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Your Personal Record of

SEMINAR APPLICATION INFORMATION

FROM THE SEMICONDUCTOR PRODUCTS DEPARTMENT

Economy Power Semiconductor Applications

by

F. W. Gutzwiller and E. K. Howell

Auburn, N. Y.

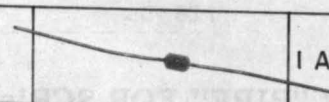
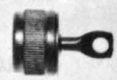
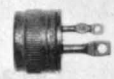
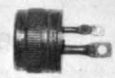
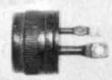
GENERAL ELECTRIC

SOME APPLICATIONS "RIPE" FOR SCR's AND TRIAC's

Furnace Controls
Alarm Systems
Automatic Battery Chargers
Industrial Ovens
Over/Under Temperature Protection
Automatic Programmers, Sequencers
Motor Starters
Lamp Dimming
Ignition Circuits
Light Level and Aperture Controls
High Power Pulse Modulators
Exciters
Emergency Lighting and Power
Tachometers
Precision Welding
Ultrasonic Generators
Voltage Regulators
Overvoltage/Overcurrent Protection
Machine Tool Controls
Electric Signs
Timers
Low Noise Static Switching
Vending Machines
High Performance Space Heating
Traffic Control
High Frequency Lighting
Motor Speed Controls

MOTOR SPEED CONTROL APPLICATIONS

Appliances
Portable Tools
Battery Operated Vehicles
Process Equipment
Materials Handling
Air Moving
Refrigeration
Floor Polishers
Servo Drives
Vending Machines
Construction Equipment
Pumps
Business Machines
Cranes, Hoists
Elevators
Laundry Equipment
Sewing Machines
Textile Machinery
Whiteprint Machines
Winding Machines
Mining Equipment
Automotive Accessories

RECTIFIER	A13		1 AMP, UP TO 600 VOLTS
	A44 A45	 *	20 AMPS, UP TO 600 VOLTS (REVERSE POLARITY ALSO AVAILABLE)
ZENER DIODE	Z4XL		1 WATT, 6.2-22 VOLTS
SCR	C6		1.6 AMPS RMS, UP TO 200 VOLTS (ALSO AVAILABLE ON DIAMOND BASE)
	C22	 *	7.4 AMPS RMS, UP TO 400 VOLTS
	C32	 *	25 AMPS RMS, UP TO 400 VOLTS
TRIAC	SC41	 *	6 AMPS RMS, UP TO 400 VOLTS
	SC46	 *	10 AMPS RMS, UP TO 400 VOLTS

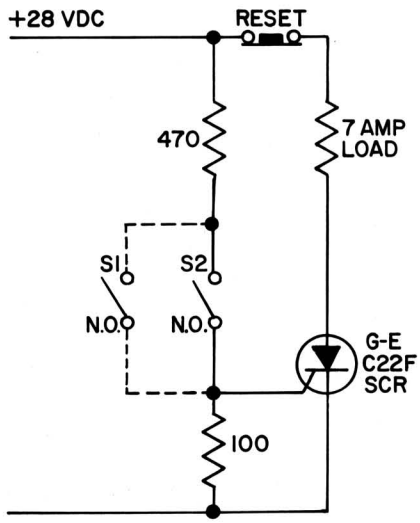
STATIC POWER SWITCHING

Advantages

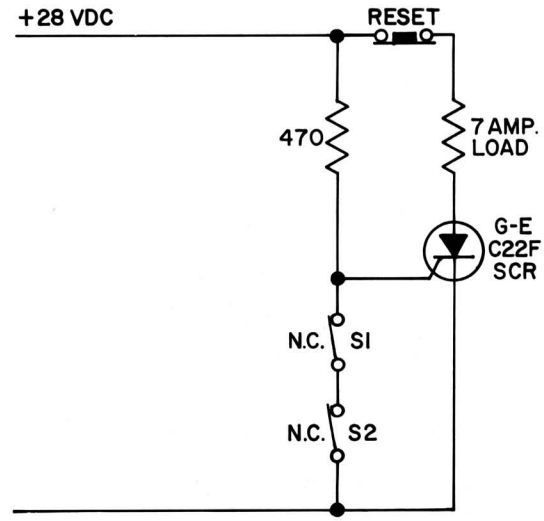
-- No bounce
-- Less noise, RFI
-- Low maintenance, no wear
-- No arcing, ideal for explosive atmospheres
-- Shock, vibration proof
-- Can be mounted in any orientation
-- High speed
-- Smaller size in many applications
-- Easily adaptable to special space factors
-- Ideal for programming, timing
-- Lowest cost in many applications
-- High power gain
-- Easy to prototype with standard components

Limitations

-- 0.5 to 1.0 volt contact drop
-- Complexity for multiple poles
-- Isolation between signal and power circuits difficult in many applications



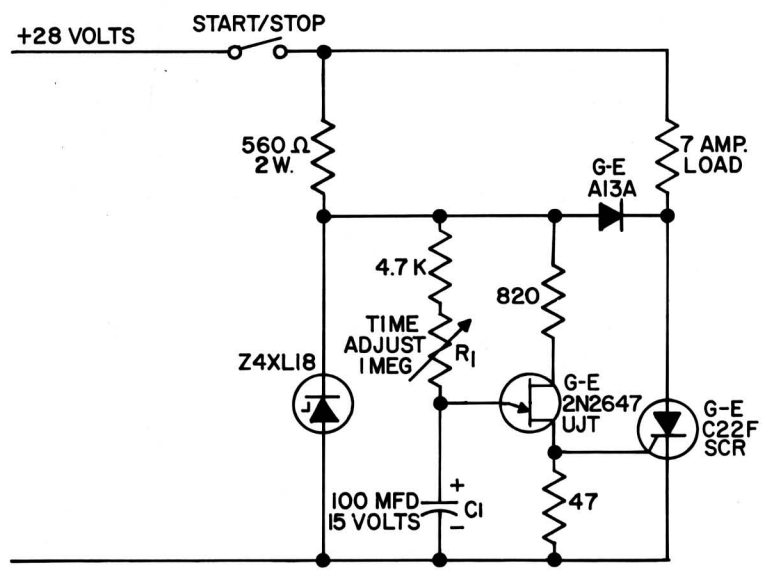
MOMENTARY CLOSING OF S1 OR S2
TRIGGERS SCR.



MOMENTARY OPENING OF S1 OR S2
TRIGGERS SCR.

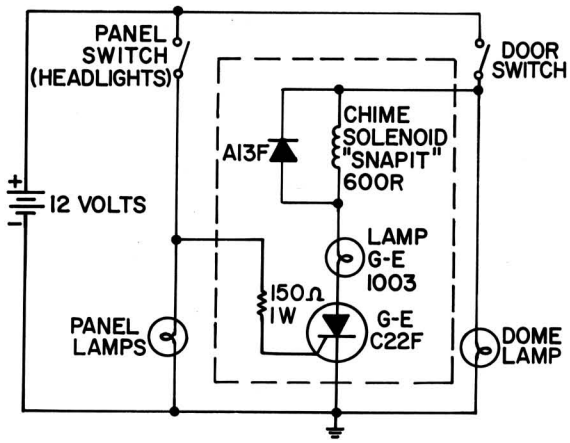
DC Latching Switches

For alarms, circuit breaker tripping, protective circuits, indicator and annunciator lights, electronic "crowbars", automatic transfer switches, squib firing, etc.



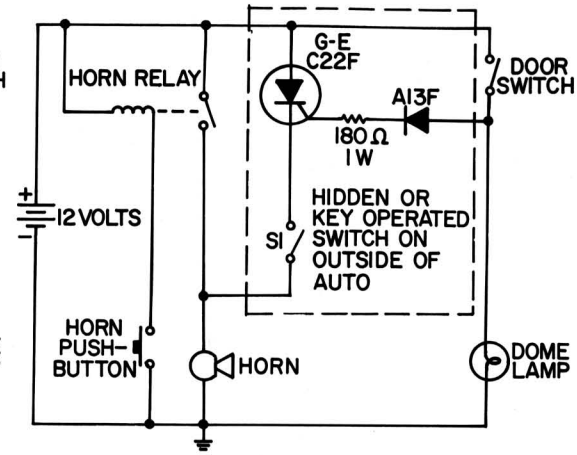
High Precision DC Time Delay Relay (1 second to 1 minute)

For appliances, process equipment, photography, industrial controls, traffic controls, starting sequences, alarm systems, etc. For shorter time ranges, reduce R1 and C1. For delays longer than one minute, see Section 7.12.3, 3rd Edition SCR Manual.



THE BATTERY-SAVER

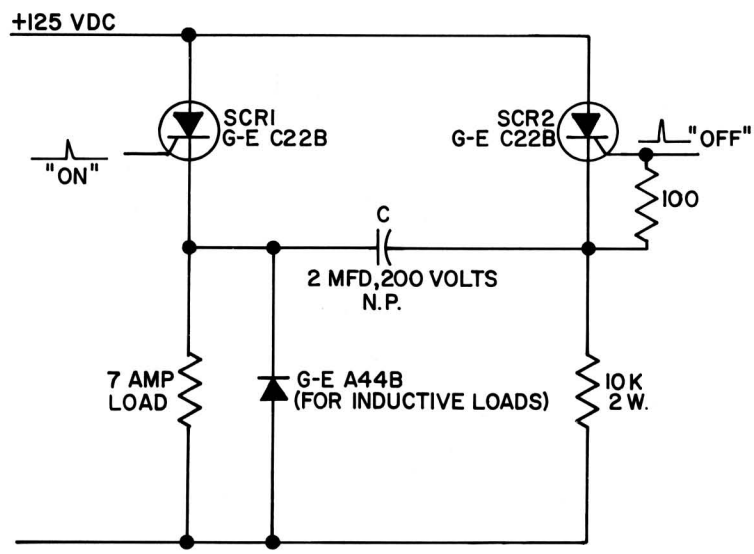
CHIME RINGS WHEN DOOR IS OPENED WITH HEADLIGHTS ON···A GENTLE REMINDER TO TURN THEM OFF.



