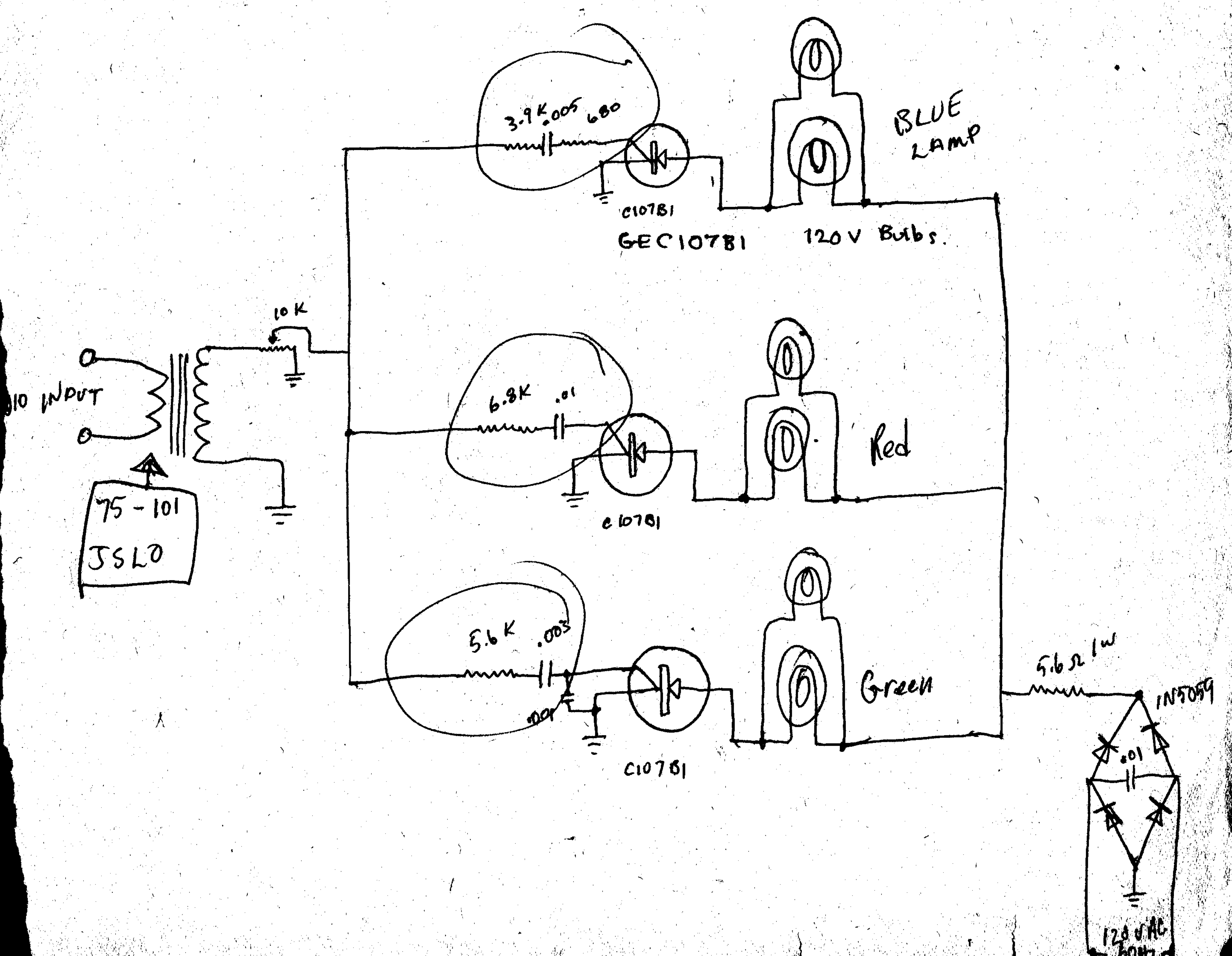


3.9K .005 680
C107B1
GEC107B1
120V Bulbs.
BLUE LAMP
10K
INPUT
75-101
JSLO
6.8K .01
C107B1
Red
5.6K .005
.001
C107B1
Green
5.6Ω 1W
1N5059
.01
120 VAC

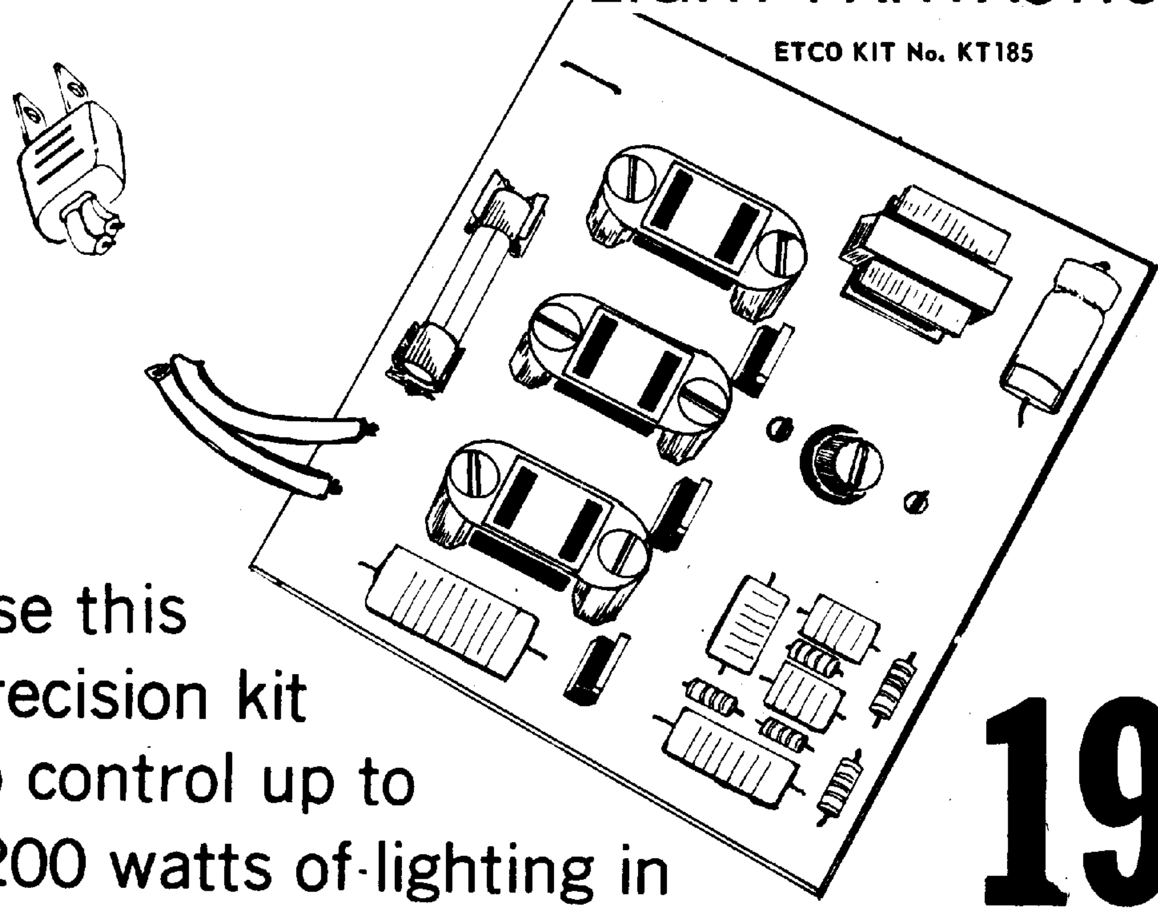
ETCO kit

ANOTHER LAB-TESTED
SOLID STATE KIT
FROM ETCO ELECTRONICS

ETCO KITS ARE DESIGNED TO PROVIDE A MAXIMUM OF ENJOYMENT – DURING CONSTRUCTION AND AFTER COMPLETION

The LIGHT FANTASTIC

ETCO KIT No. KT185



Use this precision kit to control up to 1200 watts of lighting in ANY COMBINATION OF COLOURS!

