DEKATRON TUBES

ERICSSON TELEPHONES LTD. ETELCO LIMITED

TUBE DIVISION

BEESTON, NOTTINGHAM

Telephone : Nottingham 254831

NOVEMBER 1961

Special thanks to Peter Lee
Scan: Roland Huisman

REFERENCE AND STABILIZER TUBES

Type	Price
GD75P	9/-
GD83W	10/-
GD85M/R (Ruggedised)	10/-
GD85M/S (CV449)	8/-
GD85PR/S (CV4048)	15/-
GD85WR	20/-
GD85WR/S (VX9174)	45/-
GD87M/S (5651 and CV2573)	8/6
GD90M	8/-
GD108M/S (CV1833 and 0B2)	8/-
GD150A/S (CV216 and 0D3)	9/-
GD150M	8/-
GD150M/R (Ruggedised)	10/-
GD150M/S (CV1832 and 0A2)	8/-
GD150P/S (CV2225)	8/-
GTR75M/S (CV284)	8/6
‡ GTR83W	5/-
GTR83X	4/6
GTR95M/S (CV286)	7/6
GTR150M/S (CV287)	9/-
‡ GTR150W	5/-

SPARK GAP TUBES

GTR30W
GD2W — Prices and Data on request

MAINTENANCE TUBES

GC10/2P	60/-
GD86W/S (CV2321)	15/-
GD100A/S (CV188)	17/6
GD100B/S (CV1070)	17/6
GD120A/S (CV1110 and CV1731)	26/-
GDT120M	5/-
GR4G	35/-
GS10G	50/-
GS10K	50/-
GTR120A/S (CV45)	27/-

DISCOUNT is allowed on quantities above 100 of any particular tube code.
Enquiries for quantity requirements are invited.

INDICATOR SHIELDS FOR USE WITH DEKATRONS

Type	Price - Nett (not subject to discount)	
N78211 (Bakelite 0-9)	2/-	For use with GC10B, GC10B/S,
N79368 (Metal 0-9)	1/-	GC10/4B, GC10D, GS10H and GS10J
N79369 (Metal 0-11)	1/-	For use with GC12/4B
N80977 (Metal 0-9)	1/-	For use with GS10C/S, GS10D and GR10A.
N84538 (Metal 0-11)	1/-	For use with GS12D
N84338 (Metal 0-9)	1/-	For use with GC10/2P

‡ *Data available on request*

RETAINING CLIP FOR USE WITH TROCHOTRONS

HFD 13441 2/3 ... For use with VS10G, VS10H and VS10K

ESCUTCHEON UNITS FOR USE WITH SIDE VIEWING DIGITRONS

HFD 13502	2 tube	£2 : 2 : 6	For use with Digitrons GR10G and GR10J
HFD 13503	3 tube	£2 : 10 : 0	
HFD 13504	4 tube	£3 : 2 : 6	
HFD 13505	5 tube	£3 : 12 : 6	

TUBE SOCKETS

TYPE	E.T.L. CODE	PRICE Nett (not subject to discount)	FOR USE WITH
B7G	N890325 HFD 11367	1/3	GD75P, GD83M, GD85M S, GD85M/R, GD87M, GD90M, GD108M, GD150M, GD150M/S, GD150M/R, GD150P, GDT120M,, GPE175M, GTE175M, GTR95M/S, GTR150M/S,
I.O.	N77461	1/-	GC10B, GC10B/S, GC10B/L, GC10/4B, GC12/4B, GC10D, GD150A/S
B9A	HFD 11453	1/3	GDT120T, GTE130T, GPE120T
B12E	N890066 HFD 11437	2/-	GR10A, GS10C/S, GS10D, GS10E, GS12D
B17A	HFD 13045	2/-	GR2G, GR4G, GR10G, GR2H, GR10H, GR10J, GR10K, GR12G, GR12H, GS10H, GS10J
B17A PRINTED CIRCUIT	HFD 13534	3/6	GR2G, GR4G, GR10G, GR2H, GR10H, GR10J, GR10K, GR12G, GR12H, GS10H, GS10J
B27A	N890858A HFD 13238A	4/-	GS10G, GS10K, GSA10G, VS10G, VS10H, VS10K

Delivery: Carriage paid in United Kingdom. In general the Tubes and Indicator Shields listed above are available for despatch within 7 days after receipt of order.

Continuous development of cold-cathode tubes has resulted in a number of the early types being superseded by improved designs. Where customers find it essential to have old types for replacement purposes, we shall be pleased to furnish quotations on request.

ERICSSON TELEPHONES LTD.
ETELCO LIMITED

HEAD OFFICE
22 Lincoln's Inn Fields
London, W.C. 2
Telephone
London, HOLborn 6936

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Beeston, Nottingham
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Telephone
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(This price list supersedes all our previous valve price lists)

JANUARY 1963

Printed by Ericsson Telephones Ltd.
Etelco Limited,
Beeston, Nottingham, England

COLD - CATHODE TUBES

TABLE OF EQUIVALENTS

ERICSSON TELEPHONES LIMITED
ETELCO LTD.

JANUARY 1963

TUBE EQUIVALENTS

Voltage Stabilizers and Reference Tubes

Ericsson Etelco	*CV*	*English Electric*	*G.E.C.*	*Mullard*	*U.S.A.*
GD75P				75C1	OC?
GTR75M	284			75B1	
GD83M				83A1	
GD85M/S	449	5651/QS1209	QS83/3	85A2	OG3
GD85PR/S	4048	QS1212		M8098	
GD85WR				M8190*	
GD86W/S	2321				
GD87M	2573				5651
GD90M				90C1	
GTR95M/S	286	QS95/10	QS95/10	95A1	
GD100A/S	188	QS92/10			
GD100B/S	1070		ST11	7475	
GD108M	1833	OB2 QS1208		108C1	OB2
GD120A/S	1110 1731		S130		
GTR120A/S	45		S130P		
GD150A/S	216	OB3 QS150/40	QS150/40	150C3	OD3
GD150M/S	1832	OA2 QS1207		150C2 150C4	OA2
GTR150M/S	287	QS150/15	QS150/15	150B3	
GD150P/S	2225	QS1200		150B2	6354
GD150PR/S	4104			M8163	

Trigger Tubes

GTR80M				Z900T	5823
GPE120T				Z806W*	
GTE130T	2434			Z803U	6779
GTE175M	5348				

Multi-Cathode Tubes

GC10B/S	2271			Z303C	6482
GC10B/L	6044				
GC10/4B	1739				6802
GC10/4B/L	6100				
GC10D	5143				
GC10/2P					6879
GS10C/S	2325			Z502S	6476
GR10A	5291			Z503M	
GS10H				Z504S*	

Digitron Tubes

	CV	*France (CSF)*	*Philips*	*Mullard*	*Burroughs*
GN10M		TA542	Z520M	Z520M	B5031
GR10K	5842				

* Near Equivalent

ELECTRONIC TUBES

DEKATRONS, TROCHOTRONS, DIGITRONS, REGISTER TUBES, TRIGGER TUBES, REFERENCE and STABILIZER TUBES.

PRICE LIST (NETT)

REVISED 1st JANUARY 1963.

Ericsson Telephones Ltd.
Etelco Limited

★ "DEKATRON" TUBES
(Counters and Selectors)

Type	Price
GC10B	29/-
GC10B/L (CV6044)	50/-
GC10B/S (CV2271)	34/-
GC10/4B (CV1739)	38/-
GC10/4B/L (6100)	50/-
GC10D (CV5143)	40/-
GC12/4B	40/-
GCA10G	40/-
GS10C/S (CV2325)	35/-
GS10D	45/-
GS10E	45/-
‡‡ GS10H	28/-
‡‡ GS10J	30/-
GS12D	55/
GSA10G	45/-

TROCHOTRON TUBES
(Beam Switching Tubes)

VS10G (CV5290)	125/-
VS10H (CV6103)	175/-
VS10K	125/-
VS10GM (Shielded version of VS10G)	145/-

★ "DIGITRON" AND REGISTER TUBES
(Indicator Tubes)

GR2G	30/-
GR2H	30/-
GR10A (CV5291)	35/-
GR10G	35/-
GR10H	37/6
GR10J and GR10J/F (Filter) ..	35/-
GR10K and GR10K/F (Filter) ..	35/-
‡ GR10N	100/-
GR10W	30/-
GR12G	100/-
GR12H	100/-

TRIGGER TUBES

GDT120T	8/6
‡ GPE120T	10/-
GPE175M	8/6
‡ GTE120Y	4/-
GTE130T	9/-
GTE175M	6/6
GTR120W	1/6

CORONA STABILIZER TUBES

GD340W	42/6
GD350X	42/6
GD350Y	30/-

★ Registered Trade Mark

DEKATRON TUBES

INDEX

DEKATRON TUBES

These are multi-electrode, gas-filled, cold-cathode, glow-transfer tubes used for the counting of electrical impulses and displaying the state of the count. The impulses may be produced by a wide variety of sources such as the closure of contacts, interruption of a light beam, tachometer generator, ionization chamber, etc. Dekatron tubes are also a convenient method of counting down from one frequency to another, or of measuring frequency by counting the number of cycles of a waveform which occur during a known time interval.

The Double-Pulse Dekatron Principle

A scale-of-10 Dekatron consists basically of 30 cold-cathode diodes in one envelope. The diode cathodes are rod shaped and arranged around a circular disc anode.

Ten of the electrodes are known as cathodes, ten as first guides, and ten as second guides. Nine of the cathodes are internally connected, the tenth, brought out to a separate connection in the base of the tube, is the output cathode. All the ten first guides are connected together as are the ten second guides. The cathodes, first guides and second guides are intermeshed in cyclic order. When a high potential (400—500 V) is applied to the tube, with a high resistance in the anode circuit to limit the current to a suitable value, one of the anode-cathode gaps is ionized and a " negative glow " around the particular cathode is visible through the dome of the envelope.

In the quiescent state the cathodes are at earth potential, and the first and second guides are biased positively. If the first guides are pulsed negatively the guide adjacent to the glowing cathode becomes ionized, and because the anode potential will tend to " follow " the potential of the most negative electrode, the glowing cathode is extinguished and the discharge transfers to the first guide. This process is repeated by making the second guides negative and returning the first guides to the positive bias. The glow discharge will then transfer from the first guide to the adjacent second guide. When the second guides are returned to the positive bias the glow will transfer to the next cathode which will then be negative with respect to the guides.

cont'd

Therefore, by applying successive pairs of negative pulses to the first and second guides in that order, it is possible to transfer the glow discharge from cathode to cathode in a clockwise or additive direction. If the pulses be applied in the reverse order, the circulation is anti-clockwise or subtractive.

The output cathode is connected to the earthed main cathode ring by a load resistor, and when the discharge invests this cathode, current will flow through the resistor, developing a positive voltage of 30 to 40 volts across it. This voltage can be used as a signal to indicate that the discharge has completed one revolution of the tube, and with suitable amplification it can be used to drive a further Dekatron.

Dekatron Computing Tubes

For multi-decade subtraction, the negative carry must take place on cathode 9 and the direction sensing circuits usually require at least one intermediate output. The computing tubes, therefore, besides being tested in both directions, have four individual cathodes A, B, C and D, brought out to pins on the valve base. The remaining cathodes are internally connected to the common ring which is wired to earth. The spacing of the output cathodes is so arranged that, by making the appropriate cathode act as zero, an output pulse can be obtained at any intermediate count. The method of connection is shown in the table on the relevant data sheet.

Dekatron Selector Tubes

These retain all the essentials of the Dekatron counting tubes whilst having the additional property of access to all the cathodes. The selector tubes have found many uses in frequency dividers, batching counters, generators of staircase waveforms, and in marking one selected lead from a group.

Single Pulse Dekatron Counters

Unlike other Dekatrons, these tubes require only a single pulse for each count. They are similar in appearance to double-pulse counters, but have three guide electrodes instead of two between successive cathodes.

cont'd

The negative input pulses are applied via a high resistance to the first guides and directly to the second guides. These two groups of guides are normally biased positively with respect to the earthed cathodes. The cathodes are preceded by the third guides, which are connected to earth through a high resistance. The receipt of an input pulse transfers the glow from a cathode to a first guide, and the anode current by flowing through the first guide resistor, raises the voltage of the guide. When the potential difference between first and second guides is equal to the transfer voltage, the glow moves (auto-transfers) to the second guide, where it rests until the pulse voltage is removed. The return of the first and second guides to the positive bias potential moves the glow to the third guide, and again an auto-transfer takes place to the cathode, so completing one count. The rate of change of voltage on the guides is kept to a suitable figure by small capacitors in parallel with the auto-transfer resistors.

