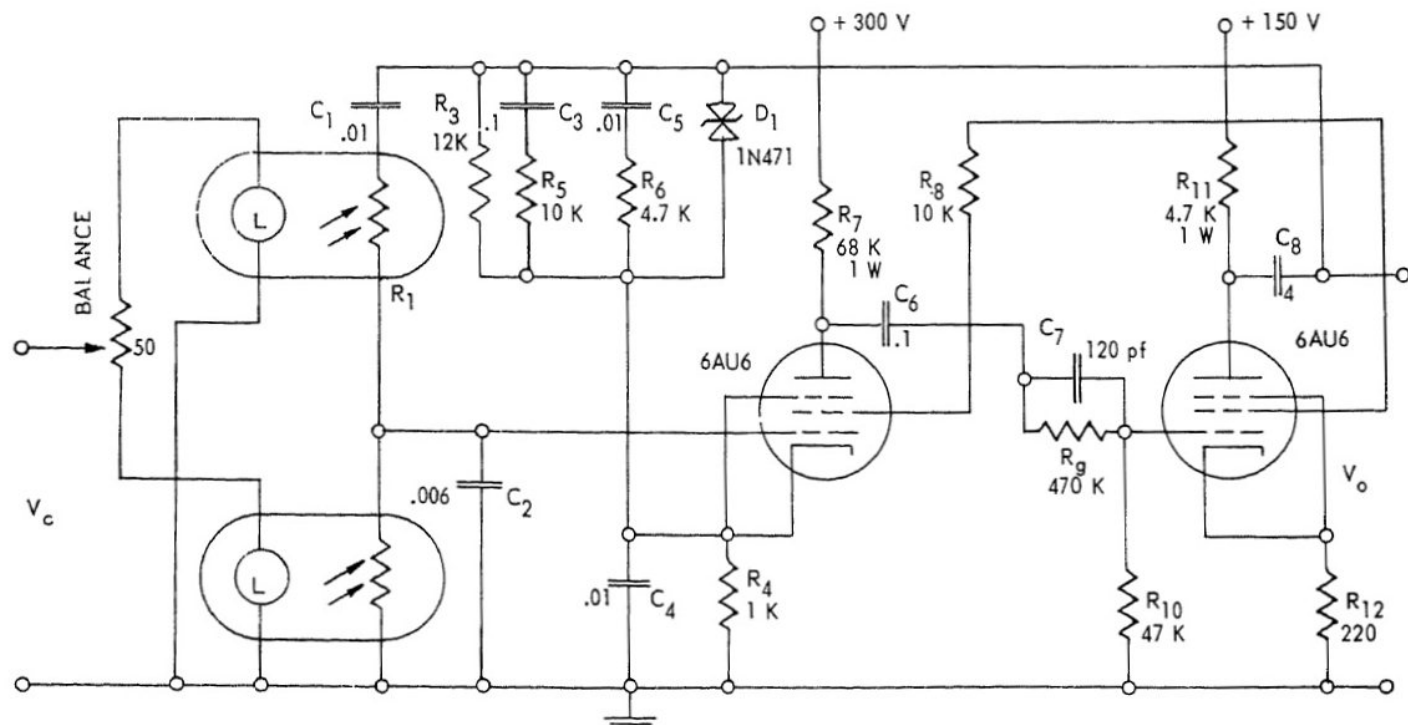
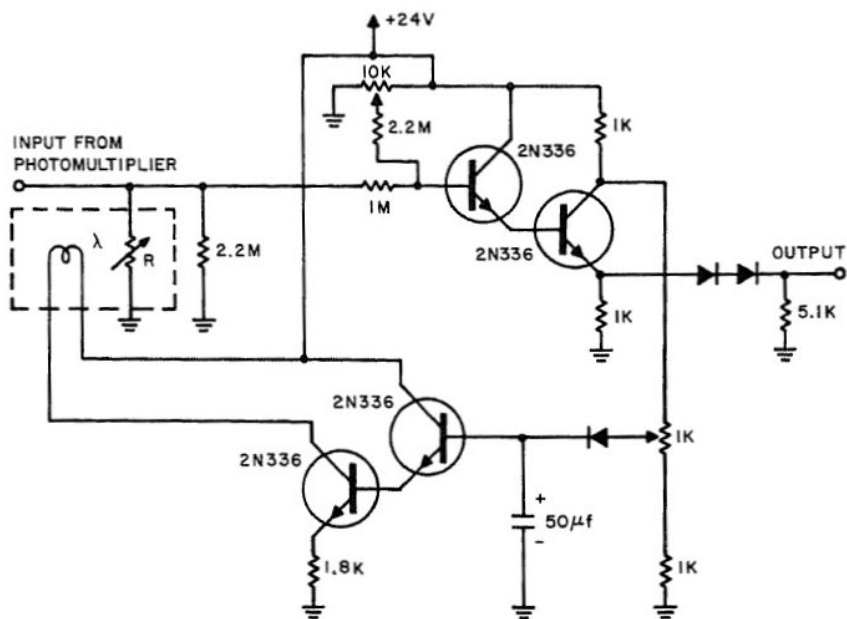