19.95

Colour your world audio with this unique device that translates audio sound into visual colour images. Three silicon controlled rectifiers deliver up to four amps each to three separate output channels, all at 117VAC. Any combination or colour of lights can be paralleled into each channel up to the rated output. The Light Fantastic is a "colour organ" that connects to the speaker leads of any amplifier and electronically converts sound into coloured light. The colour is determined by the pitch of the music from the amplifier, and the brightness is determined by the loudness of the music in each channel. The device can be used with home music systems, PA systems, or musical instrument amplifiers. There is an input level control to adjust sensitivity and the SCR gates have been designed to operate at a very low input level without inter-channel crossover. The Light Fantastic has a wide application of uses in theatre and stage work, presentations at product shows and conventions, store and window display work, and for extremely dramatic effects in home lighting.

SEE BACK OF THIS PAGE FOR CIRCUIT DIAGRAM, SPECIFICATIONS AND COMPLETE ASSEMBLY INSTRUCTIONS.

ETCO ELECTRONICS
464 McGILL STREET, MONTREAL, 125, QUE.
Phone – (514) – 288 – 6217

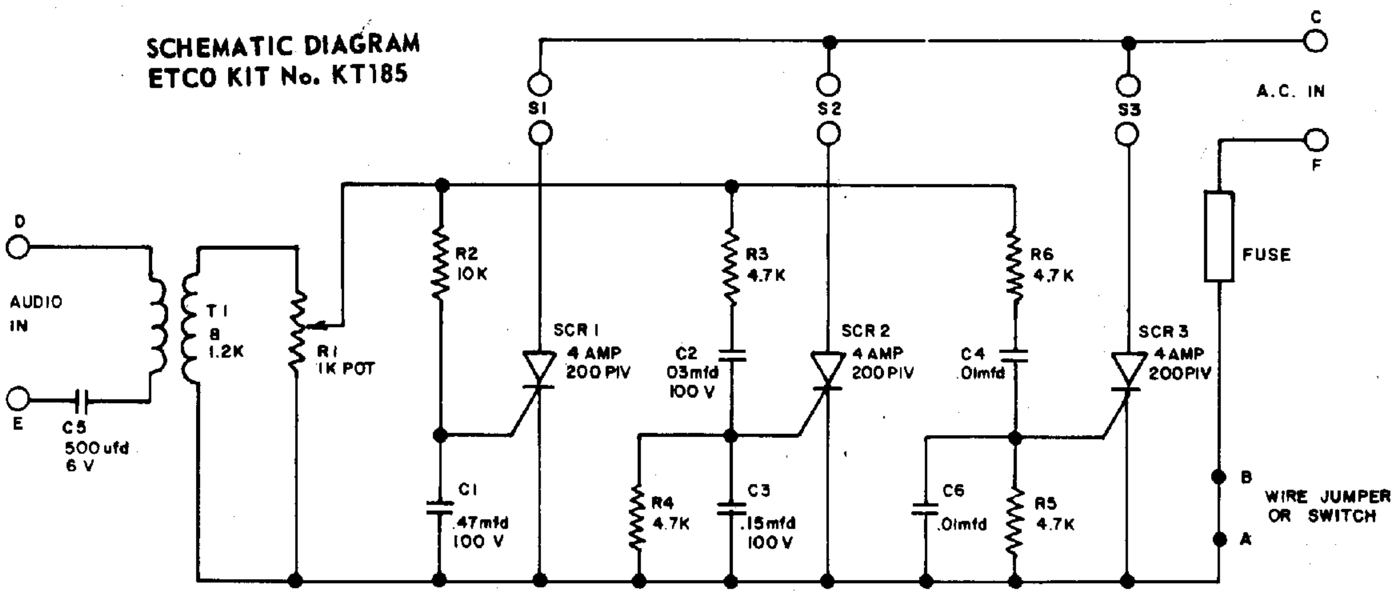
HOW TO ASSEMBLE THIS ETCO KIT

After laying out all the parts in the kit, study the enlarged drawing on the front of this page . . . that is exactly how this device will look when completed. The schematic diagram directly below shows the values of all components in the circuit. Relate these values and components to the pictorial diagram at the bottom of the page. Start assembly by mounting the 1K potentiometer in position, then the fuse holder and the 3 channel sockets (S1, S2, S3). Starting at "audio in," mount and solder the components as illustrated and continue through to the other end of the circuit "AC in." Be sure to double check each connection as you make it, being certain that your wiring corresponds to both the pictorial diagram and the schematic diagram. Check that all soldering connections are firm and clean.

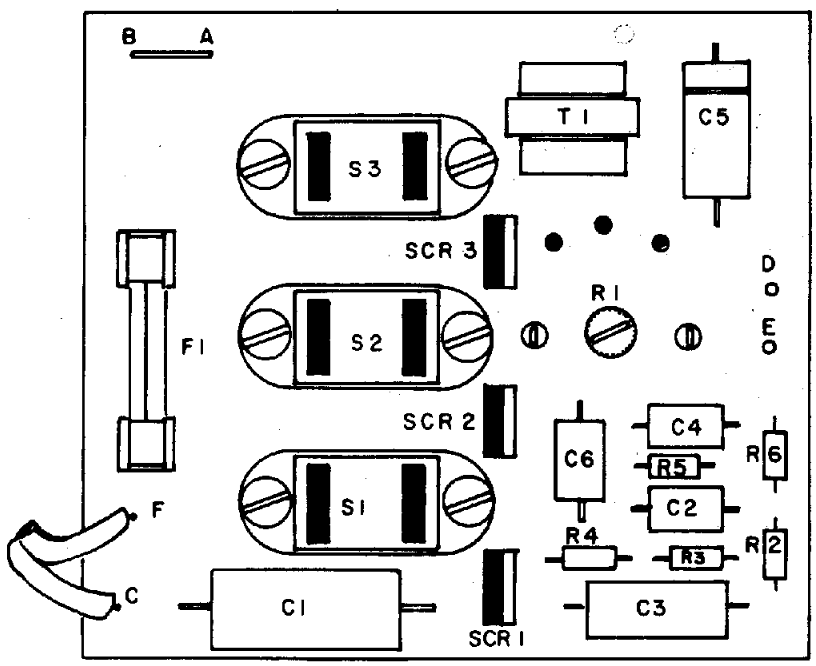
ELECTRICAL CHARACTERISTICS

AUDIO INPUT VOLTAGE:	6 volts max.
A.C. INPUT VOLTAGE:	120 volts max.
A.C. OUTPUT CURRENT: (per channel)	4 amps
SCR GATE CURRENT:	Typical 100ua.
SCR GATE FREQUENCIES:	300, 1300, 2600 Hz.

