

**Limit Ratings**

|                                                                          |                |
|--------------------------------------------------------------------------|----------------|
| Maximum counting rate : sine wave and rectangular pulses                 | 4,000 p.p.s.   |
| Maximum total anode current                                              | 550 $\mu$ A    |
| Minimum total anode current                                              | 250 $\mu$ A    |
| Minimum anode supply voltage<br>(normal room illumination)               | 350 V          |
| Maximum potential difference between guides and cathodes                 | 140 V          |
| Maximum output cathode load                                              | 150 k $\Omega$ |
| Maximum output pulse available with 150 k $\Omega$ cathode load resistor | 35 V           |

**Characteristics**

|                                          |               |
|------------------------------------------|---------------|
| Running voltage at 300 $\mu$ A (GC10B/S) | $191 \pm 5$ V |
|------------------------------------------|---------------|

**Recommended Operating Conditions**

|                                  |                       |
|----------------------------------|-----------------------|
| *Anode current                   | 310 $\mu$ A $\pm$ 20% |
| **Guide Bias                     | +18 V                 |
| Bias on output cathode resistor  | -20 V                 |
| Forced resetting pulse           | -120 V                |
| Double pulse drive-amplitude     | -80 V $\pm$ 10 V      |
| Double pulse drive-durations     | 60 $\mu$ S            |
| Integrated pulse drive-amplitude | -145 V $\pm$ 15 V     |
| Integrated pulse drive-duration  | 80 $\mu$ S            |
| 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 k $\Omega$  resistor.

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



## 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  $\pm 12^\circ$ .

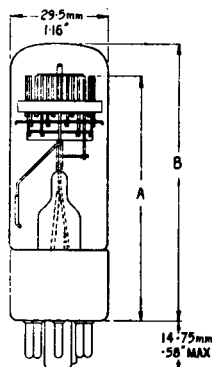
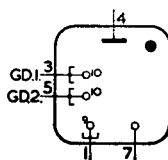
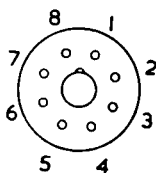
Weight  
Escutcheons

43 g (nominal)  
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<br>Pulse<br>Drive | Sine<br>Wave<br>Drive |
|--------------------------------|-------------------------------|-----------------------|
| Max. speed                     | 4,000 p.p.s.                  | 4,000 c.p.s.          |
| Max. striking voltage          | 350 V                         | 350 V                 |
| Max. anode current             | 550 $\mu$ A                   | 550 $\mu$ A           |
| Min. anode current             | 250 $\mu$ A                   | 250 $\mu$ A           |
| 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 k $\Omega$                |                       |
| Max. guide bias resistance     | 220 k $\Omega$                |                       |

## Characteristics

|                                |       |       |
|--------------------------------|-------|-------|
| Running voltage at 450 $\mu$ A | 190 V | 190 V |
|--------------------------------|-------|-------|

## Recommended Operating Conditions

|                         |                |                |
|-------------------------|----------------|----------------|
| Supply voltage          | 400 V          | 400 V          |
| Anode resistor          | 470 k $\Omega$ | 470 k $\Omega$ |
| Signal amplitude        | —120 V         | 55 V r.m.s.    |
| Both Guides             |                |                |
| Pulse duration          | 80 $\mu$ s     |                |
| Both Guides             |                |                |
| Signal delay, 2nd guide | 80 $\mu$ s     |                |
| 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 k $\Omega$  | 33 k $\Omega$  |

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



# GC10 B/L, GC10/4B/L

(CV.6044) (CV.6100)

## Scale-of-ten Counter

Specially processed for long life

|                                                       | Test                       | Test Conditions                                                                                                 | AQL % | Insp. Level | Symbol         | Limits |      | Units | Notes |
|-------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------|-------|-------------|----------------|--------|------|-------|-------|
|                                                       |                            |                                                                                                                 |       |             |                | Min.   | Max. |       |       |
| <b>GROUP A</b>                                        |                            |                                                                                                                 |       |             |                |        |      |       |       |
| <b>Acceptance Tests</b>                               |                            |                                                                                                                 |       |             |                |        |      |       |       |
| a                                                     | Insulation                 | To be measured between anyone electrode and parallel combination of all the others at 170 V.                    |       | 100%        |                | 100    |      | MΩ    | 1     |
| b                                                     | Striking Voltage           | A — K <sub>0</sub><br>V <sub>b</sub> = 350 V                                                                    |       | 100%        | V <sub>s</sub> |        |      |       | 1, 3  |
| c                                                     | Scaling Accuracy           | V <sub>b</sub> = 400 V<br>V <sub>1</sub> = +35 V<br>V <sub>2</sub> = -40 V<br>T = 60μS<br>Frequency = 4.0 kc/s  |       | 100%        |                |        |      |       | 1, 2  |
| d                                                     | Running Voltage            | V <sub>b</sub> = 400 V                                                                                          |       | 100%        | V <sub>r</sub> | 184    | 194  | V     | 1, 4  |
| <b>GROUP B</b>                                        |                            |                                                                                                                 |       |             |                |        |      |       |       |
| <b>Life Test</b>                                      |                            |                                                                                                                 |       |             |                |        |      |       |       |
| a                                                     | Survival running life test | Combined AQL<br>V <sub>b</sub> = 500 V<br>V <sub>1</sub> = +35 V<br>V <sub>2</sub> = -40 V<br>T = 60 μS         | 1.5   | IA          |                |        |      |       | 5, 7  |
| Tests to be performed at end of survival running test |                            |                                                                                                                 |       |             |                |        |      |       |       |
| b                                                     | Scaling Accuracy           | V <sub>b</sub> = 400 V<br>V <sub>1</sub> = +35 V<br>V <sub>2</sub> = -40 V<br>T = 60 μS<br>Frequency = 4.0 kc/s |       |             |                |        |      |       | 2     |
| c                                                     | Running Voltage            | V <sub>b</sub> = 400 V                                                                                          |       |             | V <sub>r</sub> | 176    | 206  | V     | 4     |