N.B.—Additional information on the use of Dekatron tubes is given in the following data sheets and in the Circuit Section.

LICENCE

The manufacture and use of " Dekatron " tubes is covered by one or more of the following United Kingdom Patents or applications :—

712,171	712,175	712,177	712,215
712,229	721,058	734,611	751,952
960,927	768,550	777,562	778,114
784,033	785,021	787,246	13961/58

These patents cover any circuit using cold-cathode ring counter tubes with guide electrodes. Purchasers of our tubes are granted a free licence to use any such circuits with " Dekatron " tubes.

Limit Ratings

Maximum counting rate : sine wave and rectangular pulses	4,000 p.p.s.
Maximum total anode current	550 μA
Minimum total anode current	250 μA
Minimum anode supply voltage (normal room illumination)	350 V
Maximum potential difference between guides and cathodes	140 V
Maximum output cathode load	150 kΩ
Maximum output pulse available with 150 kΩ cathode load resistor	35 V

Characteristics

Running voltage at 300 μA (GC10B/S)	191 ± 5 V

Recommended Operating Conditions

*Anode current	310 μA ± 20%
**Guide Bias	+18 V
Bias on output cathode resistor	—20 V
Forced resetting pulse	—120 V
Double pulse drive-amplitude	—80 V ± 10 V
Double pulse drive-durations	60 μS
Integrated pulse drive-amplitude	—145 V ± 15 V
Integrated pulse drive-duration	80 μS
Sine wave drive-amplitude	40—70 V r.m.s.

* The required anode current may be obtained from a 475 V supply via an 820 kΩ resistor.

** This does not apply in the case of the sine-wave drive.

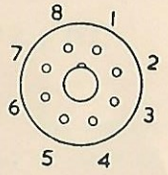
GC10B, GC10B/S
(CV.2271)

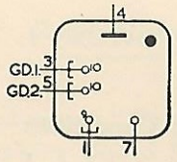
Scale-of-ten Counters

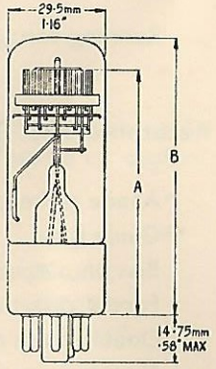
Mechanical Data

Mounting position	Any For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode "O" is aligned with pin 6 to an accuracy of ± 12°.
Weight	43 g (nominal)
Escutcheons	N.78211 Bakelite, or N.79368 Brass
Base	I.O.

Base Connections
(underside view)







Pin 1 Common cathodes
2 —
3 1st Guides
4 Anode
5 2nd Guides
6 —
7 Cathode "O"
8 —

Dimension	Nominal	GC10B		GC10B/S	
		Min.	Max.	Min.	Max.
A	72·5 mm. (2·85")	68·5 mm.	76·5 mm.	69·5 mm.	75·5 mm.
B	85 mm. (3·35")	81·5 mm.	88·5 mm.	82·5 mm.	87·5 mm.

Scale-of-ten Counter
Specially processed for long life

GC10B/L, GC10/4B/L
(CV.6044) (CV.6100)

Limit Ratings

	Rectangular Pulse Drive	Sine Wave Drive
Max. speed	4,000 p.p.s.	4,000 c.p.s.
Max. striking voltage	350 V	350 V
Max. anode current	550 µA	550 µA
Min. anode current	250 µA	250 µA
Max. input signal peak to peak	140 V	171 V
*Max. guide bias	60 V	
Max. K_o bias	—20 V	
Max. K_o load	100 kΩ	
Max. guide bias resistance	220 kΩ	

Characteristics

Running voltage at 450 µA	190 V	190 V

Recommended Operating Conditions

Supply voltage	400 V	400 V
Anode resistor	470 kΩ	470 kΩ
Signal amplitude	—120 V	55 V r.m.s.
Both Guides		
Pulse duration	80 µS	
Both Guides		
Signal delay, 2nd guide	80 µS	
Signal delay, 2nd guide		45°
*Bias voltage	35 V	9 V
Both Guides		
Bias voltage K_o	—10 V	—10 V
Output cathode load	33 kΩ	33 kΩ

* With rectangular pulse drive with a variable mark/space ratio this guide bias must be maintained, e.g., by D.C. restoration.

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units	Notes
	GROUP A **Acceptance Tests**								
a	Insulation	To be measured between any one electrode and parallel combination of all the others at 170 V.		100%		100		MΩ	1
b	Striking Voltage	A — K_o V_b = 350 V		100%	V_s				1, 3
c	Scaling Accuracy	V_b = 400 V V_1 = +35 V V_2 = —40 V T = 60μS Frequency = 4·0 kc/s		100%					1, 2
d	Running Voltage	V_b = 400 V		100%	V_r	184	194	V	1, 4
	GROUP B **Life Test**								
		Combined AQL	1·5	IA					
a	Survival running life test	V_b = 500 V V_1 = +35 V V_2 = —40 V T = 60 μS							5, 7
	Tests to be performed at end of survival running test								
b	Scaling Accuracy	V_b = 400 V V_1 = +35 V V_2 = —40 V T = 60 μS Frequency = 4·0 kc/s							2
c	Running Voltage	V_b = 400 V			V_r	176	206	V	4

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units	Notes
	GROUP C **Electrical Retest** Not more than 7 days prior to application for Services final approval								6
a	Scaling Accuracy	V_b = 400 V V_1 = +35 V V_2 = —40 V T = 60 μS Frequency = 4·0 kc/s		100%					2
b	Running Voltage	V_b = 400 V		100%	V_r	184	194		4

NOTES

1. Tests of Group A are to be applied directly after completion of manufacture.
2. The tube shall scale without error the first applications of test signals (illustrated in Fig. 1). Test signals are to be applied for at least 1/10th second. The test circuit of Fig. 2 is applicable.
3. $K_{1\text{-}9}$ 1st guide and 2nd guide electrodes to be disconnected. Illuminations of tube to be 5—50 ft. candles. Tube to conduct in less than 10 seconds.
4. The $K_{1\text{-}9}$ 1st guide and 2nd guide electrodes will be successively earthed through a suitable make before break type switch to cause 30 gaps to conduct in turn. The running voltage across each gap shall be within the specified limits. For this test the K_o and $K_{1\text{-}9}$ electrode will be commoned. The test circuit to Fig. 3. is applicable. The measurement of the running volts is to be made between 0·1 and 2·0 seconds after the contacts of the make before break type switch have broken.
5. The tubes selected for this test are to be run in the circuit shown in Fig. 4. One application of the pulses shown in Fig. 1 is to be made every 85 ± 5 hours. The tube is to receive 20 such pulses and then be removed. A tube which fails to step on the application of the test pulses shall be rejected. The normal guide bias is to be +60 V which will be reduced to +35 V immediately prior to the application of pulses.
6. During the period between the completion of Group A tests and the commencement of Group C tests no further processing shall be applied.
7. A lot shall consist of not more than one calendar month's production or 1301 whichever is the greater. For lots of 800 and less sampling codes shall be as for lots 801—1300.

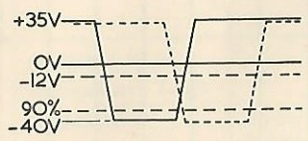


Fig. 1

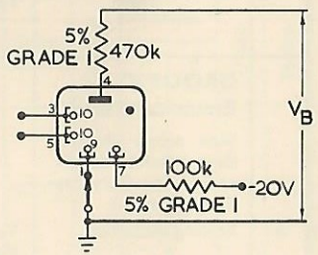


Fig. 2

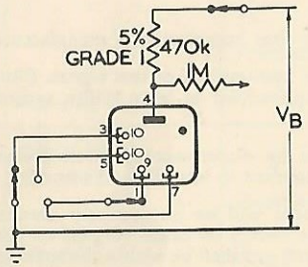


Fig. 3

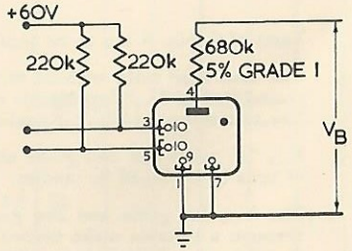
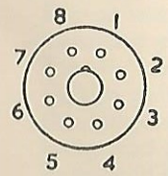


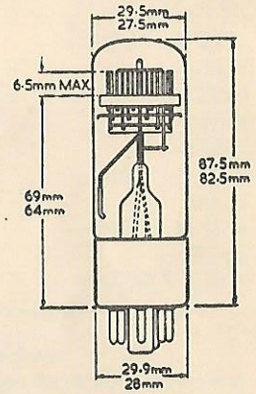
Fig. 4

Mechanical Data

Mounting position	Any For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode "O" is aligned with pin 6 to an accuracy of ± 12°.
Escutcheons	N78211 Bakelite, or N79368 Brass
Base	I.O.

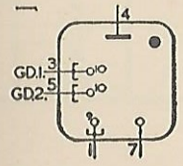
Base Connections
(underside view)





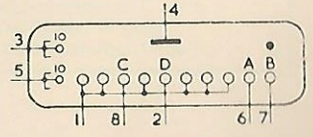
GC10B/L

Pin 1	Common cathodes
2	—
3	1st Guides
4	Anode
5	2nd Guides
6	—
7	Cathode "O"
8	—



GC10/4B/L

Pin 1	Common cathodes
2	Cathode "5"
3	1st Guides
4	Anode
5	2nd Guides
6	Cathode "9"
7	Cathode "0"
8	Cathode "3"



Bi-directional 10-way Computing Tube with Intermediate Outputs

GC10/4B
(CV.1739)

Limit Ratings

Maximum counting rate: sine wave and rectangular pulses	4,000 p.p.s.
Maximum total anode current	550 μA
Minimum total anode current	250 μA
Minimum anode supply voltage (normal room illumination)	350 V
Maximum potential difference between guides and cathodes	140 V
Maximum output cathode load	150 kΩ

Characteristics

Running voltage at 300 μA	191 V approx.

Recommended Operating Conditions

*Anode current		310 μA ± 20%
**Guide bias	+20 V	+40 V
Bias on output cathode resistor	—20 V	Zero
Resultant pulse	40 V	40 V
Forced resetting pulse		—120 V
Double pulse drive-amplitude		—80 V ± 10 V
Double pulse drive-durations		60 μS
Integrated pulse drive-amplitude		—145 V ± 15 V
Integrated pulse drive-duration		80 μS
Sine wave drive-amplitude		40—70 V r.m.s.

* The required anode current may be obtained from a 475 V supply via a 820 kΩ resistor.

** This does not apply in the case of the sine wave drive.

The following table shows the number of input pulses for which outputs may be obtained for both directions of drive and with each cathode used as the zero electrode.

Number of pulses to give output from :—

A	B	C	D	
0	1	4	6	Clockwise, A zero
0	9	6	4	Anti-clockwise, A zero
9	**0**	**3**	**5**	**Clockwise, B zero**
1	**0**	**7**	**5**	**Anti-clockwise, B zero**
6	7	0	2	Clockwise, C zero
4	3	0	8	Anti-clockwise, C zero
4	5	8	0	Clockwise, D zero
6	5	2	0	Anti-clockwise, D zero

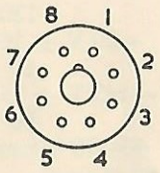
GC 10/4 B
(CV.1739)

Bi-directional 10-way Computing Tube with Intermediate Outputs

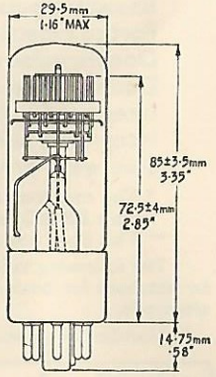
Mechanical Data

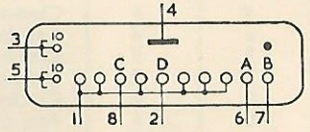
Mounting position	Any. For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode " B " is aligned with pin No. 6 to an accuracy of ± 12°.
Weight	43 g (nominal).
Escutcheons	N.78211 Bakelite, or N.79368 Brass.
Base	I.O.