HORNBLOWER AUTOMOTIVE BURGLAR ALARM

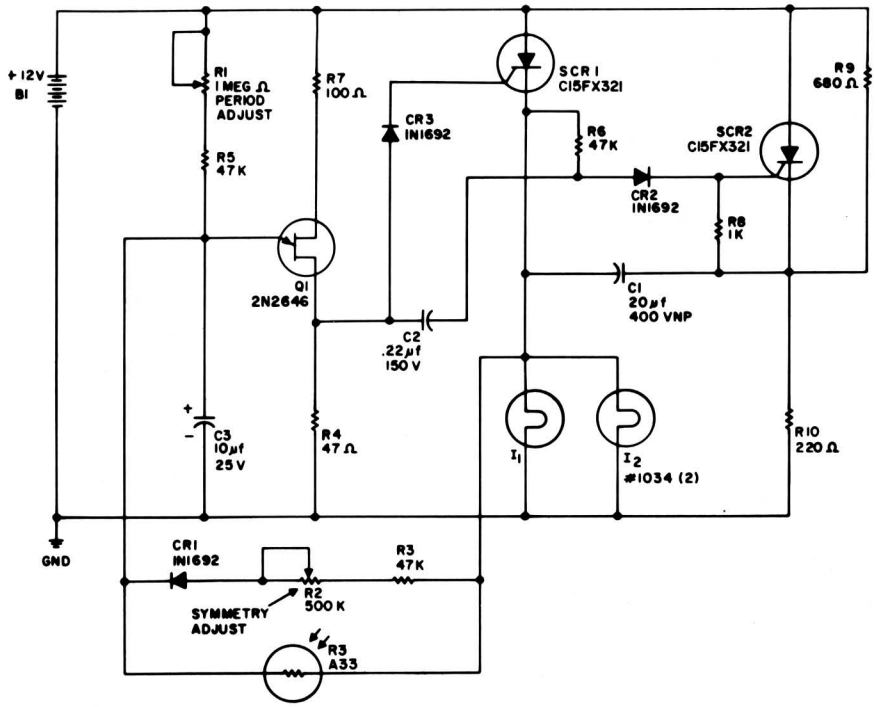
WHEN SWITCH SI IS SET (CLOSED), OPENING OF DOOR STARTS HORN BLOWING WHICH CAN ONLY THEN BE STOPPED BY OPENING SI.

Latching Power Logic Applications for Automobiles



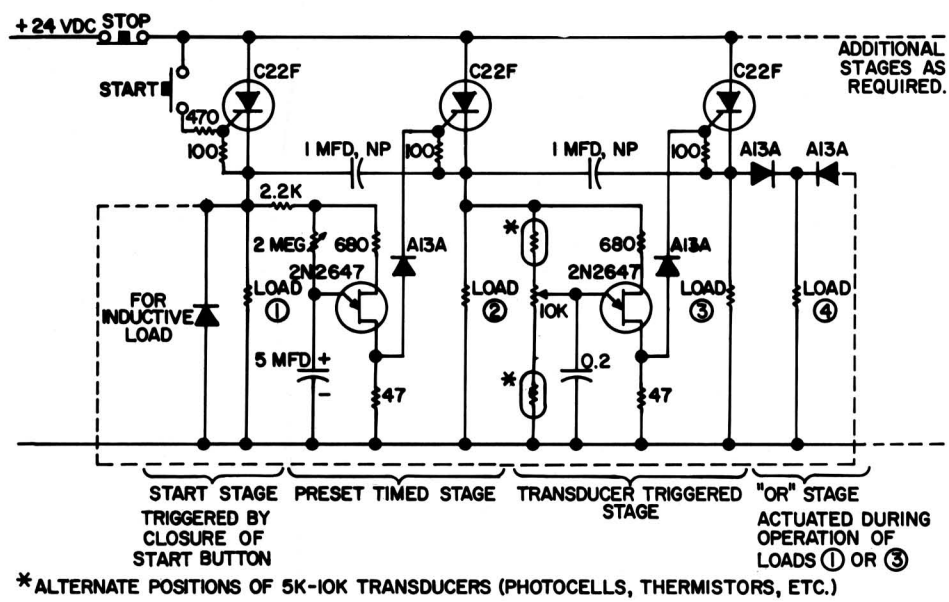
DC Static Switch, Flip-Flop, Latching Relay

For transfer switches, flashers, heavy duty cycle relay applications, contactor and solenoid drivers, heater controls, fast circuit breakers for electronic power supplies, power multivibrators, programmers, etc.



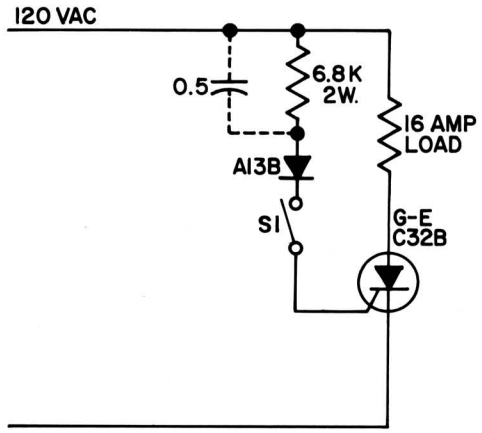
High Power, Battery-Operated Flasher With Photoelectric Control

36-40 watt output, variable flash rate up to 60 flashes per minute, independent control of on and off times, and photoelectric daylight control to shut flasher off during day and thereby increase battery life. Features C15FX321, very low cost SCR rated 4.7 amps average current at 60°C stud temperature, 50 volts PRV/VBO, maximum trigger current at 25°C = 40 ma.

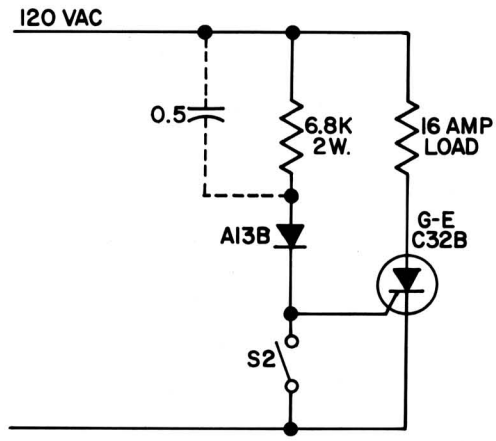


Sequence Programmer and Power Driver

Adaptable to timed or transducer-triggered intervals. Ideal for industrial process controls, traffic controls, appliances, reproduction and photographic processes, vending machines, automatic starting and stopping controls, educational machines, etc. With indicated 1 μfd commutating capacitors, loads up to one ampere can be handled. Typical loads: heaters, motors, solenoids, valves, relays, and lamps.



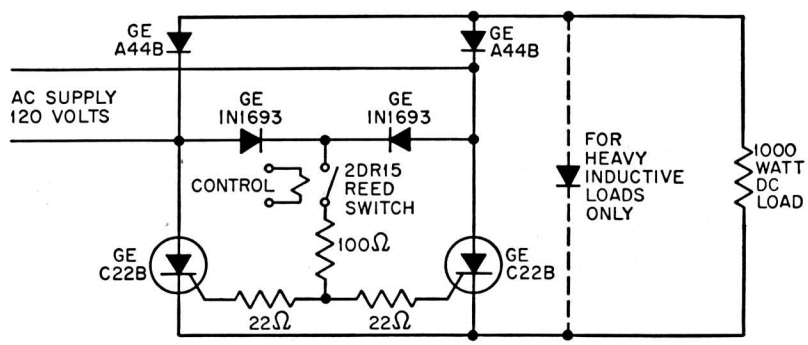
NORMALLY "OPEN"



NORMALLY "CLOSED"

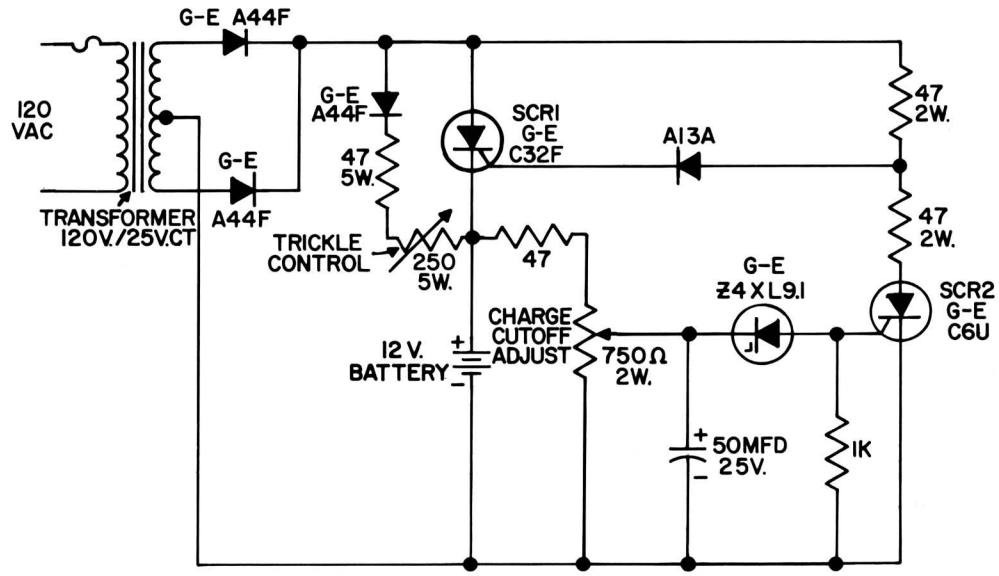
Half Wave Static Power Switch

For heater loads, contactor drivers, limit switches, and wherever half wave AC power must be switched. Top end of 6.8 K resistor can also be connected to anode of SCR for minimum gate losses when SCR is energized.



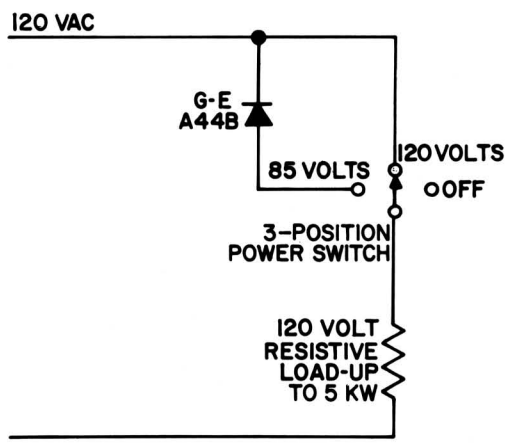
1 KW Static Switch and Rectifier

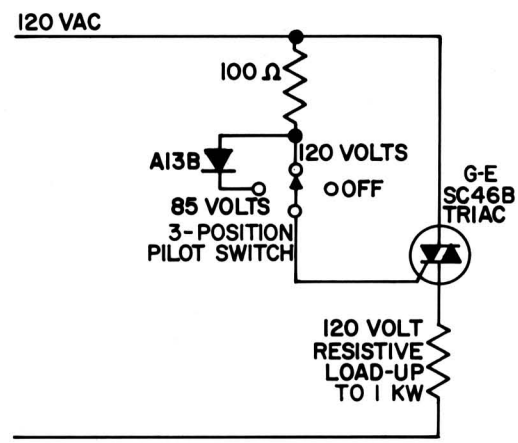
Combines one cycle response switch with AC to DC rectifier for high duty cycle applications like motor controls on conveyors, presses, and machine tools, as well as temperature controls, welding controls, process equipment, battery chargers, explosion proof switches, and overcurrent and overtemperature protection.