# Scale-of-ten Counter

Specially processed for long life

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

|   | Test                                                                                                                | Test Conditions                                                                                                                      | AQL % | Insp. Level | Symbol | Limits |      | Units | Notes |
|---|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-------|-------------|--------|--------|------|-------|-------|
|   |                                                                                                                     |                                                                                                                                      |       |             |        | Min.   | Max. |       |       |
|   | <b>GROUP C</b><br><b>Electrical Retest</b><br>Not more than 7 days prior to application for Services final approval |                                                                                                                                      |       |             |        |        |      |       | 6     |
| a | Scaling Accuracy                                                                                                    | $V_b = 400 \text{ V}$<br>$V_1 = +35 \text{ V}$<br>$V_2 = -40 \text{ V}$<br>$T = 60 \mu\text{S}$<br>Frequency =<br>$4.0 \text{ kc/s}$ |       | 100%        |        |        |      |       | 2     |
| b | Running Voltage                                                                                                     | $V_b = 400 \text{ V}$                                                                                                                |       | 100%        | $V_r$  | 184    | 194  |       | 4     |

## NOTES

- Tests of Group A are to be applied directly after completion of manufacture.
- 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.
- $K_{1.9}$  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.
- The  $K_{1.9}$  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  $K_0$  and  $K_{1.9}$  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.
- 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  $85 \pm 5$  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.
- During the period between the completion of Group A tests and the commencement of Group C tests no further processing shall be applied.
- 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.



# GC10B/L, GC10/4B/L

(CV.6044) (CV.6100)

**Scale-of-ten Counter**  
Specially processed for long life

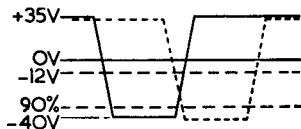


Fig. 1

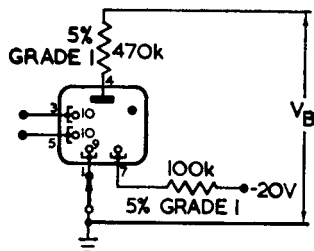


Fig. 2

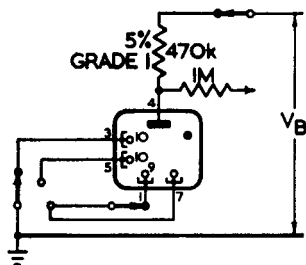


Fig. 3

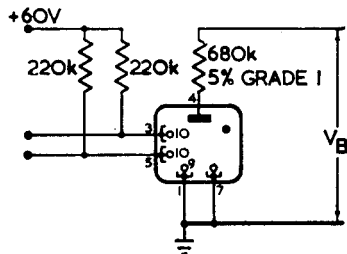


Fig. 4

# Scale-of-ten Counter

Specially processed for long life

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

## 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  $\pm 12^\circ$ .

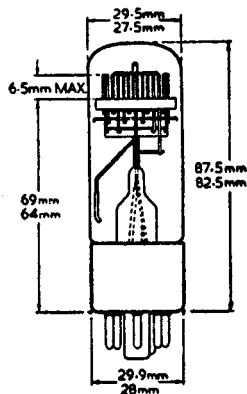
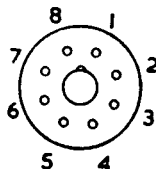
Escutcheons

N78211 Bakelite, or  
N79368 Brass

Base

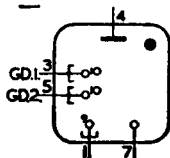
I.O.