Base Connections
(underside view)



Pin 1 Common cathodes
2 Cathode " D "
3 1st Guides
4 Anode
5 2nd Guides
6 Cathode "A"
7 Cathode " B "
8 Cathode " C "





Bi-directional 12-way Computing Tube with Intermediate Outputs

GC 12/4 B

Limit Ratings

Maximum counting rate : sine wave and rectangular pulses	4,000 p.p.s.
Maximum total anode current	550 µA
Minimum total anode current	250 µA
Minimum anode supply voltage (normal room illumination)	350 V
Maximum potential difference between guides and cathodes	140 V
Maximum output cathode load	150 kΩ

Characteristics

Running voltage at 300 µA	191 V approx.

Recommended Operating Conditions

*Anode current		310 µA ± 20%
**Guide bias	+20 V	+ 40 V
Bias on output cathode resistor	—20 V	Zero
Resultant pulse	40 V	40 V
Forced resetting pulse		—120 V
Double pulse drive-amplitude		—80 V ± 10 V
Double pulse drive-durations		60 µS
Integrated pulse drive-amplitude		—145 V ± 15 V
Integrated pulse drive-duration		80 µS
Sine wave drive-amplitude		40—70 V r.m.s.

* The required anode current may be obtained from a 475 V supply via an 820 kΩ resistor.
** This does not apply in the case of the sine wave drive.

The following table shows the number of input pulses for which outputs may be obtained for both directions of drive and with each cathode used as the zero electrode.

Number of pulses to give output from :—

A	B	C	D	
0	1	7	9	Clockwise, A zero
0	11	5	3	Anti-clockwise, A zero
11	**0**	**6**	**8**	**Clockwise, B zero**
1	**0**	**6**	**4**	**Anti-clockwise, B zero**
5	6	0	2	Clockwise, C zero
7	6	0	10	Anti-clockwise, C zero
3	4	10	0	Clockwise, D zero
9	8	2	0	Anti-clockwise, D zero

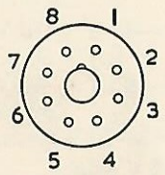
GC12/4B

Bi-directional 12-way Computing Tube with Intermediate Outputs

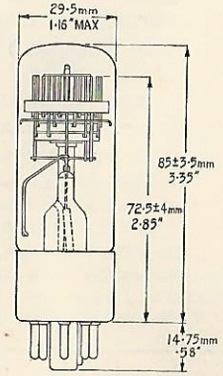
Mechanical Data

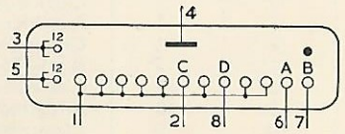
Mounting position	Any. For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode " B " is aligned with pin No. 6 to an accuracy of ± 10°.
Weight	43 g (nominal).
Escutcheon	N.79369 Brass
Base	I.O.

Base Connections
(underside view)



Pin 1 Common cathodes
2 Cathode " C "
3 1st Guides
4 Anode
5 2nd Guides
6 Cathode "A"
7 Cathode " B "
8 Cathode " D "





GC10D (CV.5143)

Scale-of-ten Counter Tube For Single-pulse Operation

Limit Ratings

Maximum counting rate : any wave shape	20 kp/s
Maximum total anode current	1·2 mA
Minimum total anode current	700 µA
Minimum anode supply voltage (normal room illumination)	420 V
Maximum potential difference between guides and cathodes	180 V

The output cathode must not rise above the potential of the commoned cathodes **by more than 10 volts,** and may be made more than 30 volts negative only when resetting.

Characteristics

Running voltage at 800 µA	215 V approx.

Recommended Operating Conditions

*Anode current	800 µA
Output cathode load	82 kΩ
Forced resetting pulse	—140 V
Random pulse drive-amplitude	$-\left(144\ \text{V} \begin{smallmatrix}+\ 50\ \text{V}\\ -\ 12\ \text{V}\end{smallmatrix}\right)$
**Random pulse drive-duration	25 µS min.
**Random pulse drive-quiescent time	25 µS min.
Random pulse drive—guide bias	+72 ± 12 V
Sine wave drive-amplitude	65—100 V r.m.s.
Sine wave drive—guide bias	+12 ± 2 V

* The required anode current may be obtained from a 475 V supply via a 330 kΩ resistor.

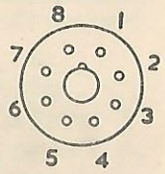
Note—To reduce the effect of stray capacity to a minimum it is essential that the anode resistor be wired not more than ¼" (or 5 mm.) from tag 4 on the valve holder.

** The maximum is limited by the repetition rate.

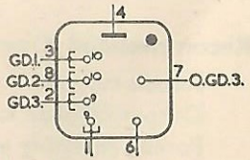
Mechanical Data

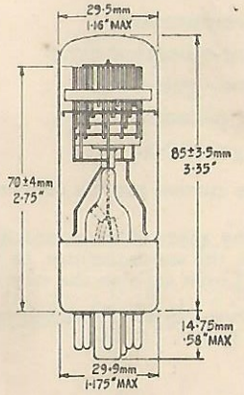
Mounting position	Any. For visual indication, the tube is viewed through the dome of the bulb.
Alignment	Cathode " O " is aligned with pin No. 6 to an accuracy of ± 12°.
Weight	44 g (nominal).
Escutcheons	N.78211 Bakelite or N.79368 Brass
Base	I.O.

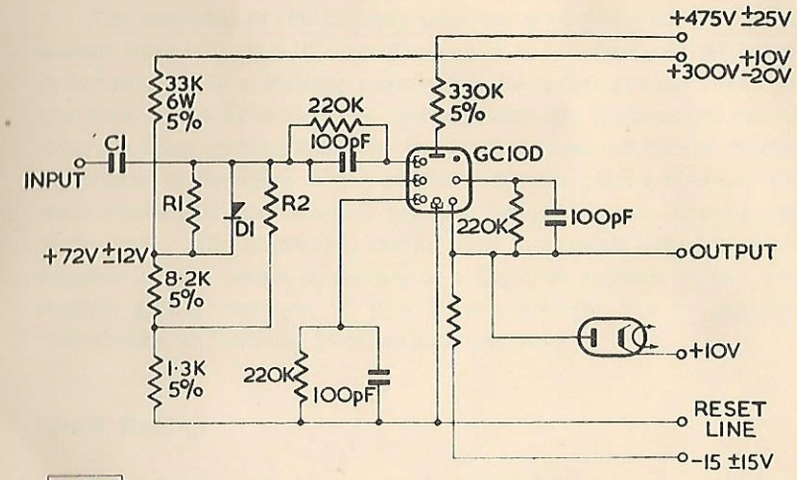
Base Connections
(underside view)



Pin 1 Common cathodes
2 3rd Guides
3 1st Guides
4 Anode
5 —
6 Output cathode
7 Output 3rd Guide
8 2nd Guides







LK122

Drive	Input		C1	R1	R2	D1
	Duration	*Amplitude*				
Random pulse	> 25 µS	145 +50 V —12 V	·02 µF	1MΩ	Not reqd.	Q3/3
Sine wave	—	65—100 V r.m.s.	To suit lowest frequency	Not reqd.	100kΩ	Not reqd.

Sine-wave or random-pulse drive for GC10D

Bi-directional 10-way Counter/Selector Dekatron with Auxiliary Anodes and Routing Guides

GCA10G GSA10G

The cathodes of the counter tube are arranged with 1—9 commoned internally and '0' brought out to a separate connection in order to provide a transfer pulse when the tubes are cascaded. In the case of the Selector tube the cathodes are all brought out to separate base connections. In both tube types additional output electrodes in the form of ten auxiliary anodes placed between the main anode and the cathodes are also brought out to connections in the base. The electrodes can be used to provide negative pulses suitable for the direct operation of a Digitron register tube. The routing guides between '9' and '0' are brought out to separate connections to facilitate bi-directional counting.

Limit Ratings

Maximum counting rate paired pulse drive	10 kp/s
Maximum counting rate single pulse drive	5 kp/s
Minimum main anode supply voltage	440 V
*Maximum main anode current	0·9 mA
*Minimum main anode current	0·5 mA
*Maximum auxiliary anode current	2·5 mA
*Maximum cathode current	3·0 mA
*Minimum cathode current	2·3 mA
Maximum cathode load	3·3 kΩ
Maximum routing guide resistor	4·7 kΩ

*The maximum main and auxiliary anode currents cannot occur with the same operating conditions. The sum of these two currents should not exceed the maximum cathode current.

The current through the auxiliary anodes may be varied by changing the Digitron anode resistor, and similarly, the Dekatron main anode/cathode current can be varied by changing its anode resistor. The two currents are substantially independent of each other.

GCA10G GSA10G

Bi-directional 10-way Counter/Selector Dekatron with Auxiliary Anodes and Routing Guides

Characteristics

Main anode to cathode running voltage	240 V nom.
Auxiliary anode voltage when conducting	225 V nom.

Recommended Operating Conditions

Main anode supply voltage	475 ± 25 V
Main anode current	0·62 mA
Auxiliary anode current	2·0 mA
Cathode load resistor	3·3 kΩ
Main anode resistor	390 kΩ
Auxiliary anode resistors (Digitron readout Fig. 1)	220 kΩ
Auxiliary biasing resistor (Digitron readout Fig. 1)	1 MΩ
Auxiliary anode resistors (no readout Fig. 2)	33 kΩ
Auxiliary anode biasing resistor (no readout Fig. 2)	100 kΩ
Forced resetting pulse amplitude	—100 V nom.
Forced resetting pulse duration	50 µS min.
Paired pulse drive Fig. 3 amplitude	120 V nom.
Paired pulse drive Fig. 3 duration	30 µS
Paired pulse drive Fig. 3 guide two delay	28 µS
Single pulse drive Fig. 4 amplitude	150 V nom.
Single pulse drive Fig. 4 duration	100 µS nom.

Bi-directional 10-way Counter/Selector Dekatron with Auxiliary Anodes and Routing Guides

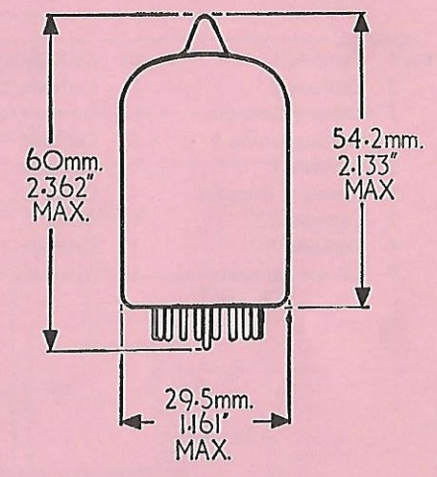
GCA10G GSA10G

Mechanical Data

Mounting position	Any. For visual indication the tube may be viewed through the dome of the bulb.
Alignment	Cathode '0' is aligned to pin 3 with an accuracy of ± 5°
Base	Modified B26A
Socket	B27A

GCA10G Base Connections (underside view)

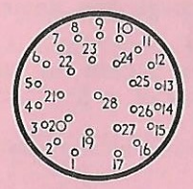
Pin 1	Commoned Cathode 1-9
2	Cathode 0
3	Routing Guide 2
4	Routing Guide 1
5	Auxiliary Anode 1
6	Auxiliary Anode 0
7	Auxiliary Anode 9
8	Auxiliary Anode 8
9	Auxiliary Anode 7
10	Auxiliary Anode 6
11	Auxiliary Anode 5
12	Auxiliary Anode 4
13	Auxiliary Anode 3
14	Auxiliary Anode 2
15	Do not connect
16	Guide 2
17	Guide 1
28	Main Anode

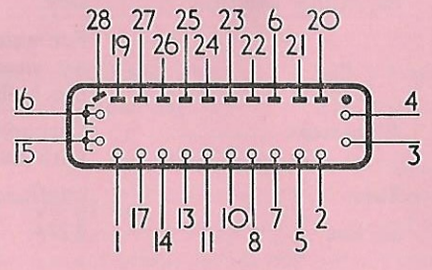


GCA10G GSA10G

Bi-directional 10-way Counter/Selector Dekatron with Auxiliary Anodes and Routing Guides

GSA10G Base Connections
(Underside View)





