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PROJECT OF THE MONTH

Digital Color Organ

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THE Project of the Month for March 1980 was a pocket color organ designed around three active filters. This month's project is a digital color organ using an LM3915 LED dot/bar display driver. Both color organs are sensitive to the frequency and amplitude of an incoming audio signal, but their visible reactions to these parameters are quite different.

The analog color organ has three fixed frequency-response ranges indicated by red (low), yellow (midrange), and green (high) LEDs. The brightness of a single color at any instant indicates the relative amplitude of that portion of the signal in the appropriate frequency range.

In the digital color organ, the opposite is true. The number of glowing LEDs indicates something about frequency, while increasing amplitude is indicated by changing colors. A more dramatic difference between the two kinds of color organs is the apparent motion of the lights. The LEDs in the analog circuit brighten and dim in fixed spots on the screen, but the LEDs in the digital version appear to bounce about in flashing clusters and moving strings.

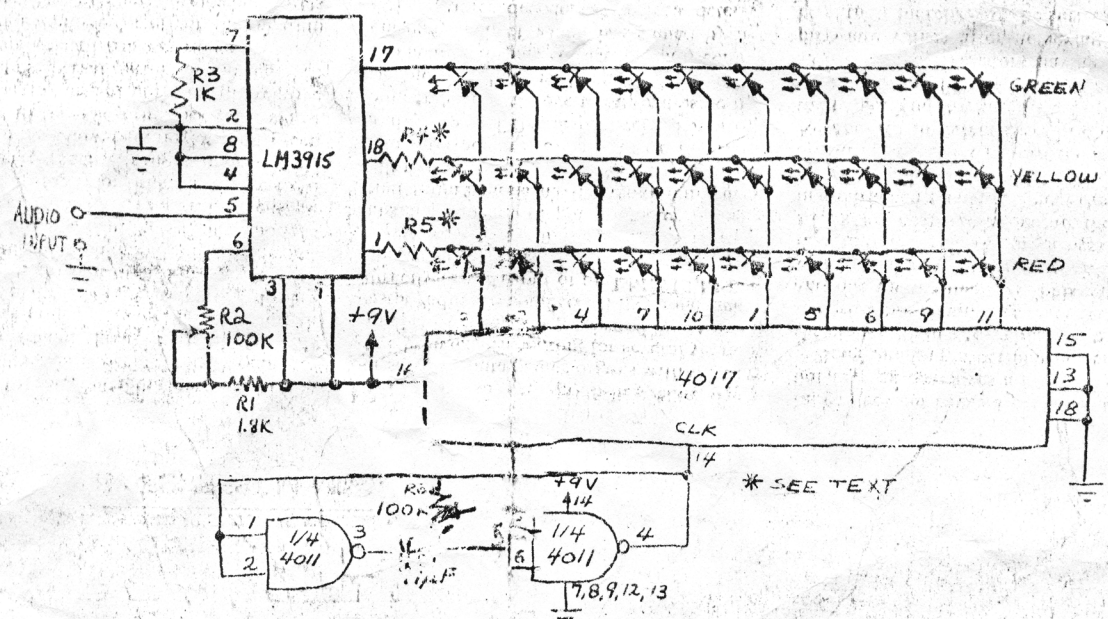
The schematic diagram here is for one of several digital color organs with which I've been experimenting for several years. In operation, signals generated by a transistor radio are coupled via its phone jack directly to the input of an LM3915 LED dot/bar display driver.

The sensitivity of the LM3915 is adjusted by means of potentiometer *R2* so that radio signals having maximum amplitude activate the green LEDs while low and intermediate levels activate the red and yellow LEDs, respectively. Potentiometer *R2* might have to be readjusted if the radio's volume is changed.

The total display consists of ten tricolor clusters, each of which is scanned by a 4017 counter/decoder at a rate determined by a clock made from two of the gates in a 4011. In accord with good design practices, the inputs of the remaining two 4011 gates are grounded. When the radio is silent, the display is blank. Sound from the radio causes a flurry of scintillating activity, as lights appear to bounce up and down while racing across the display in bursts and filaments. Slow, smooth music with restricted dynamic range does not cause a dramatic display, but a strong beat gives a very flashy show.

Before making a permanent version of the circuit, build a test circuit on a pair of solderless breadboards (one for the circuit and one for the display). This will allow you to evaluate both the circuit's operation and the relative brightness of the LEDs. For best results, operate the circuit in a darkened room and select the brightest LEDs you can find. Once the circuit is operating, experiment with the values of *R4* and *R5* to balance the brightness of the LEDs. You can initially use 1000-ohm potentiometers for *R4* and *R5*, and then substitute fixed resistors having the appropriate values after achieving a good brightness match. Also, be sure to experiment with the clock frequency by adjusting *R6* to find the most interesting level of display activity.

If you build a permanent version of the circuit, don't be afraid to experiment! Arranging the LEDs in concentric circles (with red LEDs the innermost) will produce starburst patterns. Finally, you can expand the display by adding additional 4017s and LEDs. ◇



Schematic of a color organ having a display of ten tricolor clusters.