DEVICES TO OPERATE THE MULTI-FUNCTION ANIMATION DECODER
By Fred Miller, MMR

Another document describes the construction and operation of what I call a "Multi-function Animation Decoder" or MFAD. This decoder responds to DCC commands for Functions 0-8 to perform a variety of tasks including control of lights, sounds and servo motions. The intent was to make it easy to animate the activities in several of the buildings on my layout.

The MFAD is controlled by DCC decoder function commands. Those commands can be issued from a number of different sources including DCC throttles and JMRI scripts or panels. For my Digitrax LocoNet layout, I have built two devices to operate the MFADs:

(1) An Arduino circuit which runs a "day schedule." A script is established which will issue LocoNet function ON-OFF commands at particular times of the simulated day. Details about this day scheduler are presented in this document.

(2) Another Arduino based circuit which responds to IR commands sent from an IR Pad. Keys on the IR pad select an MFAD LocoNet address, and the 0-8 keys cause the device to issue an ON or OFF LocoNet command for Functions 0-8.
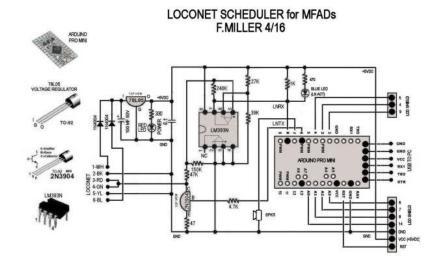
MFAD Scheduler:

My MFAD "Time of day" scheduler maintains a clock running at a selectable rate from actual time to 20x faster. The base for the device is an Arduino MiniPro operating with the *LocoNet* library, developed by Alex Shepherd, and the standard Arduino *LiquidCrystal* library. A "script" for the day's activities is held in a memory array, with entries identifying the time, the LocoNet MFAD device address, the DCC function and the ON or OFF activity.
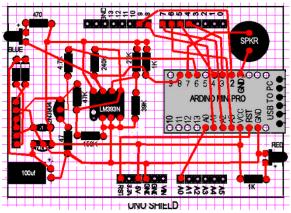

The time of day is presented on an LCD with custom enlarged numerals with a time of 01:00 AM to 12:59 PM. The in-memory script actually uses a 24 hour format (01:00 to 24:00) converted for display.
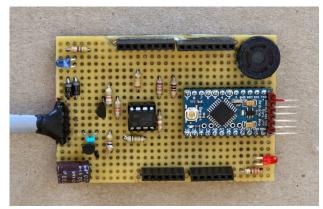
When the clock ticks forward to the time of a script entry, the sketch determines if a new LocoNet address is required and if so, acquires that address before executing the specified DCC function ON or OFF.

The device control buttons provide a means to set the speed of the clock, and stop or start the clock movement.

LOCONET SCHEDULER for MFADs
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The components of the circuit are hand-wired on a perf board. In addition to the Arduino MiniPro, components for a simple LocoNet buss interface are included. By my own convention, a blue LED is used to indicate LocoNet activity. The circuit board also provides

wire connections to the LCD display in the form of an Arduino UNO shield. Standard shield sockets are included on the perf board to enable plugging in the LCD shield. The assignment of pins to the LCD display, however are modified to be compatible with the pins needed for the LocoNet library and interface circuitry.

A small speaker is provided to warn of LocoNet error situations.

The parts for the MFAD Scheduler are not expensive. I make ample use of the eBay Chinese stores for inexpensive components.

IR Pad MFAD Commander:

Another device was developed to make use of a handheld IR pad, similar to the remotes used on TVs and audio equipment. For demonstration purposes, the device lets me select the appropriate LocoNet address (for example 1000 for the demo Café building, and 1001 for the demo Import Motors building). The number keys (0-8) on the IR pad then control the DCC functions F0 – F8 by cycling them ON or OFF.

The circuit includes an Arduino MiniPro microcontroller running a sketch which detects encoded IR signals sent from the pad and the necessary LocoNet interface circuit. The sketch makes use of the *LocoNet* library developed by Alex Shepherd to send LocoNet commands, and the Arduino library *IRremote* to help decipher the IR commands. I used the IR Pad shown since I had a bunch of them from previous projects, but almost any IR remote, including TV remotes, could be used after determining the codes they produce.

IR PAD MFAD CONTROLLER
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