Optoelectronic Circuits

FAX PHOTOMULTIPLIER AMPLIFIER—Raytheon Raysistor lamp-photoconductor, similar to CK1116 but with extremely small filaments for fast response (dashed box), improves response speed of baseband photomultiplier amplifier for AN/GXC-5 portable facsimile system that transmits graphic material. Diodes can be 1N2069.—H. Weisbecker, Designing a Feedback System? Control It With a Photo Emitter-Sensor, *Electronic Design*, Aug. 30, 1965, p 32 and 34-35.

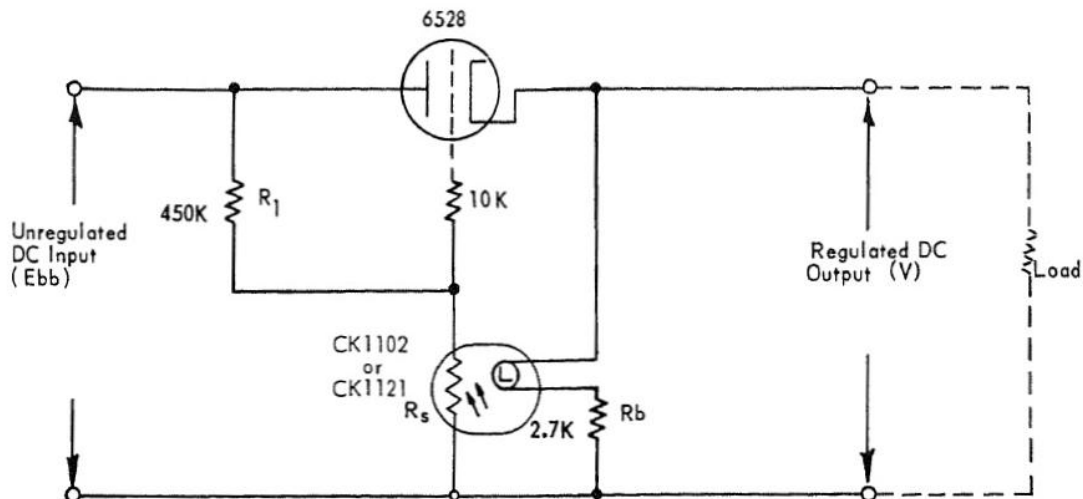


WIEN-BRIDGE VCO—Changing d-c control voltage applied to lamps of CK1102 or CK-1112 Raysistor pair changes values of photo-

cell resistances in arms of bridge, to vary output frequency over range of 10 Hz to 50 kHz. Output has constant amplitude within

1 dB and is reasonably sinusoidal.—Raysistor Optoelectronic Devices, Raytheon, Quincy, Mass., 1967, p 20.

