Programming the LPR2DMX-family

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Abstract

This document describes how the LPR2DMX family of DMX512 interface for the printer-port by Lighting-Solutions[1] has to be programmed. It includes all information the software engineer needs to know to use them with his own software.

1 Identifying

The LPR2DMX family consists of three interfaces. All are connected to the parallel or printer port and are supplied by the keyboard or mouse port. The three interfaces are the LPR2DMX, the LPR2DMX2 and the LPR2DMX3.

The LPR2DMX is released as free hardware (check [1] for details). The LPR2DMX2 features two DMX512 lines which can be configured as independent outputs or transmit the same data twice. The LPR2DMX3 has - like the LPR2DMX - one output but the first 64 slots can be outputed buffered.

All three interfaces are not isolated at all from the computer they are connected to. Except the LPR2DMX3, which is partly buffered, all interface are unbuffered.

2 Programming

Sins the three interfaces LPR2DMX, LPR2DMX2 and LPR2DMX3 are all (almost) unbuffered, the computer has to permanently supply them with data. If there is no data anymore, the DMX512 output will immediately stop sending any data.

To get the best performance out of the LPR2DMX-family the use of the parallel ports interrupt is recommended. Configuring the parallel port to EPP will work for all interfaces. Using the newer SPP-over-ECP mode should work also, but is untested. The interfaces are using the lines STROBE, ACKNOWLEDGE, BUSY and /INIT.

All three interfaces are expecting two configuration bytes at the beginning of every DMX512 frame. The first one consists of setting bits and the highest bit of the slot counter. The second the lower bits of the slot counter. After this configuration bytes the interfaces are expecting the start-code followed by as many bytes as configured in the slot counter. This sequence have to be send to the interfaces as frequent, as one likes the DMX512 frames to be. The maximum is roughly 44 frames per second with each 512 slots, which corresponds to less then 23 kbyte per second data to be transfered through the printer port. Any modern computer system can handle that easily.

3 Configuration

The two bytes send first after a reset (using the /INIT line on the parallel port) or the end of a previous frame configure the LPR2DMX-family interfaces.

The first one contains configuration bits and the upper bit of the slots counter, the second the lower bits of the slot counter. The slot counter is the number of slots to send on the DMX512 line decremented by

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one. That means, that 99 has to be set to send 100 slots. Sending more then 512 slots is not possible and not foreseen in the DMX512 specifications.

The meaning of the higher 7 bits in the first configuration byte is as follows:

bit	meaning
7	send Save-DMX check summ after the last slot (see [2] for details)
6	send data with 4 μs Mark-After-Break
4,5	configure the interface outputs
1-3	keep 0
0	highest (9th) bit of the slot counter

Bits 4 and 5 configure the outputs of the three interfaces:

interface	bit5	bit4	inverted polarity on the output
LPR2DMX	0	0	normal polarity on the output
	1	0	inverted polatity on the output
LPR2DMX2	0	0	output to universe 0 only
	0	1	output to universe 1 only
	1	0	output to universe 0 and 1 the same data
	1	1	output to universe 0 and 1 different data
LPR2DMX3	0	0	normal polarity on the output
	1	0	inverted polarity on the output

If the LPR2DMX2 is configured to output different data to both universes, the start-code and the number of slots has to be doubled. Every second byte (odd number) then goes to universe 1, the rest (even number) to universe 0: <start-code universe 0>, <start-code universe1>, <slot0 universe0>, <slot0 universe1>, <slot1 universe0>, ...

4 UserInfo read-back

If the first byte send to any of the interfaces after a reset is 0xff (-1), the device will switch to the "UserInfo read-back" mode. Within this mode, the user can read device information back using a serial protocol with STROBE as clock line and BUSY as data line. Data is valid only while STROBE is high. Data is transfered with up to 100 kHz on STROBE line in blocks of bytes without any further control characters with the lowest bit first.

The data, which can be read, are first two bytes of device ID followed by a 0 terminated string, where 10 is used as line break. The ID consists of two parts: the upper byte is the major ID, which identifies the interface:

Interface	Major ID	Minor ID
LPR2DMX	0x01	0x0a
LPR2DMX2	0x04	0x07
LPR2DMX3	0x0d	0x01

The lower byte (the minor ID) contains the software release number. Present values are listed in the table above.

After a UserInfo read-back all interfaces have to be reseted using the /INIT line or by unplugging the power. Sins unplugging the power is risky while the computer is running using the /INIT line is recommended.

5 LPR2DMX3 special features

The LPR2DMX3 has some special features, which are listed in this section.

If one sends a 0xfe (-2) just after a reset, the LPR2DMX3 expects a new value for the break time in μs. Possible values are 1..204 for 1..204 μs break time. The default value is 120 μs which is also set with a reset again.

If one sends 0xfd (-3) just after a reset, the LPR2DMX3 switches to buffered mode. In this mode, the interface outputs 64 bytes from its own memory as long as the computer does not change it. No further

interaction is needed until data in the buffer has to be changed. To do so, just send one byte with the slot number, from which position data should be changed (slot0 is the start-code) followed by one byte for the number of bytes to change and the new data.

References

[1] Lighting-Solutions, http://www.lighting-solutions.de

[2] Soundlight, http://www.soundlight.de