
CIRCUITS

Dekatron Circuits

The recommended Dekatron drive and coupling circuits are given in the following pages together with a number of suitable pulse shaping circuits. Although in the majority of cases the Dekatron counter symbol has been used, the drive circuits are equally applicable to computing and selector tubes, when the anode resistor and guide bias are correctly chosen. To compensate for the reduction in tube current which would occur in selectors, the anode resistor is reduced by an amount approximately equal to the cathode resistors.

In all the double-pulse Dekatron circuits except those with a sine wave input, the guides are taken to a positive bias which should not be less than the maximum positive potential reached by the output cathode(s). For counters this value is approximately +18 volts and for selectors approximately +36 volts.

The guides of a single pulse Dekatron operate with a positive bias of 72 volts, although the output cathode of this tube should not be allowed to rise more than +10 volts above the earthed common cathodes.

Wherever possible, the circuits which follow have been designed to operate with potentials of +475 V, +300 V, -20 V and -100 V supplies. To provide these supplies an arrangement comprising two 150 volt stabilizers has been given enabling +300 volts to be obtained from a 475 volt power supply. The -20 volts can be obtained from a potential divider across a -100 volt power unit, and the impedance of the -20 volts supply must not be greater than 4 k Ω .

Resetting

To enable counters to be set at zero, two h.t. negative lines should be provided. One directly earthed receives the returns from

cont'd



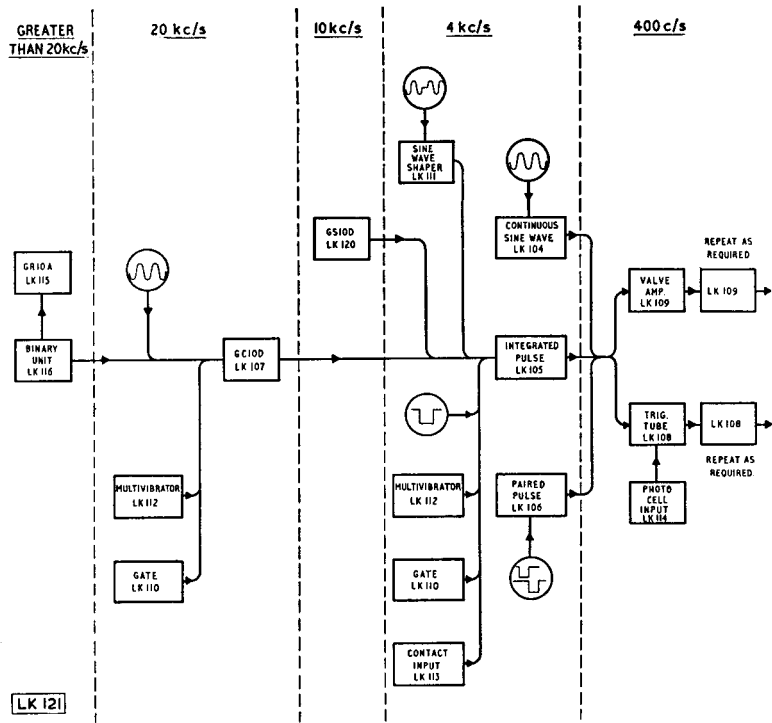
CIRCUITS

the Dekatron output cathodes (or the potential dividers feeding them), the cathodes of any coupling tubes and the negative bias supplies for these tubes. The other line, described as the reset line, takes all the remaining returns and is connected to earth via a resistor which is shorted during counting.

Operation of a key or relay which removes the short allows current from the counters and biasing resistors to flow through the unshorted resistor. This raises the potential of all the Dekatron's electrodes except the one to which it is desired to reset.

The value of the reset resistor depends on the number of decades and couplings used, and should be chosen to produce a p.d. of 100 volts.

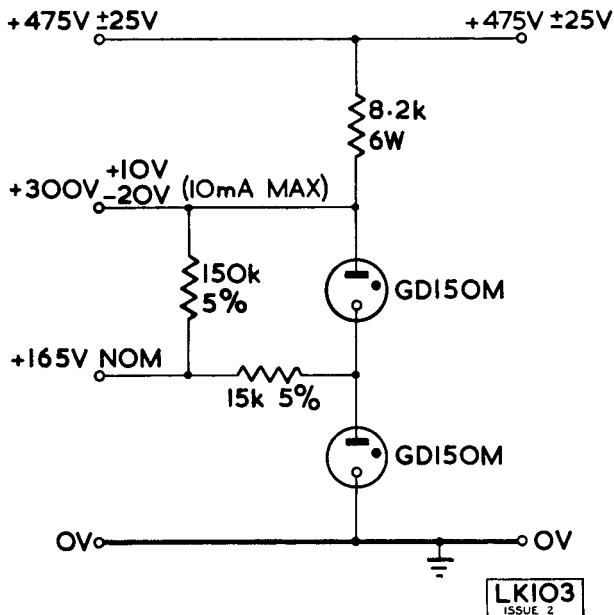




Dekatron Block Schematic Circuits

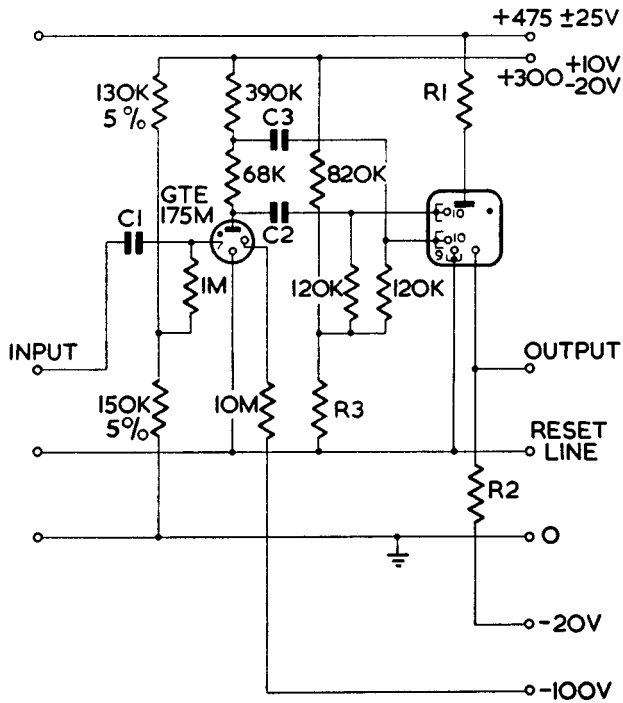


Circuits



The above circuit uses two GD.150M tubes to provide a stabilized +300 V supply from +475 V. The +165 V supply is used for trigger bias with GTE.175M trigger tubes in Dekatron coupling circuits.

