SIMPLIFIED SOLID-STATE COLOR ORGAN

By DONALD LANCASTER

More economical version of author's earlier design made possible by novel method of firing controlled rectifiers and simpler filters.

THE development of a novel method for firing controlled rectifiers, certain readily available economical components, and a fresh approach to the filter problem makes possible two improved color-organ circuits based on the author's "Solid-State 3-Channel Color Organ" (April 1963). The new circuits provide certain cost and performance advantages over the original unit.

Fig. 1A is the schematic of a "minimum parts" version designed with economy as the principal objective. The unit is suitable for use in conjunction with a display, or as an experimental device, but provides no means for adjusting the color balance or background level. It is designed to be incorporated directly into a display with no connectors or cables required. Power capability is one kilowatt total.

Fig. 1B takes the minimum-parts unit and adds the refinements to give a "deluxe" unit, suited to the needs of even the most critical hi-fi enthusiast or professional bandleader. It provides complete control over both color balance and individual color background level. A noise filter is included to minimize SCR line noise. The unit is fused and switched and designed for operation of a remote display by conventional connectors. Power capability is also one kilowatt total. By changing SCR's and doubling all wire, switch, and fuse ratings, a two-kilowatt control capability may be realized.

As considerable current flows through certain portions of the circuits, requiring heavy gauge wire and cautious common connections, the schematics are drawn using the industrial convention of showing the main current paths as heavy lines and the control circuitry as in a normal schematic.

Minimum-Parts Version

Considering the minimum-parts unit first, the circuit is basically a full-wave unfiltered bridge rectifier driving three lamp loads through series silicon controlled rectifiers (SCR). Each SCR is "told" when in each cycle to turn on by the control circuitry, giving lamp brilliance in proportion to the audio energy present.

Diodes *D1*, *D2*, *D3*, and *D4* are 18-ampere press-fit rectifiers available from *Motorola*, *Delco*, or *Tung-Sol* at very moderate cost. They may be pressed into regular copper tubing (using nothing but a bench vise) to provide both mounting and suitable heat-sinking. Finning is required. Two forward-polarity and two reverse-polarity diodes allow the use of only two heat sinks. The sinks must, of course, be insulated from each other as well as from the case. The SCR's are 3-ampere, 200 p.i.v. rated and are available from *Sarkes Tarzian* or *Texas Instruments*. These are about the most economical SCR's available and will handle loads of between 15 watts minimum and 375 watts maximum with a suitable heat sink. Lower current SCR's are no cheaper than the 3-ampere units, and the lower current diodes are actually more expensive than the ones specified.

The SCR's are controlled by three line-locked neon-bulb saw-tooth oscillators. The time for capacitors to charge to neon breakdown is determined. (*Continued on page 60*)