SCHEMATIC DIAGRAM
ETCO KIT No. KT185



PICTORIAL WIRING DIAGRAM

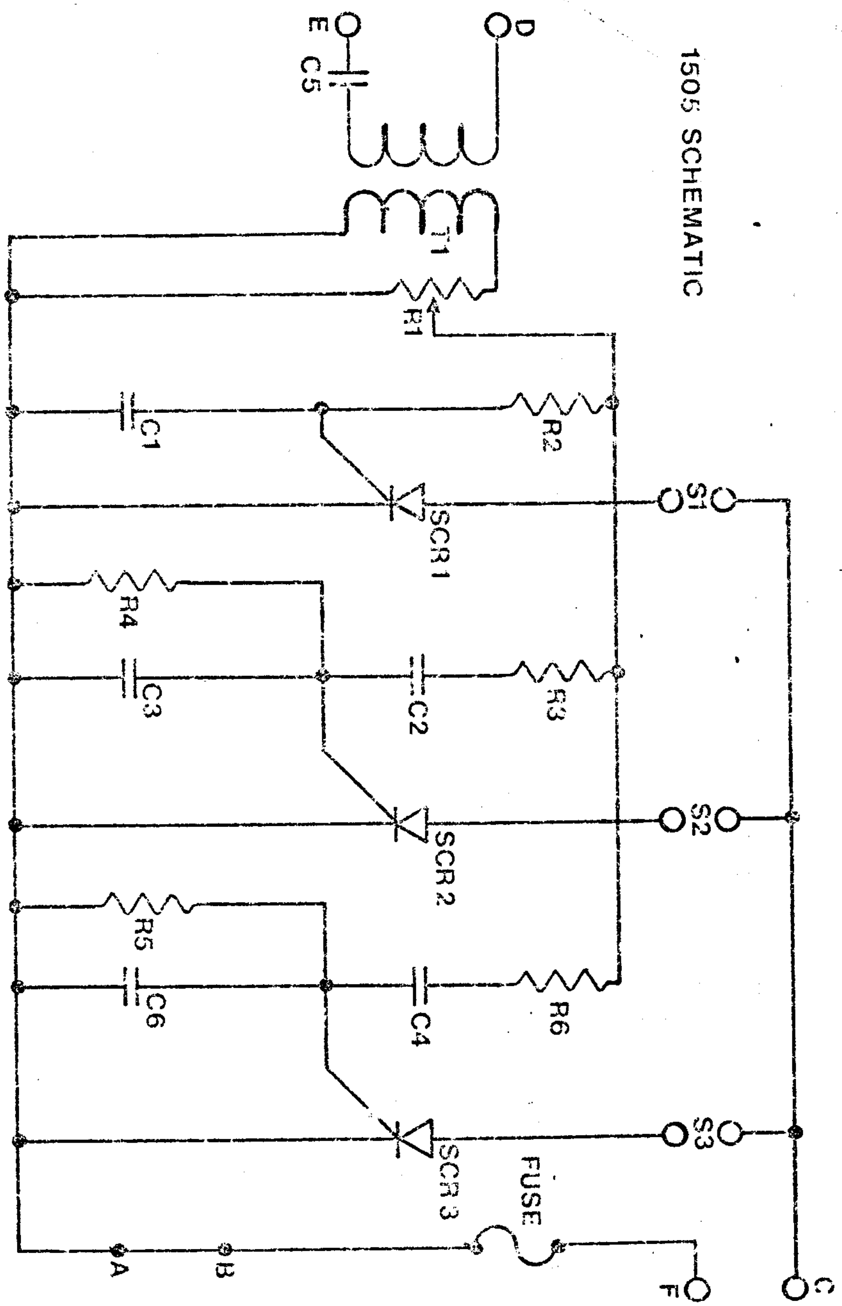


The 1505 B kit is electrically identical to the 1505. In addition an attractive plastic box completed with etched, drilled and punched panel; indicator light and an "on-off" switch are provided.

The indicator light is connected from A to C as shown on above diagram.

R-A-E INDUSTRIAL ELECTRONICS LTD.

RAE KIT



1505 LIGHT FANTASTIC

DESCRIPTION

The "Light Fantastic" translates audio into visual colour images. It connects to the speaker leads of any amplifier and electronically converts sound into pulses capable of driving 200 watts per channel. The channel is determined by the pitch of the music from the amplifier, and the brightness is determined by the volume.

The "Light Fantastic" kit is available in three versions:

1505-1	Parts only, no printed circuit board.
1505-2	Parts and printed circuit board.
1505-3	Complete unit with case and silk-screened front panel.

PARTS LIST

1505-1

SCR1,2,3	-	4 amp 200PIV Silicon Controlled Rectifier
C1	-	.47MFD Mylar Capacitor
C2	-	.033MFD Mylar Capacitor
C3	-	.15MFD Mylar Capacitor
C4,6	-	.01MFD Mylar Capacitor
C5	-	470MFD Electrolytic Capacitor
R1	-	1K ohm Potentiometer
R2	-	10K ohm 1/4W Resistor (Brown, Black, Orange)
R3,4,5,6	-	4.7K ohm 1/4W Resistor (Yellow, Purple, Red)
T1	-	1.2K ohm/8 ohm Transformer
S1,2,3	-	AC Outlets
2	-	P.C. Fuse Clips
1	-	10 Amp Fuse
1	-	AC Line Cord

1505-2 (additional to 1505-1 parts)

1	-	Printed Circuit Board
6	-	6-32 x 1" Threaded Nylon Spacers
12	-	6-32 x 1/4" B.H. Screws

1505-3 (additional to 1505-1 & 2 parts)

1	-	SPST On-Off Switch
1	-	115VAC Neon On-Off Indicator Light
1	-	Terminal Strip
1	-	Knob
1	-	Strain Relief for Line Cord
1	-	Case
1	-	Front Panel
2	-	6-32 x 1/4" B.H. Screws

ELECTRICAL CHARACTERISTICS

Audio Input Voltage :	6 Volts maximum
A.C. Input Voltage :	120VAC 60Hz
A.C. Output Current : (per channel)	4 Amps 400 Watts
SCR Gate Current :	100uA typical
SCR Gate Frequencies:	300, 1300, 2600 Hz

ASSEMBLY INSTRUCTIONS

Read all assembly instructions before starting assembly solder and/or install each component in order.

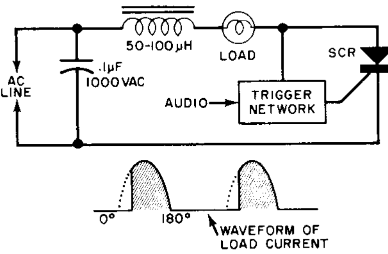
The first part of the assembly instructions cover only the components mounted on the printed circuit board.

