Computerized Lighting

Light O Rama Basic Tips and Tricks

Objectives

- Know the basic LOR strategy for implementing light control and animation.
- Show how to control inductive loads such as motors, bubble machines and fog machines.
- Understand the different ways that Servos can be controlled.
- Understand how to use some advanced features of the LOR Software suite.
- Understand how input triggers can be used to provide an interactive show.

LOR Basics (The Sequence)

- The Sequence Editor is used to build Sequences.
- A Sequence is the basic building block of LOR.
  - It contains a series of instructions for the hardware to follow.
  - They can be combined together to create a Show.
- Musical Sequences
  - Sequences that have a media file (usually MP3 or MIDI) associated with them.
  - Musical Sequences are the basis of Music/Light synchronization.

LOR Basics (The Sequence)

- Animation Sequences
  - Sequences that do not have associated media files.
  - Can optionally be downloaded into standard controllers for standalone operation.
- Channel Configurations
  - Additional information contained in a Sequence File.
  - Provides a mapping between a row in the sequence and a physical device in the network.
  - Allows attributes such as descriptive names and colors to be assigned to rows in the sequence.

LOR Basics (The Show)

- A Show is a group of Sequences.
- The Show Editor is used to build Shows.
- Shows define the triggers or cues that control the flow of sequences.
- Multiple shows can be defined.
- Only one show can be playing at a time.

LOR Basics (The Schedule)

- The Schedule determines when Shows will be presented.
- The Schedule Editor maintains the Schedule.
- Different Schedules can be made for weekdays or weekends or particular days of the year.

Controllers (Standalone)

- Standalone mode allows a controller to operate without a connection to the host computer.
- The Hardware Utility is used to configure controllers for standalone mode.
- A LOR controller operating in standalone mode can control other controllers as well as itself.
  - Additional controllers are connected as if the Standalone controller was the PC.
  - Up to 239 controllers can be connected BUT a practical expectation is to support a total of 100 to 200 channels depending on sequence complexity.

Controllers (Standalone)

- Best Supported by Deluxe models.
  - Deluxe models have more memory for sequence storage.
  - Only deluxe models can control other controllers.
- Sequencing Considerations.
  - Only Animation Sequences can be downloaded.
  - Use of ‘Loops’ can saves space in downloads.
  - Multi-Track Sequences are not supported.
  - 1/10 sec resolution – Automatically adjusted.
  - Maximum of 255 loops – Higher counts are ignored.

Controllers (Standalone)

- Various trigger conditions can be used to start the sequence (not all triggers are supported by all hardware).
  - Run whenever power is supplied.
    - Unit is placed on a manual switch or timer.
  - Run at a scheduled time.
    - Single On / Off time can be specified.
    - Unit must have onboard clock option.
  - Run when input is received.
    - Can be used in conjunction with a Scheduled time.
    - Switches (N/O or N/C) as well as devices such as motion detectors.

Controllers (Standalone)

- Multiple sequences can be downloaded.
  - Up to 10 sequences can be downloaded.
  - Unit ID dials are used to select a sequence.
    - The controller assumes that it is UNIT “01”.
    - User assigns Unit ID numbers to sequences at download time.
  - Special effects can be assigned to Unit IDs.
    - Play all sequences – repeat forever.
    - Random play of all sequences – repeat forever.
    - Up to 4 sequences can be assigned to run concurrently.
    - Random selection of sequence when input received.

Controllers (Special Unit IDs)

- Valid Unit IDs are in the range of ‘01’ to ‘F0’ better known as 1 to 240.
- Unit ID ’00’ is used to reset the unit.
  - Reset if the unit is not responding or is acting abnormal.
  - Reset will clear all settings such as MAX and MIN intensity and remove any Standalone Sequences.
- Unit ID “FF” places the unit in Test Mode.
  - Unit will sequence (flash) each circuit on one at a time in order 1,2,3… It Loops forever.