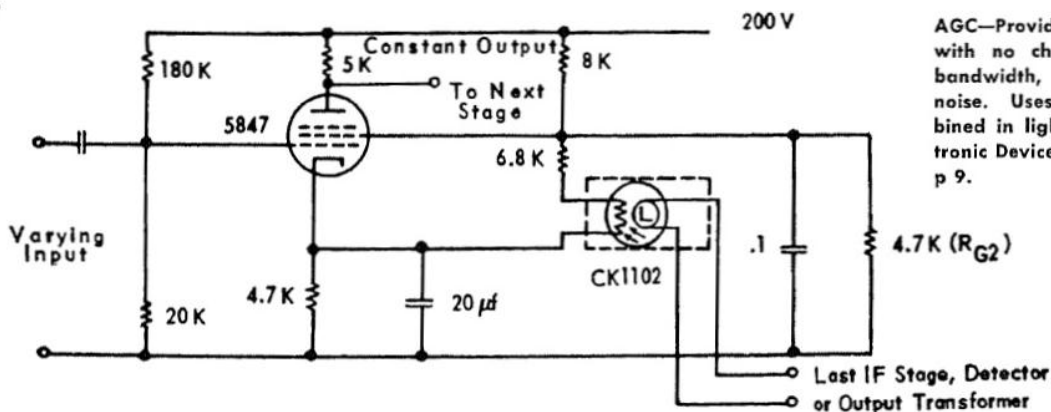
OPTOELECTRONIC CIRCUITS



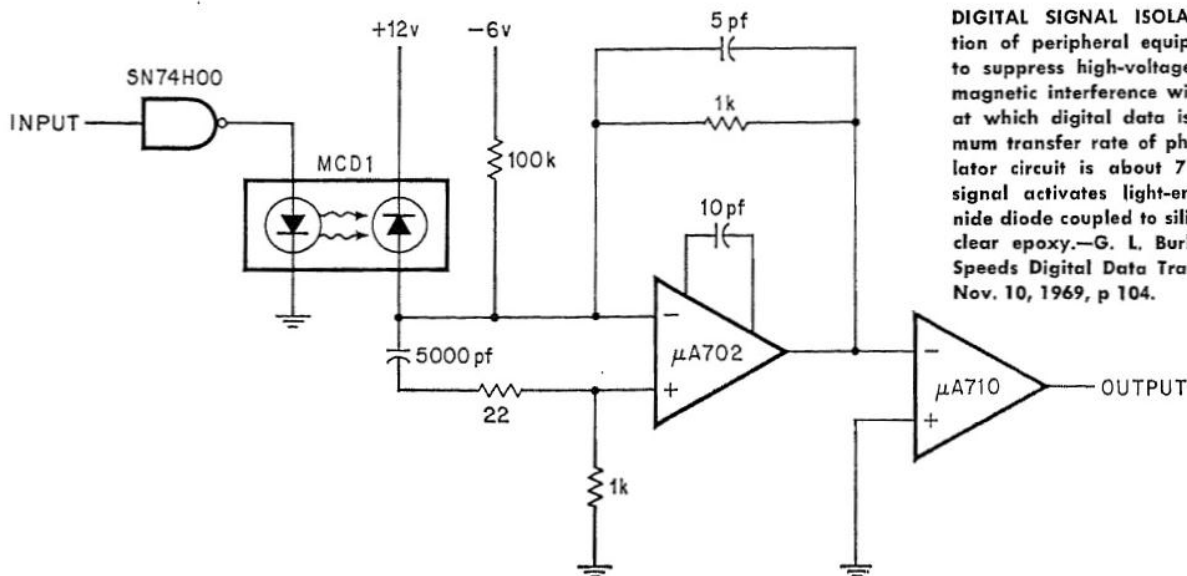
RAYSISTOR CONTROL—Uses combination lamp and photocell in single package to sense output voltage and apply appropriate controlled

voltage to grid of series regulator triode. Report gives design calculations. Good regulation is obtained for 100 V d-c output

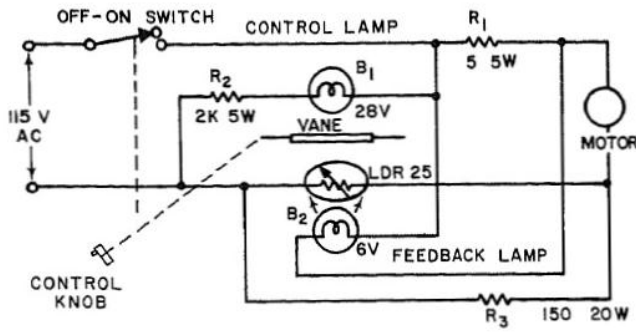
when input varies from 200–400 V.—Raysistor Optoelectronic Devices, Raytheon, Quincy, Mass., 1967, p 13.



AGC—Provides 20 dB dynamic control range, with no change in frequency response or bandwidth, good isolation, and no added noise. Uses light source and photocell combined in light-tight case.—Raysistor Optoelectronic Devices, Raytheon, Quincy, Mass., 1967, p 9.