1. Transformer T1 - Note: Transformer will only mount one way on PCB.
2. Capacitor C5 - 470MFD Electrolytic Note: Band on assembly diagram denotes indentation on capacitor body.
3. SCR1,2&3 - 4 amp 200PIV Silicon Controlled Rectifier. Note: Black portion on assembly diagram denotes plastic body of SCR.
4. Potentiometer R1 - 1K ohm. Install from under board with three tabs through P.C.B.
5. Capacitor C6 - .01MFD Mylar

SCR NOISE PROBLEMS

***Q.** I bought an inexpensive color organ about a year ago. It worked well until I put 150-watt floodlights on it. Now I have intolerable interference. Is there any circuit to attenuate the noise?*—Michael Ethier, St. Paul, MN.

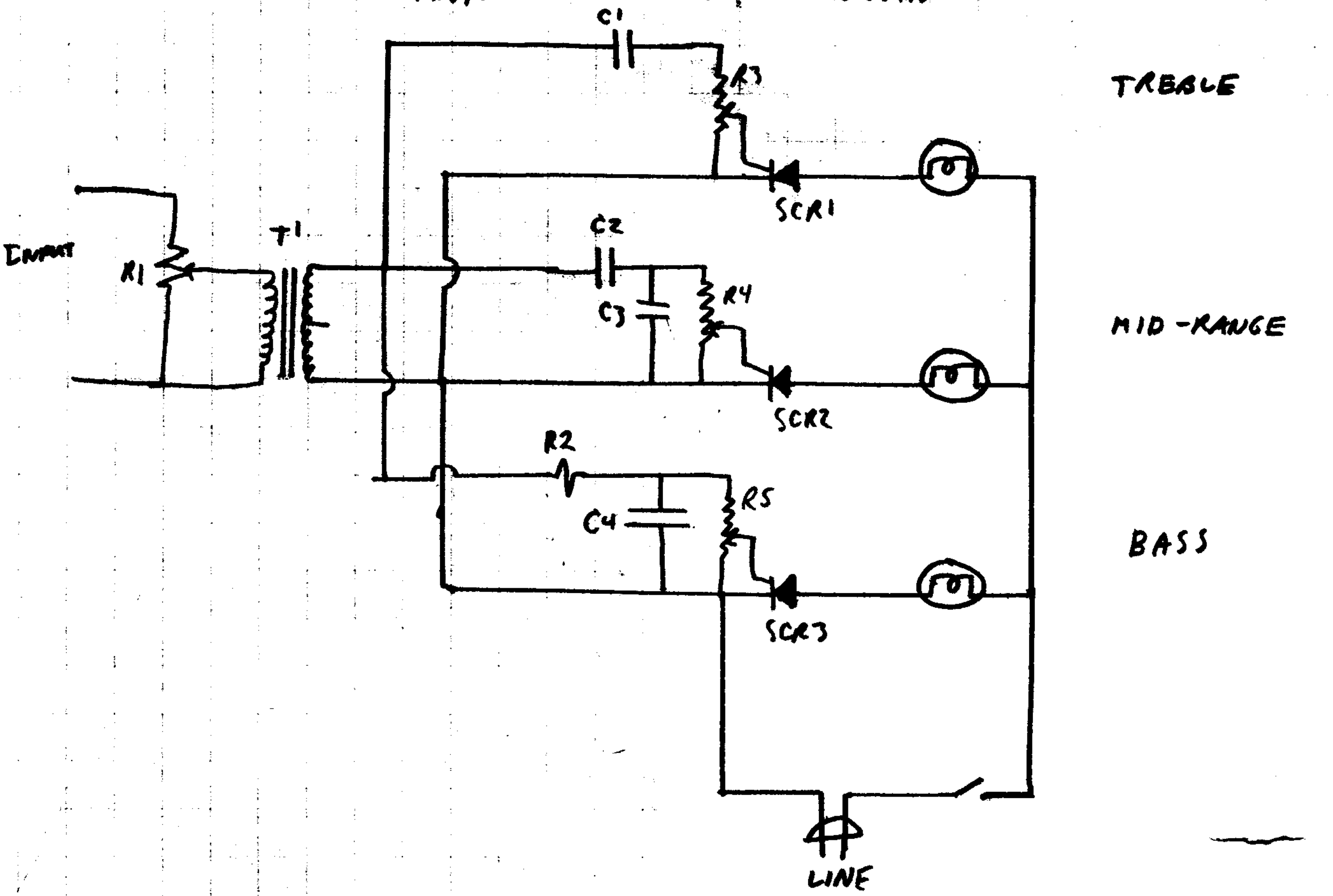
A. The color organ uses SCR's to turn on the lamps. When the SCR turns on, it does so abruptly, generating the fast-rising waveform shown in the figure. This waveform is repetitive and is rich in harmonic energy. The larger the overall amplitude becomes (as when you switched to higher-powered bulbs), the more harmonic energy is present. You don't mention whether the interference is coming through your audio system or through a radio receiver. It might be both—the harmonics in the SCR switching waveform extend into the r-f region.



You can prevent the radiation of harmonics by installing an LC network across the ac line, and, if necessary, shielding the color organ enclosure. The LC filter will prevent the transient from propagating out along the power wiring, and the shielding will prevent radiation by element leads and wiring within the organ. A commercial "brute force" line filter can be used, or a wound coil and capacitor can be installed inside the organ. A 1000-V ac, 0.1-µF disc ceramic capacitor and about 70 turns of insulated wire on a ferrite core are suitable. One mail-order source of ferrite rods is Amidon Associates, 12033 Otsego St., No. Hollywood, CA 91607. Its 30-61-4 (4″ × 0.5″ dia. or 10.2 × 1.3 cm) and 30-61-7 (7.5″ × 0.5″ dia. or 19.1 × 1.3 cm) rods, priced at $2.50 and $1.50 respectively, are well suited for use in "hash" filters.

Have a problem or question on circuitry, components, parts availability, etc? Send it to the Hobby Scene Editor, POPULAR ELECTRONICS, One Park Ave., New York, N.Y. 10016. Though all letters can't be answered individually, those with wide interest will be published.