Controllers (Special Unit IDs)

- To use a special Unit ID take the following steps:
  - Disconnect power from the unit.
  - Set the Unit ID to the desired value.
  - Re-connect power to the unit.
- Once you are finished with the special Unit ID take the following steps:
  - Disconnect power from the unit.
  - Set the Unit ID back to the proper address.
  - Re-connect power to the unit.

Controllers (Upgrading Firmware)

- Firmware is the internal operating system of a controller.
- Upgrades to the firmware are necessary for new features and enhancements.
- The Hardware Utility provides the mechanism to download new firmware.
  - Firmware files are kept in a folder named “Firmware”.
  - Filenames describe the controller type: i.e. A CTB16D would have firmware files named CTB16D_xxxx.lhx.
  - Hardware utility verifies that the firmware selected is valid for the attached controller.

Controllers (Upgrading Firmware)

- Living inside the controller is a special, independent program called a Bootloader.
- The Bootloader communicates with the Hardware Utility when downloading Firmware.
- When the Bootloader is in control of the Unit, the LED will blink: long on, short off, long on…
- Emergency Procedure: If the controller does not start downloading after 15 seconds, power it off then on again, WHILE the Hardware Utility is attempting to start the download.

Controllers (Min/Max Intensity)

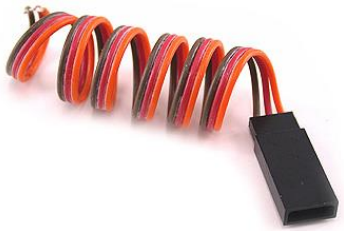
- Hardware Utility allows for the setting of Minimum and Maximum Intensity levels.
- Any commands sent to a Controller that contain intensities that fall outside the limits are adjusted to the limit.
- Why use Minimum and Maximum levels?
  - Setting a Max Level can save electricity and prolong bulb life.
  - Setting a Min Level can make ramp ups start ‘smoother’ – Generally only applies to high wattage bulbs.

Controllers (Direct Connect Servos)

- A servo contains a motor, gearbox and an electronic positioning circuit.
- They are used to animate objects.
- Some Deluxe LOR controllers can support direct connection of 2 servos.
- The LOR controller provides the positioning signal to the servo.