15 Ampere Battery Charging Regulator

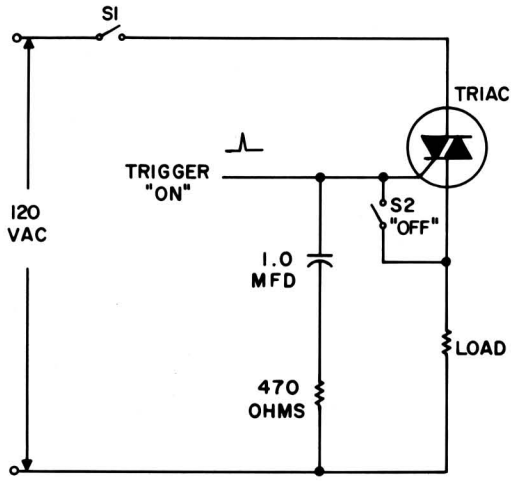
Cuts off heavy charging when battery voltage reaches preset level, starts charging again when voltage falls below preset level. For portable tools, appliances, house and travel trailers, outboard marine use, emergency power, etc.



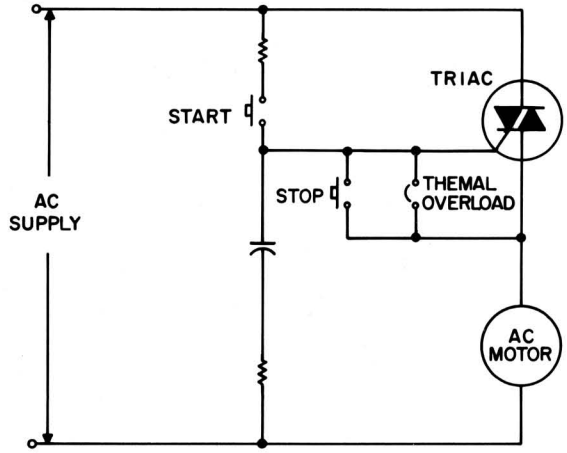


3-Position Power Control

For control of loads like heaters, ovens, lamps, and universal motors. The Triac version requires only a low current pilot switch, hence is ideal for cyclical loads, low maintenance applications, and wherever remote control, low noise, or power gain is desirable.



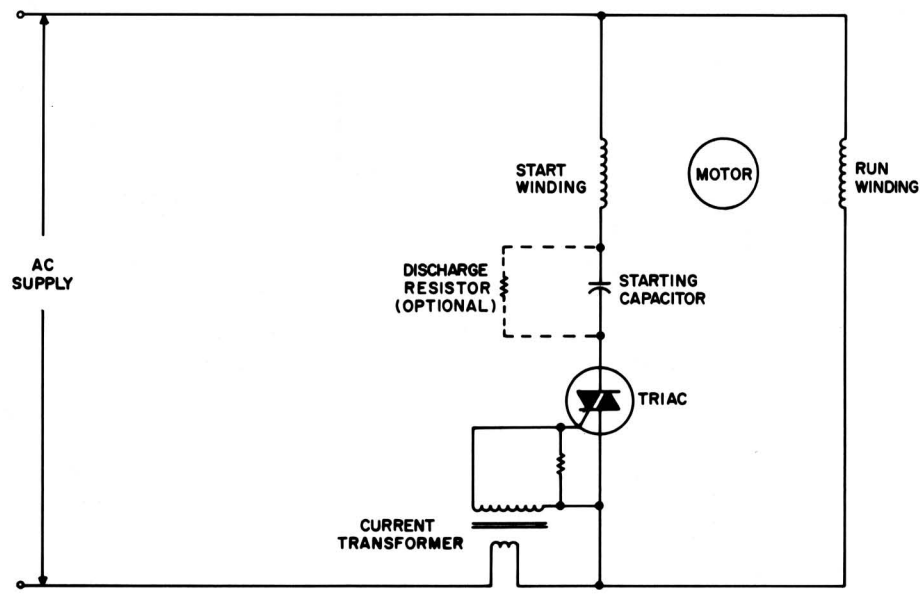
AC LATCHING SWITCH



AC MOTOR STARTER

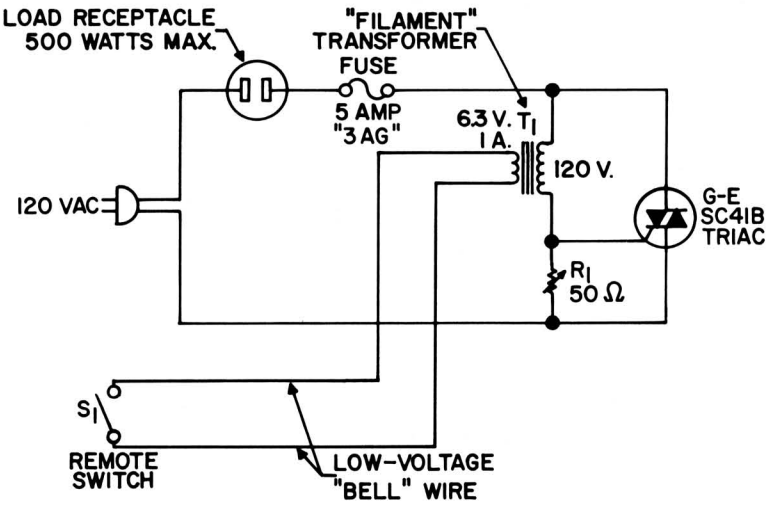
AC Latching Switch . . . AC Motor Starter

Once Triac is triggered, the voltage developed on the 1 MFD capacitor by load voltage triggers the Triac on succeeding cycles until momentary closing of the "OFF" contact discharges the capacitor without triggering the Triac. The AC motor starter operates analogously to the typical industrial magnetic starter. Momentary closing of the start button latches the Triac on and starts the motor. The motor is shut down by loss of line voltage, momentary actuation of the stop button, or closing of the thermal overload contact.



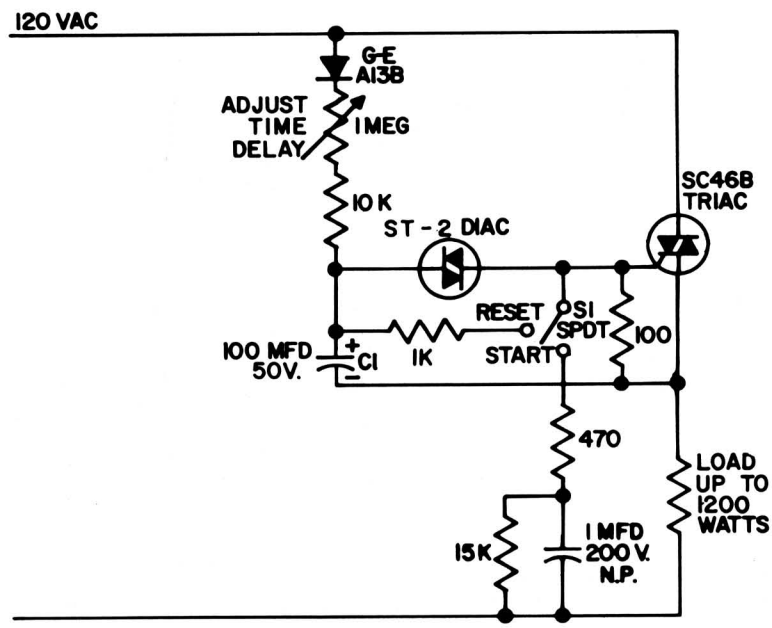
AC Split Capacitor Motor Starter

The static Triac switch replaces the conventional centrifugal switch or current relay used with split-capacitor-start motors. The turns ratio of the current transformer is designed to pick up the Triac on the inrush current to the run winding. The Triac drops out when the current settles down to normal operating levels. A small low cost ferrite core is adequate for the current transformer. The entire circuit can be mounted inside the motor and is ideal where high reliability, frequent starting, or spark-free operation is necessary.



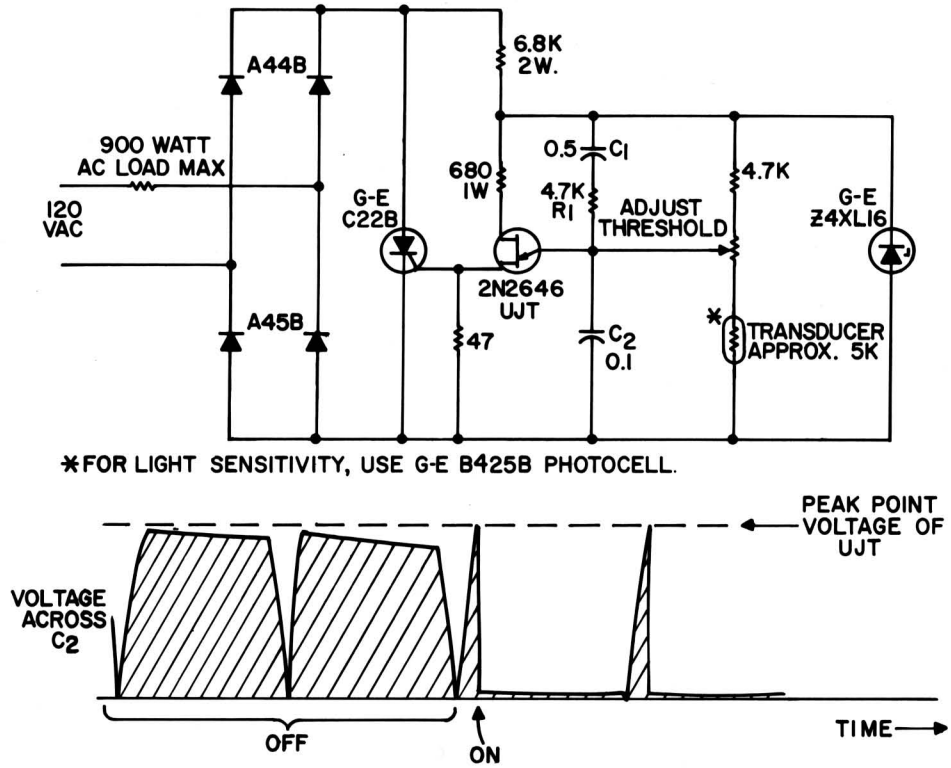
Isolated Low Voltage Remote Control

When remote switch S1 is open, T1 blocks trigger current to Triac. With S1 closed, T1 saturates and triggers Triac. Typical applications include appliances, signaling systems, outdoor lighting, and remote controls for heating, ventilating, pumping, refrigeration, etc.



