

Kuper 2K native DMX control

The Kuper K2001 cards have several isolated RS422 serial ports, and one of these can be used to control up to 16 channels of DMX dimmers.

(Only K2001 cards have the isolated on-board UART necessary to create the DMX512 string. The older RTMC48 cards do not have a UART on the card so they cannot be used for DMX512.)

In order to enable this function, you must create a pragma file to tell Kuper what parameters to use, then set up the actual dimmer channels in the Kuper setup as move axes.

To make the pragma file you'll have to leave the RTMC software (but make sure you stay in the Kuper directory). The simplest tool to create the file is the DOS "edit" command.

For those rusty in the ways of DOS, make sure you're in the Kuper directory, then type "edit dmxcard<enter>".

You'll open a basic but effective text editing program. You can then type in your data.

There's usually only one entry necessary, the port address for the UART chip, e800 hex.

Your file, in its entirety, should typically read...

```
e800 <cr>
```

This generates a standard 8-bit DMX signal from the first RS442 port (pins 1-9 on the port header).

In the (unlikely) case you need a 16 bit signal, your file would contain a second entry

```
e800 16 <cr>
```

Many of the machines at Laika already have the file created as a placeholder, but mis-named so it won't activate, typically it's there under the name "dmxcard.off". If this is the case on your machine, you can simply change the name to "dmxcard" using the DOS "rename" command.

```
Rename dmxcard.off dmxcard <enter>
```

Now, re-enter the RTMC software.

The DMX channels are hard-mapped to axes 33 through 48. Once enabled, the position of axis 33 is transmitted as DMX channel #1, the position of axis 34 is transmitted as DMX channel #2, etc, up to Axis 48, which is transmitted as DMX channel #16.

The Kuper software usually displays real axes 1 through 16 by default. To work with the higher axes, use the F1, F2 and F3 keys to move back and forth between the axis 1-16, axis 17-32 and axis 33-48 pages.

Pressing F3 brings up axes 33 through 48 (pressing F1 gets you back home). Go to the axis 33-48 page and using NameAxis, rename your DMX channels to something more meaningful than "Parm1".

Just like any axis, there has to be some rational way to map screen units to dimmer behavior. Kuper allows you to do this, but uses a method slightly different from the familiar pulses-per-unit format (since, frankly, there are no pulses).

Kuper instead asks you to specify the working range for the variable, by convention we typically use 0 to 100%.

It accesses and stores these limits under the "software limits" screen, which you can find under the hardware setup sub-menu. From the main menu, select...

< HardSet > / < Software Position Limits >

You'll get the software limits page. Set the lower limit to 0 (for 0%), set the upper limit to 100 (for 100%). The full DMX output for that channel will now scale between 0 and 100, with 0 being fully off, and 100 being fully on. Positions greater than 100 or less than 0 are automatically clipped accordingly.

All you have to do is punch in the numbers, you don't want to actually turn on the position limits (don't make the channels red) because this may interfere with pre-rolls and post-rolls. The Joystick limits, the two columns over on the right side of the screen, are immaterial to this setup, unless you want to limit an encoder or something like that.

Although pulses per units is not actually part of the scaling process any more, they still matter because pulses per unit interacts to set the slew speed (because slew speed is calculated by way of pulses).

That is, slew speed in pulses per second is divided by pulses per unit to get units per second. This is how fast the channel is slewed.

DMX channels have no mass, of course, and can slew instantly, but that's not healthy for the lamps. Typically we want to ramp the lamps up and down.

To get a certain slew rate, say 75 units per second, pick a round number for pulses per unit, and then pick a number of pulses per second 75 times higher. For example, 1000

pulses per unit, and 75000 pulses per second gives a channel slewing 75% per second, or about 1.25 seconds from full on to full off. Dimmers have no acceleration so the slew accelerations and decelerations can be very small. Typical numbers are 0.1.

A typical Axis setup looks like this...

Slew Speed Pulses/Second	75000
Slew Accel {seconds}	0.1
Slew Decel {seconds}	0.1
Pulses per Unit	1000

Don't forget to save your default setup when you're done.

Programming

A DMX channel programs exactly like any other channel, you can keyframe it or encode it.

The only differences occur when you try to go outside the minimum and maximum limits. The numbers will move past the limits, but the channel itself will clip. This is fine, and just as soon as the axis moves back within range, it'll lock up and follow the curve.

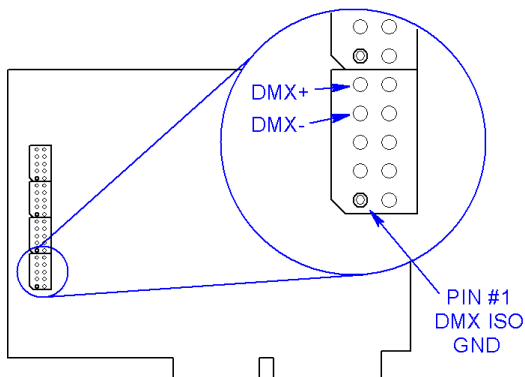
The only time you'll get in trouble with this is if you have the software limits turned on. Then you can pre-roll past a limit (because of the relatively high slew speeds, 75 units/second), and the system will then refuse to let it jog back within range till you resolve the limit issue. Leave the limits off.

Cables

The DMX signal is available as one of 4 serial channels on a 40 pin header on the K2001 board.

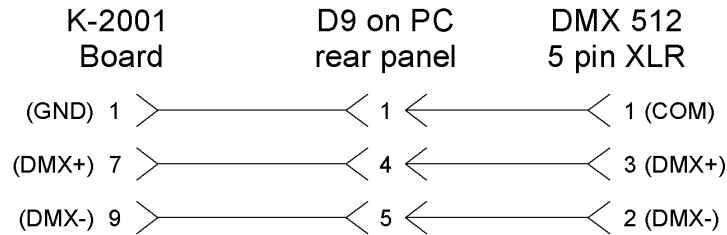
The DMX channel is the lowest 10 pin segment of the serial channel connectors.

Only 3 pins need be connected, DMX+, DMX- and DMX GND. Since the DMX ground is truly a floating, isolated ground, you should not make a connection to the connector shell.



In most installations (including factory Kuper installations) These signals are typically brought to the back of the computer through some ribbon cable to a 9 pin female D-shell, with a semi-standard pinout.

Most users will then create a small pigtail from the D-shell to a 5 pin XLR connector, the official standard. The entire signal chain typically pins out like this...



Ideally, a DMX channel is supposed to electrically “float” with respect to ground, and the Kuper DMX signal does this, *providing* you make no connection between the D-9 outer shell and the electrical ground in your cable. If you *do* make such a connection, you will connect your DMX ground to the computer’s metal chassis, which is almost certainly connected to electrical and power supply ground, probably defeating the purpose of an isolated design like DMX512.