Technovision Interactive LD48

Operating Guide
Revision 201711

TECHNOVISION INTERACTIVE INC

www.technovision.com

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Overview of the LD48

The LD48 lamp controller from Technovision provides the capability of controlling up to 48 individual DC lamps or LEDs. This can be achieved as a "stand-alone" controller or by having the LD48 controlled by another device such as a PC-2 or KPC-2 controller. There are two RS-232 ports on the LD48 as well as a two-wire TTL (5 volt) serial interface (DATA and CLK) by which to control the LD48.

Standard Features

- DB25 male Parallel Port connector – multi-function 16 bit I/O port (used for buttons, TTL outputs, TTL control etc.)
- 3 TTL input lines on the Communications Port - RESET, DATA and CLOCK.
- DB9 male connector for TTL and RS232 control.
- Removable terminal connectors for all wires.

- Removable Power connector.
- Each lamp output is rated at 48 volts MAX @ 1/2 AMP each.
- Facilitates the switching of two DC voltage levels (24 outputs per voltage).
- Clamping diode protection.

Operating Modes of the LD48

There are three operating modes of the LD48:

TTL Control: **LD48TTL** firmware option allows the LD48 to be controlled by any device capable of transmitting TTL data (see next page).

RS232 Control: **LD48EXT** firmware option allows the LD48 to be controlled by any RS232 device capable of transmitting at 9600 baud, 8 bits and no parity (see page 5).

Custom: Custom, standalone firmware designed by Technovision to utilize the lamp outputs, button inputs and/or RS232 ports of the LD48.

TTL Control using LD48TTL firmware:

Connector_____DB9M connector
SIGNAL GROUND_____Pin 5
RESET_____Pin 1 (a low signal will reset all outputs to OFF)
DATA_____Pin 4 (TTL level)
CLOCK_____Pin 6 (TTL level)
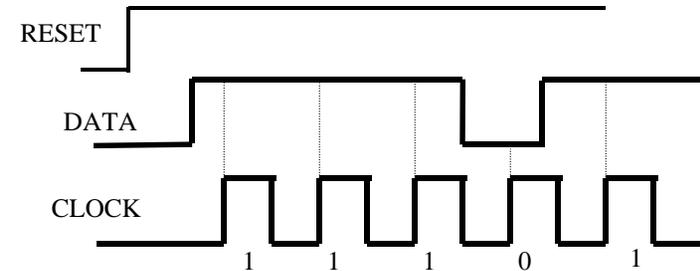
As the data is clocked into the board the bits are shifted each time - the last data bit clocked into the board is always the data bit for output terminal 1. For example: if 10 bits are clocked in, the first bit is for terminal 10 and the last bit is for terminal 1. Data is clocked in on the rising edge of the clock line.

Maximum CLOCK speed is 30kHz and must remain high for at least 6us.

The first 24 lamp outputs are located on BANK #1 of the LD48 and the second 24 are located on BANK #2.

Wiring instructions if using RSSEND for the PC2:

PIN ON COMMUNICATION PORT OF LD48	PIN ON PC2 PARALLEL PORT
1 (**RESET**)	10
4 (**DATA**)	9
6 (**CLOCK**)	22
5 (**GROUND**)	1 or 13

RS232 Control using LD48EXT firmware:
The LD48 with the LD48EXT program chip is capable of providing up to 48 grounds to DC lamps when controlled through RS232 commands. The first 24 lamp outputs are located on BANK #1 of the LD48 and the second 24 are located on BANK #2.

When the LD48 powers up, it has to check to see if the ID SETTER is attached (pulling the appropriate pins low on port B to set the ID number of the board). If the LD48 powers up and sees no ID SETTER attached, it does not change the current LD48 id number.

Setting the ID of the LD48 (default is 1 for a new board).
To set the ID of the board, you must power up the LD48 with the appropriate bits pulled to ground on the Parallel port of the LD48.

Pin#	Description (ID value)
10	1
22	2
9	4
21	8
8	16
20	32
7	64
19	128
1 and 13	GROUND

Example:
To set the board ID to 25 you will jumper pins 8, 21 and 10 to GROUND (value 16 + 8 + 1).

RS232 Protocol (9600, 8, N, 1)
The DB9 male connector on LD48 (**this is not a standard RS232 port – do not attach any other pins**) is used for RS232 control:

```
Pin#          Description
 2            RS232 Input to the LD48
 5            RS232 Data Ground
```

RS232 Format (lamp and board control)
There are two formats for the RS232 commands being sent to the LD48 with LD48EXT firmware – individual lamp control and full board control. There should be at least 20ms between each set of commands.
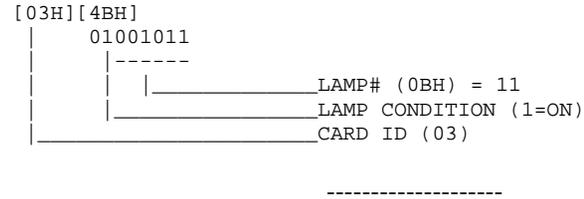
Individual lamp control (2 byte command):
Byte 1 = card id (01H..FEH)
Byte 2 = lamp and the action (bit 6 = lamp condition and bits 0..5 = LAMP#) (bit6=1=LAMP ON or 0 = LAMP OFF).
Example:
[03H][4B]will set output 11 on card 3 ON.

```
[03H][4BH]
     01001011
     │------
     │   │   │_____LAMP# (0BH) = 11
     │   │_____LAMP CONDITION (1=ON)
     │_____CARD ID (03)

               -------------------
```