3 CHANNEL COLOR ORGAN



R1 - 1K→5K POT
R2 - 4.7K
R3, R4, R5 - 1 to 5K POTS.
C1 - .01
C2, C3 - .05
C4 - .47 OR ~~GREATER~~ NON-POLARIZED
SCR1, 2, 3 - 200PIV - 2A <u>MAXIMUM</u>
MAY USE TRIACS.
T1 - OUTPUT TRANSFORMER - 8Ω WINDING USED AS PRIMARY
8Ω TO ABOUT 1.2K IS ABOUT RIGHT
- ARMACO AT-4
- JANA 10801

FOR GREATER SENSITIVITY CHANGE C1 TO .02 AND C3 TO .1 TO MAINTAIN SEPARATION

LISTE DES PIECES — PARTS LIST

	Liste des pièces	Parts list
1	interrupteur bipolaire	power switch, double pole
1	porte-fusible	fuse holder
1	fusible 15 A	fuse 15 A
1	cordon secteur avec terre	line cord with ground
2	transformateurs #SA-7410B	transformers #SA-7410B
2	réceptacles téléphoniques,stéréo	stereo phone jacks
6	réceptacles secteur	line outlets
6	barettes terminales	terminal strips
1	potentiomètre double 500K	dual control, 200K
3	potentiomètres doubles 2 ou 3M	dual controls, 2 or 3M
4	boutons pour potentiomètres	control knobs
6	thyristors 4 A 200v	thyristors 4 A 200v

résistances — resistors

	Résistances	Resistors
6	1K $\frac{1}{2}$W (brun,noir,rouge)	1K $\frac{1}{2}$W (brown,black,red)
4	4K7 $\frac{1}{2}$W (jaune,violet,rouge)	4K7 $\frac{1}{2}$W (yellow,violet,red)
6	27K $\frac{1}{2}$W (rouge,violet,orange)	27K $\frac{1}{2}$W (red,violet,orange)
2	470K $\frac{1}{2}$W (jaune,violet,jaune)	470K $\frac{1}{2}$W (yellow,violet,yellow)
1	100K1W	

condensateurs — capacitors

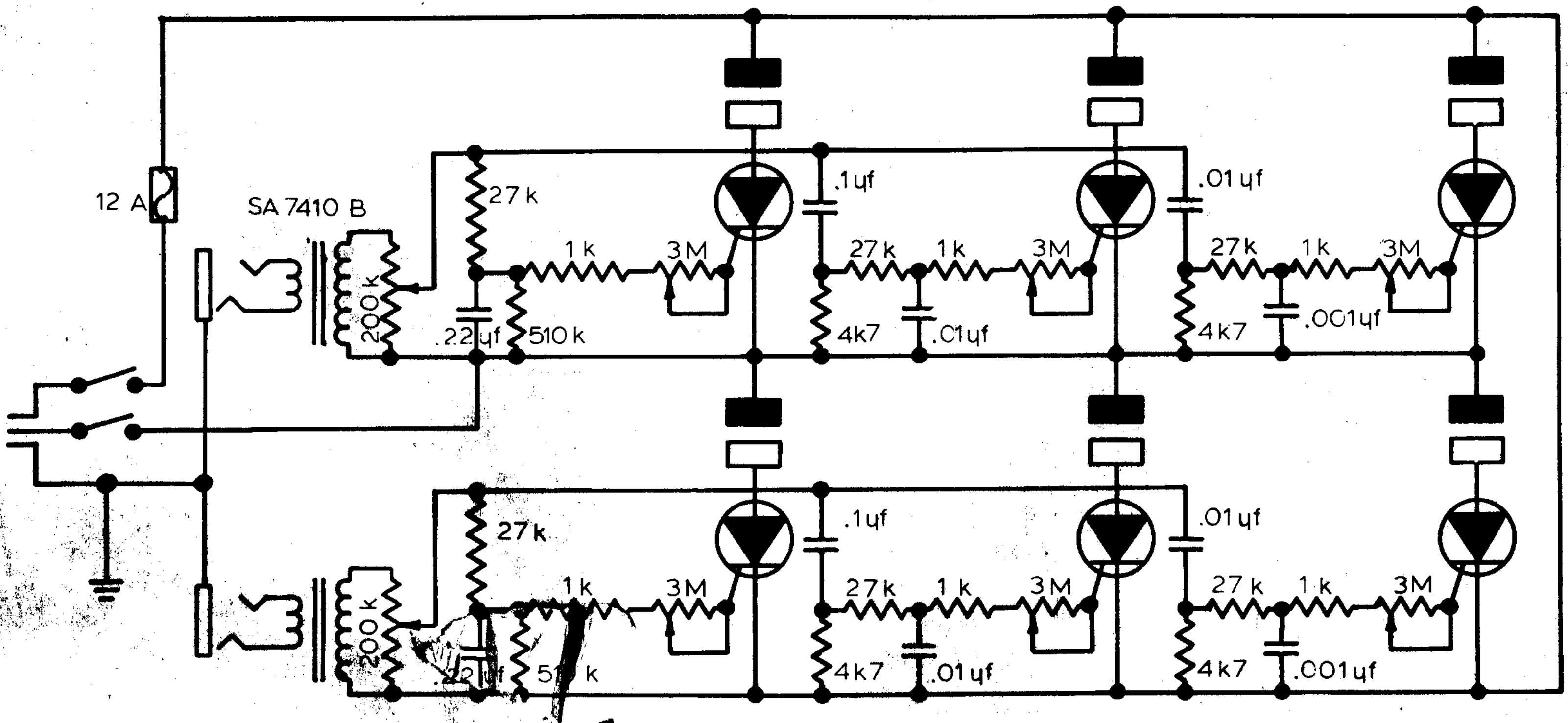
2	0.22 microfarad 200V
2	0.1 microfarad 200V
4	0.01 microfarad 200v
2	0.001 microfarad 200v

Put 330K ~~470K~~

Resistors

from 6 to K on

50K's



12 A
SA 7410 B
200 k
27 k
1 k
3M
.22 uf
510 k
.1uf
27 k
4k7
.01uf
.01 uf
.001uf

THIS LITTLE color organ has only a thousandth of the light power of its conventional counterparts, but it's ideal for solo viewing. I've also found it to be an effective attention-getting device at small gatherings.

As shown in Fig. 1, the circuit consists of three active filters which separate the audio input signal into low, medium and high frequencies. Each filter drives three series-connected LEDs. I chose red for the low frequencies, yellow for the middle range and green for the high frequencies.

The red and yellow LEDs are driven by bandpass filters. With the component values I chose, the red filter peaks at 20 Hz and has a total passband of 1 to 70 Hz. The yellow filter peaks at 80 Hz and has a total passband of 25 to 85 Hz. The green LED is driven by a high-pass filter with a response which extends from about 75 Hz to beyond the limits of audibility.

Figure 2 shows the frequency response of the three filters superimposed on the same graph. The overlap of filter responses can be eliminated by altering the frequency responses of the filters. I intentionally included the overlap, however, to prevent the possibility of all the LEDs going dark simultaneously.

As clearly indicated in Fig. 2, the circuit favors the low end of the audio spectrum. While I've found this gives an excellent visual representation of most music, you might want to alter the frequency response of one or more filters for other effects.

For best results, assemble the circuit in a light-tight enclosure. Make a window for the LEDs from a thin sheet of translucent plastic or ground glass, materials sold at many camera stores.

Figure 3 shows the enclosure I selected, a French bicycle light sold under the trade name "Wonder." It or a similar bike light of domestic manufacture can be purchased from most bicycle stores.

I removed the light's reflector and switch assembly and installed a circuit board cut with a nibbling tool to fit the interior of the case. The LEDs were grouped in three red-yellow-green triangles as shown in Fig. 4. You can, of course, select your own color and pattern arrangements. The visual impact of the LEDs is much greater if they are viewed through a translucent screen. You can transform the plastic flashlight lens from transparent to translucent by lightly buffing it with fine emery paper.