Stabilized Voltage Supplies for use with Dekatron Circuits



LK108

	Counters	Selectors
R1	820 k Ω	680 k Ω
*R2	150 k Ω max.	150 k Ω max.
R3	39 k Ω	47 k Ω

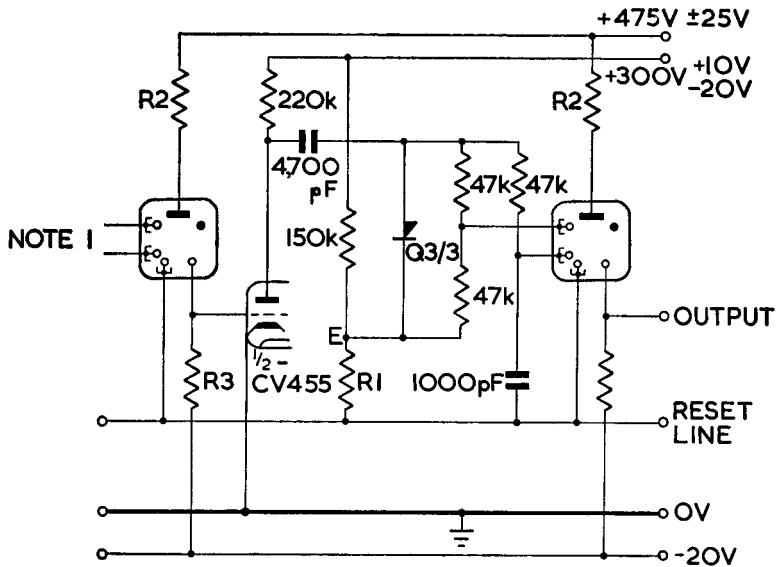
	Input to previous stage	
	Rect. Pulses	Sine Wave
C1	.001 μ F	.01 μ F
C2	.001 μ F	.001 μ F
C3	.002 μ F	.002 μ F

* The cathode load resistor of the previous stage must not be < 150 k Ω

**Cold-cathode Trigger Tube Circuit
for coupling two 4 kc/s Dekatrons
(0-500 "carries" per second)**



Circuits

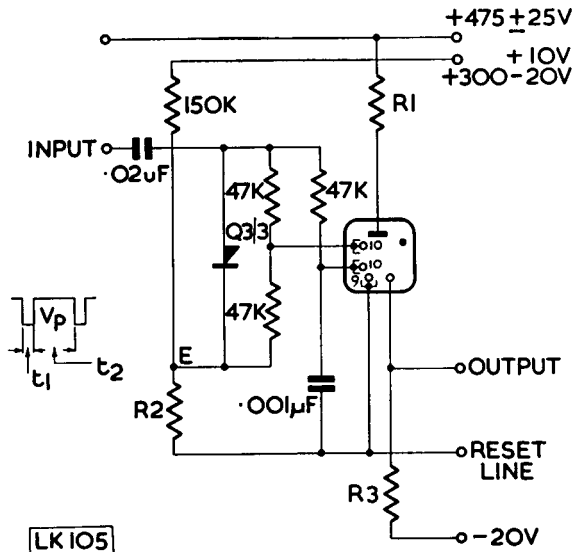
LK109
ISSUE 4

	Counters	GS10C	GS12D
R1	10 k Ω	22 k Ω	22 k Ω
R2	820 k Ω	680 k Ω	910 k Ω
R3	150 k Ω	150 k Ω	270 k Ω
E	+18 V	+36 V	+36 V

NOTE:—Suitable input circuits are LK105 and LK106. Sine wave drive LK104 may be used at a minimum frequency of 400 c.p.s.

Amplifier for Coupling two Double-pulse Dekatrons





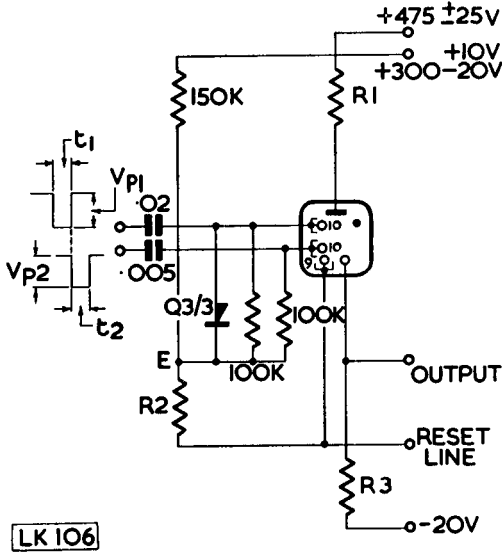
	Counters	Selectors
R1	820 kΩ	680 kΩ
R2	10 kΩ	22 kΩ
R3	150 kΩ max.	150 kΩ max.
E	+18 V	+36 V

$$V_p = -145 \pm 15 \text{ V} \quad t_1 = > 80 \mu\text{s} \quad t_2 = > 170 \mu\text{s}$$

NOTE:—When this circuit is used to precede circuit LK 109 (Triode Amplifier Cct.) the $0.02 \mu\text{F}$ input capacitor should be reduced to $4,700 \text{ pF}$

Integrated-pulse Drive for 4 k/cs Dekatron



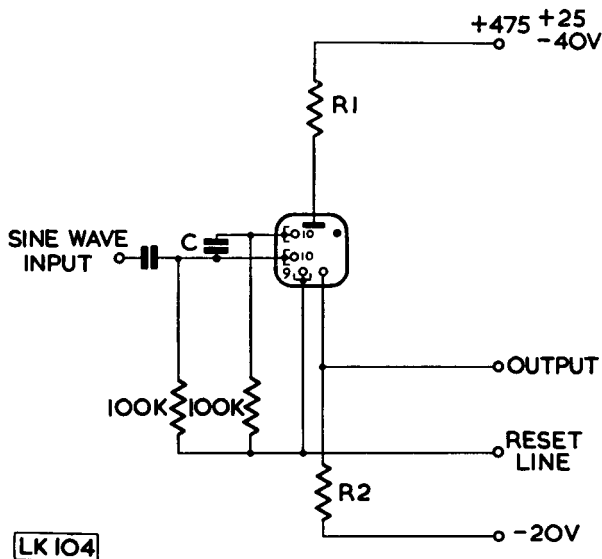


	Counters	Selectors
R1	820 kΩ	680 kΩ
R2	10 kΩ	22 kΩ
R3	150 kΩ max.	150 kΩ max.
E	+18 V	+36 V

$V_{P1} = V_{P2} = -80 \pm 10 \text{ V}$ $t_1 = t_2 = > 60 \mu\text{S}$

Paired-pulse Drive for 4 kc/s Dekatron



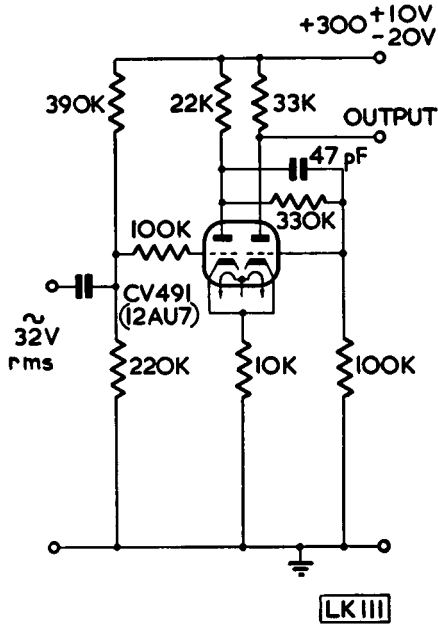


	Counters	Selectors
R1	820 kΩ	680 kΩ
R2	150 kΩ max.	150 kΩ max.