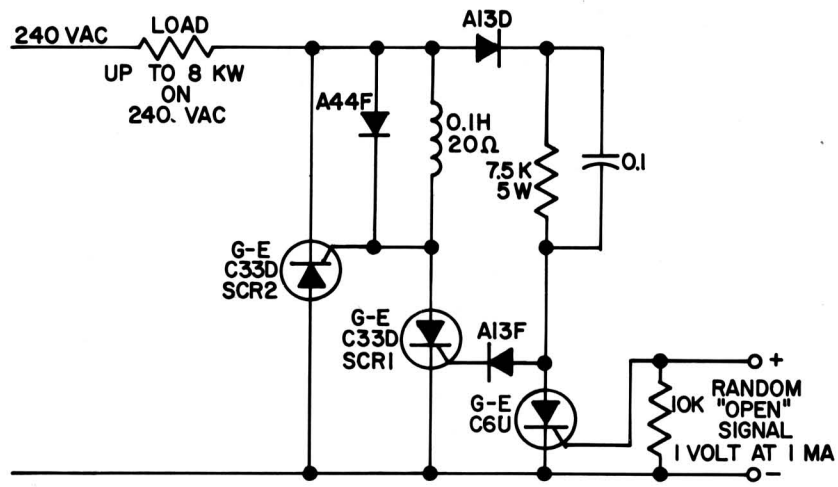
One Minute Static AC Time Delay for 1200 Watts

Ideal for industrial and commercial control circuits. Can control inductive or resistive loads. Combines simplicity of Triac AC latching circuit with low cost of Diac triggering. Features high degree of repeatability and quick reset.



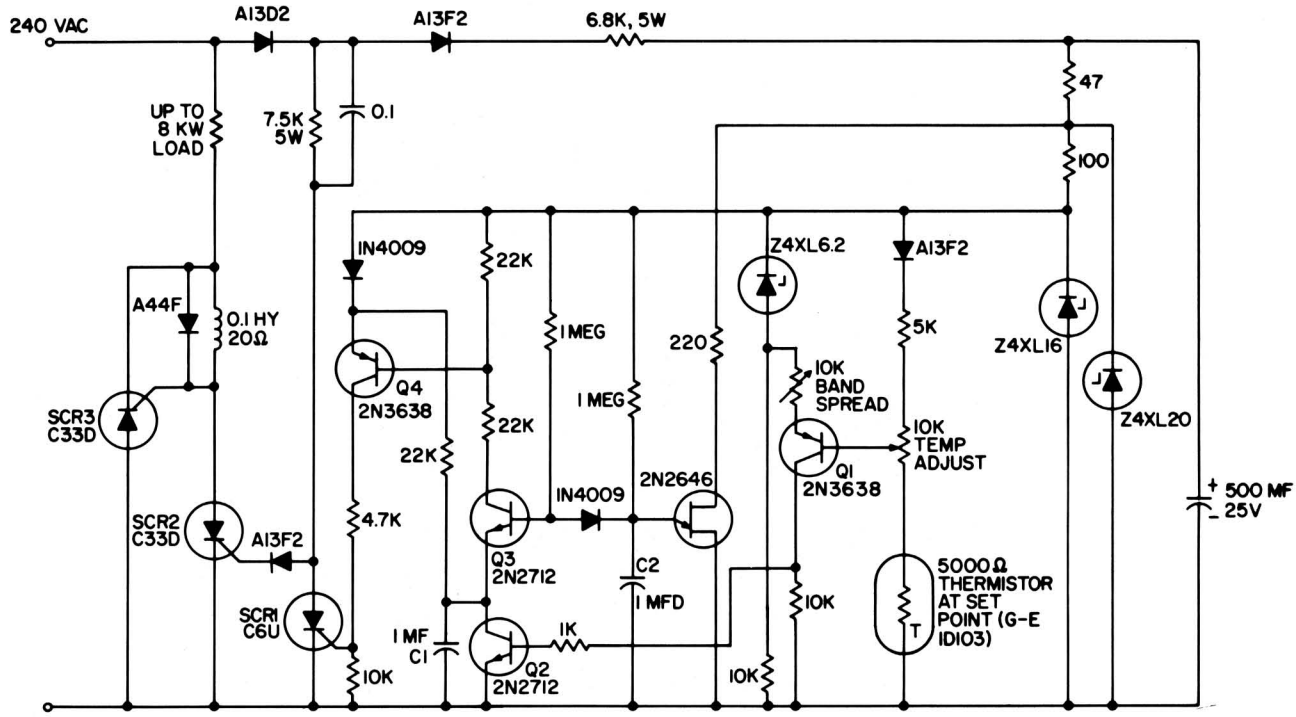
Snap-Action AC Threshold Switch

For temperature control, overtemperature protection, solenoid and relay drivers, AC motor starters and controls, automatic lighting controls, etc. R1 and C1 determine spread between pick-up and drop-out.



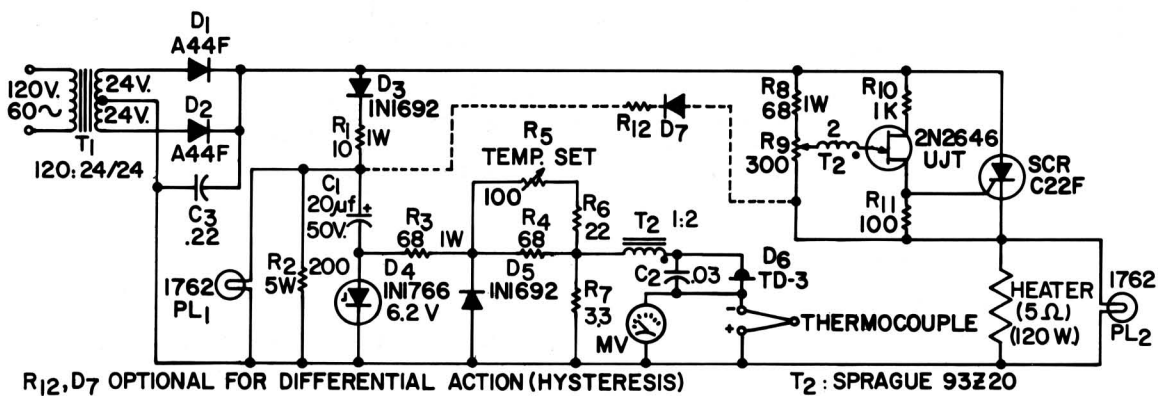
8 KW Synchronous AC Switch for Low RFI Operation

Absence of "open" signal causes SCR's to deliver full wave power to load. Regardless of phasing of control signal, load voltage is always applied in full cycles with negligible discontinuities, hence minimum radio frequency interference. SCR2 operates as a "slave" of SCR1, thus always delivering an even number of half cycles to load, thereby preventing magnetic saturation effects in inductive loads. Ideal wherever RFI and audio filtering is undesirable, where magnetizing inrush current to transformers causes nuisance fuse blowing, and where sensitive test equipment operates in vicinity of power switches.



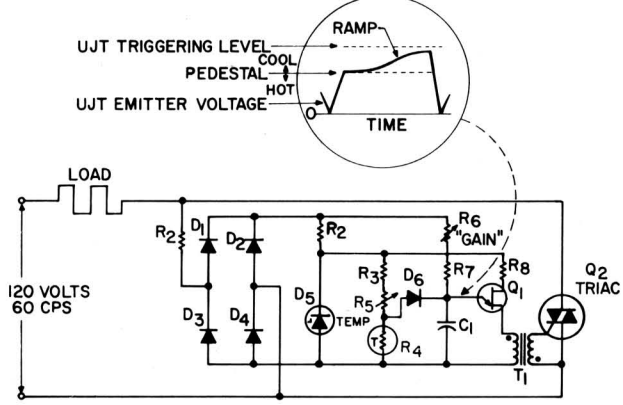
8 KW Synchronous AC Switch with Thermistor Modulator

Proportional control of heaters is obtained by switching on and off in whole number of cycles. The temperature dependent error signal from the thermister in a bridge is amplified by Q1 and Q2 and establishes a DC bias on C1. When this voltage is higher than the instantaneous sawtooth voltage on C2, stages Q3, Q4, and SCR1 are cutoff, allowing SCR2 and SCR3 to apply power to the load. This is a high-gain control circuit which can maintain the temperature of a system within 1°F of the setpoint. Synchronous switching eliminates the need for RF filters.



Temperature Regulator (Thermocouple).

A tunnel diode compares the output of thermocouple against a reference voltage which appears only at the beginning of each half cycle. When the tunnel diode switches, a pulse is applied to the unijunction transistor, which is operated in the latching mode, for triggering the SCR at the beginning of each half cycle. This system was designed to operate the heater at a temperature of 800°F, with a maximum error signal permitted of 20°F.

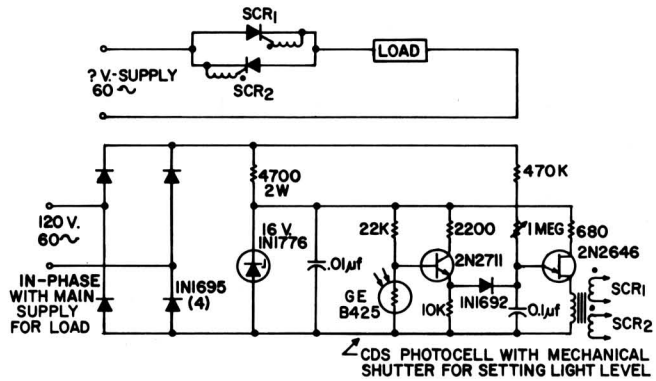


R_1, R_2 = 2200 OHMS, 2 WATTS
R_3 = 2200 OHMS, 1/2 W
R_4 = THERMISTOR, APPROX 5000 OHMS AT OPERATING TEMPERATURE, GE-4H
R_5 = 10,000 OHMS W.W. POTENTIOMETER
R_6 = 5 MEGOHM POTENTIOMETER
R_7 = 100 KΩ, 1/2 W.
R_8 = 1000 OHMS, 1/2 W.

Q_1 = 2N2646
Q_2 = SC46B
T_1 = SPRAGUE 11Z12 OR EQUIVALENT
D_{1-4} = GE A 14B
D_5 = GE Z4XL22
D_6 = GE A 14A
C_1 = 0.1μfd, 30 V.

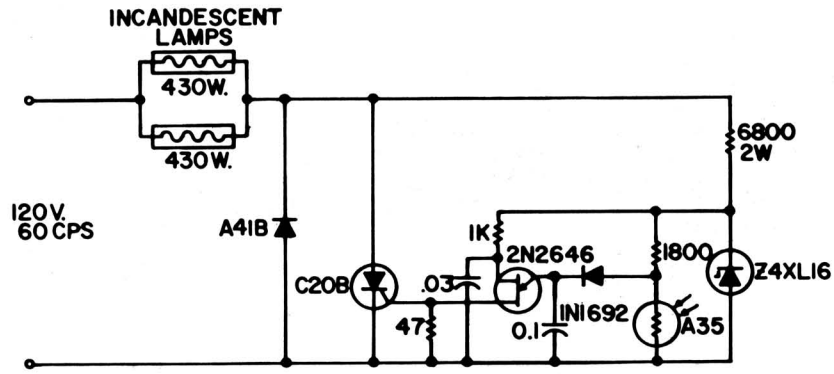
Ramp-and-Pedestal Precision Temperature Regulator.

