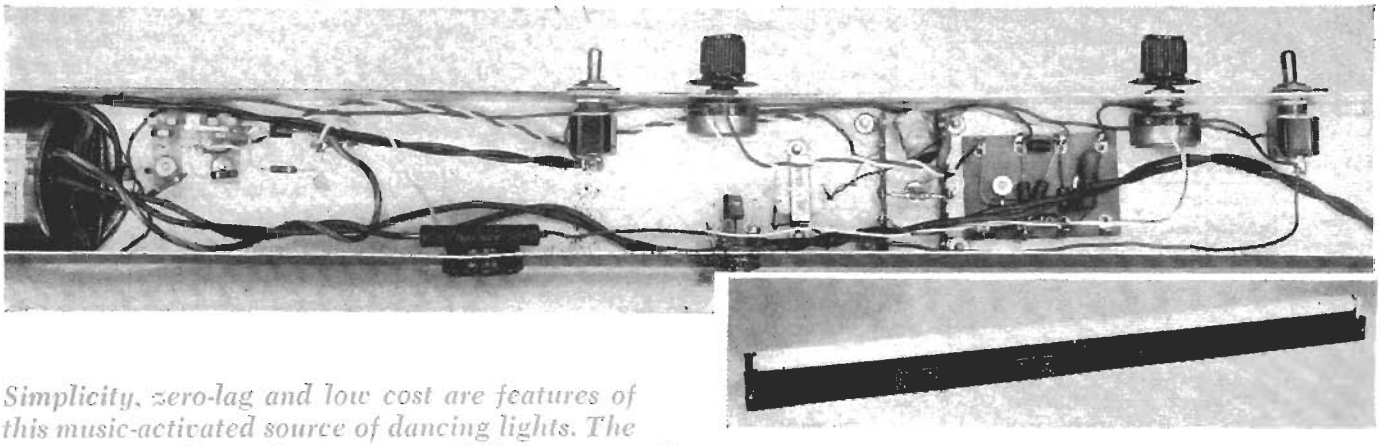
# dancing fluorescent strobe



*Simplicity, zero-lag and low cost are features of this music-activated source of dancing lights. The circuit is capable of driving up to 10 fluorescent tubes.*

**by CHARLES L. ANDREWS**

THE FLUORESCENT LIGHT STROBE AND Music Display is the answer to a lot of problems that plague conventional light displays.

In incandescent displays you always feel that the display is "behind" the music, because of the lag inherent in all incandescent bulbs. This does not happen with fluorescent tubes, since ey are basically a mercury arc with switching times in tenths of microseconds.

With this characteristic, fluorescent tubes are ideal for strobing with music, especially in tubes with a low-persistance phosphors such as blue, daylight, cool white, and blacklight. Although the bright red, green and yellow tubes have a longer persistence than the ones just mentioned, they have a much higher intensity and give a superior strobe effect many times brighter and better than an incandescent bulb.

Another problem with typical 150-watt colored spot lights is that their normal life of 2000 hours is decreased in music displays by as much as 35%. Fluorescent tubes last almost 7500 hours in flashing applications. Another consideration is the vividness of the colored light and the number of colors available. Fluorescent tubes come in 22 different phosphors going thru many shades of red, green, blue, yellow, white, and two types of blacklight. Their intensity and purity of color is unequaled by any spotlight.

Cost of the new tubes ranges from .00 to $3.00, with the exception of ıiter-type black light which is $10.00. This is a considerable reduction from $6.00 for a 150-watt spot light. It's a real bargain when you consider the average lifetimes of the lamps.

Fluorescent tubes are better for certain types of environmental lighting displays—cove lighting, poster displays, direct viewing and floor-mounted stage lighting. Fluorescent tubes are also quite an effective complement to incandescent lighting in many areas.

## Circuit operation

The General Electric dimming ballast provides filament voltage (approximately 3.5–4.5 volts) to the tubes at all times, which allows rapid starting of the tube. When the triac turns on (see Fig. 1) it fires into a typical resonant L–C–R circuit that delivers a pulse of approximately 600 volts to the tube. The width of this pulse is around 120 $\mu$sec and will start the lamp. The voltage then drops to 200 volts or less, depending on the conduction angle of the triac at the time.