Frequency	4 kc/s	2 kc/s	1 kc/s	500 c/s	200 c/s	100 c/s	50 c/s
C	680 pF	.002 μF	.005 μF	.01 μF	.02 μF	.05 μF	.1 μF
Drive Amplitude	40—70 V r.m.s.						

Continuous Sine-wave Drive for 4 kc/s Dekatron

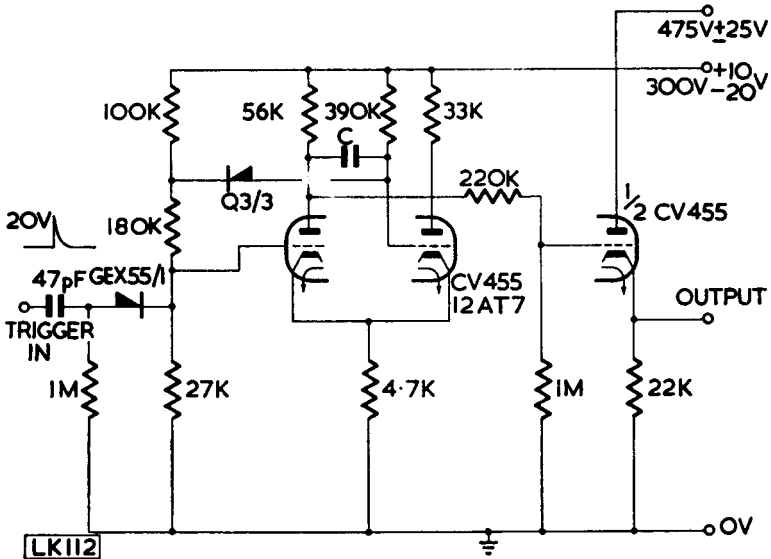




In the continuous sine-wave drive circuit LK.104 the correct phase relationship is not achieved until a few cycles have elapsed. In order to count trains of sine-waves it is necessary to convert them into pulses suitable for the integrated pulse drive LK.105. The above circuit fulfils this requirement.

Sine-wave Shaping Circuit



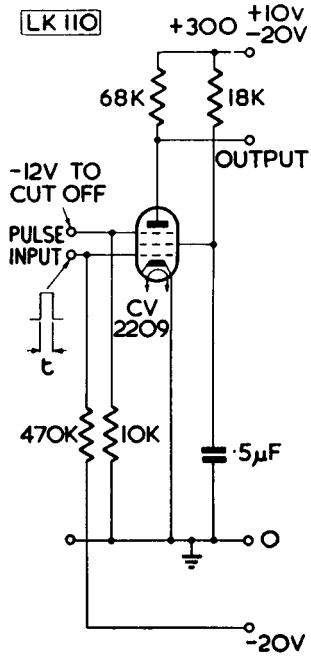


Output Pulse	C
25 μ S	100 pF
80 μ S	470 pF

The above circuit is designed to feed either the integrated pulse drive LK.105, or the GC10D single pulse drive LK.107. Triggering is achieved with a short positive pulse of amplitude greater than 20 V.

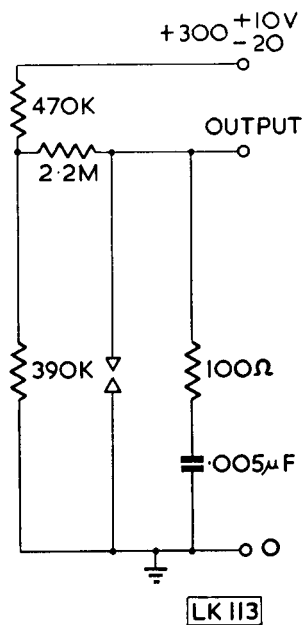
Multivibrator Pulse Shaping Circuit





GC10D	GS10D	4 kc/s Dekatron
25 µS	35 µS	80 µS
Pulse Amplitude > +20 V		

Gate Circuit for use with Single and Double-pulse Dekatron Drive Circuits

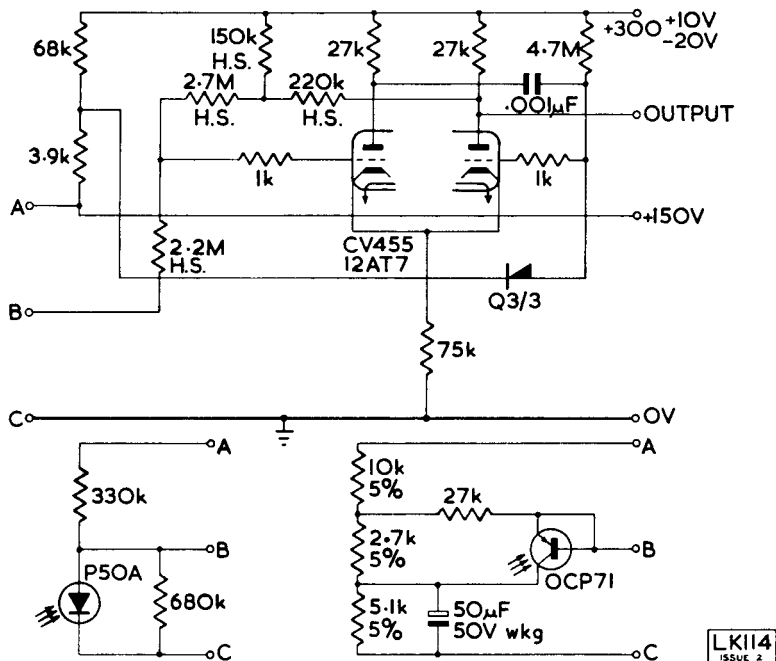


In order to prevent spurious counting due to contact bounce, it is essential to precede the integrated pulse drive LK.105 with a quenching circuit.