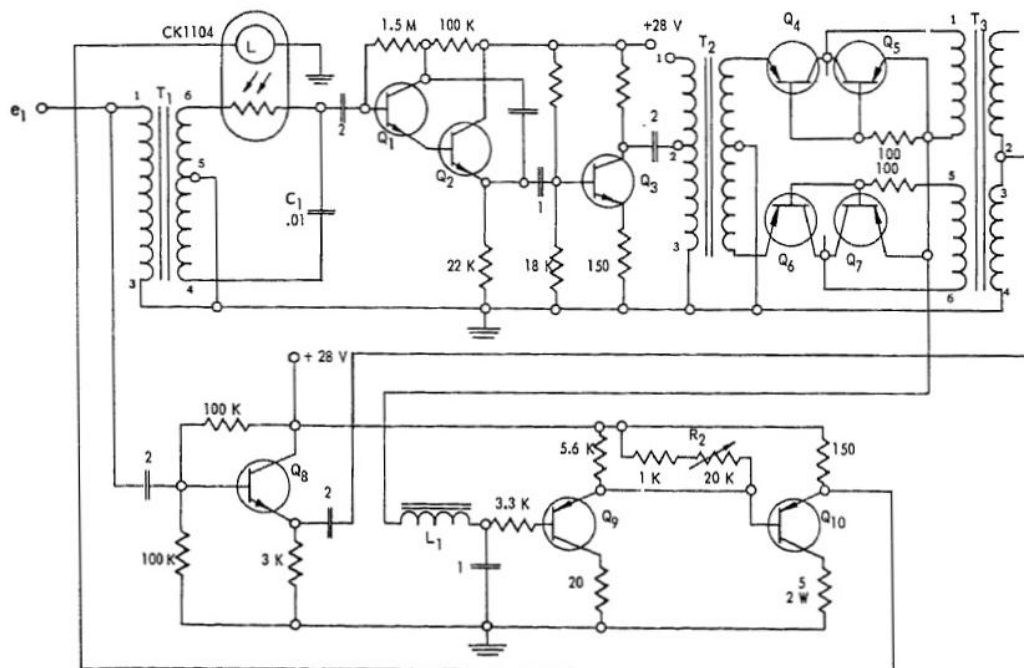
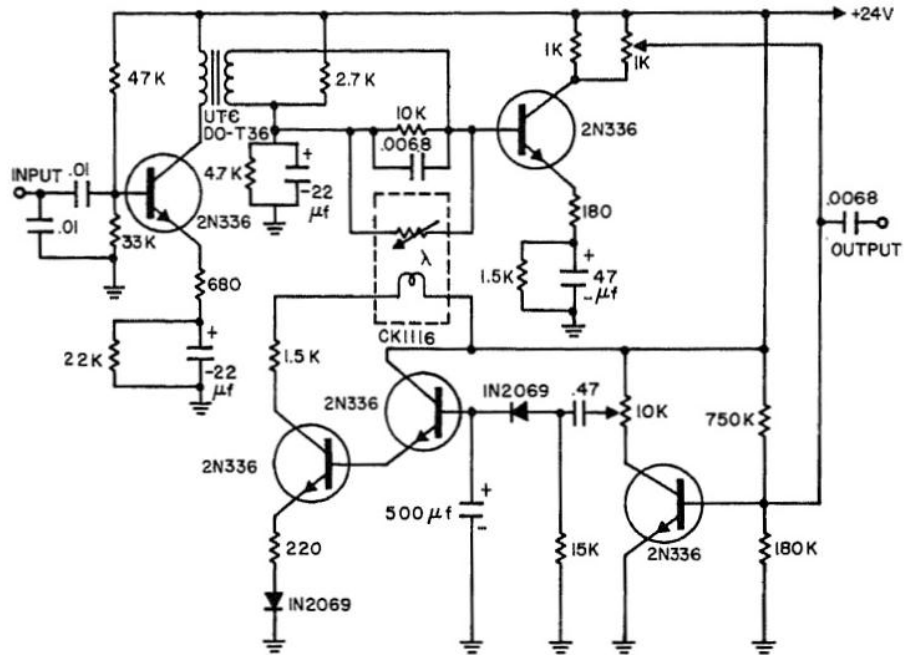


DIGITAL SIGNAL ISOLATOR—Provides isolation of peripheral equipment from computer to suppress high-voltage effects and electromagnetic interference without affecting speed at which digital data is transmitted. Maximum transfer rate of photodiode-coupled isolator circuit is about 7 MHz. Digital input signal activates light-emitting gallium arsenide diode coupled to silicon diode detector by clear epoxy.—G. L. Burkart, *Optical Isolator Speeds Digital Data Transmission*, *Electronics*, Nov. 10, 1969, p 104.



PHOTOELECTRIC APPLIANCE CONTROL—Low-cost speed control for small universal motor in kitchen appliances or for lamp loads up to 60 W requires only cadmium sulfide cell, lamp, and knob-controlled vane. Additional 6-V lamp provides optoelectronic feedback for speed regulation. Performance equals that of two scr's back-to-back.—Bargain Components, *Electronic Design*, Oct. 12, 1964, p 44-45.

BACKGROUND CONTROL FOR A-M FAX—Raytheon CK1116 lamp-photoconductor (dashed box) and Darlington in feedback loop provide background control for a-m facsimile signal generated in AN/GXC-5 portable facsimile system for transmitting graphic material. Also generates audio frequency-shift signal between 1,500 and 2,300 Hz, below 2,400-Hz a-m carrier. Output may be transmitted by radio or over phone lines. Article gives design equations.—H. Weisbecker, *Designing a Feedback System? Control It With a Photo Emitter-Sensor*, *Electronic Design*, Aug. 30, 1965, p 32 and 34-35.