Full Board Control (8 byte command):
Byte 1 = FFH
Byte 2 = board id (01H..FFH). An id of FFH represents ALL boards
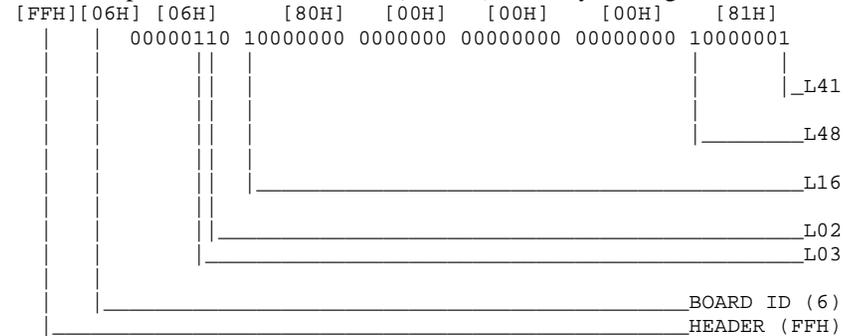Bytes 3 to 8 = lamp setting (each bit = lamp output)

Example:
[FFH][FFH][6 bytes] will set all boards to the bits represented by the 6 bytes.
[FFH][01H][6 bytes] will set board 1 to the bits represented by the 6 bytes.

To set lamp 2, 3, 16, 41 and 48 ON (board 6), the 8 byte string sent would be:
```
[FFH][06H][06H]    [80H]   [00H]   [00H]   [00H]   [81H]
     │   00000110 10000000 0000000 00000000 00000000 10000001
     │   │   ││ │                               │      │
     │   │   ││ │                               │      │_L41
     │   │   ││ │                               │
     │   │   ││ │                               │_____L48
     │   │   ││ │
     │   │   ││ │_____L16
     │   │   ││
     │   │   ││_____L02
     │   │   │_____L03
     │   │
     │   │_____BOARD ID (6)
     │_____HEADER (FFH)
```

Wiring Instructions when providing grounds to DC lamps

If 24 or less lamps using the same power supply are being used
Attach VOLTAGE + from your DC power supply to the + side of all DC lamps and the terminal labelled B1V+ on the VREF connector on the 4 position terminal connector. Attach the GROUND from your power supply to the terminal labelled GND. Attach the ground from each lamp to the matching terminal number on the LD48 board (BANK #1).

If more than 24 lamps using the same power supply are being used
Attach VOLTAGE + from your DC power supply to all lamps and the terminal labelled B1V+ and B2V+. Attach the GROUND to the input terminal on the LD labelled GND. Attach the ground from each lamp to the matching terminal number of BANK #1 and BANK #2 on the LD48 board.

If lamps using two different power supplies are being used
Attach VOLTAGE + from your first DC power supply to all lamps using that voltage and to the terminal labelled B1V+. Attach VOLTAGE + from your second power supply to all lamps using this voltage and the terminal labelled B2V+. Attach the GROUNDs from both power supplies to the input terminal labelled GND. Attach the ground from each lamp to the matching terminal number on the board. Terminals on BANK #1 will provide the grounds to lamps connected to B1V+ and terminals on BANK # 2 will provide the grounds to lamps connected to B2V+.
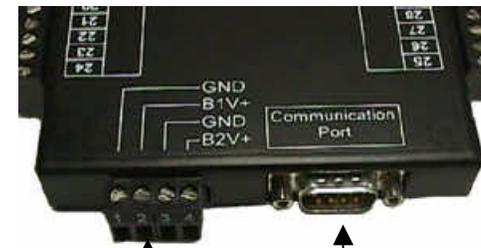
LD48 Output Ratings

The LD48 board is rated at .5 (½) amps per output to a maximum voltage of 48 volts (DC).

The VREF (B1V+ and B2V+) Inputs

VOLTAGE + has to be connected to the LD48 to provide clamping diode protection and NOT to provide power for the lamps.
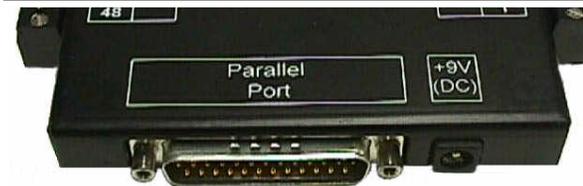
LD48 Voltage reference (VREF) and Communications Port

VREF   Communications Port

Communications Port Specifications (DB9M)

Pin #	SIGNAL NAME	Pin #	SIGNAL NAME
1	/RESET (TTL)	6	/CLOCK (TTL)
2	RS232-1 INPUT	7	RS232-2 OUTPUT
3	RS232-1 OUTPUT	8	RS232-2 INPUT
4	/DATA (TTL)	9	VCC IN
5	GROUND		

LD48 Parallel Port and Power Connector

Parallel Port Specifications (DB25M)

Pin #	SIGNAL NAME	Pin #	SIGNAL NAME
1	GROUND	14	VCC (5 VDC)
2	no connection	15	PORTA-7
3	PORTA-6	16	PORTA-5
4	PORTA-4	17	PORTA-3
5	PORTA-2	18	PORTA-1
6	PORTA-0	19	PORTB-7
7	PORTB-6	20	PORTB-5
8	PORTB-4	21	PORTB-3
9	PORTB-2	22	PORTB-1
10	PORTB-0	23	PORTA-2
11	PORTA-1	24	PORTA-0
12	FUTURE USE	25	VCC (5 VDC)
13	GROUND		

Power Requirements: AC 120V, 60 Hz
  (9 or 12V DC, 500mA, 2.5mm center positive, power adapter included)
Net Weight: 3 lbs. (1.5 kg.)
Dimensions (HxWxD) 1.5" x 9.25" x 5.5"