Pin 1	Cathode 1	Pin 10	Cathode 6	Pin 20	Auxiliary Anode 0
2	Cathode 0	11	Cathode 5	21	Auxiliary Anode 9
3	Routing Guide 2	12	Do not connect	22	Auxiliary Anode 7
4	Routing Guide 1	13	Cathode 4	23	Auxiliary Anode 6
5	Cathode 9	14	Cathode 3	24	Auxiliary Anode 5
6	Auxiliary Anode 8	15	Guide 2	25	Auxiliary Anode 4
7	Cathode 8	16	Guide 1	26	Auxiliary Anode 3
8	Cathode 7	17	Cathode 2	27	Auxiliary Anode 2
9	Do not connect	19	Auxiliary Anode 1	28	Main Anode

Bi-directional 10-way Counter/Selector Dekatron with Auxiliary Anodes and Routing Guides GCA10G GSA10G

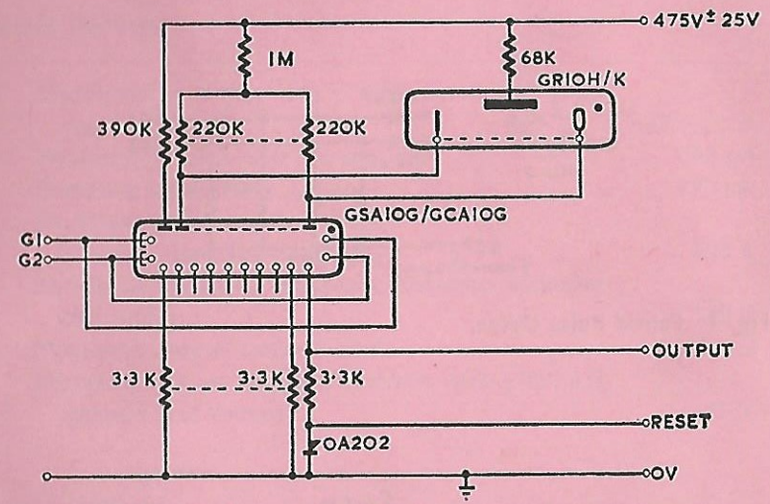


Fig. 1 Dekatron with Digitron Readout.

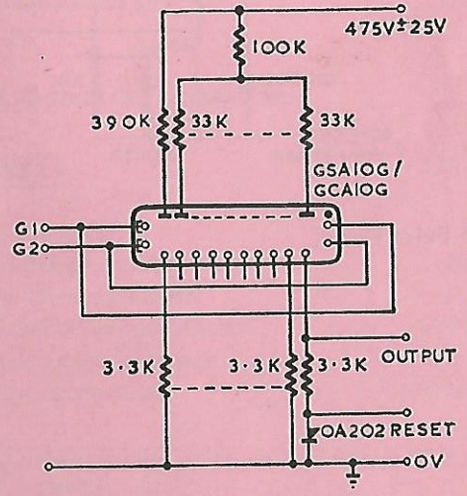


Fig. 2 Dekatron without Digitron Readout.

GCA10G GSA10G

Bi-directional 10-way Counter/Selector Dekatron with Auxiliary Anodes and Routing Guides

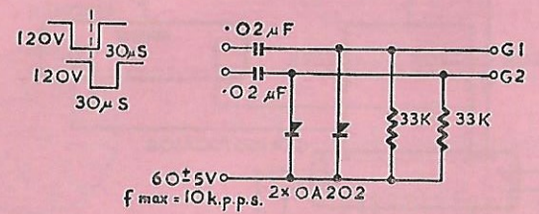


Fig. 3 Paired Pulse Drive.

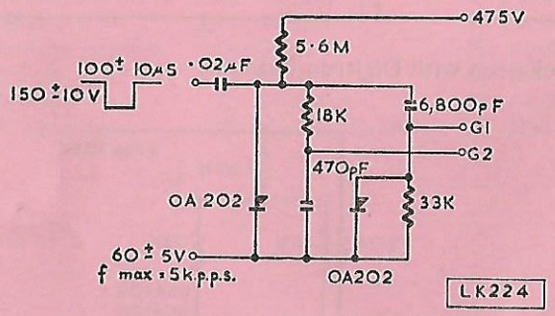


Fig. 4 Single Pulse Drive.

Bi-directional 10-way Selector Tube

GS10C/S (CV.2325)

Limit Ratings

Maximum counting rate: sine wave and rectangular pulses	4,000 p.p.s.
Maximum total anode current	550 μA
Minimum total anode current	250 μA
Minimum anode supply voltage (normal room illumination)	400 V
Maximum potential difference between cathodes and guides	140 V
Maximum output cathode load	150 kΩ
Maximum output available at 4 kc/s with a 150 kΩ cathode load resistor	35 V

Characteristics

Running voltage at 325 μA	192 V approx.

Recommended Operating Conditions

*Anode current	325 μA ± 20%
**Guide bias	+36 V
Forced resetting pulse	—120 V
Double pulse drive-amplitude	—80 V ± 10 V
Double pulse drive-durations	60 μS
Integrated pulse drive-amplitude	—145 V ± 15 V
Integrated pulse drive-duration	80 μS
Sine wave drive-amplitude	40—70 V r.m.s.

* The required anode current may be obtained from a 475 V supply via a 680 kΩ resistor.

** This does not apply in the case of the sine wave drive.

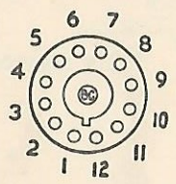
GS10C/S
(CV.2325)

Bi-directional 10-way Selector Tube

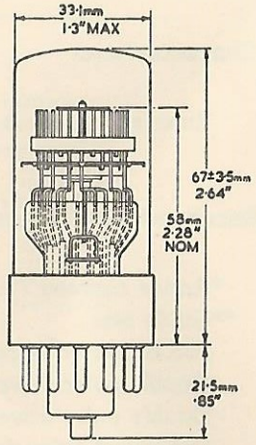
Mechanical Data

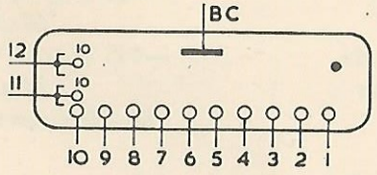
Mounting position	Any. For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode No. 1 is aligned with pin No. 11 to an accuracy of ± 12°.
Weight	53 g. (nominal).
Escutcheon	N.80977
Base	Duodecal with bottom cap.

Base Connections (underside view)



Pin	1	Cathode 0
	2	,, 9
	3	,, 8
	4	,, 7
	5	,, 6
	6	,, 5
	7	,, 4
	8	,, 3
	9	,, 2
	10	,, 1
	11	2nd Guides
	12	1st Guides
B.C.		Anode





Bi-directional 12-way Selector Tube

GS12D

Limit Ratings

Maximum counting rate: sine wave and rectangular pulses	4,000 p.p.s.
Maximum total anode current	350 μA
Minimum total anode current	190 μA
Minimum anode supply voltage (normal room illumination)	400 V
Maximum potential difference between cathodes and guides	140 V
Maximum output cathode load	270 kΩ
Maximum output available across a 270 kΩ cathode load resistor	35 V

Characteristics

Running voltage at 270 μA	191 V

Recommended Operating Conditions

*Anode current	270 μA ± 20%
**Guide bias	+36 V
Forced resetting pulse	—120 V
Double pulse drive-amplitude	—80 V ± 10 V
Double pulse drive-durations	60 μS
Integrated pulse drive-amplitude	—145 V ± 15 V
Integrated pulse drive-duration	80 μS
Sine wave drive-amplitude	40—70 V r.m.s.

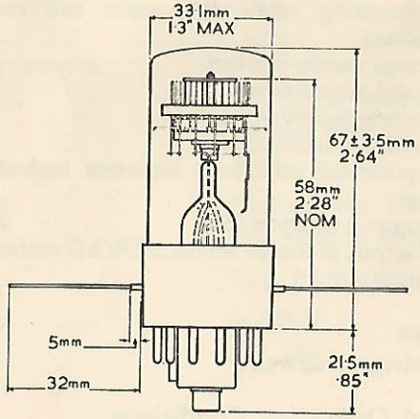
Mechanical Data

Mounting position	Any. For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode No. 1 is aligned with pin No. 12 to an accuracy of ± 10°.
Weight	50 g (nominal).
Escutcheon	N.84538.
Base	Duodecal with bottom cap and two flying leads.

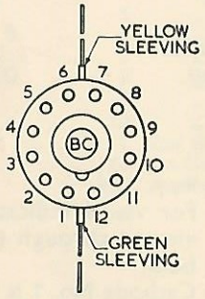
* The required anode current may be obtained from a 475 V supply via a 910 kΩ resistor.

** This does not apply in the case of the sine wave drive.

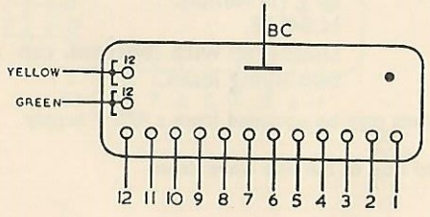
Bi-directional 12-way Selector Tube



Base Connections
(underside view)



Pin	1	Cathode 0
	2	,, 11
	3	,, 10
	4	,, 9
	5	,, 8
	6	,, 7
	7	,, 6
	8	,, 5
	9	,, 4
	10	,, 3
	11	,, 2
	12	,, 1
Bottom Cap		Anode



Lead between pins 6 and 7 with yellow sleeving — 1st Guides

Lead between pins 12 and 1 with green sleeving — 2nd Guides

Limit Ratings

Maximum counting rate:	
Continuous sine wave drive	20 kp/s
Rectangular pulse drive	10 kp/s
Maximum total anode current	900 µA
Minimum total anode current	700 µA
Minimum supply voltage, anode to cathode (normal room illumination)	440 V
Maximum potential between guides and cathodes	180 V
Maximum output pulse available with 47k cathode load resistor	35 V

Characteristics

Running voltage at 800 µA	208 V approx.

Recommended Operating Conditions

*Anode current	800 µA
**Guide bias	+50 ± 5 V
Cathode load resistors	47 kΩ max. ←
Forced resetting pulse	—140 V
***Double pulse drive—amplitude	—120 V ± 10 V
Double pulse drive—duration	30 µS ± 20%
Double pulse drive—pulse overlap at the 90% pulse level	10 ± 5 µS ←
****Integrated pulse drive—amplitude	—145 V ± 15 V
Integrated pulse drive—duration	33 µS ± 20% ←
Sine wave drive—amplitude	60—100 V r.m.s. ←

* The required anode current may be obtained from a 475 V supply via a 300 kΩ ± 5% resistor.

Note—To reduce the effect of stray capacity to a minimum it is essential that the anode resistor be wired not more than ¼" (5 mm) from the anode tag on the valve holder.

** This does not apply in the case of the sine wave drive. See circuit LK.100, Issue 2.

*** The pulses should have a rise time of less than 150 V/µS and a droop of less than 30 V. See circuit LK.102, Issue 2.

**** The pulse should have a rate of rise of less than 150 V/µS and a droop of less than 5 V. See circuit LK.101, Issue 2.

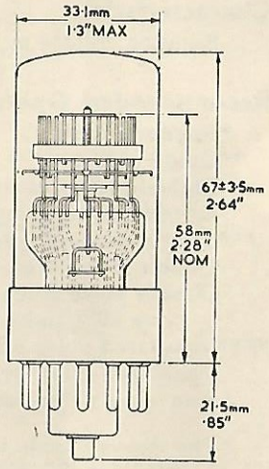
N.B. ← Indicates a change from previous data sheet.

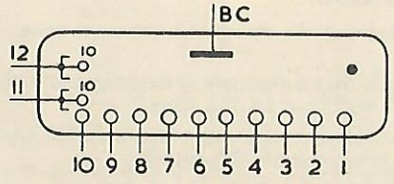
Mechanical Data

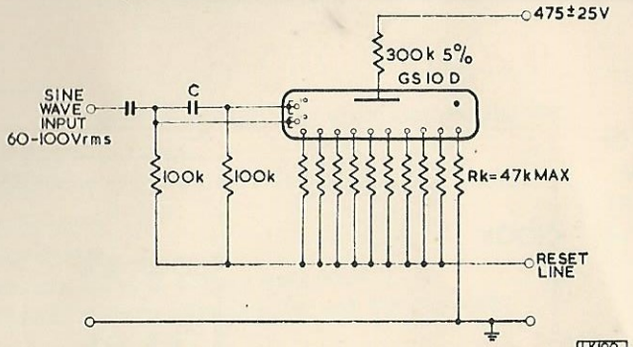
Mounting position	Any. For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode 1 is aligned with pin No. 11 to an accuracy of ± 12°.
Weight	53 g (nominal)
Base	Duodecal with bottom cap.
Escutcheon	N80977.