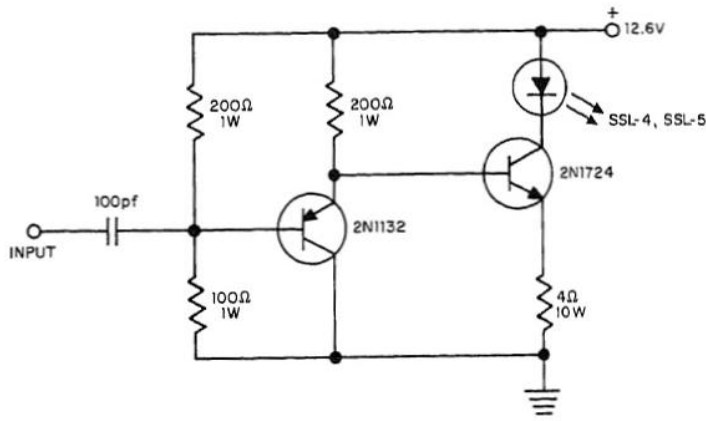


AUDIO PHASE SHIFTER—Raysistor serves as variable resistance in servo loop, to provide constant phase shift of 90 deg within 2 deg

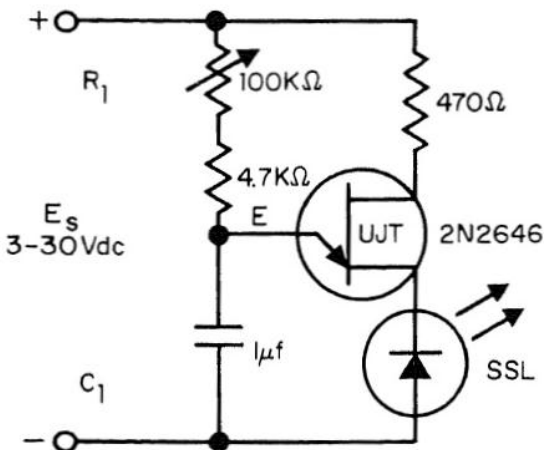
from 200 to 2,000 Hz. Initial control voltage applied to Raysistor lamp, value of C1, and operating frequency range are mutually in-

terdependent, and affected by choice of transistors.—Raysistor Optoelectronic Devices, Raytheon, Quincy, Mass., 1967, p 23.

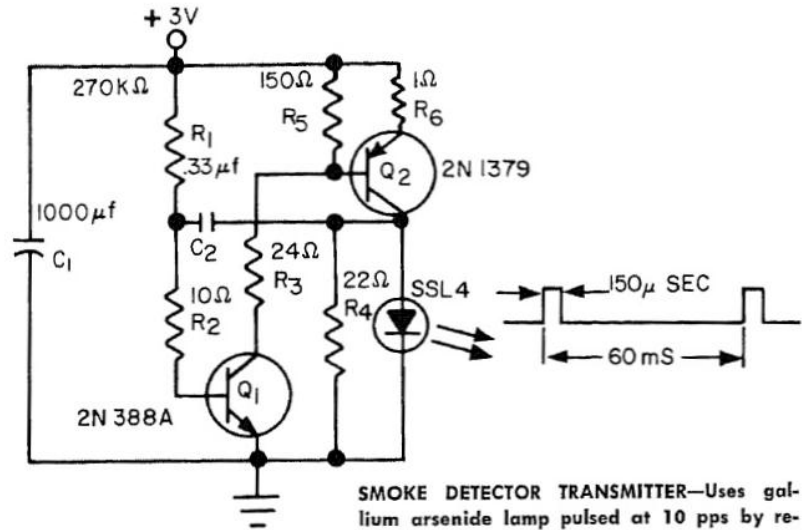
OPTOELECTRONIC CIRCUITS



LIGHT-BEAM MODULATOR—Two-transistor modulator is linear up to 80% modulation of light beam generated by gallium arsenide solid-state lamp. Bandwidth is 30 Hz to 250 kHz.—L. M. Hertz, Solid State Lamps—Part II, General Electric, Cleveland, Ohio, No. 3-0121, 1970, p 8.

