Power Driver Master

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http://www.pinballcontrollers.com

General Description:

A PinballControllers.com driver boards are used to control the activation of connected devices by turning on or off power to the devices in response to commands from a P-ROC. The board receives commands from the P-ROC over an RS-485 serial bus which allows many boards to be chained together and used simultaneously. There are three different types of driver boards that can be used to make up a chain: Power Driver Master, Power Driver 16, and Power Driver Matrix 8x8.

Power Driver Master Details:

The Power Driver Master must always be the first board in a chain, and it connects directly to the P-ROC through a 16-bit ribbon cable. This board is the master of the RS-485 chain, taking commands from the P-ROC and sending them to the rest of the boards in the chain.

Connectors:

J1	Logic Power	Required
2-pin Molex: 0.156” spacing		
1	5V	I
2	Ground	I

J8	Data	Required
2x8-pin Ribbon: 0.100” spacing		
1	Data (3.3V*)	I
2	Ground	N/A
3	RESERVED	N/A
4	Ground	N/A
5	RESERVED	N/A
6	Ground	N/A
7	RESERVED	N/A
8	Ground	N/A
9	RESERVED	N/A
10	Ground	N/A
11	RESERVED	N/A
12	Ground	N/A
13	RESERVED	N/A
14	Ground	N/A
15	RESERVED	N/A
16	Ground	N/A

***** This signal is NOT 5V tolerant

J10	Serial Data Out	Required
2-pin Molex: 0.100” spacing		
1	Serial+	O
2	Serial-	O

LEDs:

LED	Meaning
D2	5V

D3	3.3V

PDB Procotol:

The PDB Protocol describes the format of data being received on the Data input pin (J8: pin-1). This is also the format of the serial data sent out on J10.

PDB Protocol	
Bit	**Field**
Byte 0	{0,0,Board Address[5:0]}
<between bytes>	1-5 IDLE clock cycles
Byte 1	{0,0,0,0,0,Command[2:0]}: 0: Read 1: Write 2: RESERVED 3: RESERVED 4: RESERVED 5: RESERVED 6: RESERVED 7: Clear all registers on board
<between bytes>	1-5 IDLE clock cycles
Byte 2	{0,0,Register Address[5:0]}: 0: Bank A 1: Bank B
<between bytes>	1-5 IDLE clock cycles
Byte 3	{0,0,0,0,Data bits[7:4]}
<between bytes>	1-5 IDLE clock cycles
Byte 4	{0,0,0,0,Data bits[3:0]}

Each byte is sent MSB first.

A transaction consists of 5 data bytes. There must be at least 10 IDLE cycles between transactions. Between each byte of a transaction there must be between 1 and 5 IDLE cycles.

The data signal must be high during all IDLE cycles.

Data must be sent at 8 MHz, 125ns per bit.

Getting Started:

Hardware

- Mount the board using the 4 mounting holes.
- Connect a P-ROC or microcontroller to J8. If using a P-ROC, connect J8 to the P-ROC's J34 header using the included 16-pin ribbon cable. If using a microcontroller, connect at least pin 1 of J8 to your microcontroller's 3.3V data output and a ground pin (any even numbered pin on J8) to your microcontroller's ground.
- Connect a 5V supply to J1.
- Connect J10 to the next board in your chain using a 2-wire cable. If the boards are separated by more than a few feet, a shielded & twisted pair is recommended. For short runs, any 2-wire cable should suffice.

Software

- If using a P-ROC:
    - Once configured, the P-ROC can automatically control a chain of driver boards. Configure the P-ROC's Output Controller to use active high polarity, and then set up the P-ROC's Driver Groups as appropriate for your application. For sample configurations and help, visit the PinballControllers.com Driver Board forum at http://www.pinballcontrollers.com/forum/index.php?board=16.0 .
    - Alternatively, software can control the driver board chain directly through the P-ROC by issuing writes to the P-ROC's Serial Bus Output register. Refer to the P-ROC FPGA Specifications for more details.
- If using a microcontroller:
    - Implement the PDB Protocol described earlier in this document. Sample code for the Arduino microcontroller can be found at: http://www.pinballcontrollers.com/index.php/products/driver-boards/driver-board-faq/83.