Base Connections
(underside view)

Pin	1	Cathode 0
	2	,, 9
	3	,, 8
	4	,, 7
	5	,, 6
	6	,, 5
	7	,, 4
	8	,, 3
	9	,, 2
	10	,, 1
	11	2nd Guides
	12	1st Guides
B.C.		Anode



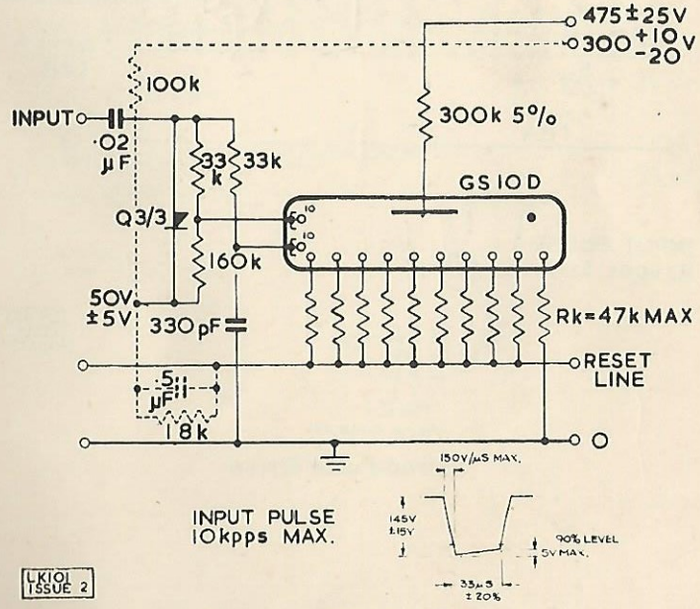




LK100
ISSUE 2

FREQUENCY	20 kc/s	15 kc/s	10 kc/s	5 kc/s	2 kc/s	1 kc/s	500 c/s	200 c/s	100 c/s	50 c/s
C	270 pF	330 pF	470 pF	680 pF	·002 µF	·005 µF	·01 µF	·02 µF	·05 µF	·1 µF

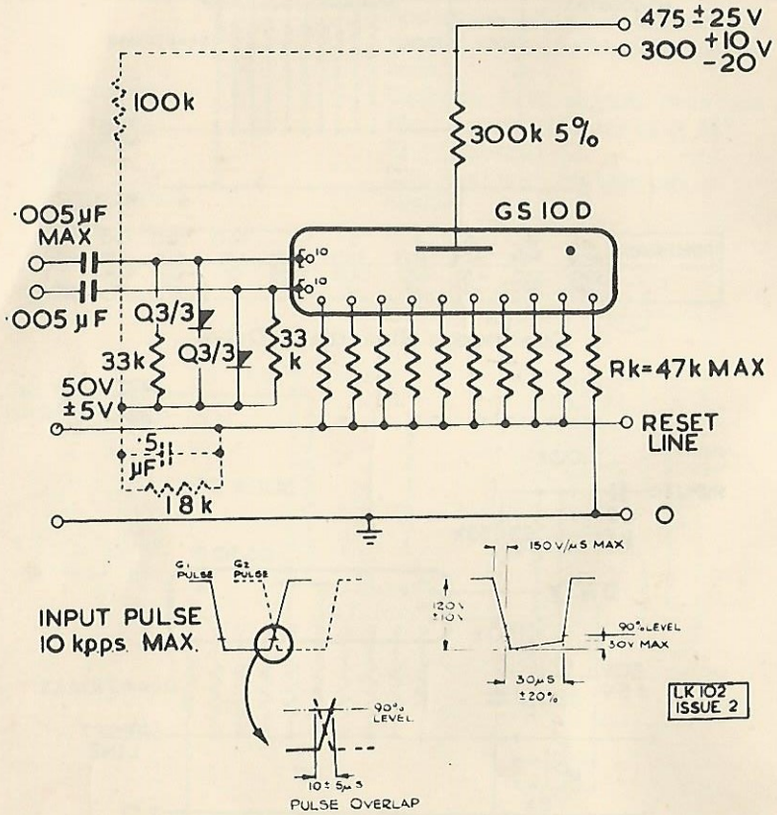
Continuous Sine-Wave Drive



LK101
ISSUE 2

Integrated-Pulse Drive

Bi-directional 10-way Selector Tube



Paired-Pulse Drive

Bi-directional 10-way Selector Tube

Limit Ratings

Maximum operating speed: sine wave and rectangular pulses	10 kc/s
V_a minimum	440 V
I_a maximum	0·9 mA
I_a minimum	0·7 mA
Maximum cathode voltage excursion	35 V
Minimum voltage between Vk and Vg (Vg—Vk)	10 V

Recommended Operating Conditions

Anode supply voltage	475 V
Anode current	0·8 mA
Anode resistor	240 kΩ 5%
Cathode voltage ($V_G = 50 \pm 5$ V)	35 V max.
Pulse Amplitude—Double Pulse ($V_G = 50 \pm 5$ V $R_G = 33$ kΩ)	—120 V min.
Pulse Duration— ,, ,, ,, ,,	25 µS min.
Pulse Overlap— ,, ,, ,, ,,	7 ± 3 µS
Pulse Amplitude—Integrated Pulse Drive	—130 V min.
Pulse Duration— ,, ,, ,, ,,	25 µS min.

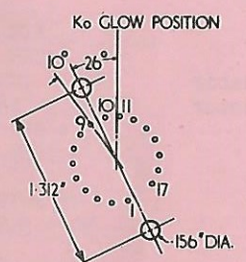
GS10H

Bi-directional 10-way Selector Dekatron with Routing Guides

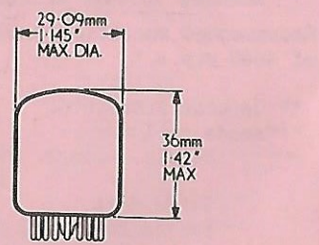
Mechanical Data.

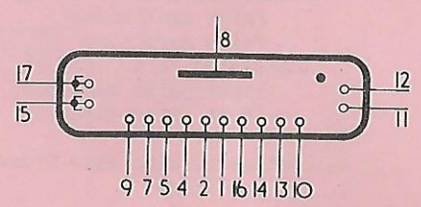
Mounting position	Any. For visual indication the tube is viewed through the dome of the bulb.
Alignment	Cathode 1 is aligned with pin 9 ± 3°.
Base	B17A.
Escutcheon	N79368.
Valveholder, printed circuit	E.T.L. code HFD 13534.
Valveholders, tags	A.E.I. type VH26/1703. E.T.L. code HFD 13045.

Valveholder connections and fixing, (under-chassis view).



Valveholder requires 1·0" dia. hole in chassis.





Pin 1	Cathode 6	Pin 10	Cathode 0
2	" 5	11	Routing Guide 2
3	Do not connect	12	" " 1
4	Cathode 4	13	Cathode 9
5	" 3	14	" 8
6	Do not connect	15	Commoned Guide 2
7	Cathode 2	16	Cathode 7
8	Anode	17	Commoned Guide 1
9	Cathode 1		

Bi-directional 10-way Selector Dekatron with Routing Guides

GS10H

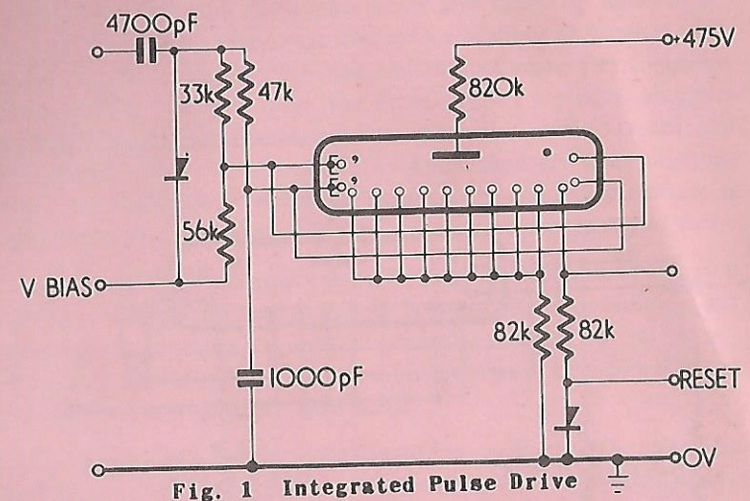


Fig. 1 Integrated Pulse Drive

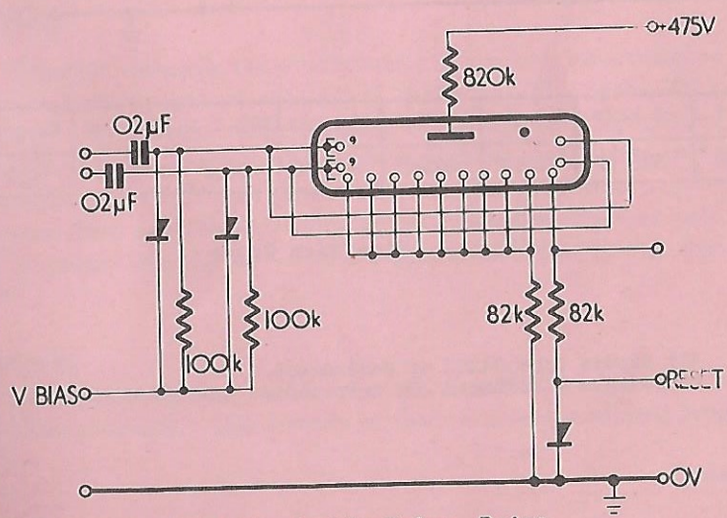
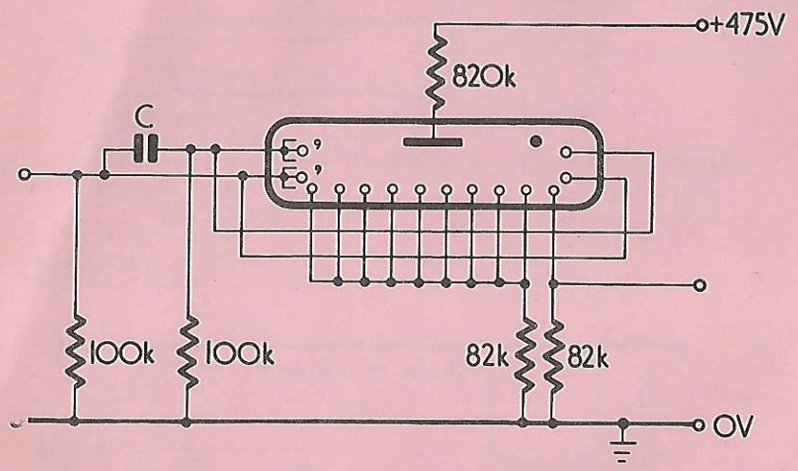


Fig. 2 Double Pulse Drive

GS10H

Bi-directional 10-way Selector Dekatron with Routing Guides



f	4 kc/s	2 kc/s	1 kc/s	500 c/s	200 c/s	100 c/s	50 c/s
C	680 pF	·002μF	·005μF	·01μF	·02μF	·05μF	·1μF

Fig. 3 Sine Wave Drive

All diodes type OA202 or equivalent.
Components & Voltages 10% tol. unless specified in data.

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 kΩ.