Temperature of the thermistor determines the pedestal voltage to which capacitor C1 is charged at the beginning of each half cycle. The capacitor then continues to charge along an adjustable ramp until the unijunction transistor triggers. This circuit features adjustable gain (slope of the ramp function) to permit stabilization of the complete feedback control system. At maximum gain setting, load power is controlled over its full range by 3°C change in thermistor temperature. Since this is a low impedance thermistor circuit, use a large thermistor and/or good heat transfer to the thermal load.



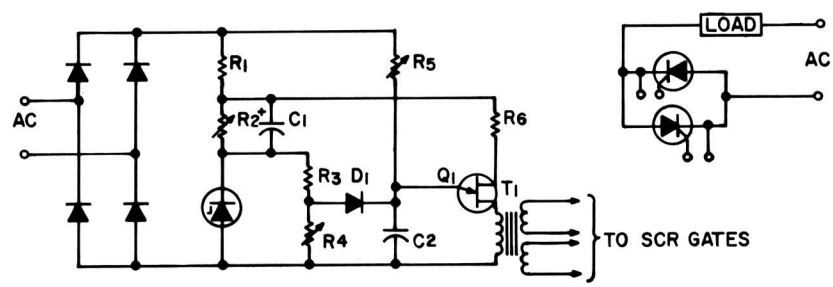
Photoelectric Load-Control System

This is a ramp-and-pedestal system in which a cadmium sulfide photocell drives a transistor emitter follower to control the pedestal level charging on the capacitor. Since the input impedance of the emitter follower is very high, this circuit will accommodate a very wide range of impedance levels in the photocell, or any other resistance-type transducer. This circuit may be used to regulate the output of a lamp, or the illumination on a surface. By exposing the photocell to a small pilot lamp connected in parallel with the load, regulation of RMS voltage across the load is obtained. A low voltage, higher current lamp in series with the load will permit regulation of load current. The use of a variable aperture or shutter will permit proportional control of the load in response to a mechanical position input information. In this manner, the load can be controlled by temperature of a bi-metal, pressure in a bellows, humidity in a hair hygrometer, or the indication of any meter or gauge movement.



High-Gain Limited Range Light Control.

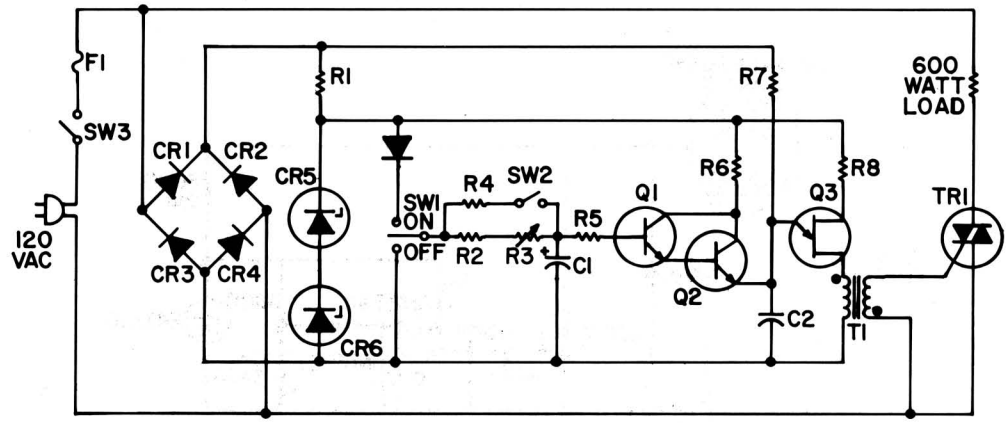
For applications in which control of the load below the 1/2 power point is not required, a rectifier can supply 1/2 cycle uncontrolled, and an SCR can provide regulation by phase control in the other half cycle. This is also a ramp-and-pedestal system with a very small ramp amplitude which is provided by the logarithmic characteristic of a diode. The photocell is operated in a low resistance condition in order to achieve fast response time and eliminate hunting when controlling the output of the lamp load.



R_1 : 5000Ω R_3: 3300 R_5 : 5M C_1 ; 200μf, 10v Q_1 : 2N2646
R_2: 500Ω R_4: 10K R_6 : 1K C_2 : 0.1μf

Wide-Range Line Voltage Compensation Control

Regulation is obtained by the relationship between pedestal height and peak point voltage of the unijunction transistor. Interbase voltage of the UJT is derived from the zener voltage plus an unregulated DC voltage which varies with line voltage. The cosine-shaped ramp provides good regulation over a wide range of input voltages. Since the line voltage compensation information is fed into the interbase voltage of the unijunction transistor, this function is compatible with other forms of pedestal control systems.

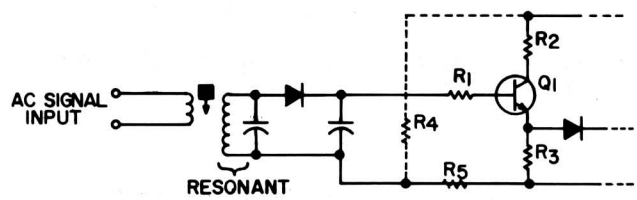


CR1 THRU CR4 : G-E IN1693 RECTIFIER DIODE
CR5, CR6 : G-E Z4XL7.5 ZENER DIODE
CR7 : G-E IN1692 RECTIFIER DIODE
C1 : 100 µf, 15 WVDC ELECTROLYTIC CAPACITOR (G-E QTI-22)
C2 : 0.1 µf, 15 WVDC CAPACITOR
Q1, Q2 : G-E 2N2712 n-p-n TRANSISTOR
Q3 : G-E 2N2647 UNIJUNCTION TRANSISTOR
TRI : TRIAC SC41B
F1 : 3 AMPERE FUSE

R1 : 3.3 K OHM, 2 WATT RESISTOR
R2, R4 : 4.7K OHM, 1/2 WATT RESISTOR
R3 : 5 MEGOHM, 1 WATT POTENTIOMETER
R5, R7 : 1 MEGOHM, 1/2 WATT RESISTOR
R6 : 2.2 K OHM, 1/2 WATT RESISTOR
R8 : 470 OHM, 1/2 WATT RESISTOR
SW1 : SPDT SWITCH
SW2 : SPST SWITCH
T1 : SPRAGUE 35ZM923 PULSE TRANSFORMER

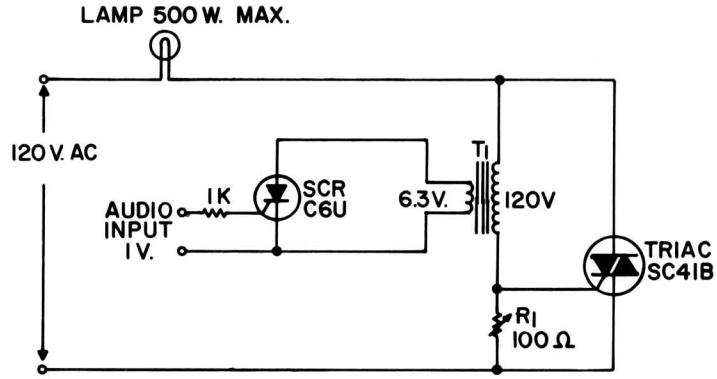
Time-Dependent Light Dimmer (Bachelor Light).

Pedestal height is controlled by the DC voltage across a large capacitor, C1, through a darlington emitter follower circuit. The high input impedance of the darlington connection permits very long charging and discharging time for the capacitor, which produces a very slow turn-on and turn-off of the lamp load. At maximum-time setting, approximately 20 minutes is required to make the full transitition from on to off condition.



Frequency-Selective AC Amplitude Control Circuit

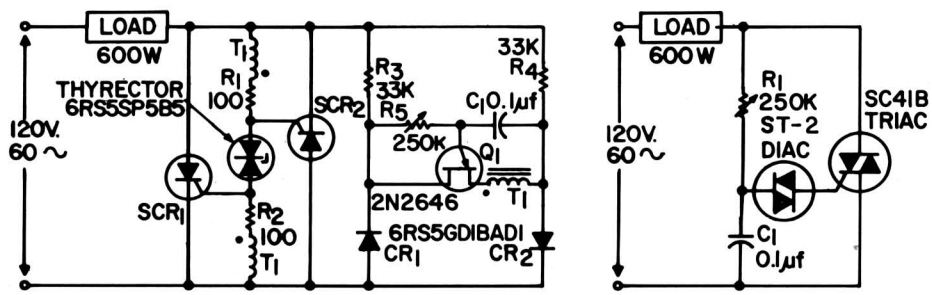
Since the emitter follower control of pedestal height permits control from a DC signal, load power can be controlled from any signal that can be converted to DC. In this case the amplitude of a tone signal can be used to control load power. This circuit is useful for remote control work, or program control from a tape recorder, or for use as audio modulation such as by noise or by music with wide band filters. This circuit may also be used with a tachometer for motor speed control.



NOTE: T_1 IS A 6.3 V., 1 A. "FILAMENT" TRANSFORMER. ADJUST R_1 FOR MAXIMUM RESISTANCE THAT WILL NOT TURN ON LAMP WITH ZERO INPUT.

Audio-Controlled Lamp

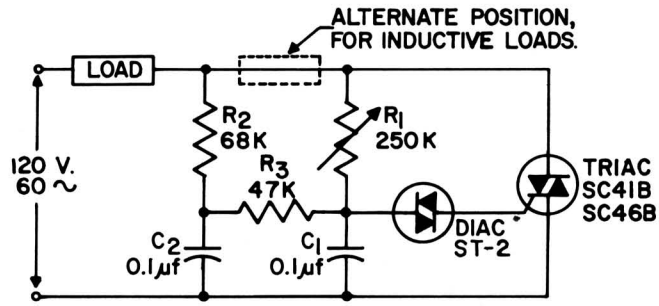
This is an on-off control with isolated, low voltage input. Since the switching action is very rapid, compared with the response time of the lamp and the response time of the lamp and the response of the eye, the effect produced with audio input is similar to the proportional control circuit. If the input signal to the SCR consists of phase-controlled pulses, full wave control of the lamp load is obtained.