Contact Input

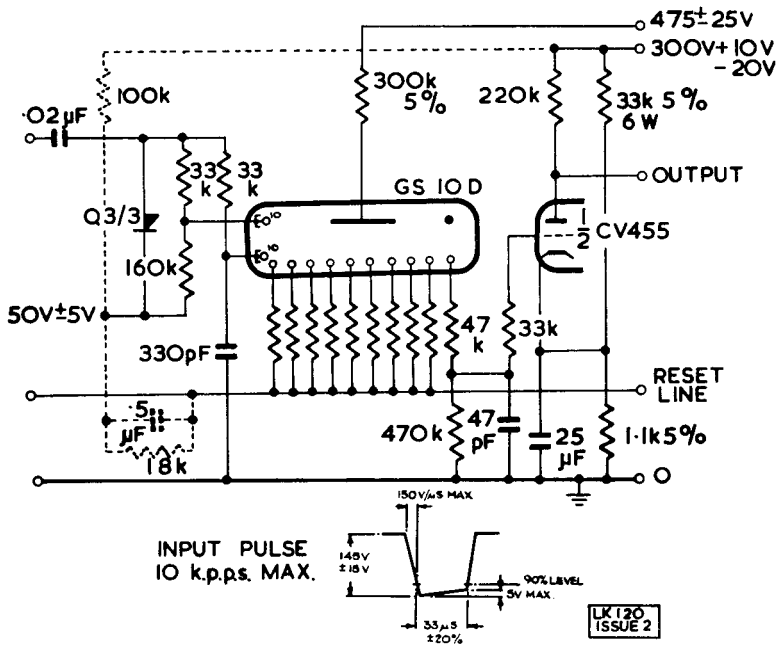


Circuits



This circuit has been designed for use with either a P50A, germanium junction photo-cell, or an OCP71, photo-transistor. A positive going pulse is produced at the output whenever the light focused on the cell is interrupted. This pulse is suitable for driving the cold-cathode coupling circuit LK.108. The 150 V supply rail should be stabilized and may be obtained from the stabilizing circuit LK.103.

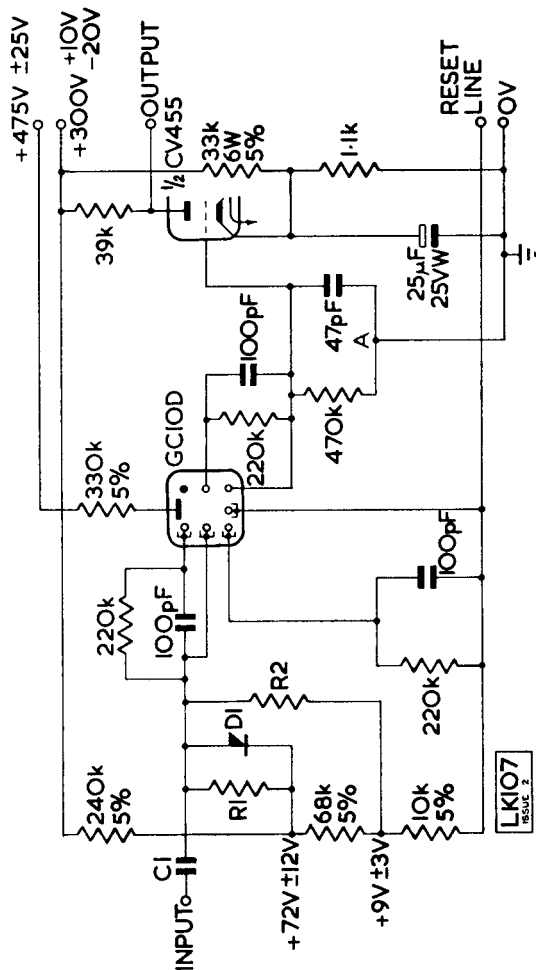
Photo-cell Input for 4 kc/s Dekatron



The grid and cathode of the pulse amplifier are used as a limiting diode for the GS10D output cathode voltage.

Coupling Circuit from GS10D to GS10C or other 4 kc/s Dekatron

Circuits

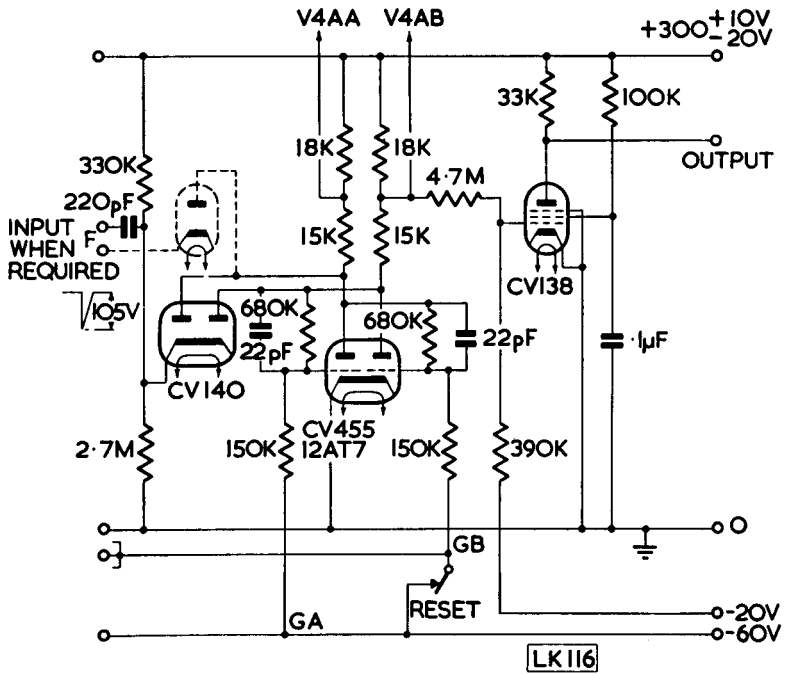


GC10D Single-pulse Drive with Coupling suitable for Integrated-pulse Drive LK105

Drive	Input		C1	R1	R2	D1
	Duration	Amplitude				
Random pulse	> 25 μ s	145 V +50 V -12 V	·02 μ F	1 M Ω	Not req'd.	Q3/3
Sine-wave	—	65—100 V r.m.s.	To suit lowest frequency	Not req'd.	100 k Ω	Not req'd.