Resetting

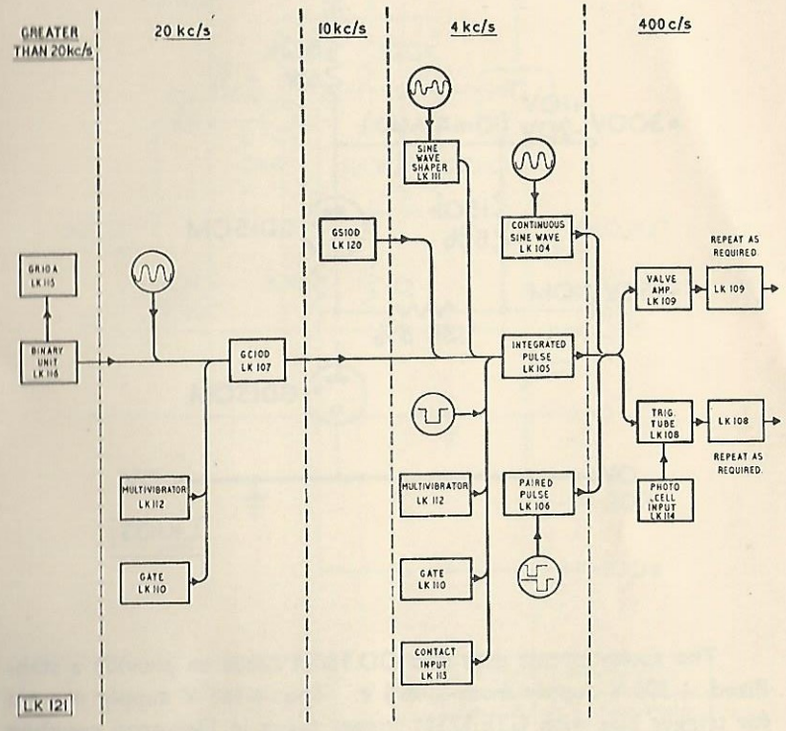
To enable counters to be set at zero, two h.t. negative lines should be provided. One directly earthed receives the returns from

cont'd

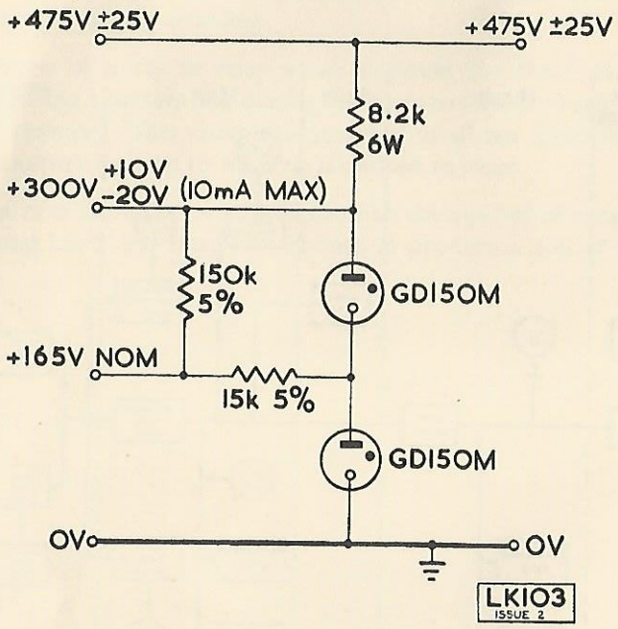
the Dekatron output cathodes (or the potential dividers feeding them), the cathodes of any coupling tubes and the negative bias supplies for these tubes. The other line, described as the reset line, takes all the remaining returns and is connected to earth via a resistor which is shorted during counting.

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.

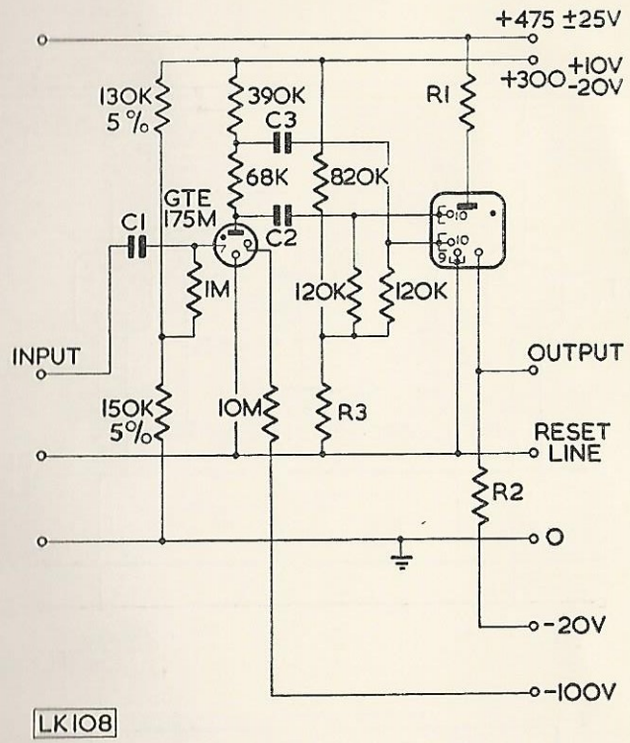


Circuit Index



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

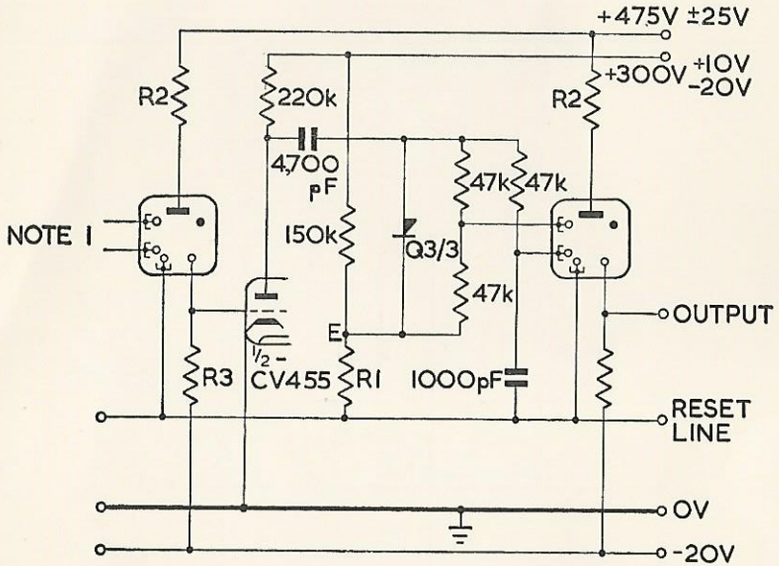


	Counters	Selectors
R1	820 kΩ	680 kΩ
*R2	150 kΩ max.	150 kΩ max.
R3	39 kΩ	47 kΩ

	Input to previous stage	
	Rect. Pulses	Sine Wave
C1	·001 µF	·01 µF
C2	·001 µF	·001 µF
C3	·002 µF	·002 µF

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

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

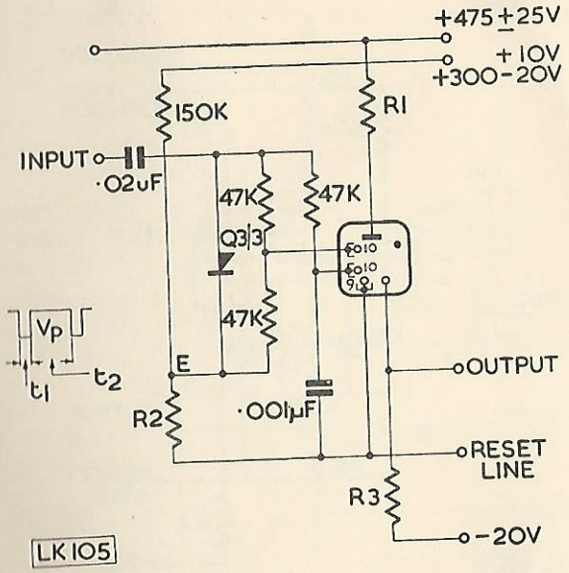


LK109
ISSUE 4

	Counters	GS10C	GS12D
R1	10 kΩ	22 kΩ	22 kΩ
R2	820 kΩ	680 kΩ	910 kΩ
R3	150 kΩ	150 kΩ	270 kΩ
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



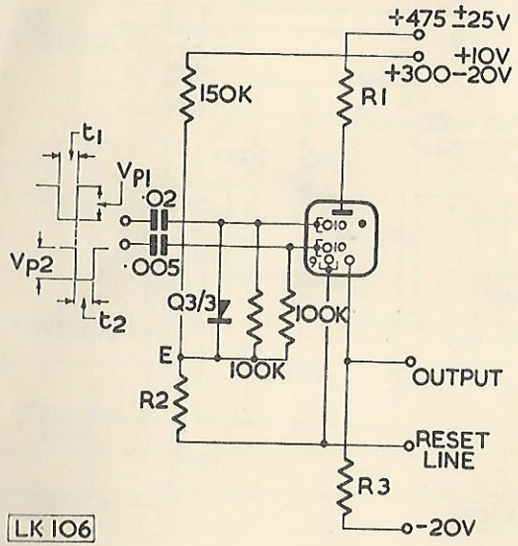
LK105

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

$V_p = -145 \pm 15$ V $t_1 = > 80$ μS $t_2 = > 170$ μS

NOTE:—When this circuit is used to precede circuit LK 109 (Triode Amplifier Cct.) the ·02μF input capacitor should be reduced to 4,700 ρF

Integrated-pulse Drive for 4 k/cs Dekatron

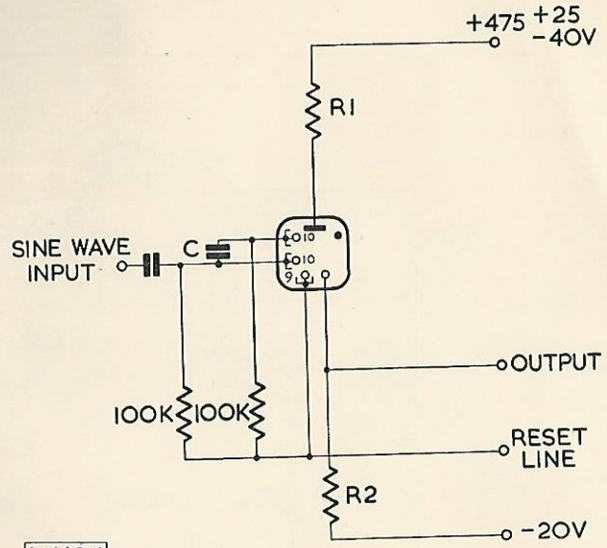


LK 106

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

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

Paired-pulse Drive for 4 kc/s Dekatron

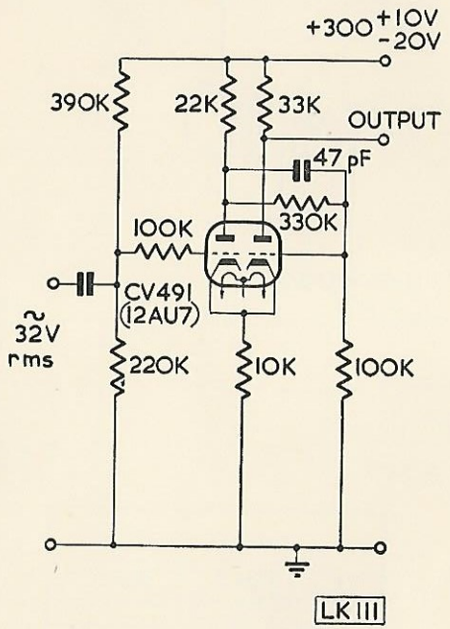


LK 104

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

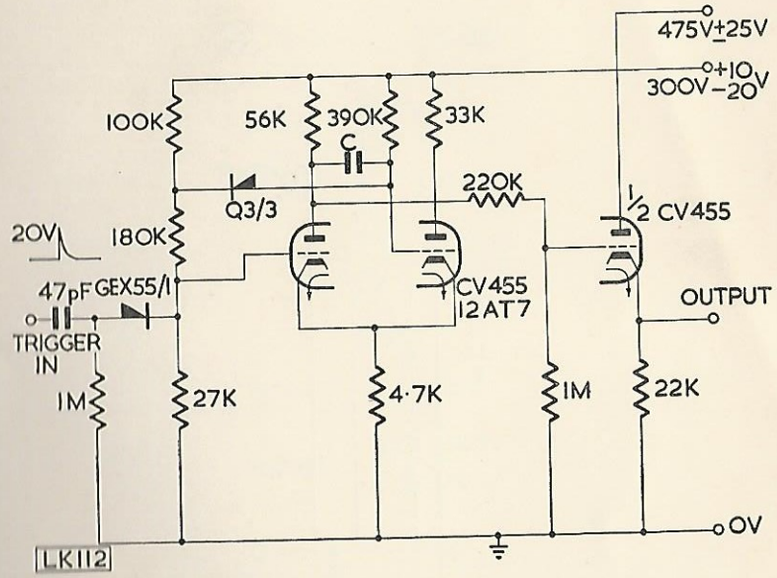
Frequency	4 kc/s	2 kc/s	1 kc/s	500 c/s	200 c/s	100 c/s	50 c/s
C	680 pF	·002 μF	·005 μF	·01 μF	·02 μF	·05 μF	·1 μF
Drive Amplitude	40—70 V r.m.s.						