(a) SCR CIRCUIT (b) TRIAC CIRCUIT

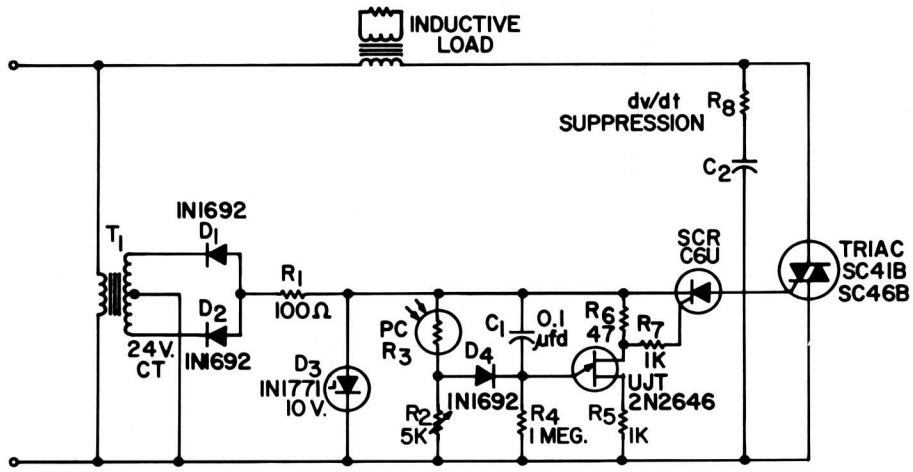
Basic Full-Wave Control Circuit

The Triac circuit is the ultimate in simplicity for manual control of load power. This circuit is ideal for control of heaters, fans, and limited range control of lamps. An elementary photoelectric control may be obtained by replacing R1 with a cadmium sulfide photocell such as the G-E type B425. The function may be inverted by making R1 10 K and by placing the photocell in parallel with C1.



Extended Range Full-Wave Control Circuit

The use of a second capacitor, C2, permits reliable phase control over a much wider range, particularly at low output settings.



Refined Ramp and Pedestal System for Inductive Loads

This circuit illustrates some of the basic design concepts required for successful control of certain inductive loads. These are:

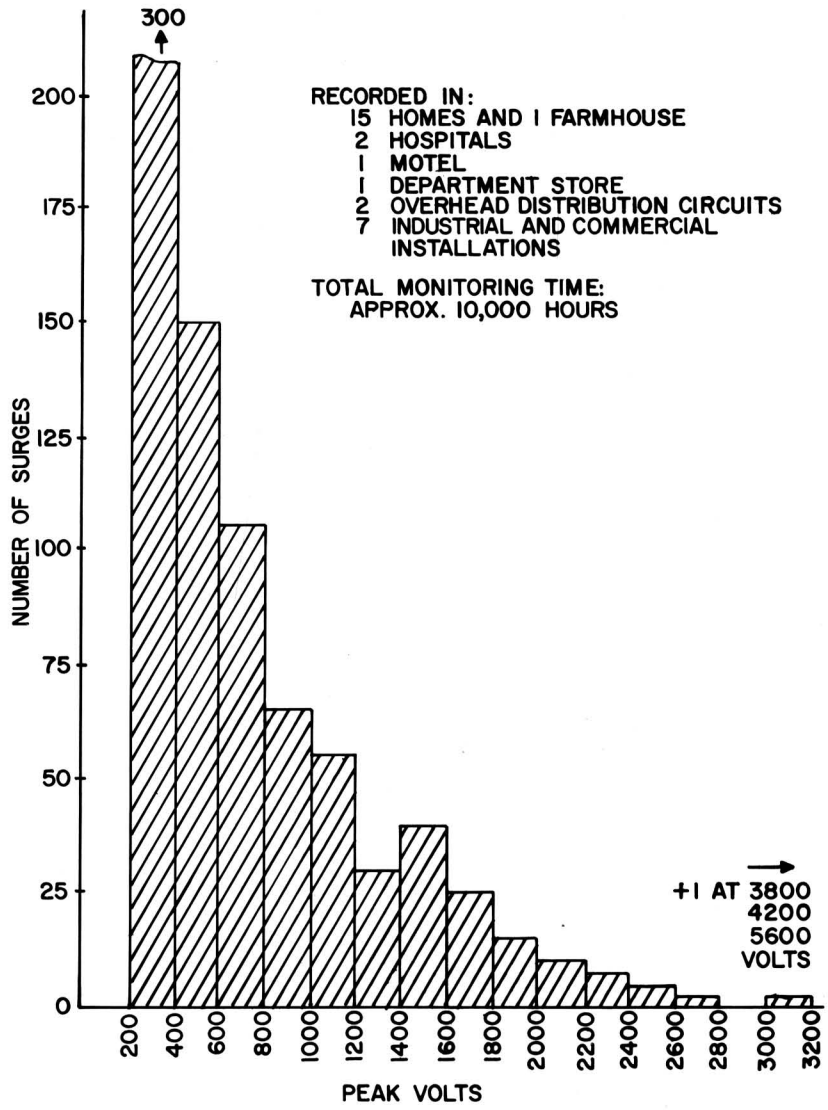
A. Supply voltage for the unijunction transistor is derived directly from line voltage to ensure symmetry of triggering angle on each half cycle and avoid DC components of load current.

B. Gate current for the Triac is supplied continuously by the SCR from the initial trigger pulse to the end of each half cycle. This eliminates the problem of getting the inductive load current above holding current during the time of a short trigger pulse, and permits triggering of the Triac even though the unijunction trigger pulse occurs before the Triac has turned off.

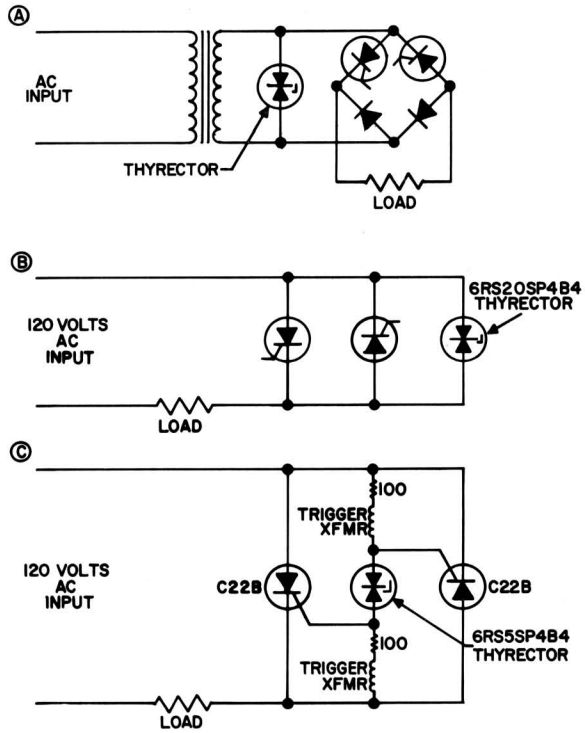
C. An RC network is provided to limit the rate-of-rise of voltage across the Triac when it turns off. If the voltage rises too rapidly, the Triac may turn on again and control would be lost.

STUMBLING BLOCKS AND PITFALLS WITH SCR's

-- Voltage and dv/dt
-- Current and di/dt
-- Temperature
-- RFI, noise



Distribution of Voltage Surges



Effective Transient Voltage Suppression With G-E Thyrectors

Thyrectors provide economical and effective transient voltage suppression for silicon rectifiers and SCR's in most types of circuits. In A and B the Thyrector shunts transient energy around the semiconductors while clipping voltage within semiconductor capability. In variation C the Thyrector is connected in the gate circuit of the SCR's so that a portion of the transient energy triggers the forward biased SCR into conduction, thereby protecting the reverse biased SCR from damage. This latter scheme utilizes a smaller lower cost Thyrector for a given degree of protective effectiveness.

THE OVERCURRENT PROBLEM

Typical Causes

- -- Short Circuits
- -- Stalled Motors
- -- Starting Inrush
- -- Component Failures
- -- Mistriggering of SCR's

Some Possible Solutions

- -- Fuses
- -- Circuit Breakers
- -- Current Limiting Impedance
- -- Crowbarring
- -- Gate Blocking on SCR's
- -- Use of Higher Rated Semiconductors
- -- Soft Start
- -- "Integrate" Load to Avoid External Shorts