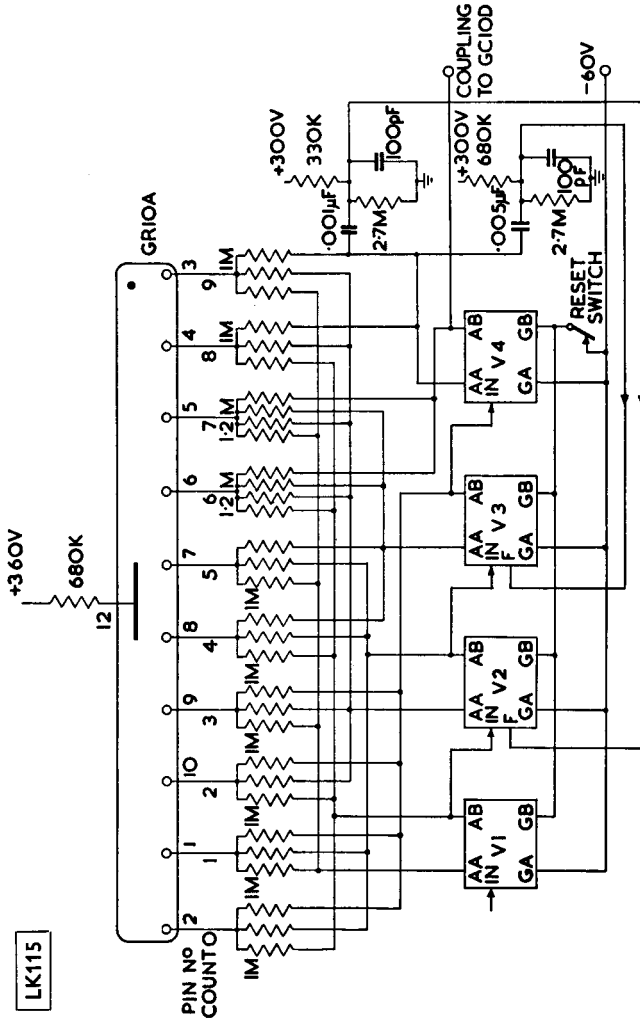
The grid and cathode of the pulse amplifier are used as a limiting diode for the GC10D output cathode voltage.

If a -20V rail is available, the junction A of the 470k resistor and 47pF capacitor may be taken to this supply and the CV455 cathode taken to the 0V rail, eliminating the cathode potential divider.



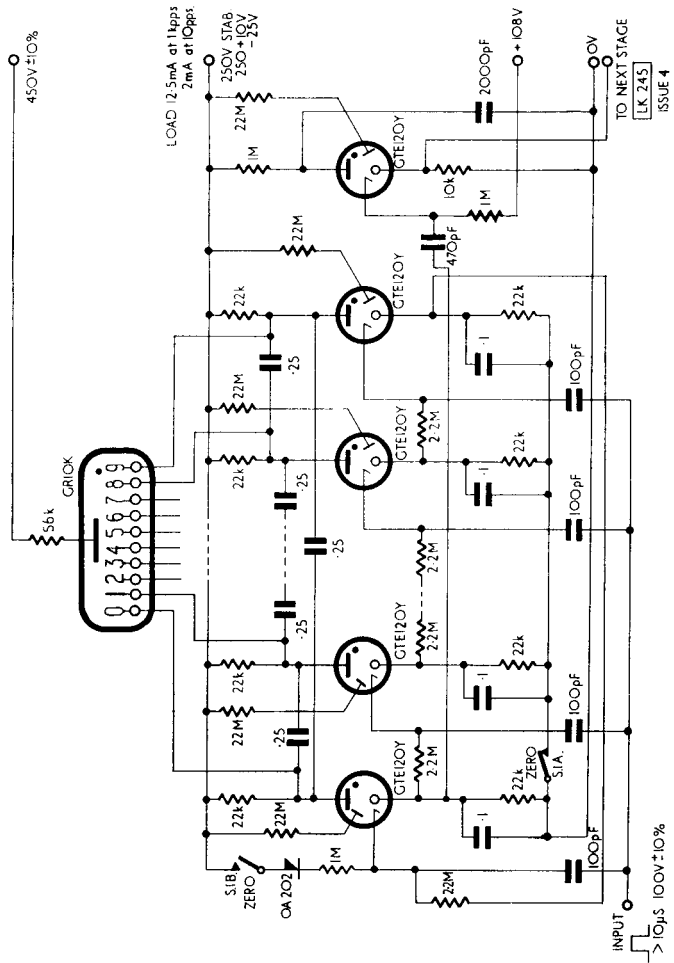
Detail of Binary Counting Stage with Pulse Amplifier for Driving GC10D Circuit LK107





GR10A Connected to Conventional Decade Scaler





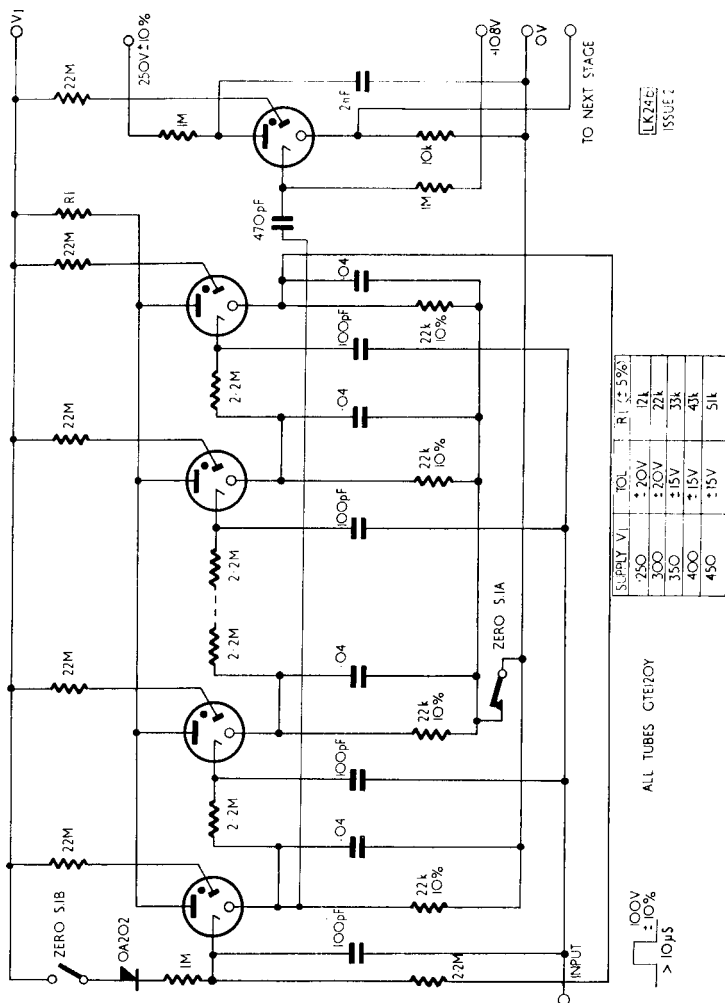
To zero the circuit S.1A and S.1B should be operated together. The same contacts may also be used to zero cascaded decades.

Trigger Tube Ring Counter
 incorporating *Digitron Readout 1kp.p.s. max.