I used point-to-point wiring to interconnect the various components. The flashlight case didn't have sufficient space for batteries, so I taped two 9-volt batteries to the back of the case and connected them to the circuit via a short cable and a couple of battery clips. The circuit will work when powered by a 9-volt supply, but 18 volts gives more light and provides better response at low volume settings.

A two-conductor cable with two miniature phone plugs soldered in parallel at one end and connected to the input transformer's 8-ohm primary is used to route audio signals to the color organ. Insert one plug in the phone jack of a transistor radio. The other plug should go to a jack connected to a small monitor speaker box so you can hear the music while you're viewing it. Alternatively, you can defeat the radio's speaker cutoff by rewiring its earphone jack.

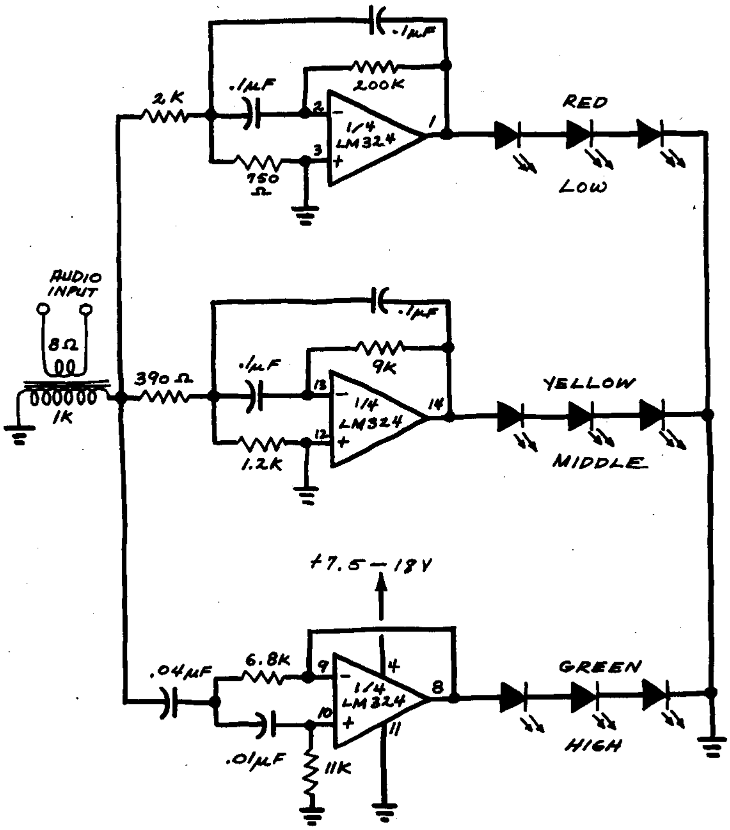


Fig. 1. Schematic diagram for a miniature color organ.

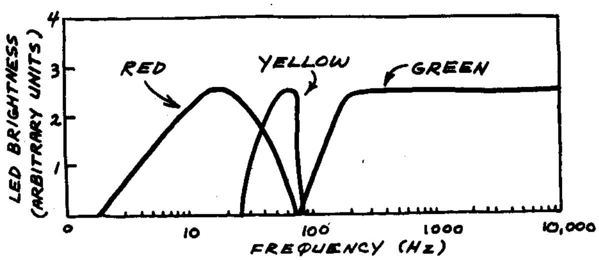


Fig. 2. Frequency response of LED color organ.

Next, dim the room lights, tune in some good music and enjoy the show. You can adjust the radio's volume and tone controls to alter the visual effects. And don't worry about power consumption. The circuit draws only 3 to 5 mA from a single 9-volt battery or 5 to 12 mA from two series-connected 9-volt batteries. ◇

Fig. 3. Prototype assembled in a bicycle light.

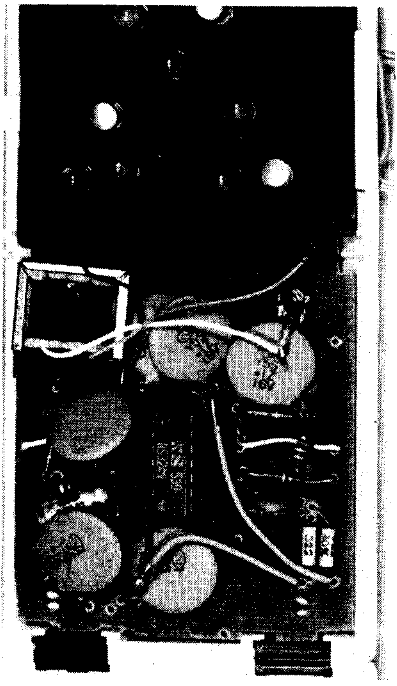
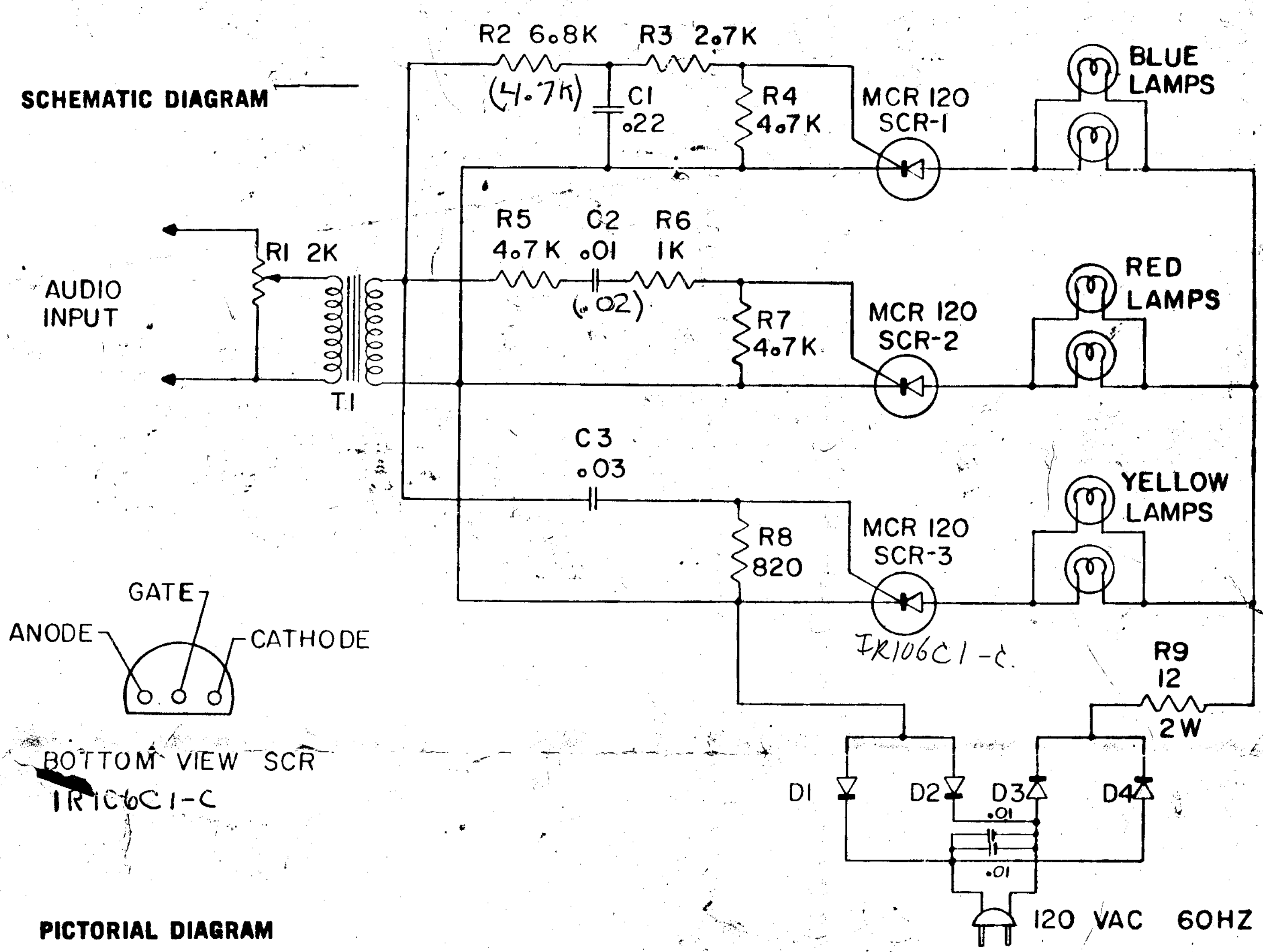