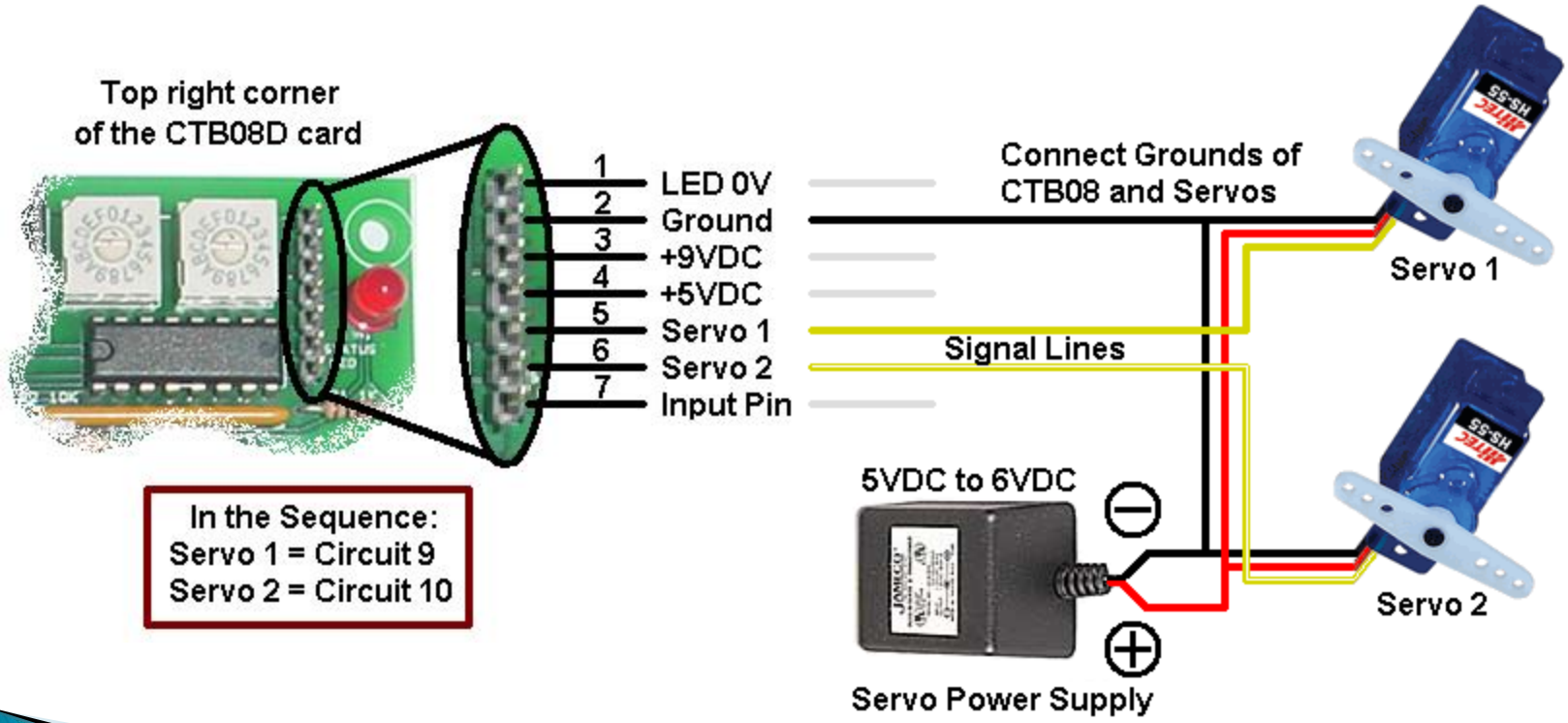
Controllers (Direct Connect Servos)

- A servo has three wires. (Red, Black and another color which will vary).
  - Black is ground.
  - Red is voltage + and is usually 5vdc to 6vdc.
  - The third wire (usually white, yellow or orange) is the signal wire that receives position information from the LOR controller.



Controllers (Direct Connect Servos)

- Servo Wiring Diagram for CTB08D



Hardware (LOR Director)

- LOR Director (LOR-DC-MP3) takes the place of the PC when running shows.
- Built-in MP3 player for Musical Sequences.
- Regular Sequences, Shows and Schedules can be transferred to the LOR Director.
- Onboard clock and calendar for show scheduling.

Hardware (Servo Card)

- The Servo Card (LOR-SC16) provides 16 standard servo outputs.
- Accepts standard 3 pin servo connector.
- Provides industry standard (1ms..2ms) pulses.
- 1 amp of power is available on card for servos.
- Additional connector for the addition of an outside power supply.
- Appears as a standard controller in a LOR sequence.

Hardware (DIO Card)

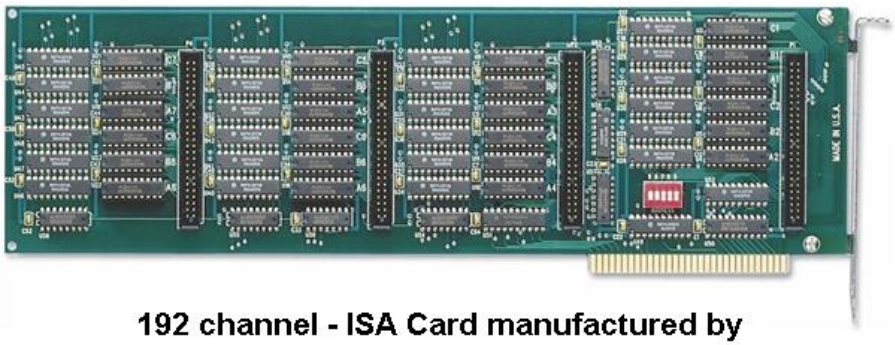
- The LOR DIO card (LOR-DIO32) supports both input and output of digital signals.
- Can be used to control Solid State Relays (SSR) directly (5VDC up to 20ma).
- Optically isolated Inputs can be used to support multiple motion detectors, pressure mats and other input devices.
- Daisy chain connection into the LOR network.

