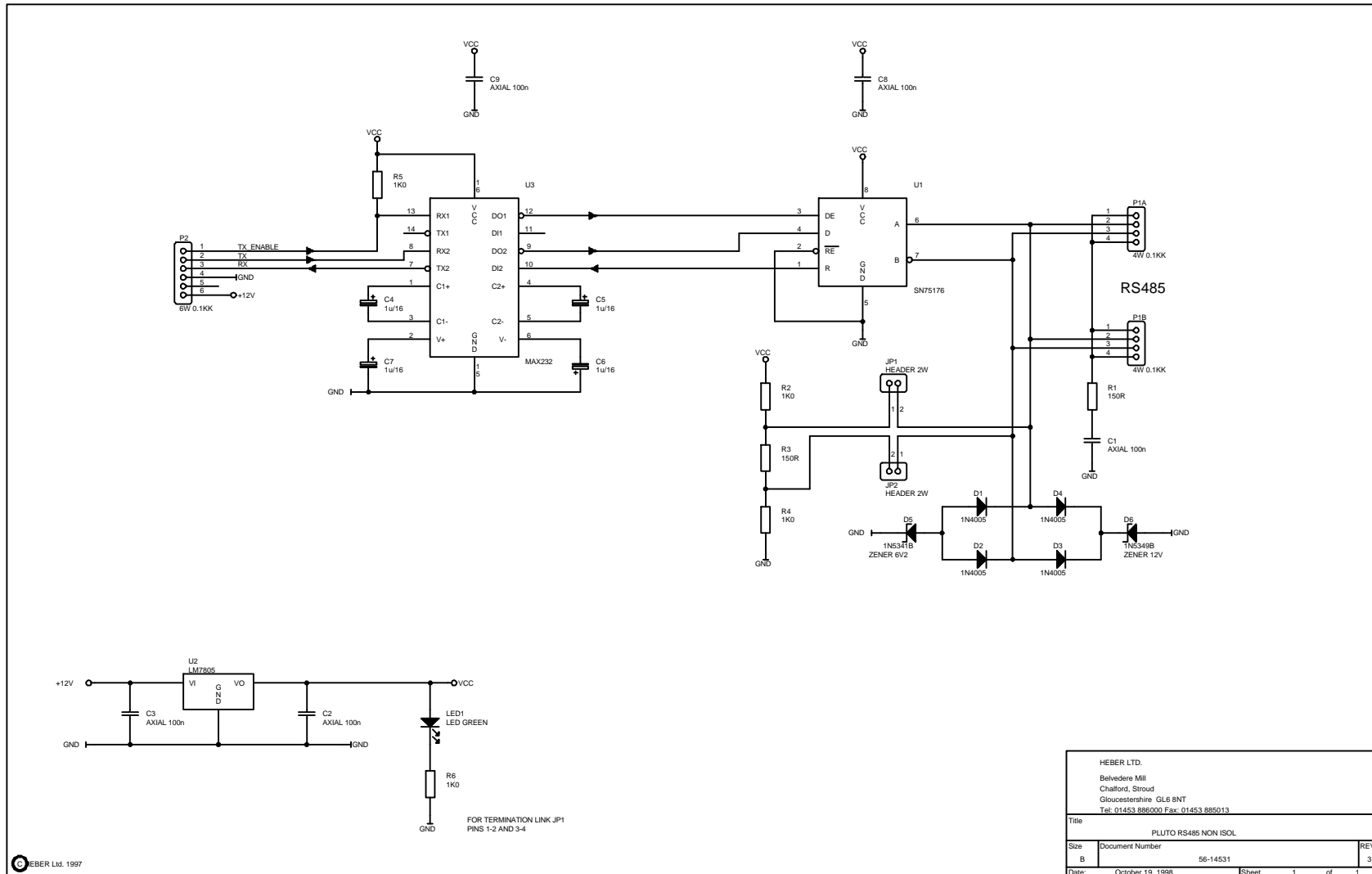




Figure 6 Non-Isolated Interface Board Component Ident Silk Screen

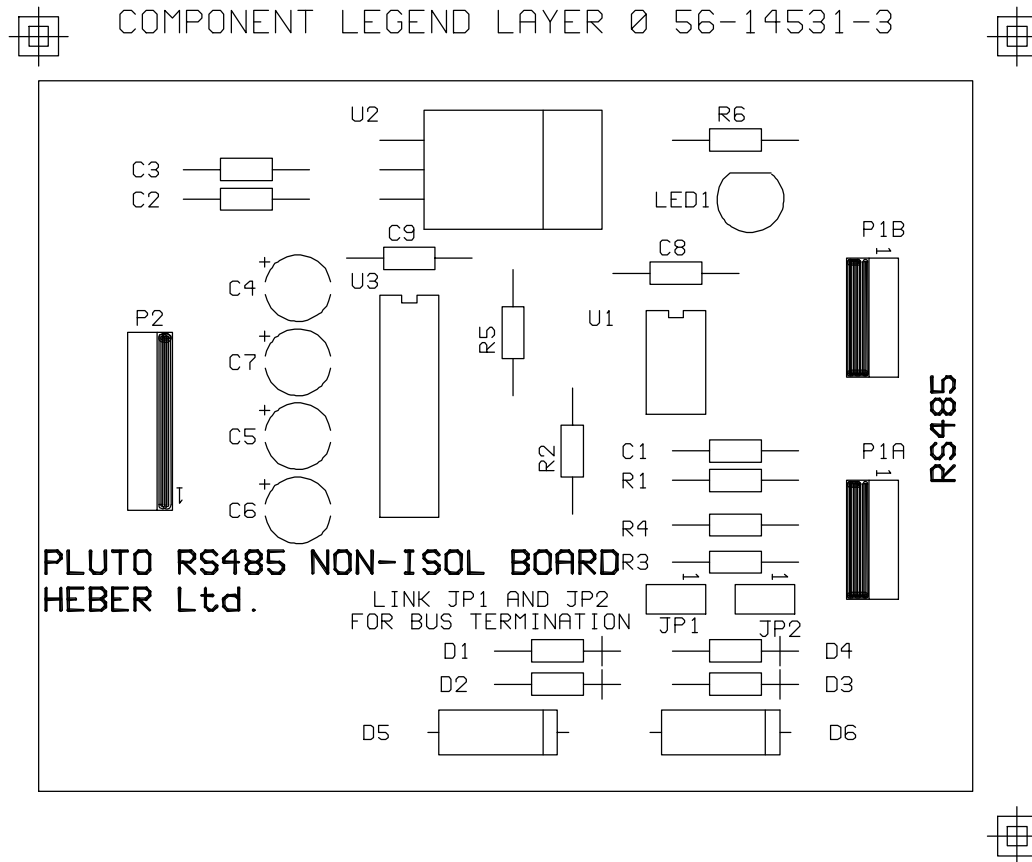