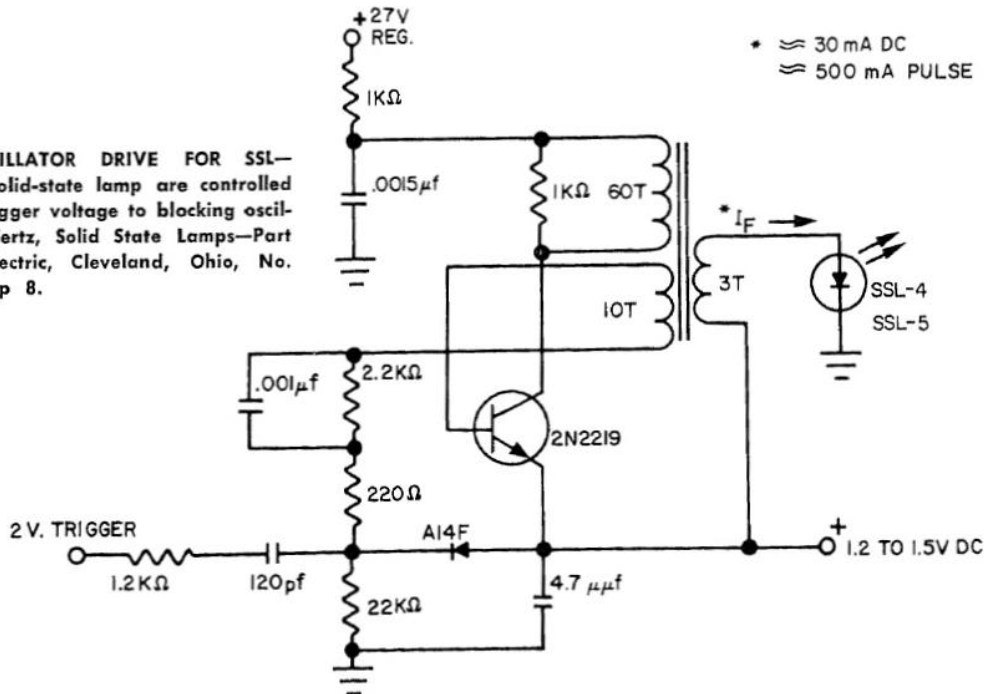


LAMP DRIVE—Simple ujt pulse generator gives 20-ms fast-rise pulses for driving solid-state lamps. R1 changes frequency, and C1 changes frequency range and pulse width. With 15-V supply, frequency range is 10 to 200 pps.—L. M. Hertz, Solid State Lamps—Part II, General Electric, Cleveland, Ohio, No. 3-0121, 1970, p 23.

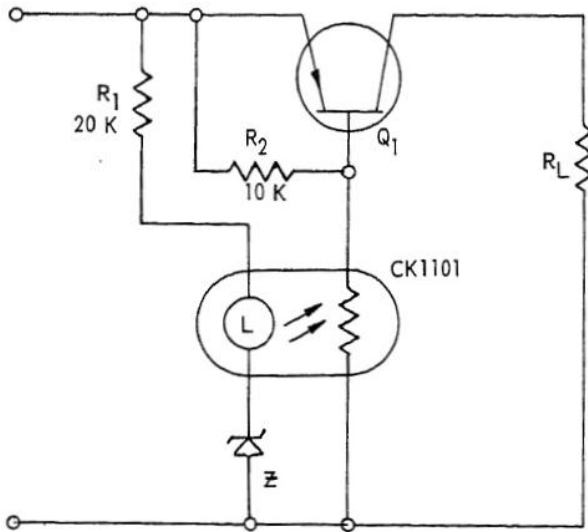
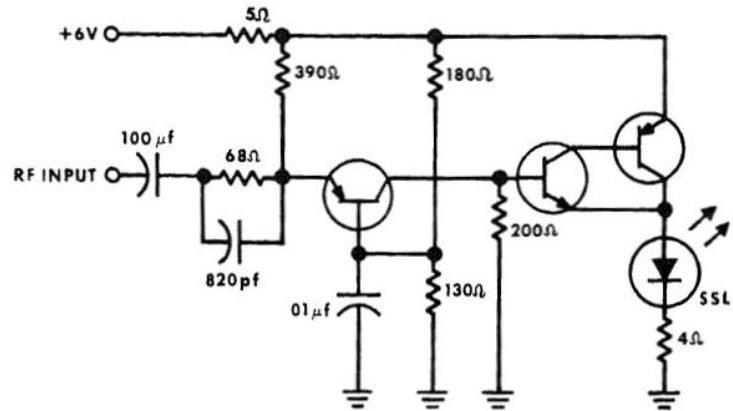


SMOKE DETECTOR TRANSMITTER—Uses gallium arsenide lamp pulsed at 10 pps by relaxation oscillator Q1-Q2. Draws only 0.7 mA from pair of D flashlight cells. Used with four mirrors to provide 8-inch optical path to sensor in receiver.—L. M. Hertz, Solid State Lamps—Part II, General Electric, Cleveland, Ohio, No. 3-0121, 1970, p 31.

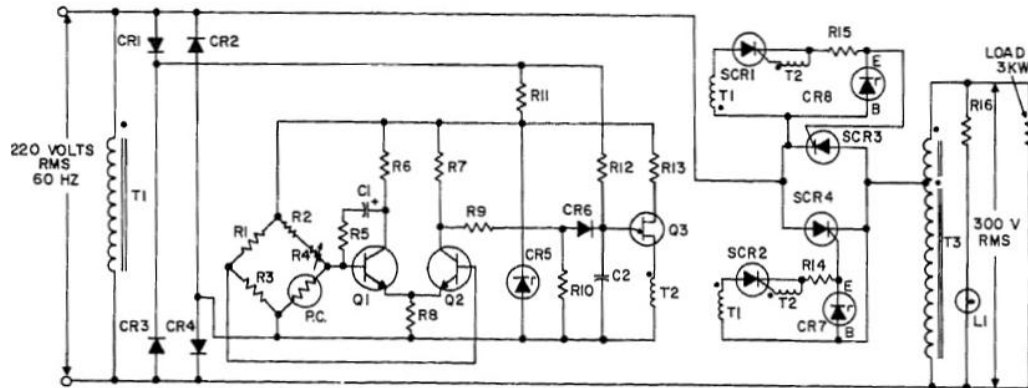
BLOCKING-OSCILLATOR DRIVE FOR SSL—Flashes from solid-state lamp are controlled by applying trigger voltage to blocking oscillator.—L. M. Hertz, Solid State Lamps—Part II, General Electric, Cleveland, Ohio, No. 3-0121, 1970, p 8.