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.

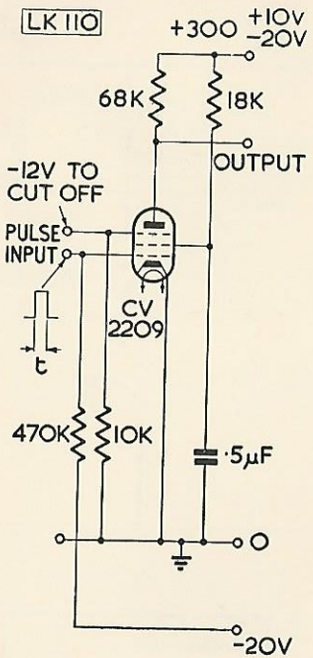
Sine-wave Shaping Circuit



Output Pulse	C
25 µS	100 pF
80 µS	470 pF

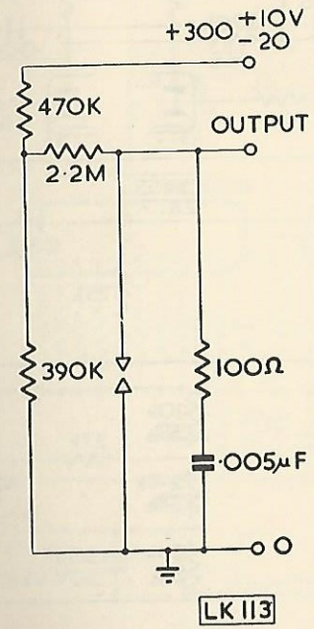
The above circuit is designed to feed either the integrated pulse drive LK.105, or the GC10D single pulse drive LK.107. Triggering is achieved with a short positive pulse of amplitude greater than 20 V.

Multivibrator Pulse Shaping Circuit



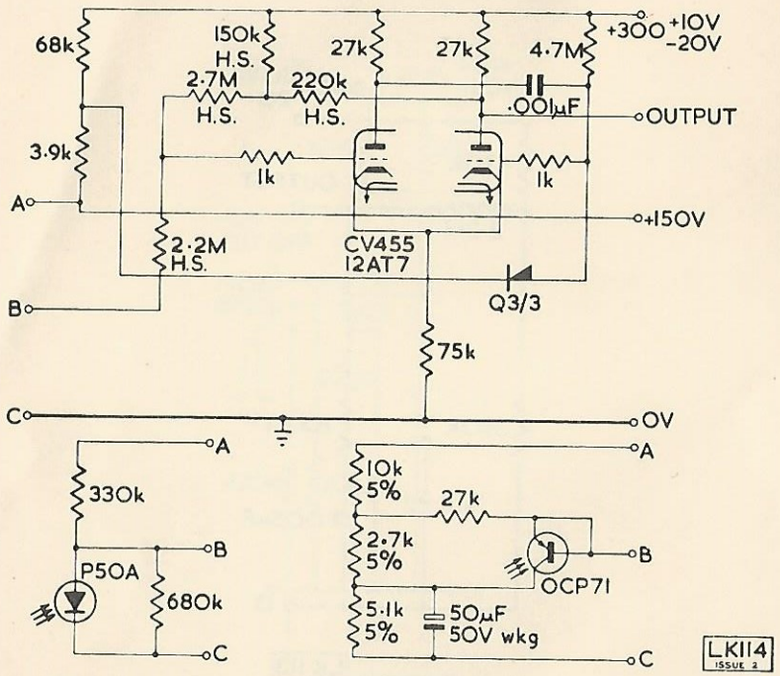
GC10D	GS10D	4 kc/s Dekatron
25 μS	35 μS	80 μS
Pulse Amplitude > +20 V		

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



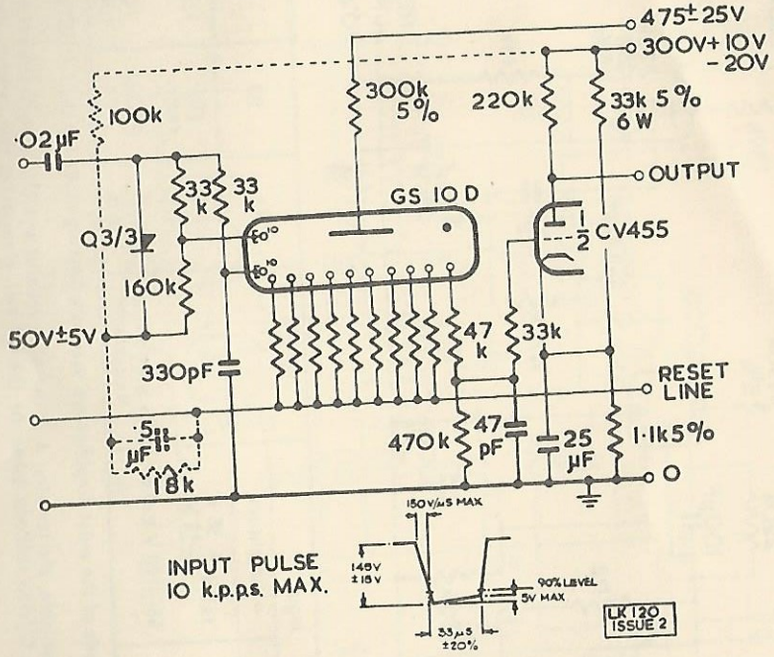
In order to prevent spurious counting due to contact bounce, it is essential to precede the integrated pulse drive LK.105 with a quenching circuit.

Contact Input



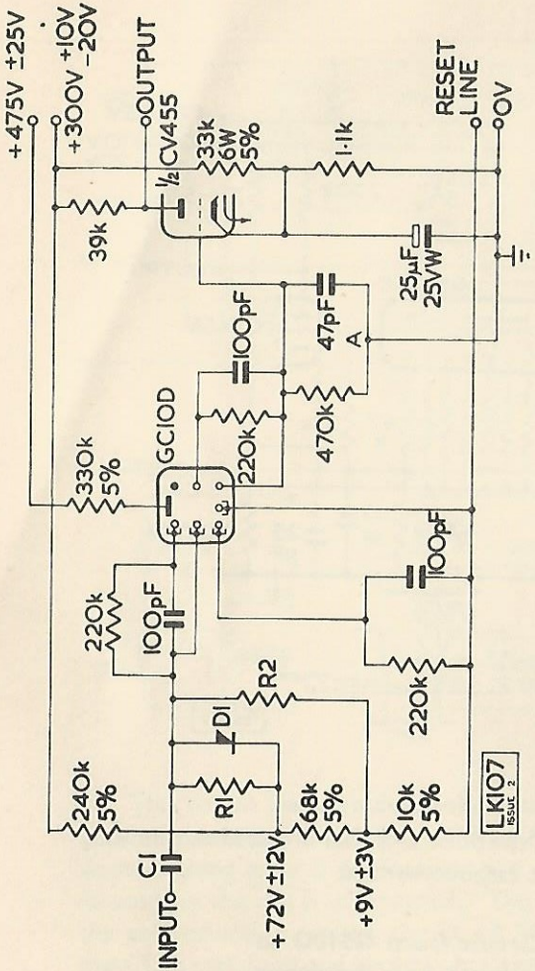
This circuit has been designed for use with either a P50A, germanium junction photo-cell, or an OCP71, photo-transistor. A positive going pulse is produced at the output whenever the light focused on the cell is interrupted. This pulse is suitable for driving the cold-cathode coupling circuit LK.108. 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

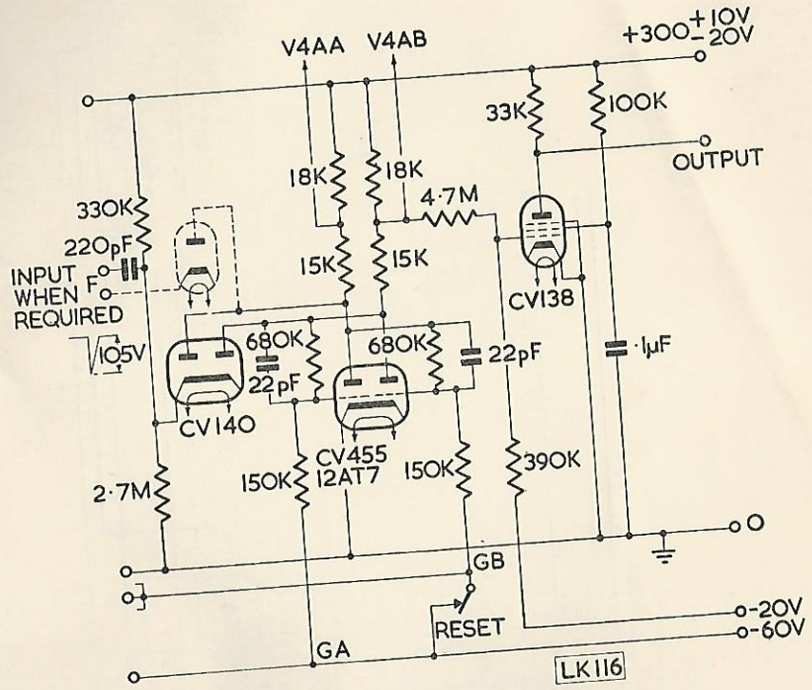


Drive	Input		C1	R1	R2	D1
	Duration	Amplitude				
Random pulse	> 25 µS	145 V + 50 V −12 V	·02 µF	1 MΩ	Not req'd.	Q3/3
Sine-wave	—	65—100 V r.m.s.	To suit lowest frequency	Not req'd.	100 kΩ	Not req'd.

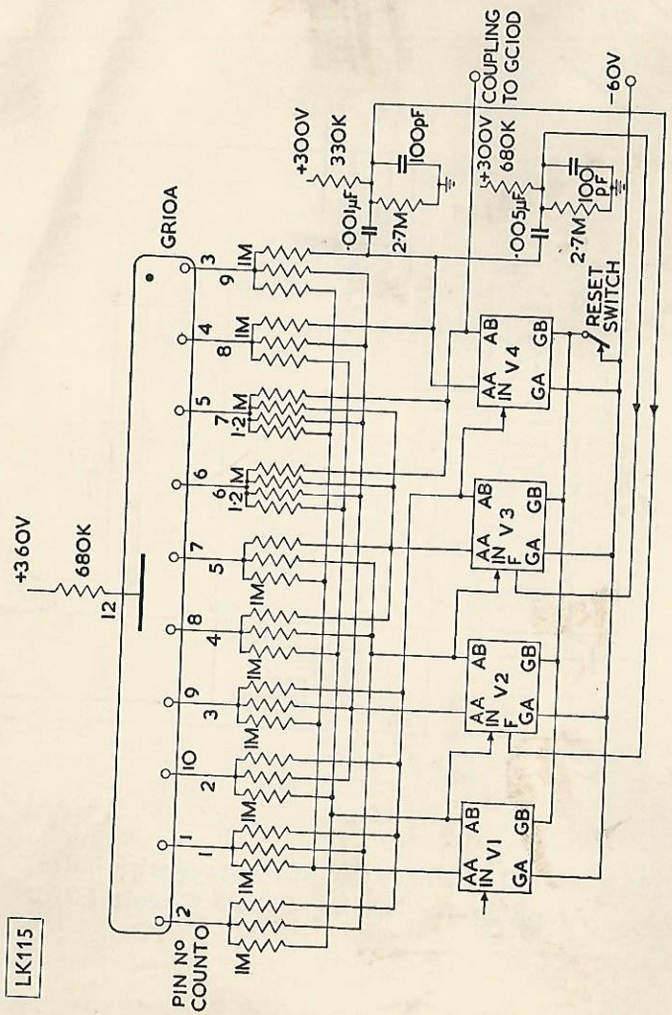
The grid and cathode of the pulse amplifier are used as a limiting diode for the GC10D output cathode voltage.

If a —20V rail is available, the junction A of the 470k resistor and 47pf capacitor may be taken to this supply and the CV.455 cathode taken to the 0V rail, eliminating the cathode potential divider.