Fig. 4. Prototype internal assembly. Transformer is cemented to circuit board.

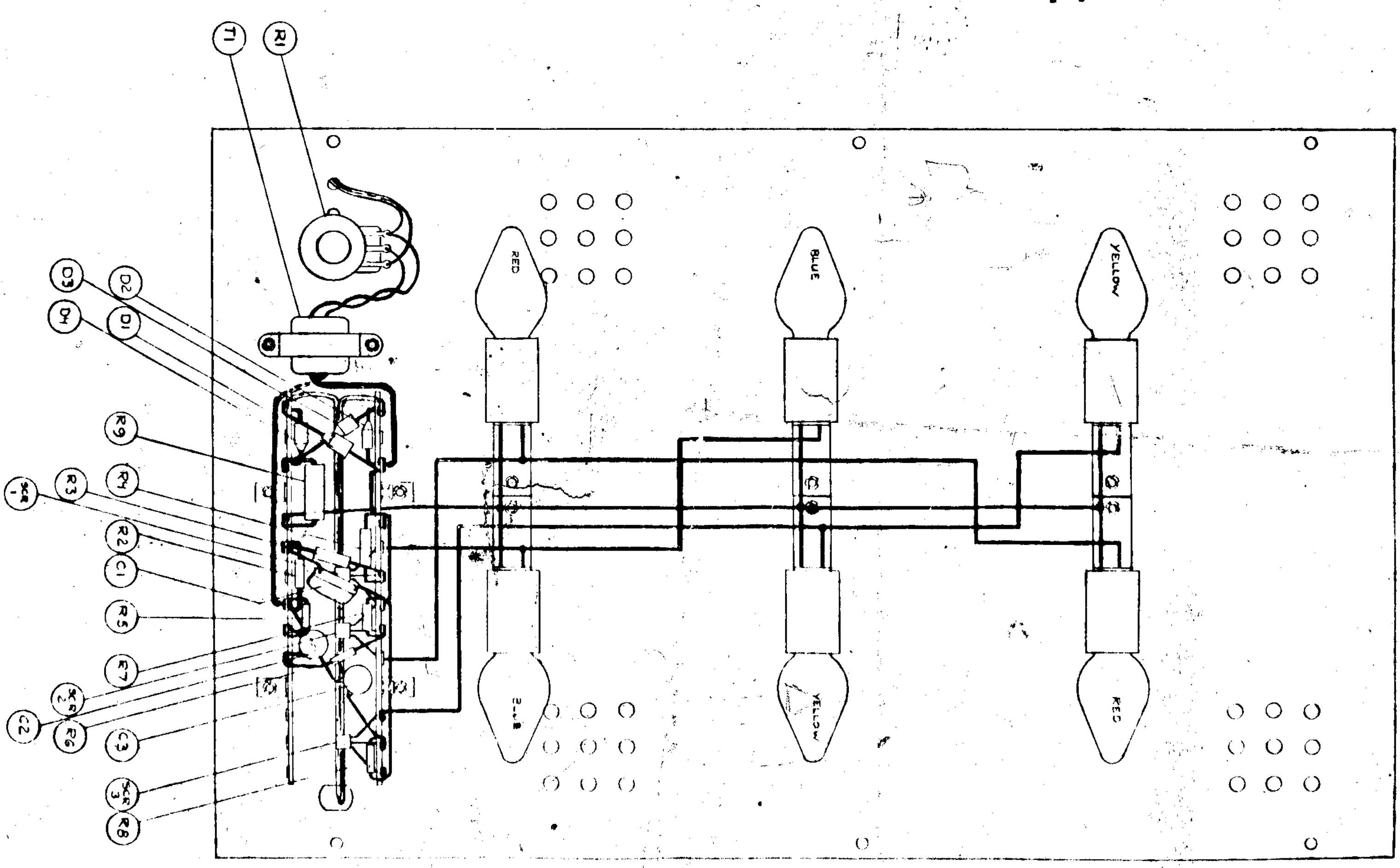
D51-272852-1	Cabinet
33-270736-24	Control
78--272160-1	Diode Rectifier (4 used)
77-272948-1	Blue Lamp
77-272948-2	Red Lamp
77-272948-3	Yellow Lamp
B35-272980-1	Plastic Front
B82-272947-1	Lamp Socket
77-272968-1	SCR Motorola (MCR 130)
B79-272973-2	Cord and Plug Assembly
B79-272950-1	"Y" Adaptor
75-272957-1	Transformer

SCHEMATIC DIAGRAM



BOTTOM VIEW SCR
IR106C1-C

PICTORIAL DIAGRAM



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.