* Registered Trade Mark



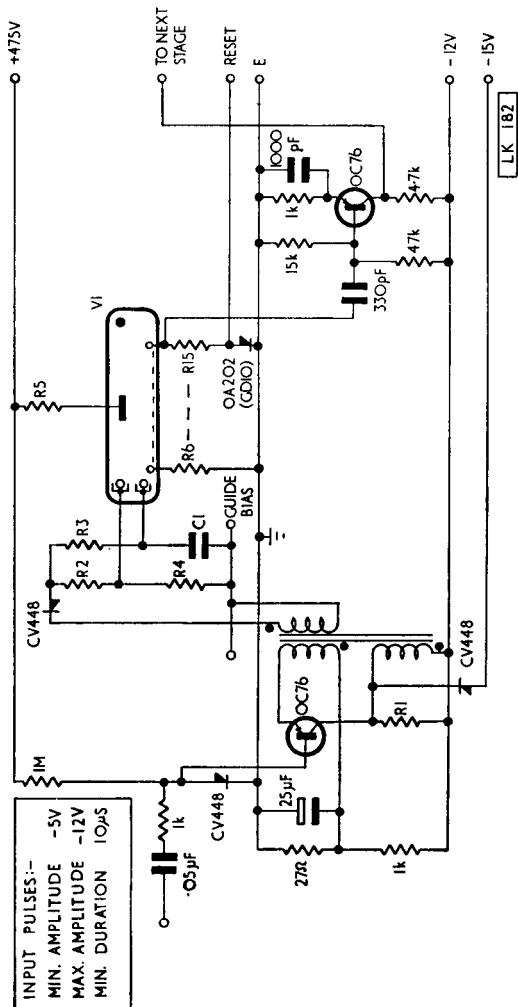
Circuits



To zero the circuit S.1A and S.1B should be operated together. The same contacts may also be used to zero cascaded decades.