LIGHT-BEAM MODULATOR—Gallium arsenide solid-state lamp can be modulated at frequencies up to 100 MHz, depending on SSL used, with conventional r-f transistor power amplifier. Transistor types depend on frequency and on power requirements of SSL used.—L. M. Hertz, Solid State Lamps—Part II, General Electric, Cleveland, Ohio, No. 3-0121, 1970, p 6.



UNDervoltage PROTECTION—When supply voltage drops below predetermined level established by zener, voltage across neon lamp in Raysistor drops below extinguishing voltage and it goes out, increasing photocell resistance and turning off transistor Q1, to drop load current essentially to zero.—Raysistor Optoelectronic Devices, Raytheon, Quincy, Mass., 1967, p 26.

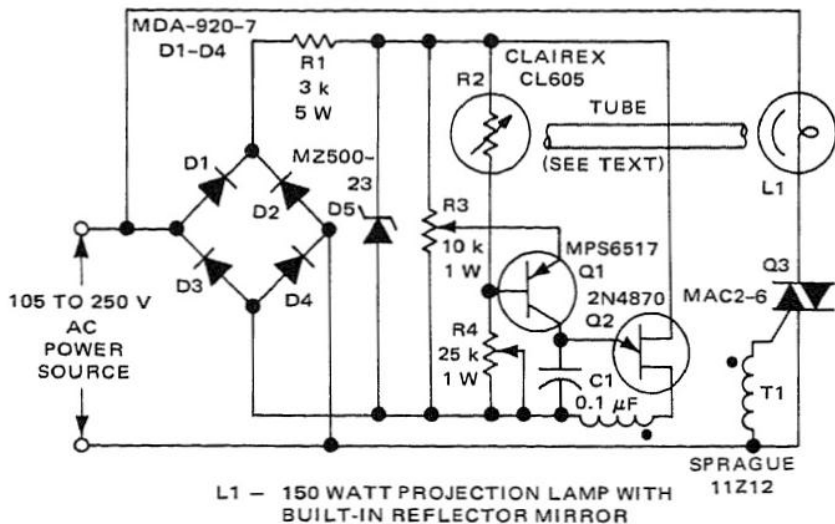


3-KW A-C VOLTAGE REGULATOR—Holds a-c load voltage constant at 300 V for a-c line voltage drop from 220 V to 190 V, and allows output to drop only 1.5 V for input jump to 250 V. Lamp L1 across load, sealed into photocell PC as GE PL5B1, gives sensing of phase-controlled true rms load voltage, which is initially adjusted to desired 300 V by trim-pot R4 in bridge. Article describes circuit operation in detail, tells how to adapt for soft-start during initial transient condition when circuit is turned on, and shows how to use as current regulator.—J. L. Brookmire, AC Voltage or Current Regulator Featuring Closed-Loop Feedback Control, General Electric, Syracuse, N.Y., No. 200.46, 1966.

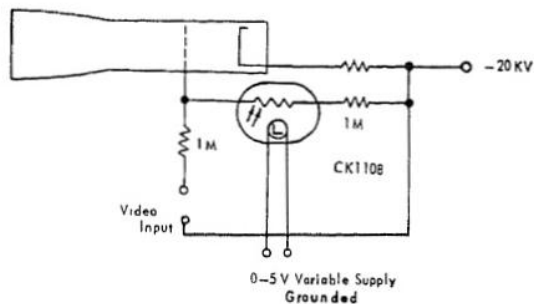
ALL RESISTORS $\pm 10\%$ AND 1/2 WATT EXCEPT WHERE MARKED

- CR1 THRU CR4 - G.E. A13D OR A14D
- CR5 - G.E. Z4XL22
- CR6 - G.E. A13F OR A14F
- CR7 - CR8 - G.E. 16L1423
- C1 - 10MF, 25 VDC G.E. 62F204 MINIATURE TUBULAR WET SLUG CAP.
- C2 - 0.22 UF, 50 VDC $\pm 10\%$ G.E. 75F385-244A
- Q1 - Q2 - G.E. 2N2925
- Q3 - G.E. 2N2646
- SCR1 - SCR2 - G.E. C6U or C106Y
- SCR3 - SCR4 - G.E. C135E OR C35E
- T1 - 220 V RMS PRIMARY 12 V RMS SECONDARY 100 MA RMS RATED SECONDARY CURRENT