Hardware (DMX interface)

- Provides a link between a LOR network and a DMX universe.
- Can provide 32 intelligent channels with fading and all standard LOR lighting effects.
- Can be daisy chained into an active DMX universe.

Hardware (Standard DIO boards)

- DIO boards are cards placed inside the PC.
- Usually SSRs are connected to the outputs of the DIO cards to control lights.
- LOR supports Measurement Computing, BSOFT and most ISA cards using 8255.



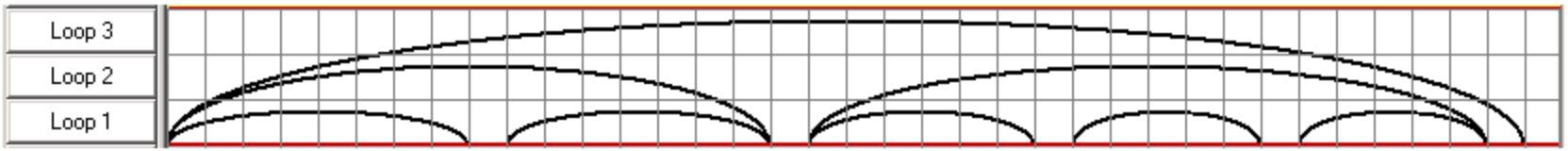
192 channel - ISA Card manufactured by Measurment Computing

Hardware (X-10 using the CM11-A)

- X10 uses Power Line Communication (PLC) to control lights – no extra cables.
- **Good for static control of lights.**
- **Poor choice for active light displays.**
- Runs 1000s of times slower than LOR.
- A serial port is use to attach the CM11A.
- If LOR and X10 are used, two Serial Ports are required.

Sequence Editor (Loops)

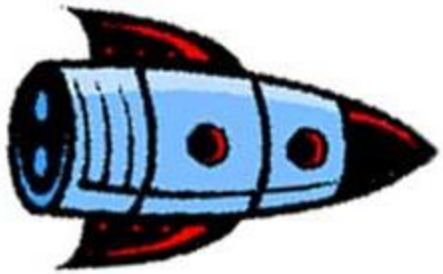
- Loops simplify the building of Animation Sequences containing repetition – like chases.
- A loop repeats a section one or more times.
- Nested loops are loops within loops.
- Nesting loops makes downloads much smaller.
- Up to 10 levels can be used (some controllers can not handle all 10 levels).



Nested Loops -- Three levels represented

Sequence Editor (Loops)

- Loops can change speed as they are executing.
  - Like the rocket, loops change speed once per repeat.
  - With each iteration the loop goes faster or slower.
- Perform sanity check on last loop time!!
- Not all controllers support speed changes within loops.



Building Shows (The Show Editor)

- The Show Editor is used to combine Animation and/or Musical Sequences into shows.
- There are multiple sections within a show – most sections are optional.
- The Show's sections are executed in a preset sequence.
- A show runs as long as it is scheduled to run – It will repeat sections or shorten sections to ensure that it ends on schedule.

Building Shows (The Show Editor)

- The ***Background*** section
  - Used to turn on lights and sequences that should be running constantly from Show start to Show end.
  - This section is optional and may remain empty .
  - Only Animation Sequences are permitted.
  - If you want to simply turn on a group of lights:
    - Create an Animation Sequence with the required channels.
    - Make the Sequence a single Event at least 1 minute long.
    - Turn the lights on for the full duration of the Sequence.
    - Do not make the sequence very short, they do run constantly and loop at the end.