Trigger Tube Ring Counter

Max. Frequency 1 kc/s

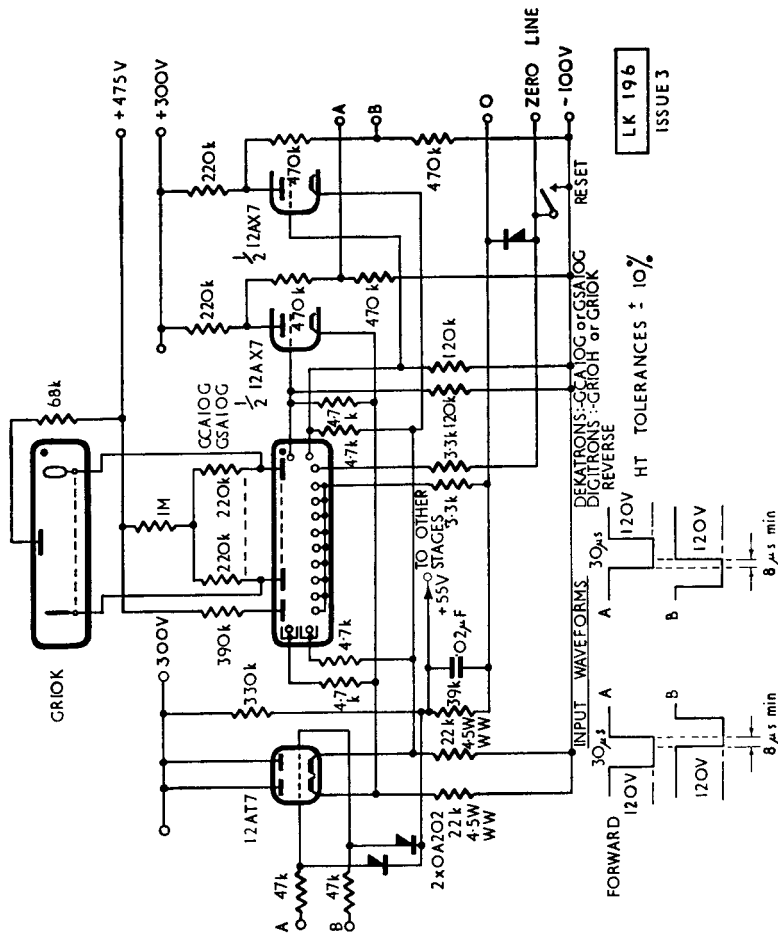


Transistor Blocking Oscillator Drive of *Dekatrons

*Registered Trade Mark

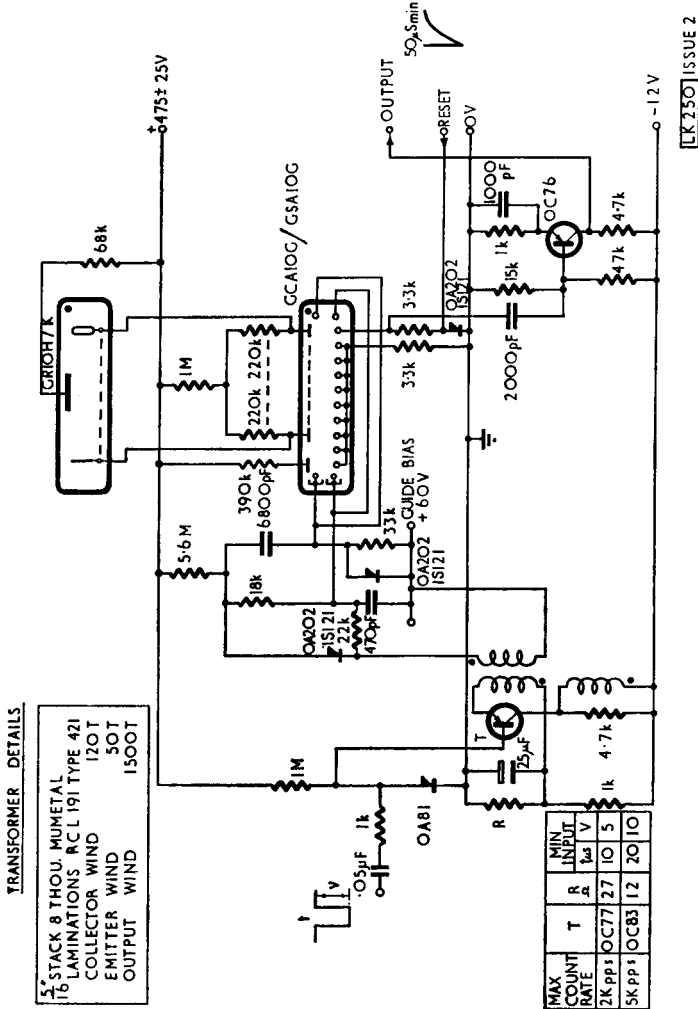


UNDER REVISION



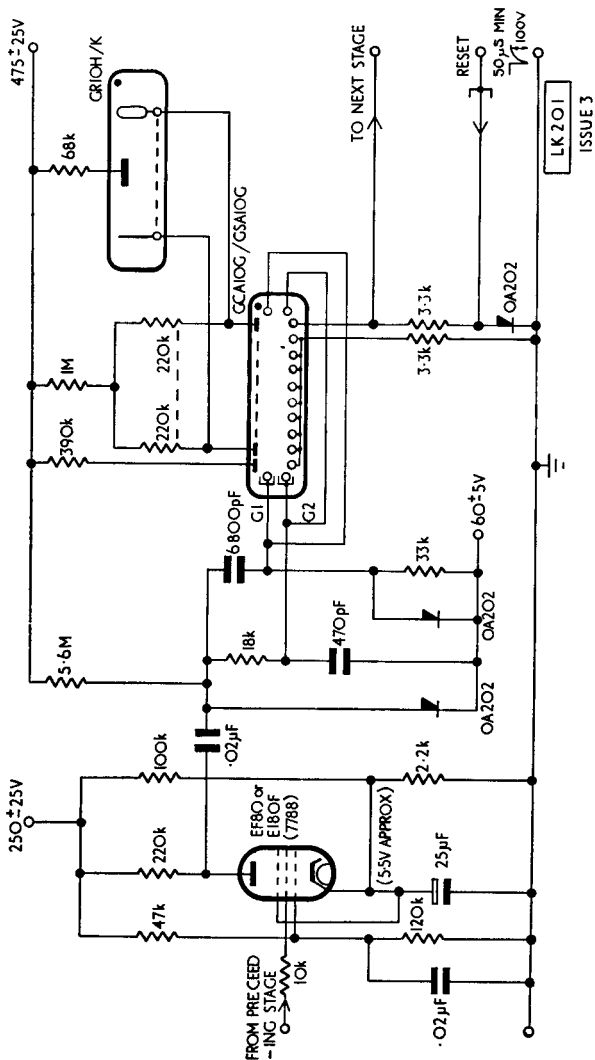
Reversible Drive and Coupling Circuit for GCA10G/GSA10G

