ELCOM A Color Organ with Active Filter

USING ACTIVE FILTERS, THIS NEW COLOR ORGAN PRODUCES A SHARPER, MORE VIVID VISUAL DISPLAY THAN PREVIOUS DESIGNS, EVEN AT LOW VOLUME LEVELS.

This circuit covers a distinctly different design for building a color organ, a device which is becoming more and more popular as a complement to both mono and stereo systems. While the object of such visual displays is to give sharp color response to specific tones, the limited selectivity of passive - filter systems causes color washout whenever multi-instrument recordings are played.

The active-filter color organ also operates at lower sound levels than previous designs, creating a pleasing effect with more types of music. In addition to these advantages, parts cost for this design is actually less than for a comparable passive-filter device.

The circuit is basically a full-wave unfiltered bridge driving four differently colored lamp loads through series silicon controlled rectifier (SCR) switches. A musical signal at the input terminals allows the control circuitry to turn on an SCR, and its accompanying colored lamps, when the appropriate tone and volume are reached.

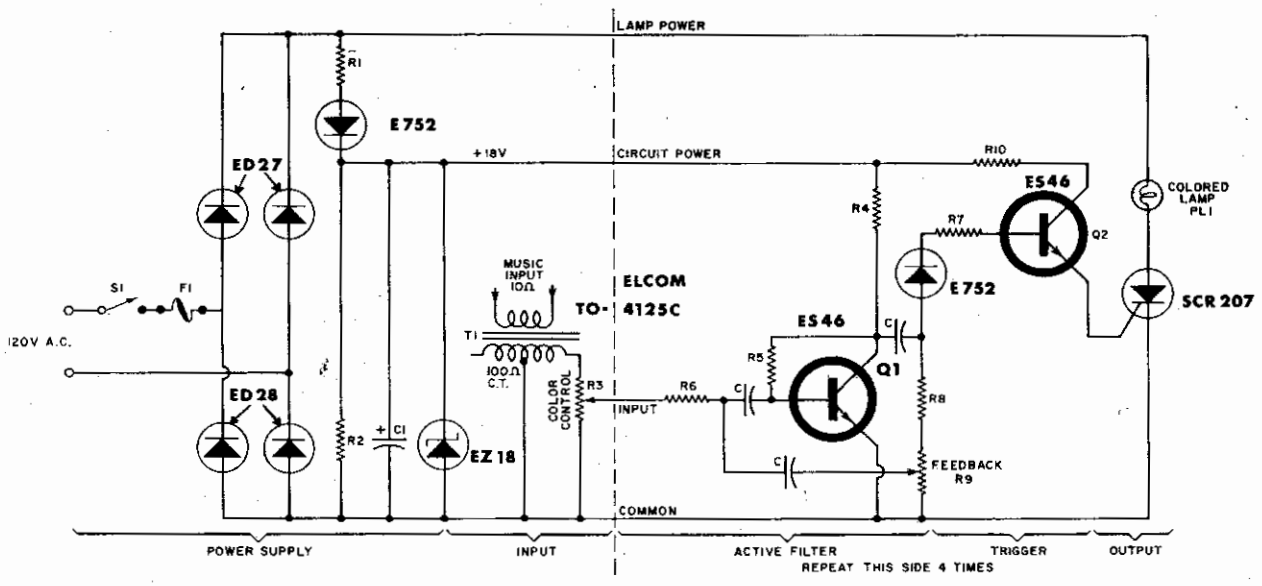
The innovation presented here is the use of an active filter as a means of tone differentiation. The active filter is a single - transistor amplifier (Q1 in Fig. 1) with frequency-sensitive positive feedback.

One frequency band will be amplified much more than others, that frequency being determined by the RC values in the feedback circuit. By varying the capacitor values, the different operating frequencies can be established to activate the four display colors.

The degree of amplification at the resonant frequency over other frequencies depends upon the amount of positive feedback. The feedback for each channel is controlled by a 2000 ohm trimmer, R9. As the potentiometer is advanced to increase the feedback, the filter selectivity increases until a point is reached where the circuit breaks into oscillation. Below this point, the filter has maximum selectivity. The magnitude of the feedback is adjusted by advancing R9 until the corresponding lamp for each channel lights with no audio input. Each potentiometer is then turned back until the corresponding lamp just goes out. This adjustment procedure produces the sharpest display. Even with widely separated response frequencies, the average musical recording has more than enough spectral content to keep the display "Alive". However, a softer display may be achieved by advancing color control, R3. This effectively widens the filter bandwidth to produce a color blending. This is the only color adjustment used during operation once the feedback has been set for each channel.

The output of the active filter is fed to an emitter-follower amplifier (Q2) which triggers the SCR.

The color organ may be attached to any music system by connecting the input terminals to the speaker. The input transformer, T1, works well with 4-, 8-, or 16- ohm speakers and provides isolation between the music system and the a.c. line power used in the color organ.



R1—1500 ohm, 10 W res. ±10%
R2—820 ohm, 1 W res. ±10%
R3—50 ohm pot "Color Control"
C1—15 μF, 35 V elec. capacitor
S1—10 A toggle sw.
F1—10 A. 120 V fuse

The following parts are for a single channel. Four channels are required.

R4—3300 ohm, ½ W res. ±10%
R5—1 megohm, ½ W res. ±10%
R6—4700 ohm, ½ W res. ±10%
R7—10,000 ohm, ½ W res. ±10%
R8—2700 ohm, ½ W res. ±10%
R9—2000 ohm pot (Mallory "Trim-Pot" MTC-1)
R10—560 ohm, ½ W res. ±10%
PL1—120 V incandescent bulb—in color (20 to 150 W total per channel)

C—0.1 μF, 50 V capacitor (for l.f. green channel)
C—0.047 μF, 50 V capacitor (for medium-l.f. blue channel)
C—0.022 μF, 50 V capacitor (for medium-h.f. red channel)
C—0.01 μF, 50 V capacitor (for h.f. yellow channel)