Building Shows (The Show Editor)

- The *Startup* section
  - This section contains a list of Sequences to start the show.
  - This section is optional and may remain empty.
  - Can contain both Animation and Musical Sequences.
  - Will execute the sequences in the order listed
  - The next section will not begin until the last Sequence is completed.
  - A good place to put a special song to start the Show.

Building Shows (The Show Editor)

- The ***Animation*** section
  - Begins after the ***Startup*** section completes.
  - This section is optional and may remain empty – If it is empty the ***Musical*** Section should not be empty.
  - Any number of Animation Sequences may be listed.
  - Sequences can be played one at a time OR all at once.
  - When the scheduled end of the show is reached, all sequences will terminate immediately OR when any running Musical sequence completes.

Building Shows (The Show Editor)

- The ***Musical*** section
  - Runs at the same time as the ***Animation*** section.
  - This section is optional and may remain empty – If it is empty the ***Animation*** section should not be empty.
  - Contains a list of 0 or more Musical Sequences.
  - List may be played in order or random shuffle.
  - A delay between songs may be specified.
  - An animation sequence can be specified to run between the songs.
  - At Show end, currently playing song completes.

Building Shows (The Show Editor)

- The ***Shutdown*** section
  - This section contains a list of Sequences to end the show.
  - This section is optional and may remain empty.
  - Can contain both Animation and Musical Sequences.
  - Will execute the sequences in the order listed.
  - The show will not end until the last Sequence is completed.
  - A good place to put a special song to end the Show.

Schedules (The Schedule Editor)

- The Schedule determines when your shows will be automatically performed.
- Two basic categories of schedules: (Day of Week Schedule) and (Day of Year Schedule).
- Day of Week Schedule
  - Each day of the week has its own schedule.
  - Schedules repeat every week of the year.
  - Multiple/different shows can be scheduled each day.
  - Shows can be scheduled down to the minute.

Schedules (The Schedule Editor)

- Day of Year Schedules
  - Particular days of the years can have “special” schedules.
  - Day of Year Schedules supersede any Day of Week schedules.
  - Can be used to play different show(s) on particular days of the Year.
  - Can be used to extend or shorten shows on particular days of the Year.

Schedules (The Schedule Editor)

- Why multiple shows per day?
  - Different shows (with and without music) can be scheduled such that the music stops at specific time.
    - Create one show with Musical Sequences and optionally Animation Sequences – Call it “ShowM”.
    - Create one show without any Musical Sequences – Call it “ShowA”.
    - Schedule ShowM to run from 6PM to 9:30PM.
    - Schedule ShowA to run from 9:30PM until 11:00PM.
    - Lights will start at 6PM with music – music stops at 9:30 display remains running.

Schedules (The Schedule Editor)

- Why multiple shows per day? (cont'd)
  - Play MP3 files (and optionally broadcast them FM) prior to starting the display
    - Create a series of Musical Sequences with no channels – When played, the sequences will output music but not control any lights.
    - Create a Show made of the "empty" Musical Sequences – Call it ShowE.
    - Create a "regular" show – Call it ShowR.
    - Schedule ShowE to run from 1:00 PM to 6:00 PM.
    - Schedule ShowR to run from 6:00 PM to 11:30 PM.
    - Your music will start playing (without lights) at 1:00 PM and then at 6:00 PM the display will come to life.

Conclusion

- We talked about the basic LOR strategy for implementing light control and animation.
- We showed how to control inductive loads such as motors, bubble machines and fog machines.
- We reviewed the different ways that Servos can be controlled.
- Hopefully you now understand how to use some advanced features of the LOR Software suite.
- We mentioned input triggers, and how they can be used to provide an interactive show.