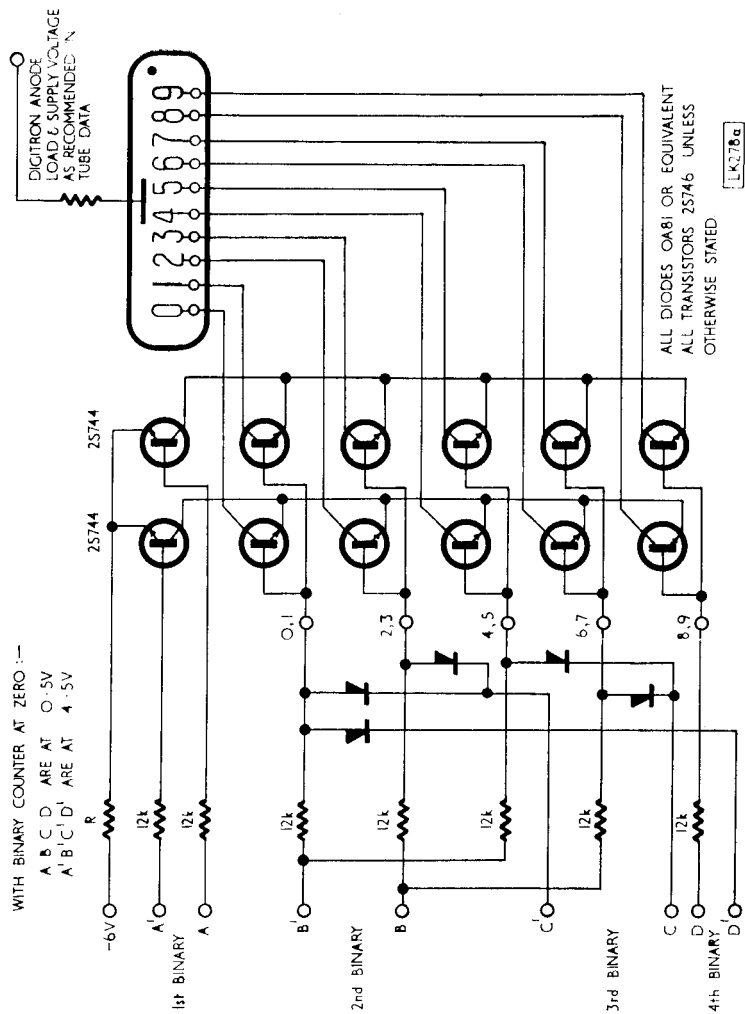




GCA10G/GSA10G Transistor Drive and Coupling Circuits



UNDER REVISION**GCA10G/GSA10G Pentode Coupling Circuit**

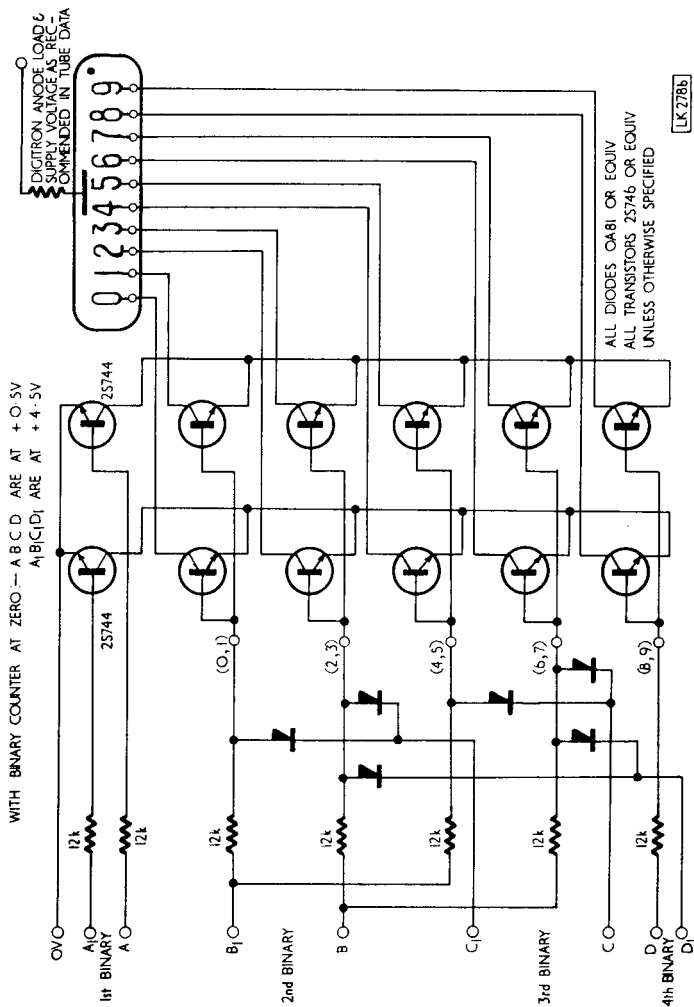


***Digatron Display from 1-2-4-8 Binary Coded Decimal Input**

* Registered Trade Mark



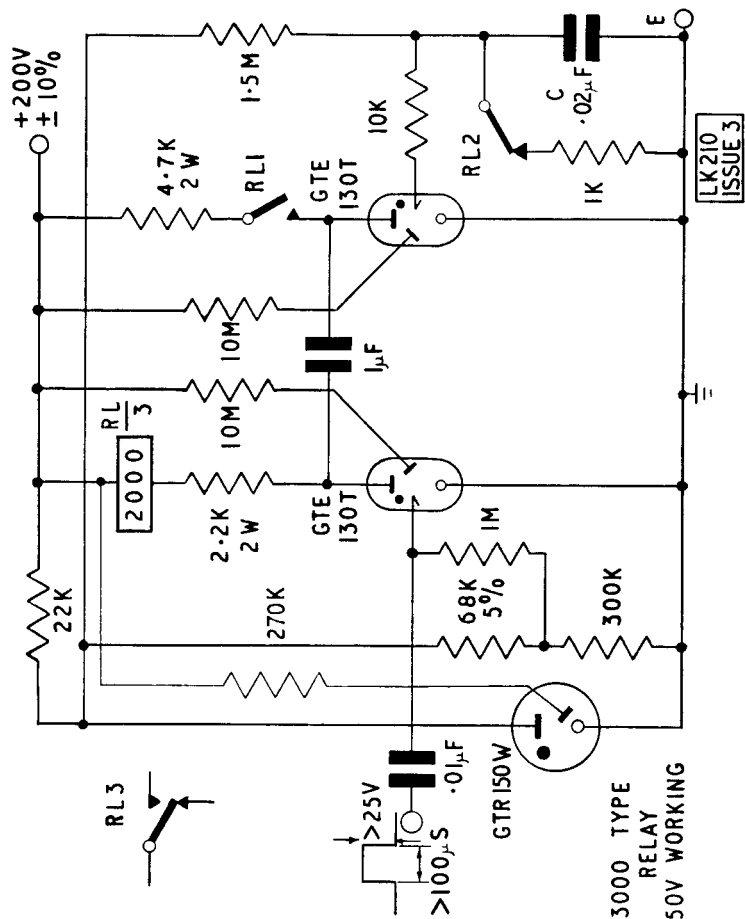
Circuits



***Digatron Display from 1-2-4-2 Binary Coded Decimal Input**

*** Registered Trade Mark**

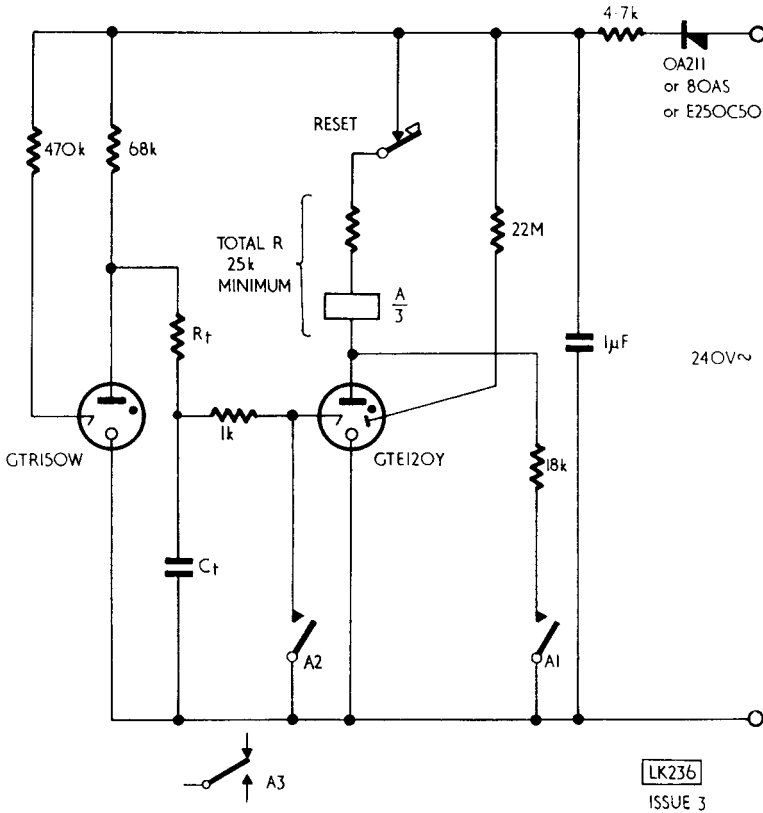




This circuit accepts pulses as small as 25 V, 100 μ s into 1 M Ω ; and operates a 50 V, 25 mA relay or electromagnetic counter for approx. 50 ms. The value of C determines the duration of the relay energizing pulse. Maximum speed 15 p.p.s.

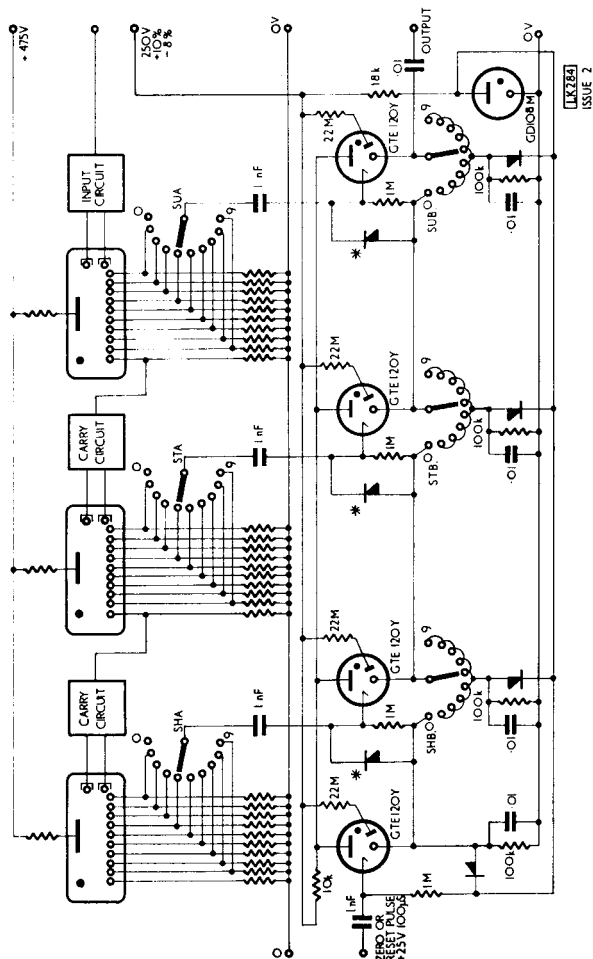
Electronic to Electro-magnetic Coupling Circuit

Circuits



Timing period = 1.6 R.C. secs. R in M Ω
 C in μ F
 R max. = 470M Ω C min. = 470pF

Simple R.C. Timer for Nominal 240 V A.C. Operation



Max. speed 5 kp.p.s.—For speeds below 250 p.p.s. Diodes marked * can be omitted.
 Min. Dekatron Cathode Voltage 20 V.
 No Connection is necessary to the 'O' position of the selector switch 'A' wafers.

Pre-set Batch Counter-using Ring Counter Coincidence Circuit



ALL DIODES TYPE OA202 OR EQUIVALENT