At low light levels the current flowing thru the lamp is much less than the holding current of most triacs (10–15 mA). Thus, to get smooth dimming with full range, a resistor or lamp must be a part of the triac load to keep the triac conducting. Switching this load out of the circuit causes a brilliant strobe effect.

The firing circuit is conventional. A bridge rectifier provides full-wave rectification. The Zener diode clips the full-wave pattern at 20 volts. Since a 117-volt wave form is clipped, there is a much greater percentage of the waveform at 20 volts, which allows a much wider range of control than might be possible with a 24-volt transformer.

The 200,000-ohm BACKGROUND control allows full dimming and shut-off of the lamp with no signal applied. It is useful in music and music-strobe applications to set the depth of effect desired.

Input transformer T1 steps up the voltage taken from the speaker terminals. This voltage is rectified by diode D6. This voltage is applied to the 0.1-$\mu$F capacitor and charges it to the firing potential of the unijunction transistor. When the unijunction fires, a positive pulse is applied to the triac through the isolating pulse transformer.

Two alternate diodes are in series with the triac along with a voltage divider to help share any transient voltage during turn-on.

## Using the circuit

Begin by connecting the power and closing switch S2. Now you can vary the 200,000-ohm BACKGROUND control from full-on to full-off with no music input. Next, connect input jack J2 across the speaker terminals. Adjust the sensitivity to the point where there is a fluctuation in light intensity corresponding to the intensity of the music. You may wish to set the "depth" of this effect by adjusting the background control, which will bias the circuit at some level of illumination.

In the MUSIC-STROBE position (S2 open), sensitivity is adjusted so the light flashes with the higher sound levels. In some cases you might want to bias the light in conduction at some minimum level to cut down on the intensity of the strobing action.

A female socket on the back of the fixture allows control of a 100-watt

**PARTS LIST**

**Resistors**
R1—5000 ohms, 3 watts
R2—200,000-ohm, 1-watt potentiometer
R3, R7—2200 ohms, ½ watt
R4—470 ohms, ½ watt
R5, R6—1 megohm, ½ watt
R8—250-ohm, 1-watt, potentiometer
**Capacitor**
C1—0.1 μF, 50V, ceramic
**Semiconductors**
D1, D2, D3, D4—200-PIV, 1-amp silicon rectifiers
D5—20V, 1-watt Zener diode
D6—50 PIV diode
D7, D8—400-PIV, 2-amp Silicon rectifier
Triac—400 PIV, 5 amps
Q1—2N2646 unijunction transistors
**Transformers**
T1—Output transformer; 10-ohm sec., 2,000-ohm pri connected as input transformer (Lafayette 99 F 61012 or equiv.)
T2—Pulse transformer; 1:1 ratio (Sprague 11Z12 or equiv.)
**Miscellaneous**
J1—ac female outlet, chassis mounting
J2—phone jack
S1, S2—spst toggle switch
GE Dimming ballast—89G541
40-watt fluorescent lamp fixture
lamp cord, knobs