APPLICATION FACTORS WHICH CAN INCREASE SCR HOLDING CURRENT

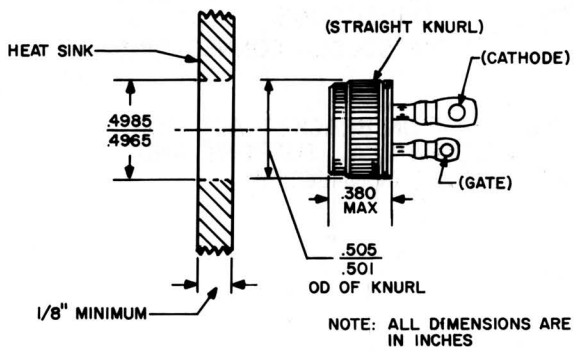
-- Low Temperature

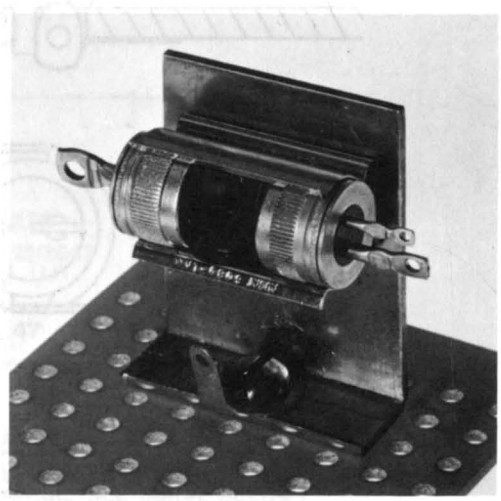
-- Low Gate to Cathode Impedance

-- Insufficient Latching Current

-- Negative Gate Bias

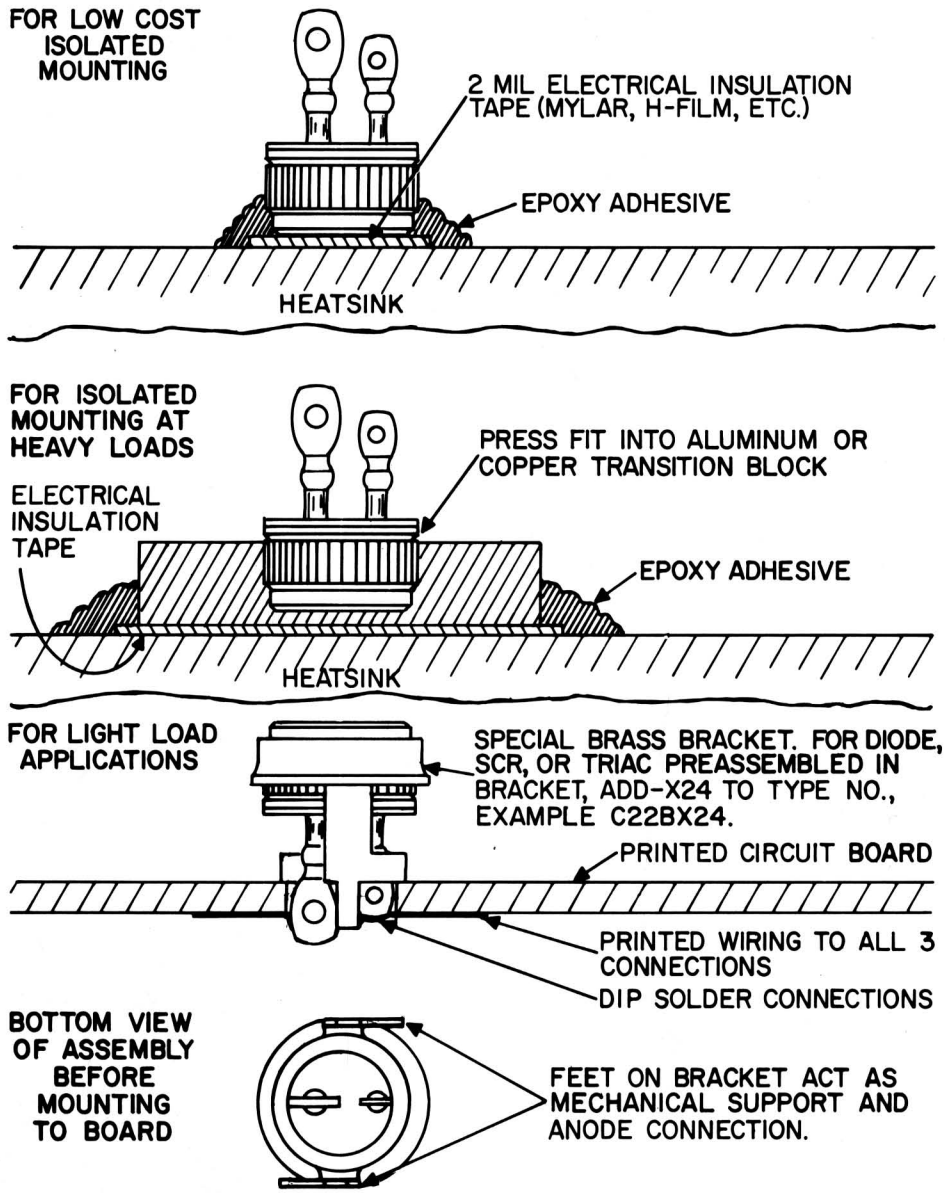
-- Slow Recovery Diode in Series with Gate
-- Discharge of Capacitive Coupled Trigger Pulse
-- Ringing in Gate Circuit Following Trigger Pulse





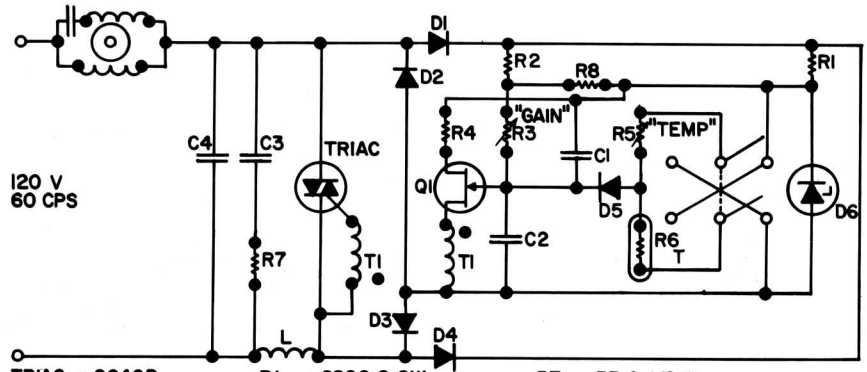
Press-Fit Mounting of Economy-Line Rectifier/SCR/Triac Package

See the specification sheet for the particular semiconductor for detailed installation instructions.



Some Handy Mounting Methods for the Versatile Press-Fit Package

IV. Motor Speed Controls

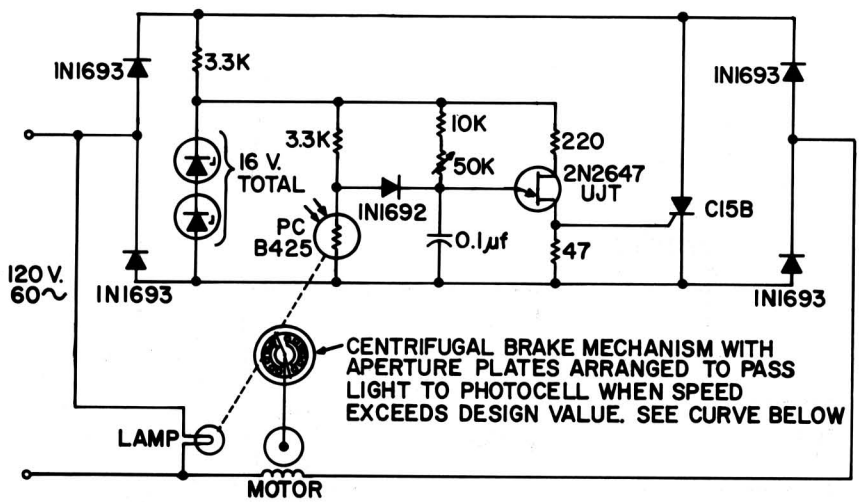


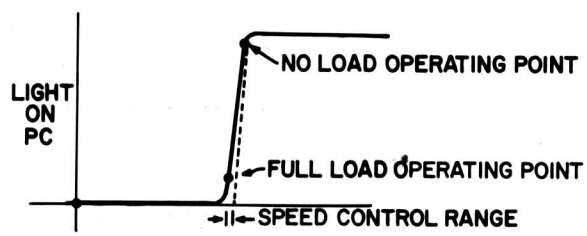
TRIAC	: SC46B	R1	: 6800 Ω 2W	R7	: 33 Ω 1/2 W
D1→D4	: IN1693	R2	: 470 KΩ 1/2W	C3	: .02μf, 200 V
D5	: IN1692	R3	: 5 MEG 1/2 W	T1	: XFMR 1:1
D6	: IN1776	R4	: 1 K Ω 1/2 W		: SPRAGUE 35ZM923 OR EQUIV.
Q1	: 2N2646	R5	: 10K Ω 1W	C4	: 0.1μf, 400V
C1 & C2	: 0.1μf, 50 V	R6	: SEE NOTE	R8	: 470K Ω 1/2W

NOTE: IN THE ABOVE ARRANGEMENT, CIRCUIT IS SET UP FOR A HEATING APPLICATION. IN A COOLING APPLICATION R6 & R5 ARE INTERCHANGED. R6 SHOULD BE A THERMISTOR WHICH WILL AFFORD 3KΩ TO 5KΩ AT TEMPERATURE DESIRED. "TEMP ADJ" R5 SHOULD BE SET TO PROVIDE FULL "ON" AT DESIRED UPPER TEMPERATURE OF THERMISTER R6, "GAIN" R3 OR "BANDWIDTH" MAY THEN BE SET FOR "FULL OFF" (ZERO SPEED) CONDITION AT DESIRED "LOWER TEMP" OF R6.

Temperature Control of Speed; Shaded Pole & PSC Motors

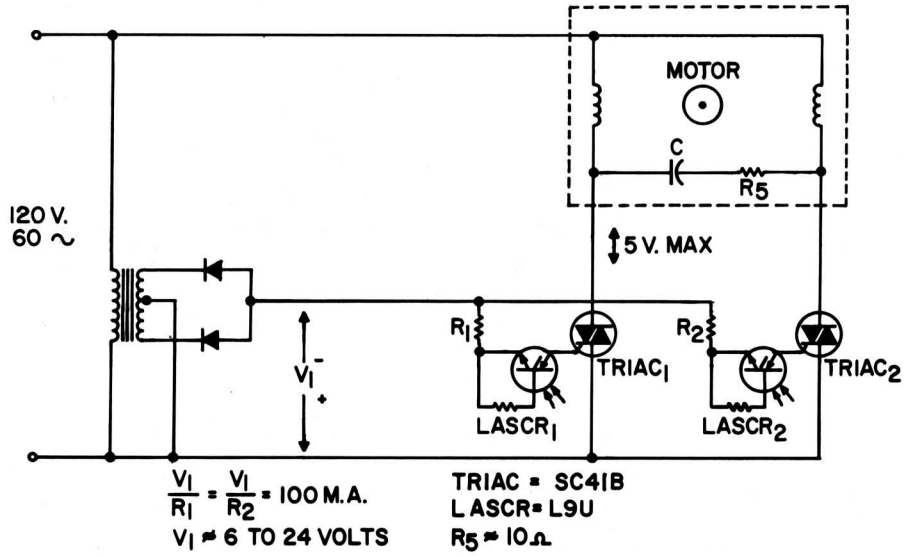
This is a ramp-and-pedestal system designed for the control of fan or blower motors in response to temperature of a thermistor. The circuit includes RF noise suppression and dv/dt suppression.





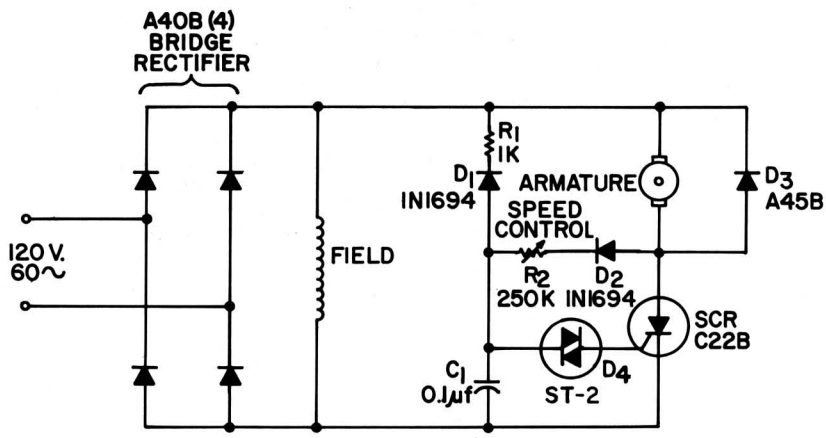
AC Motor Speed Regulator

To accurately regulate the speed of an induction motor, some form of feedback signal is required. In this circuit, a centrifugal mechanism acts as a variable shutter between the lamp and the photocell, and is capable of holding motor speed within farily tight limits.