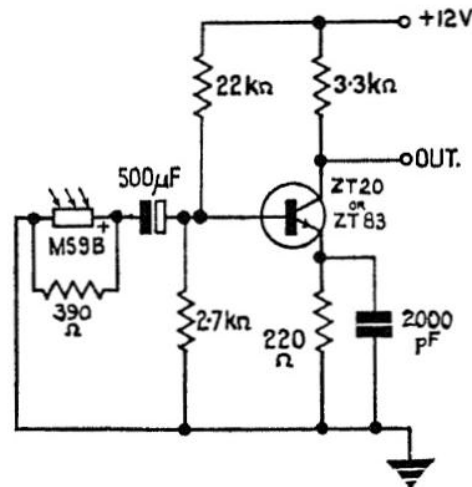
- T2 - PULSE TRANSFORMER 1:1:1 ALADDIN PART NO. 90-2398
- T3 - TURNS RATIO 1:1.82 4KVA
- R1 - 22K
- R2 - 2.2K
- R3 - 18K
- R4 - 10K MULTI-TURN TRIM POT
- R5 - 10K
- R6 - 2.2K
- R7 - 2.2K
- R8 - 2.2K
- R9 - 5.6K
- R10 - 47K
- R11 - 8.2K, 10 WATT
- R12 - 1.5MEG
- R13 - 1K
- R14 - R15 - 220 OHM
- R16 - 9K $\pm 5\%$, 14 WATTS



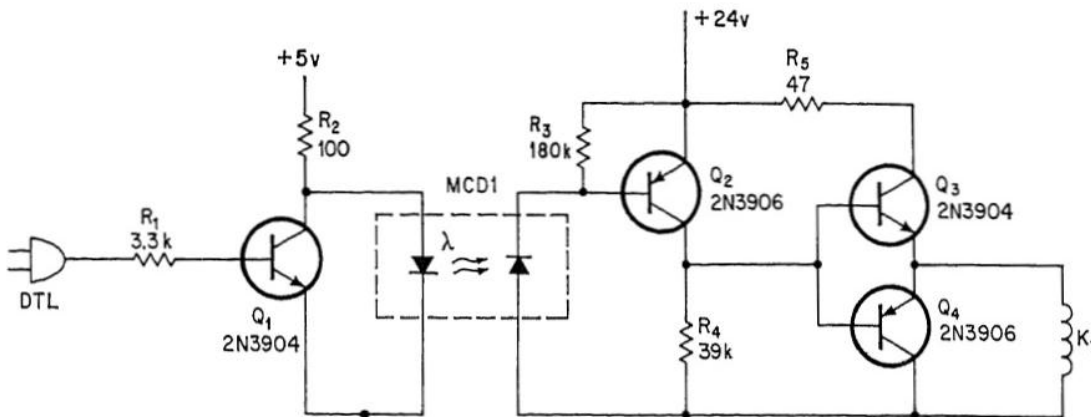
100-V REGULATOR FOR PROJECTION LAMP— Holds rms voltage across 150-W lamp within 2% of 100 V rms for all input voltages between 105 and 250 V a-c. Uses photoelectric feedback to firing circuit Q1-Q2 which controls conduction angle of triac Q3. Photocell senses red glow of back of reflector inside lamp, as heated by filament, to get integration of light output by mass of reflector and thereby eliminate 60-Hz modulation of filament.—“Semiconductor Power Circuits Handbook,” Motorola, Phoenix, Ariz., 1968, p 3-27.



AUTOMATIC CONTRAST CONTROL—When lamp of Raysistor is energized by amplified video signal, automatic contrast control is obtained over range of 60 dB along with up to 25 kV isolation. Lamp filament provides automatic averaging effect because of its thermal inertia.—Raysistor Optoelectronic Devices, Raytheon, Quincy, Mass., 1967, p 15.



TAPE READER FOR PULSED LIGHT CIRCUITS— Designed for use with gallium arsenide and gallium phosphide lamps that can be pulsed at high repetition rates, to give low-drift performance of chopper amplifier without using chopper transistor. With low duty cycle, higher peak light intensities can be obtained than are available from fixed light sources. Can also be used for reading punched cards.—Silicon Photocell Applications, Ferranti Ltd., Oldham, Lancs., England, No. 9, 5/67, p 10.



RELAY ISOLATOR—Gallium arsenide light-emitting diode, optically coupled to silicon p-i-n photodiode, combine to produce complete electrical isolation between IC driver

and 400-ohm relay, thus eliminating relay noise and spikes. With no light reaching photodiode detector through light pipe, photodiode is at maximum impedance of 5 g-

ohms, Q2 and Q3 do not conduct and relay is not energized.—W. Otsuka, Photodiode Coupled Pair Isolates DTL from a Relay, *Electronics*, July 21, 1969, p 82.