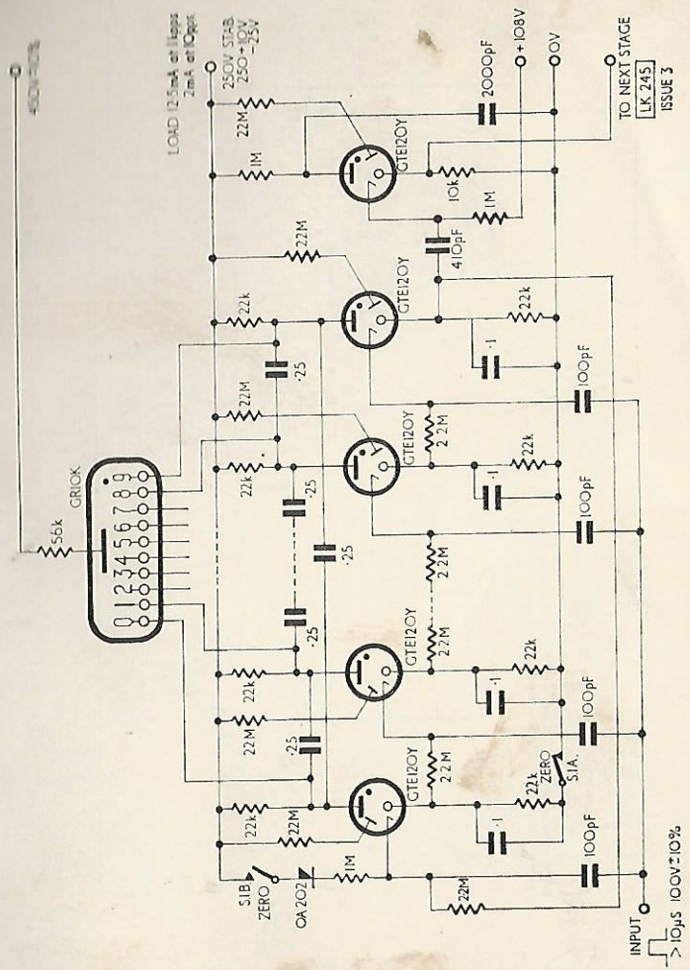
GC10D Single-pulse Drive with Coupling suitable for Integrated-pulse Drive LK105



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



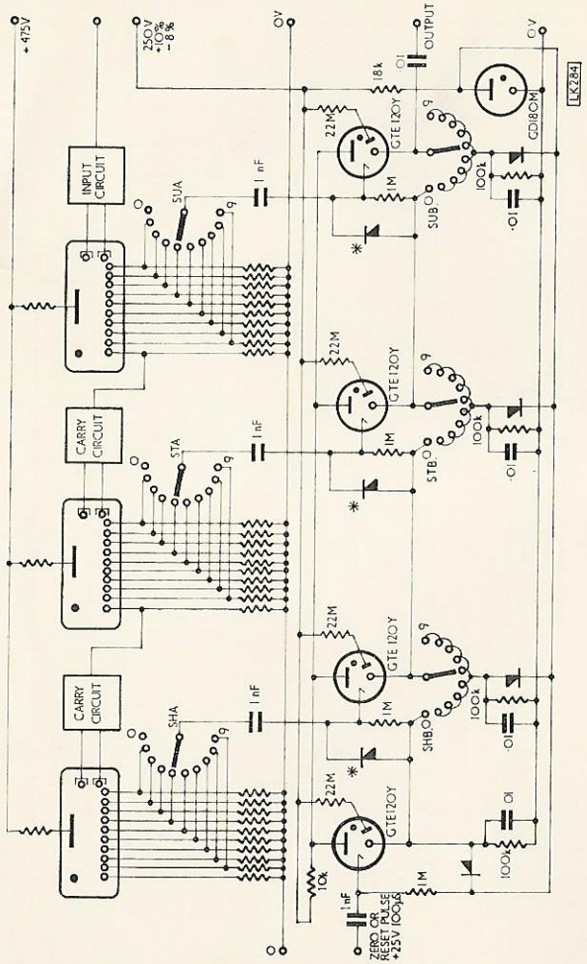
GR10A Connected to Conventional Decade Scaler



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.

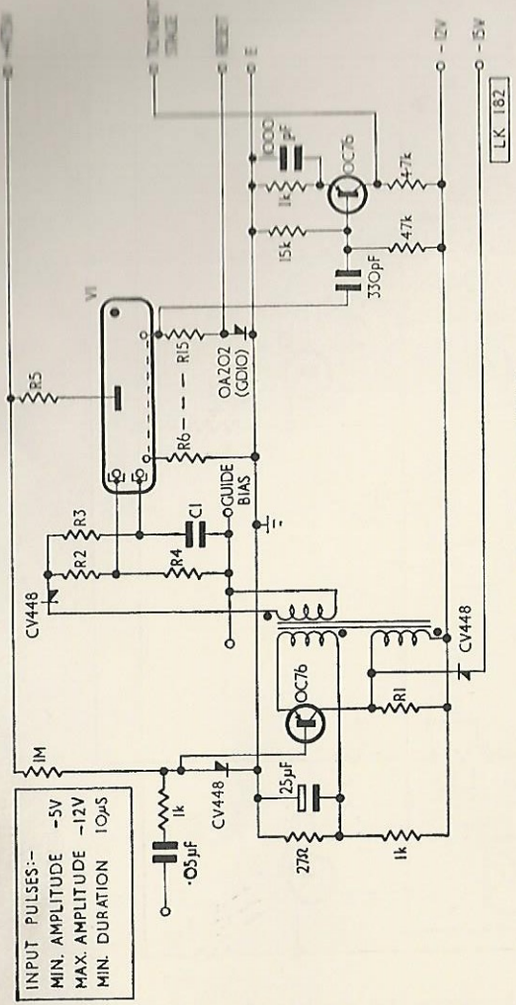
* Registered Trade Mark



ALL DIODES TYPE OA202 OR EQUIVALENT

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



TRANSFORMER DETAILS

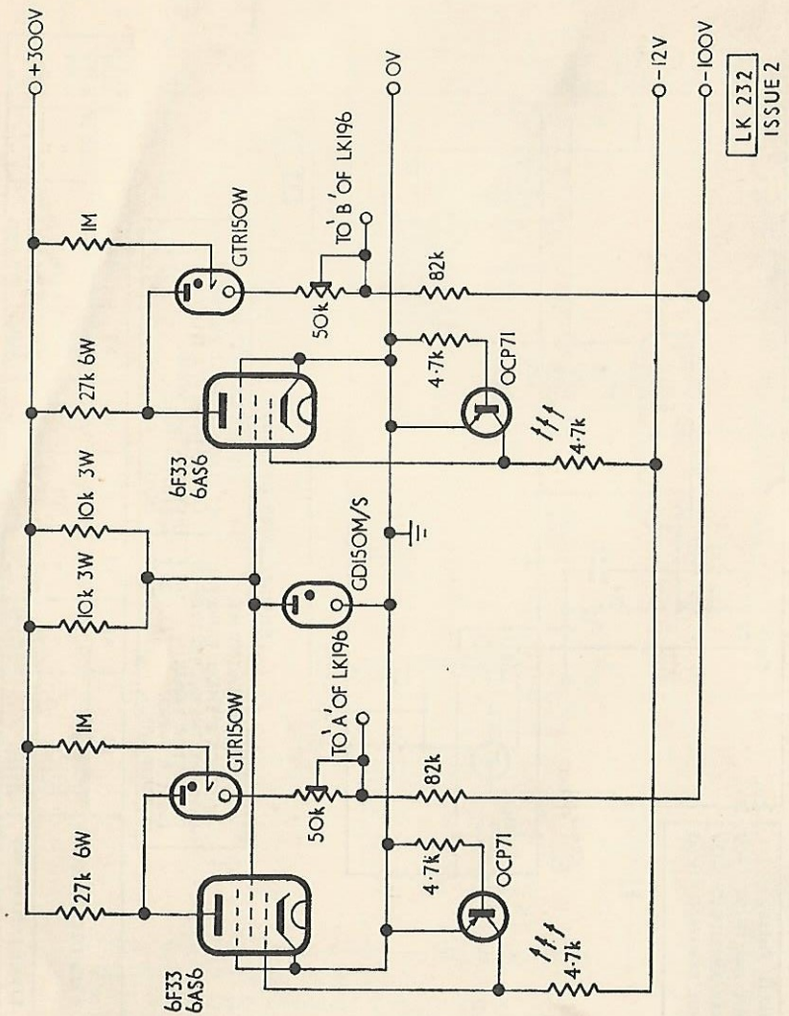
4 kc/s DEKATRONS
½" STACK 8 THOU. MUMETAL LAMINATIONS RCL 191 TYPE 421
COLLECTOR WIND. 100 T
EMITTER WIND. 20 T
OUTPUT WIND. 906 T

10 kc/s DEKATRONS
½" STACK 4 THOU. MUMETAL LAMINATIONS RCL 191 TYPE 450
COLLECTOR WIND. 45 T
EMITTER WIND. 7 T
OUTPUT WIND. 515 T

	V1	R1	R2	R3	R4	R5	R6-15	C1	GUIDE BIAS
4 kc/s DEKATRONS	GC10B etc.	4.7k	47k	47k	47k	820k	150k max.	1000 pF	+18V
	GS10C	"	"	"	"	680k	"	"	+36V
	GS12D	"	"	"	"	"	270k " max.	"	"
10 kc/s DEKATRONS	GS10D	NOT	33k	33k	160k	300k	47k max.	330 pF	+50V
	GS10E	REQ'D	"	"	"	240k	39k max.	"	"

Transistor Blocking Oscillator Drive of *Dekatrons

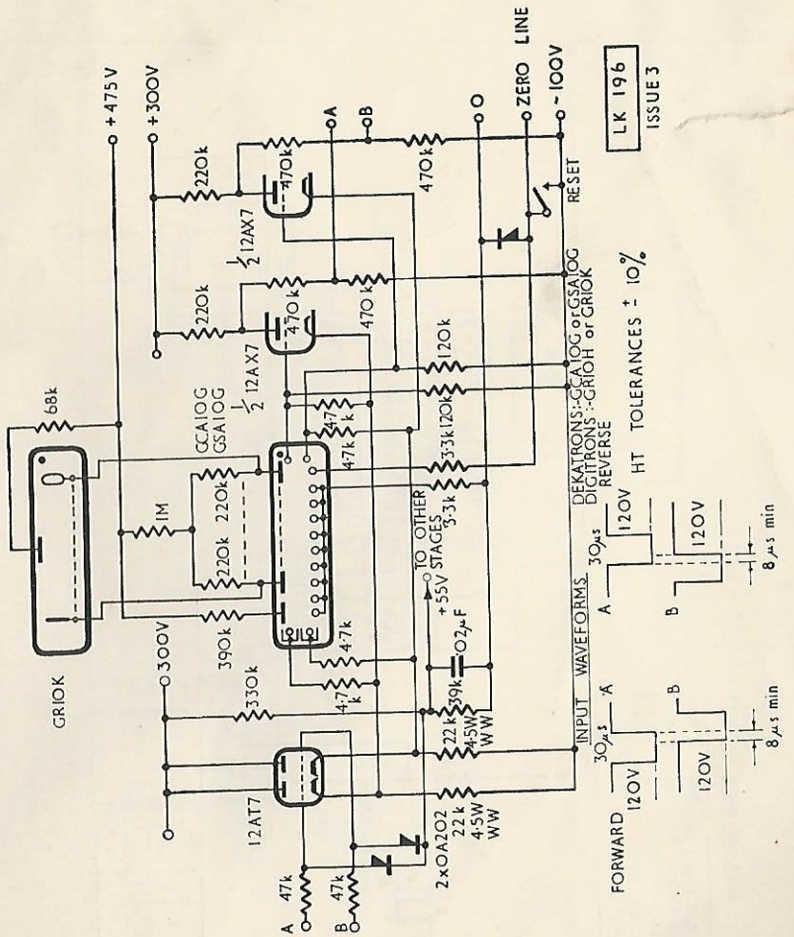
*Registered Trade Mark



Twin Photo Input to Reversible *Dekatron

Note:—Ratio of Light/Dark Approx. 1 : 2

*Registered Trade Mark



Reversible Drive and Coupling Circuit for GCA10G/GSA10G

GCA10G/GSA10G Transistor Drive and Coupling Circuits

GCA10G/GSA10G Pentode Coupling Circuit