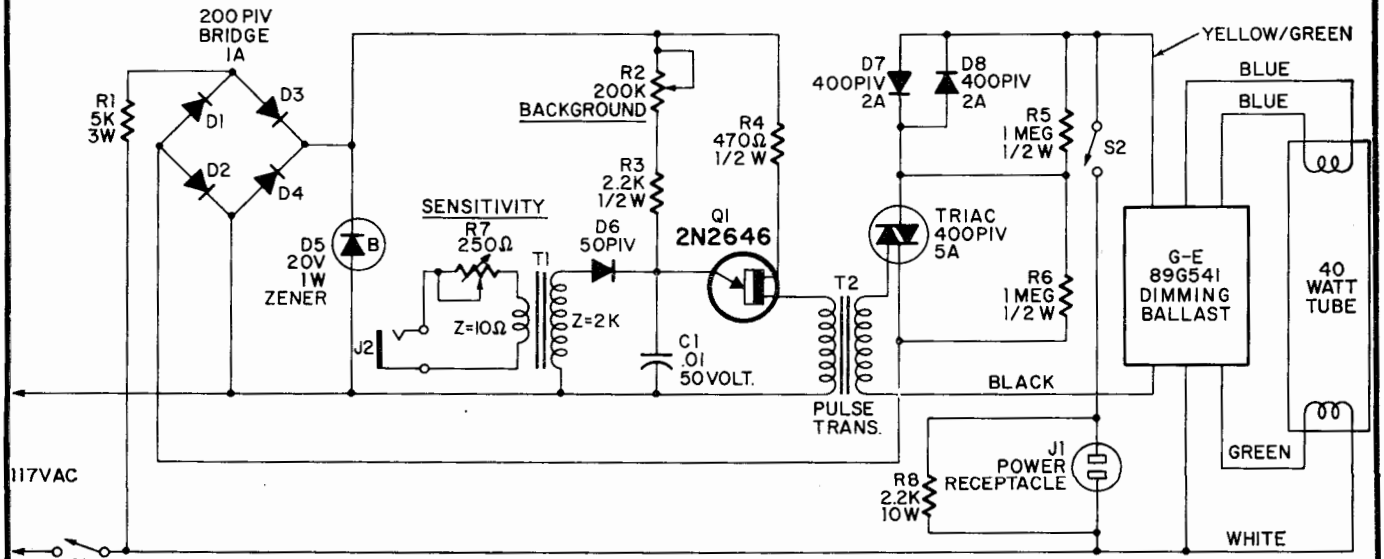



**FIG. 1—FLUORESCENT STROBE schematic shows its simplicity and low cost. C1 is a 0.1 μF, not .01 as on the diagram.**

incandescent spot light in addition to the 40-watt fluorescent lamp.

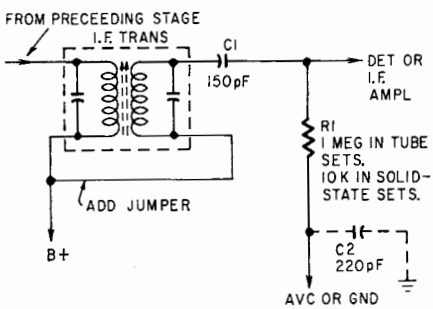
Obviously, any number of triggering devices such as active filters, multivibrators, and passive filters could be substituted for the simple firing circuitry. Just be sure to retain isolation between the triac and the power lines, with a pulse or isolation transformer.

It is also possible to fire multiple tubes by adding parallel ballasts across the triac. A 40-watt lamp draws a maximum of 430 mA, so a 5-amp triac can control as many as 10 additional lamps. **R-E**

# TECHNOTES

## SALVAGING DEFECTIVE I.F.'S

Those miniature i.f. transformers used in radios are notorious for developing leakage between windings. This is, as you might expect, especially true in damp climates. But here's a trick that will get them going again with minimum fuss. This conversion may be applied to either the first i.f. or the second, and in many cases, both at the same time. You will need a 150-pF capacitor (C1) and either a 1-meg resistor for tube sets or a 10,000 ohm unit for the solid-state jobs (R1). In some cases, a 220-pF capacitor (C2) will be needed when the second i.f. is converted. The R1-C2 network takes the place of the avc filter these i.f.'s sometimes have. After you have finished you might have to make a touchup alignment. This trick has saved me the trouble of getting many special transformers. Try it!—*Gary McClellan*




## PORTABLE ANTENNA DROOP

To prevent portable TV antennas from drooping when extended, coat the ball socket with a mixture consisting of rosin dissolved in alcohol. —*Sylvania Service Notebook*

## RCA CTC 22AD PULSE REGULATOR

In early-production versions of the CTC 22AD, if failure of the 17KV6 pulse regulator causes cathode resistor R412 to open, the set may operate, with marginal picture quality after the tube is replaced. The symptoms would be those associated with reduced horizontal drive.

Later production sets have the changes shown in the simplified schematic. Changing the B-plus source point for screen grid resistor R404 and the sound detector to the cathode end of R412 (as shown) shuts down horizontal deflection and sound detector circuits in the event of R412 failure. Symptoms for R412 failure in sets with these changes are: no sound, no raster.—*RCA Television Service Tips* **R-E**