Figure 7 Isolated Interface Board Schematic

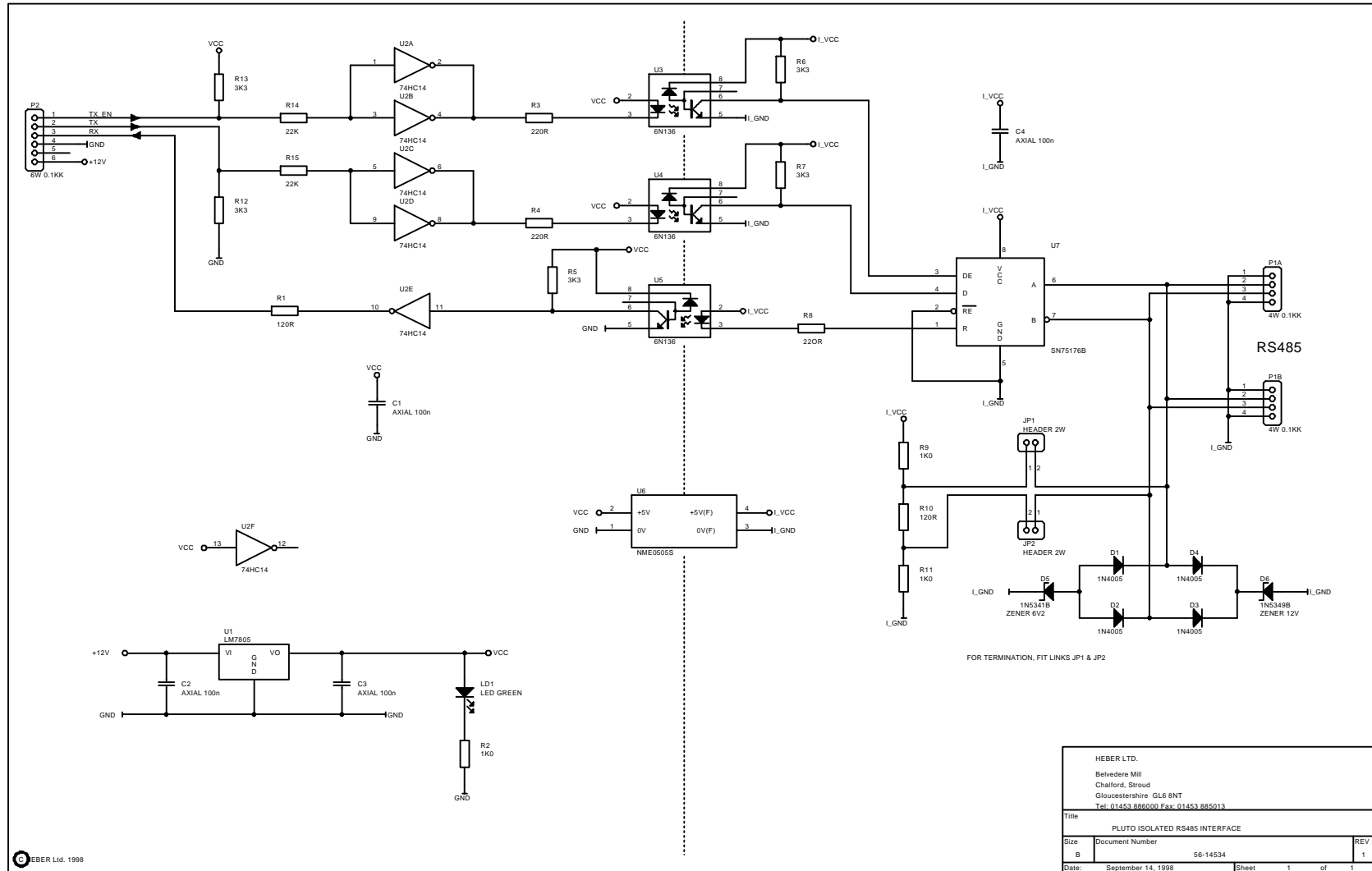


Figure 8 Isolated Interface Board Component Ident Silk Screen