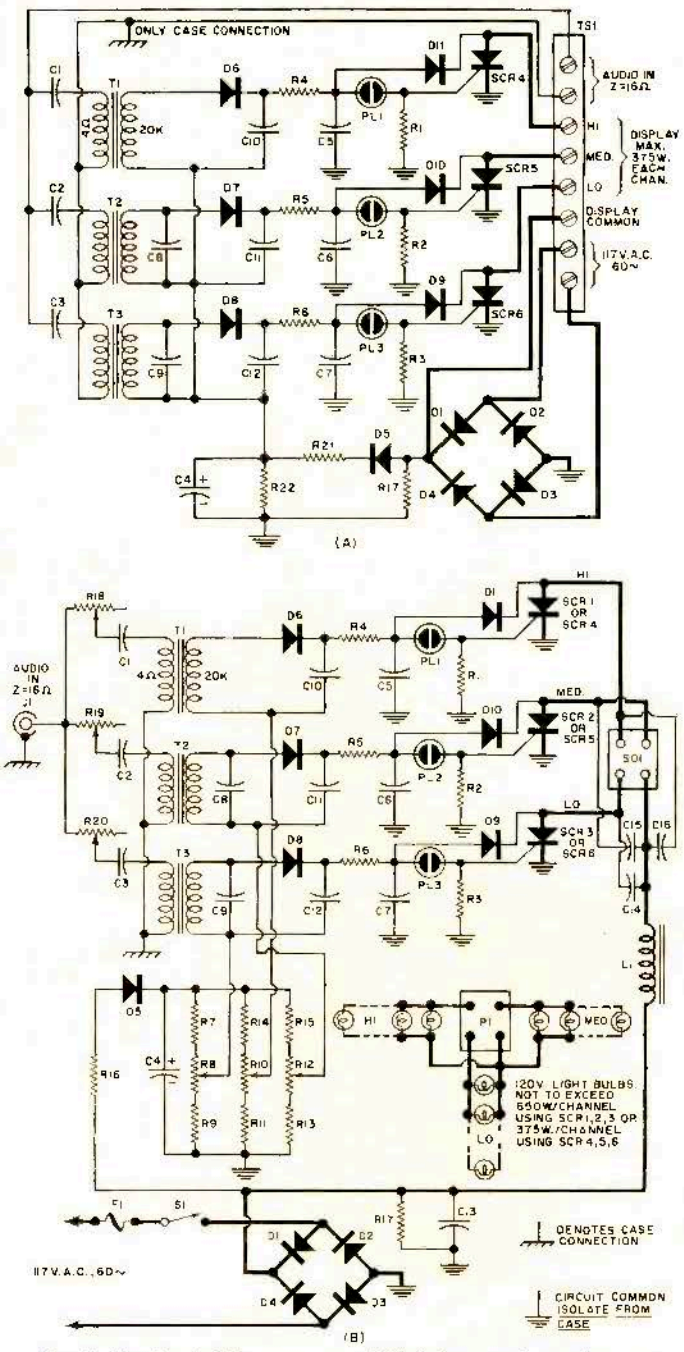

Fig. 1. Circuit of (A) economy and (B) deluxe versions of organ.

R1, R2, R3—1000 ohm, ½ w. res.
R4, R5, R6—100,000 ohm, ½ w. res.
**R7, R9, R11, R13, R14, R15—27,000 ohm, ½ w. res.*
**R8, R10, R12—25,000 ohm linear-taper pot*
**R16—100 ohm, ½ w. res.*
R17—4000 ohm, 5 w. wirewound res.
**R18, R19, R20—50 ohm, 5 w. linear-taper pot*
R21, R22—10,000 ohm, 2 w. res.
C1—10 µf. non-polar. capacitor (Olson Asst. No. AS-552)
C2—25 µf. non-polar. capacitor (see C1)
C3—150 µf. non-polar. capacitor (see C1)
C4—8 µf., 150 v. elec. capacitor
C5, C6, C7—.02 µf. ceramic capacitor
C8—.01 µf. ceramic capacitor
C9, C10—.04 µf. ceramic capacitor
C11—.1 µf. Mylar capacitor
C12—.25 µf. Mylar capacitor
**C13, C14, C15, C16—.01 µf. ceramic capacitor*
PL1, PL2, PL3—NE-2 neon lamp
D1, D2, D3, D4—18-amp. rectifier (Motorola MR3224 and MR3224R. Note: R is a reverse-polarity unit. heat-sink design determines which to use)
D5, D6, D7, D8, D9, D10, D11—750 ma., 200 p.i.v. diode (D1-56, IN2070, or equiv.)
**SCR1, SCR2, SCR3—5-amp, 200 p.i.v. silicon controlled rectifier (Sarkes STCRD or TI 2N1774)*
SCR4, SCR5, SCR6—3-amp, 200 p.i.v. silicon controlled rectifier (Sarkes 3TCRD or TI-1042)
**S1—Heavy-duty switch (10 or 15 amp. Use 15-a, when using SCR1, SCR2, SCR3)*
**F1—8 or 16 amp fuse (use 16-a. with SCR1, SCR2, SCR3)*
T1, T2, T3—Audio output trans. 20,000:4 ohms, 5 w. (Burstein Applebee #13A223)
**L1—22 t. #16 wire on Arnold A-930157-2 core*
**J1—Phono jack*
**SO1—Four-prong socket (Jones S304AB or S404AB when using SCR1, SCR2, SCR3)*
**PL—Four-prong plug (Jones P304CCT or P4043CCT when using SCR1, SCR2, SCR)*
TS1—8-screw terminal strip
**Used only in the deluxe version (Fig. 1B)*