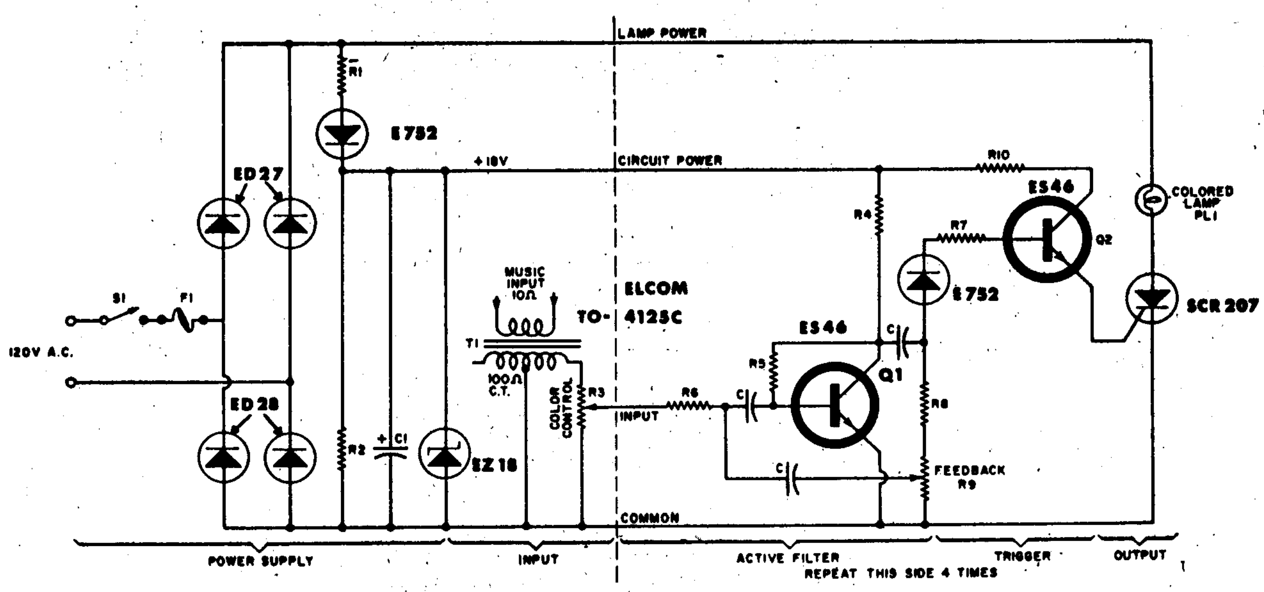
The innovation presented here is the use of an active filter as a means of tone differentiation. The active filter is a single - transistor amplifier (Q1 in Fig. 1) with frequency-sensitive positive feedback.

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.

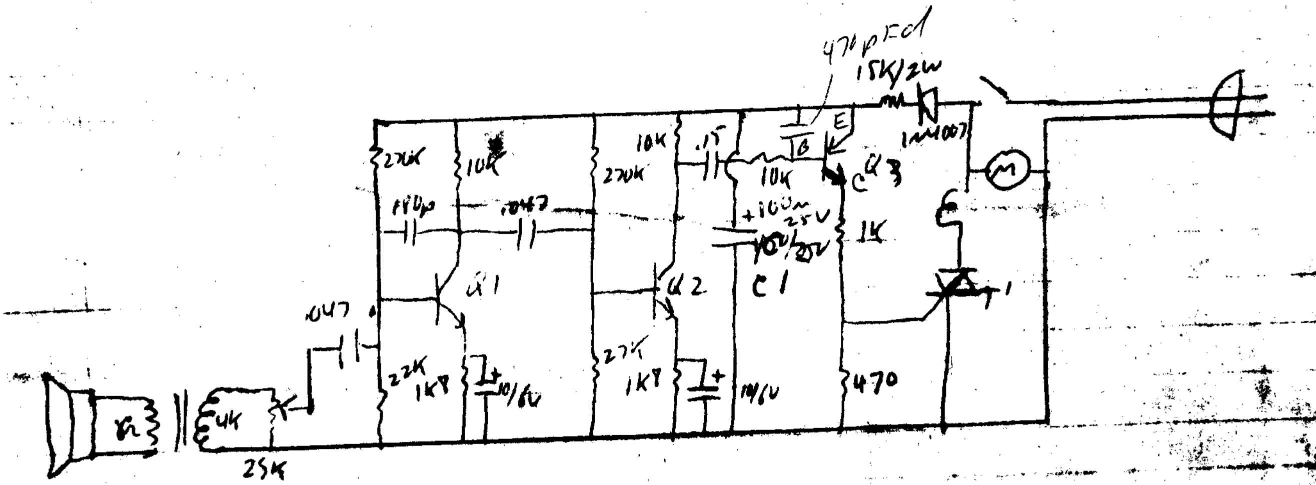


E546 = 2N4401

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)

Sound Activated Color Organ (100)



Speaker used as microphone

Q1, Q2 - 2N3904
Q3 - 2N5142
T1 = RCA 40502 Triac - 200V - 2A

Mar 10/75
D. Fraser
P.O. Box 778
Edmonton Alta T5J 2L4
474-5759

If C1 is over 100uF, a 50V cap must be used.

PROJECT OF THE MONTH

Digital Color Organ

BY FORREST M. MIMS

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.

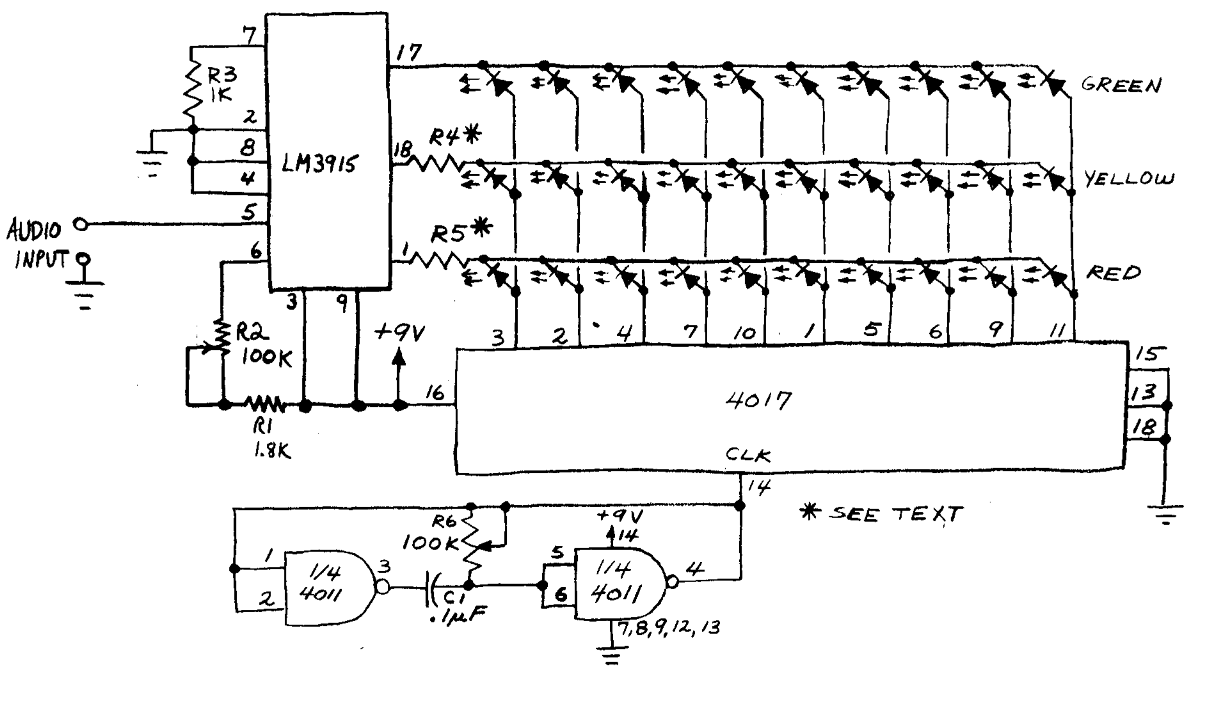
The schematic diagram here is for one of several digital color organs with which I've been experimenting for several years. In operation, signals generated by a transistor radio are coupled via its phone jack directly to the input of an LM3915 LED dot/bar display driver.

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.