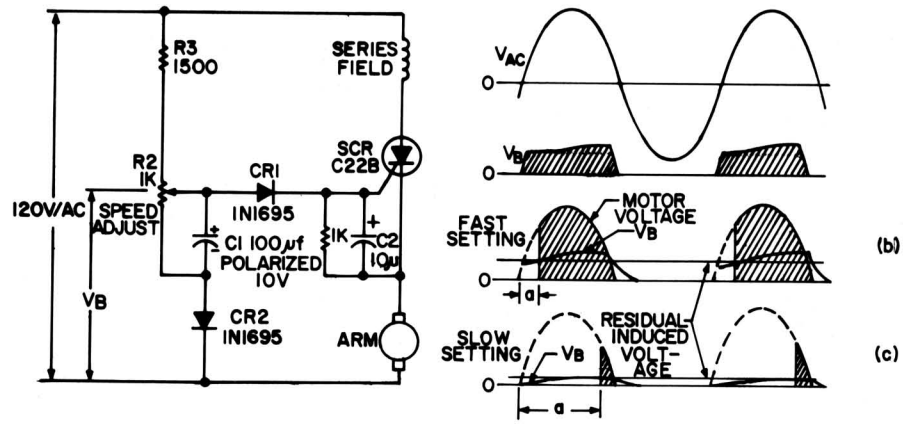
Reversing Induction-Motor Drive

Light activated SCR's control the direction of rotation of a split capacitor motor through two Triacs. Although this is an on-off control, it is used in proportional control systems where the motor drives some proportional control device.



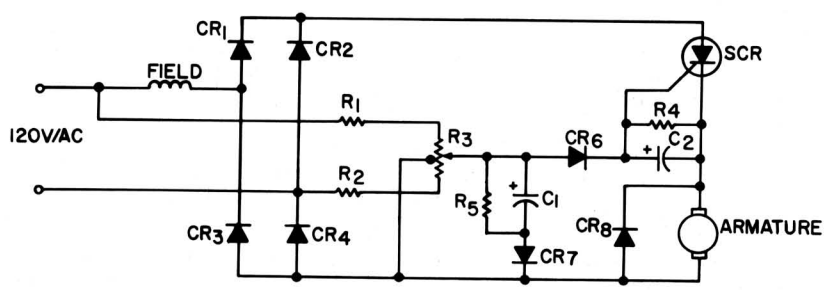
Speed Control for Shunt-Wound DC Motors

The phase control of this SCR is derived from the voltage across the SCR, hence senses motor speed and loading conditions. This provides a form of feedback control for regulation of motor speed. The control circuit is reset at the end of each half cycle by R1 and D1.



Universal Motor Adjustable Speed Drive

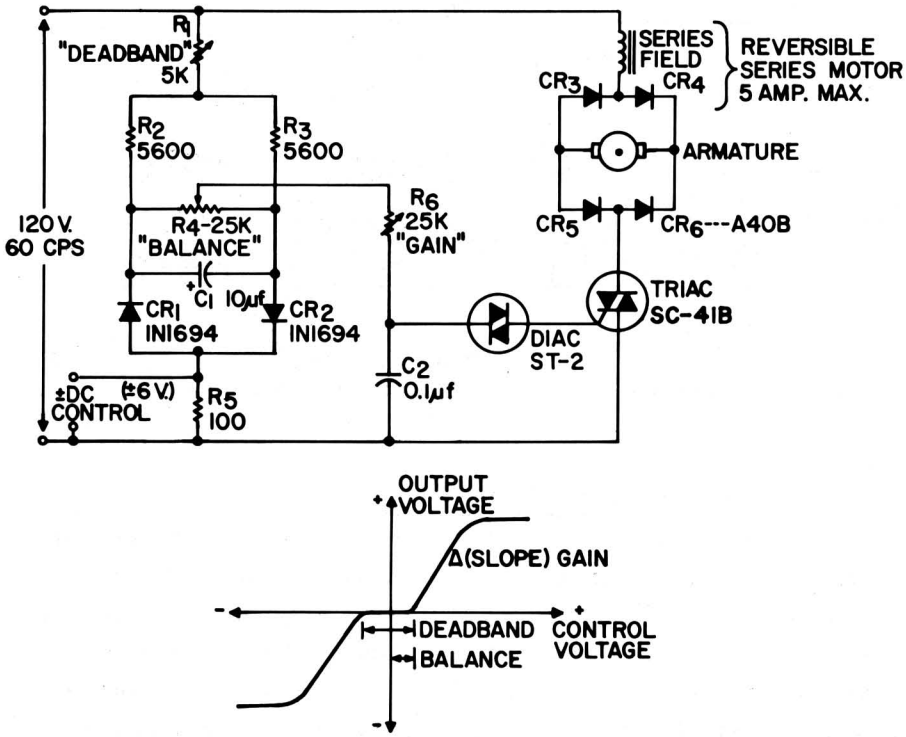
This is an extremely simple, yet sophisticated feedback control system that compares the voltage across the capacitor with the generated EMF in the armature to regulate motor speed. This circuit is widely used in the field of power tools such as drills, saws, etc, and sewing machines. To avoid re-connection of the motor, the series field may also be placed in the armature circuit. This permits plug-in connection to most universal motor devices.



R_1 : 1500	C_1 : 200μf	SCR : C20B
R_2: 1500	C_2: 5μf	CR_8 : A40B
R_3: 3000 CT	CR_{1-4} : A40B	MOTOR: SERIES, REVERSIBLE
R_4: 1000	CR_{6-7} : IN1694	
R_5: 470		

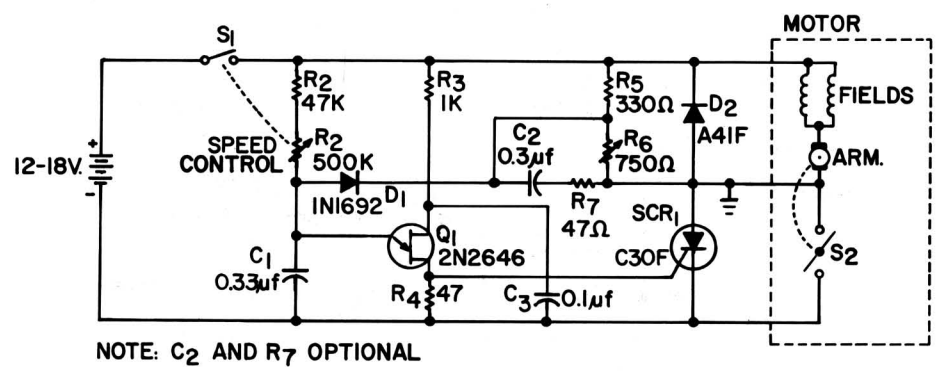
Reversible Half-Wave Speed Control

With a bridge-rectifier feeding the SCR, armature current is always in the same direction. Field current, however, depends on which polarity of the applied voltage is present at the time the SCR conducts. Direction of rotation of the armature is determined by causing conduction in either the positive or the negative half cycle of the supply voltage. Feedback control of motor speed is provided by comparing counter emf with a capacitor voltage.



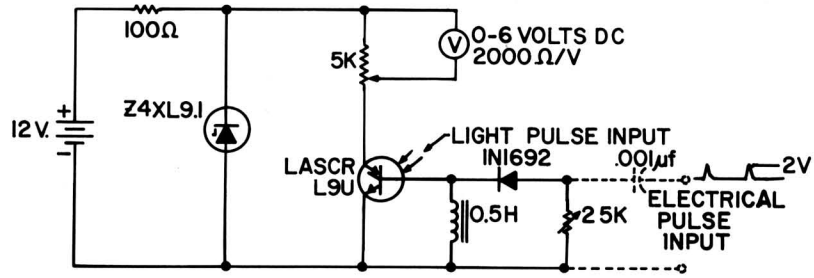
Reversing Motor Drive, DC Control Signal

This is a positioning servo drive featuring adjustment of balance, gain, and deadband. In addition to control from a DC signal, mechanical input can be fed into the balance control, or that control could be replaced by a pair of resistance transducers for control by light or by temperature.



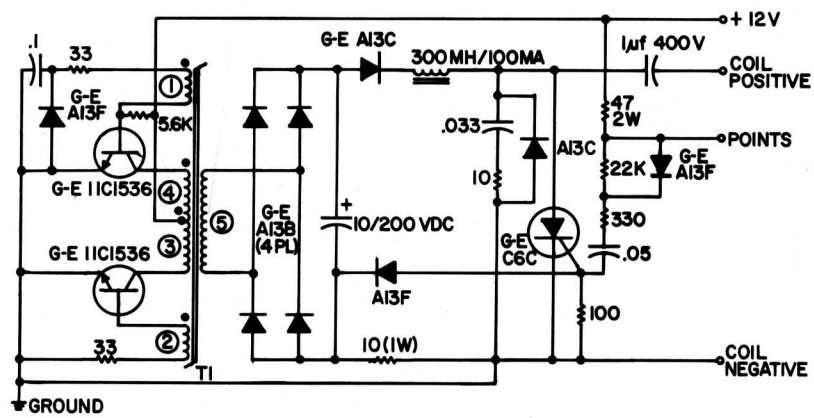
DC Motor Speed Control

This is an extremely simple, and low cost, control for DC motors operating from low voltage DC supplies. The major problem of commutating (turning off) the SCR is solved in this circuit by a simple mechanical contact system that momentarily bypasses the SCR twice per revolution of the motor. The SCR is turned on by the unijunction transistor oscillator and is turned off by the switch on the motor. Since commutation is provided at a certain point in the revolution of the armature, the speed of the motor must be synchronous with the oscillator. This provides very precise control of the motor speed. This system is quite useful for low voltage, low current applications where the life of standard automotive breaker points is long enough to be acceptable from the maintenance standpoint.



Simple Tachometer for Optical or Electrical Sensing

This circuit uses the light activated SCR as a low-current gate-turn-off switch. After being triggered by light or by an electrical pulse, the LASCR will remain conducting until current in the gate inductance builds up to a value sufficient to turn it off. Since the current through the meter continues for a fixed length of time after each triggering impulse, the average current, hence the reading of the meter, will depend on the repetition rate of the triggering pulse. If the time interval between trigger pulses is 10% longer than the on time of the SCR, the average current through the SCR will be 90% of peak current. As the time between trigger pulses decreases, average current in the SCR will increase to being equal to peak current. The voltmeter should be set so this condition represents full scale deflection of the meter. A further decrease in time between trigger pulses will then result in a pulse-skipping, or frequency-dividing action, in which the SCR conducts only on alternate pulses. This causes the meter indication to drop to half scale, thus automatically providing a range change of 2:1.



T1 { TWO #206F440-3C3 "E" CORES, ONE #595F425 BOBBIN } FERROXCUBE, SAUGERTIES, N.Y.
① & ② EACH 5 TURNS #32 HEAVY FORMVAR BIFILAR WOUND
③ & ④ EACH 9 TURNS #20 HEAVY FORMVAR BIFILAR WOUND
⑤ 126 TURNS #32 HEAVY FORMVAR

Automotive Ignition System

This is an SCR, capacitor-discharge system driven by a silicon-transistor inverter. The use of all-silicon semiconductors provides reliable operation at high temperatures. Battery drain is low, less than two amps, over the entire speed range. This circuit will provide full spark voltage up to 6000 RPM on an 8 cylinder engine. Load on the points is very light, resulting in no arcing and very little wear. This circuit uses existing points and condenser, existing ballast, and existing coil re-connected. A lock-out circuit in the gate of the SCR prevents false triggering caused by point bounce, thus eliminating mis-firing.