

FWI DA720 DMX card

This card is only necessary in K48 environments, K2001's already have native DMX capability.

This card mimics the data format of the RTD Industries DA720 digital-to-analog converter card. Kuper RTMC software already has the capability to interface with these cards, so no additional software is necessary

The DA720 was an 8 channel card. In order to handle the any or all of the available 48 “real” Kuper channels, this DMX card mimics 6 DA720 cards.

In practice, since your Kuper is certainly also driving several motors, and the RTMC software requires a “camera” axis, not all 48 channels will be available for DMX. A channel cannot do double-duty; it can be used for either a motor or as DMX. A channel used for motors will output random data on the corresponding DMX channel, so that channel will be unavailable.

DMX dimmers are usually multi-channel devices, which work in blocks of 4, 6 or 8 channels, so in practice, motor and DMX channels should be mapped into contiguous blocks to minimize wasted dimmer channels.

Typically, you want to start filling channel space with motors from the bottom (channel 1) upwards, and with DMX at the top (channel 48) working downwards. As DMX dimmers always have provisions for setting their base address, configuring the first dimmer to axes 45-48, the next one to axes 41-44, and so forth is never a problem.

The DMX card requires an address space of 96 bytes for transferring the 48 axes (16 bits each). In most Kuper systems based on a relatively current motherboard, the unbroken block of address space from 280(hex) thru 2EF(hex) is available on the expansion bus (this is the space once reserved for the EGA2 display card, which is virtually never seen any more).

By setting 280(h) on the card I/O address DIP switches, the card is set to start "listening" for 48 channels in the bottom of this address space

The Kuper sees this card as 6 DA720's, with a mapping of...

Card #1, 280(h) thru 28F(h), Kuper channels 1 thru 8

Card #2, 290(h) thru 29F(h), Kuper channels 9 thru 16

Card #3, 2a0(h) thru 2aF(h), Kuper channels 17 thru 24

Card #4, 2b0(h) thru 2bF(h), Kuper channels 25 thru 32

Card #5, 2c0(h) thru 2cF(h), Kuper channels 33 thru 40

Card #6, 2d0(h) thru 2dF(h), Kuper channels 41 thru 48

To use the DMX card

- 1) If you already have a rig setup you want to keep, open RTMC130, load your existing setup, and save a 1 frame move to a named move file, being careful to save only the motor axes you want to keep, including camera and any virtual axes. This creates a move file with only those specific axes and their related setups. Do not use the “save temp” command, since this saves all axes.
- 2) Install the DMX card in any available ISA slot, set the 4 card address switches for 280(hex) only (on-off-on-on) consult the chart printed on the board, attach the DMX connector pigtail.
- 3) Select the data mode desired, either linear or exponential with DIP switch #6. Incandescent lights are highly non-linear with dimming, compressing much of the available dimming range in to a small Kuper control band. This card offers optional pre-processing dimming data, by applying logarithmic correction before transmission to the dimmer pack, effectively presenting the Kuper operator with a much more linear control space. Do not use this function if your dimmer applies this correction on it's own, or you'll “double correct” and overshoot. For “control” functions, like DMX light gobos and such, yo must use “linear” mode. As an option, FWI can provide DMX cards with this switch available as a toggle switch on the back panel, so it can be changed without opening the machine. Off = linear (the default) On = exponential correction.
- 4) Select the desired DMX word length with DIP switch #5. This is usually 8 bits, but some dimmers optionally support 16 bits. The native resolution of the card is 12 bits which is either compressed to 8 bits or padded to 16 bits for transmission. If 16 bit mode is available, it gives you finer control, especially with exponential mode. Off = 8 bits (the default), On = 16 bits.
- 5) There are 2 folders on the disk, one for systems running RTMC130 and one for systems running RTMC130X. Pick the appropriate folder for your system and copy these files from the data disk into the Kuper directory,
 - * DA720 a Kuper pragma file which tells the RTMC software that DA720 cards are installed
 - * DACADDR A Kuper utility file which specifies the base addresses of DA720 cards
 - * K130_DMX.MOV or K130XDMX.MOV An RTMC move file which sets up the DMX channels
 - * DMXDIAG.EXE a simple DOS utility for card setup & testing
- 6) Run the DXMDIAG utility program. It will run in the same DOS environment as RTMC, so long as you have a mouse driver installed. Using the diagnostic, use the “Test Base Addr” function to make sure the card is at the correct base address and is communicating with the machine. The green LED on the back of the card will blink if the base address test is good. You can also use this utility to debug your DMX system.
- 7) Start Kuper and load your default setup. This sets up any “environment” you had preexisting, like virtual machine data.
- 8) Load the move file “DA720DMX.mov” and specify “load setup”. This move overwrites the setup on the 48 real channels, effectively creating a 48 channel DMX controller, setting up all channels for DMX output. The green LED on the back of the card will light, indicating data from the Kuper.
- 9) Load the move you saved in step 1, also specifying “load setup”. This brings back the real axes you specifically saved, overwriting the DMX configuration in those channels with your original motor and setup data. All the other real axes are not overwritten, and are available for DMX

10) Save the state now in the Kuper as the new setup.

Important information

- 1) The setup files are only suggestions, to make setup easy. If you're familiar with DAC cards, the DMX card sets up exactly the same way.

Typical axis setup is...

20000 pps (you can slew fast, but still don't want to "slam" the lamps)
0.1 sec accel & decel (DMX cards have no inertia)
100 ppu

As with DAC cards, you set up the working range using the <hard set> menu. Lower and upper excursion ranges are set using the <setup software limits> page.

Typical working ranges you might want to use are...

0 to 100 percent, for typical dimmers
0 to 255 counts, for direct digital control in 8 bit mode
0 to 4095 counts, for direct digital control in 16 bit mode

Like all DACs, you can patch channels around using the <mouse jog> <patch DAC> function, it works like patch motors. You have to enable DMX/DAC channels using the same page. Click the channel numeral next to the channel name, it will turn yellow when enabled.

- 2) This card needs at least one address strobe in the low address page (essentially the first or second DAC card) to initiate data transfer, that means that at least one channel on the first Kuper page (channels 1 thru 16) has to be enabled as a DAC channel.

You don't actually have to use it as a DAC/DMX channel, you can still use all 16 channels on the first page for motors, you just have to have at least one of them secondarily enabled as a DAC to strobe the card so it'll uplink the data frame.

Again, you enable a DAC channel by going into the <mouse jog> menu, and clicking the <patch DAC> function. Click on the channel numeral next to the name, it will turn yellow when enabled.

- 3) DMX comes on several different connectors.

This card has a 9 pin female D-shell matching the Kuper K2001 standard.

Most "professional" equipment uses a 5 pin XLR (this is the official USITT DMX standard)

Most "entertainment" equipment, stage dimmers and such, uses a 3 pin XLR.

The pinouts of these three connectors are...

	9pin D-shell	5 pin XLR	3 pin XLR
GND	1	1	1
DMX+	4	3	3
DMX-	5	2	2