Activity E: DMX Frame Reception

The goal of this activity is to record the actual DMX-512 waveform as seen on a differential cable.

Equipment

The lab will provide:

DMX-512 Control surface (8 channel fader)

One DMX Control surface (e.g. control desk)
One or more DMX splitters
DMX-512 3-pin XLR shielded cables to each lab positions
DMX terminators (as required)

For each lab position you need:
1 Oscilloscope
1 Set of Scope leads
1 XLR adaptor

You may also use:
Line driver chip on breadboard (from an earlier experiment).

Background

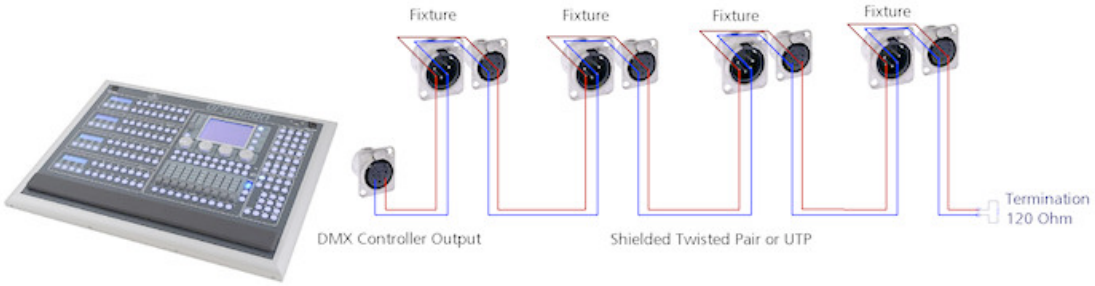
The start of a DMX Frame is indicated by a break of 88uS or greater followed by a Mark After Break, MAB, of 8uS or greater. This break is used by the receiver to start reception of the DMX slots. The MTBF, Mark Time Between Frames can be up to 1 second, after which a receiver declares that it has no-synch and that the signal is lost. The MTBF is set high.

Each DMX-512 Frame comprises a start code in the first control slot position. This identifies the frame typ with a code that informs the receiver what sort of data is going to follow in the remainder of the frame. For example, control data will have a start code of zero. For other uses, other start codes can be used. This is followed by up to 512 eight-bit slot values, each between 0 and 255, so one cable typically controls 512 device attributes (these could correspond to individual pieces of equipment - if each required one control slot, but also may correspond to control value for equipment that uses multiple control slots at the same time).

You will be provided with a DMX signal generated by a control surface. As in other largerer DMX networks, the signal you will receive will come form a repeater (known as “splitter” or “merger”). This regenerates the DMX signal and allows split one DMX signal (sometimes known as a “universe”) to besent on multiple cable segments. This allows a DMX network to span large distances. Some repeaters are able to merge multiple inputs to form a single output or to convert between a DMX cable network and one using Ethernet transmssion.

Connection to the bus

The bus is controlled by a computer, or a control surface that generates the DMX frame. Sometimes a splitter or merger is used to regenerate the signal from one bus to another. Equipment is connected by plugging cables between the connectors.



Connection of equipment to the DMX Control Bus

•Connect the (male) 3 or 5 pin connector of the DMX cable to the output (female) connector of the control surface or the first fixture.
•Connect the other end of the cable with a (female) connector to the male input of the next fixture.
•A terminator is placed in the output (female) connector of the device at the end of the cable bus.

Procedure for lab exercise.

Ensure you record the waveforms observed in each case, in a way that you can redraw these if called upon in the continuous assesement reporting at the end of the lab activities.

• Connect the DMX cable to an oscilioscope to view the DMX wavefrom. Check that you understand the waveform presented on the scope:

• Can you identify the start of the frame (Break and MAB)? It may help for you to use the start/stop button of a digital scope to freeze the waveform.

• Can you identify the control slot (the first slot after the break)? Note the start and stop bits and verify the waveform you see.

• Select a number of values for slot 1, e.g. 0%, 100%, 25%, can you verify the values in each case? (recall that data within a byte is typically sent lsb-first). Note the bit-ordering of the data as seen on the scope.

• Select a number of values for slot 2, can you capture this also on the scope? Note that there is no precise timing between adjacent slots, when using asynchronous communication.

• If you have time, connect the UART receiver built in the earlier lab to the conrol bus. Be sure to connect the inputs to the differential receive line inputs of the transceiver and to monitor the output signal (R). Can you verify the signal is correct polarity? (Look for the polarity of the break signal).