Base Connections  
(underside view)



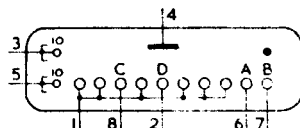
## GC 10 B/L

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



## GC 10/4 B/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"





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

**GC 10 D**  
(CV.5143)

## Limit Ratings

|                                                                                                                                                                               |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Maximum counting rate : any wave shape                                                                                                                                        | 20 kp/s     |
| Maximum total anode current                                                                                                                                                   | 1.2 mA      |
| Minimum total anode current                                                                                                                                                   | 700 $\mu$ A |
| Minimum anode supply voltage<br>(normal room illumination)                                                                                                                    | 420 V       |
| Maximum potential difference between guides<br>and cathodes                                                                                                                   | 180 V       |
| The output cathode must not rise above the potential of the commoned cathodes <b>by more than 10 volts</b> , and may be made more than 30 volts negative only when resetting. |             |

## Characteristics

|                                |               |
|--------------------------------|---------------|
| Running voltage at 800 $\mu$ A | 215 V approx. |
|--------------------------------|---------------|

## Recommended Operating Conditions

|                                     |                                |
|-------------------------------------|--------------------------------|
| *Anode current                      | 800 $\mu$ A                    |
| Output cathode load                 | 82 k $\Omega$                  |
| Forced resetting pulse              | —140 V                         |
| Random pulse drive-amplitude        | — (144 V $\pm$ 50 V)<br>— 12 V |
| **Random pulse drive-duration       | 25 $\mu$ S min.                |
| **Random pulse drive-quiescent time | 25 $\mu$ S min.                |
| Random pulse drive—guide bias       | +72 $\pm$ 12 V                 |
| Sine wave drive-amplitude           | 65—100 V r.m.s.                |
| Sine wave drive—guide bias          | +12 $\pm$ 2 V                  |

\* The required anode current may be obtained from a 475 V supply via a 330 k $\Omega$  resistor.

**Note**—To reduce the effect of stray capacity to a minimum it is essential that the anode resistor be wired not more than  $\frac{1}{4}$ " (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  $\pm 12^\circ$ .

Weight

44 g (nominal).

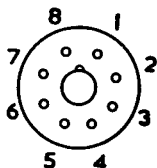
Escutcheons

N.78211 Bakelite or  
N.79368 Brass

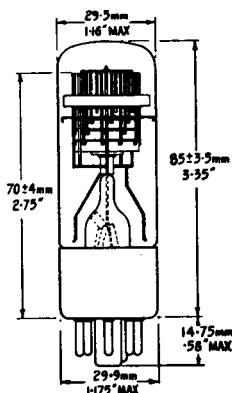
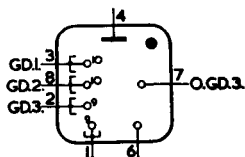
Base

I.O.

Base Connections  
(underside view)



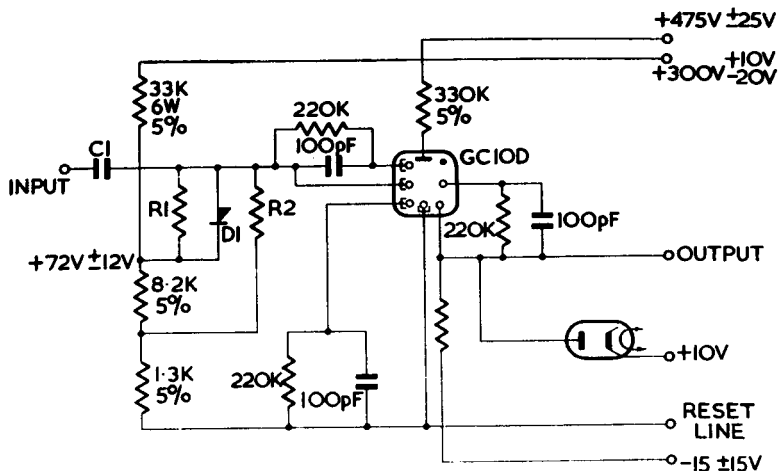
- Pin 1 Common cathodes  
2 3rd Guides  
3 1st Guides  
4 Anode  
5 —  
6 Output cathode  
7 Output 3rd Guide  
8 2nd Guides



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

**GC10D**

CV.5143



LK122

| Drive        | Input        |                    | C1                             | R1          | R2            | D1        |
|--------------|--------------|--------------------|--------------------------------|-------------|---------------|-----------|
|              | Duration     | Amplitude          |                                |             |               |           |
| Random pulse | > 25 $\mu$ S | 145 +50 V<br>-12 V | ·02 $\mu$ F                    | 1M $\Omega$ | Not reqd.     | Q3/3      |
| Sine wave    | —            | 65—100 V<br>r.m.s. | To suit<br>lowest<br>frequency | Not reqd.   | 100k $\Omega$ | Not reqd. |

**Sine-wave or random-pulse drive for GC10D**





# Miniature Bi-directional 10-way Computing Tube

GC10/2P

## Limit Ratings

|                                                                    |                |
|--------------------------------------------------------------------|----------------|
| Maximum counting rate : sine wave and rectangular pulses           | 1,000 p.p.s.   |
| Minimum counting rate                                              | 1 p.p. hour    |
| Maximum total anode current                                        | 500 $\mu$ A    |
| Minimum total anode current                                        | 315 $\mu$ A    |
| Minimum anode to cathode supply voltage (normal room illumination) | 320 V          |
| Maximum potential difference between cathodes and guides           | 140 V          |
| Maximum output cathode load                                        | 150 k $\Omega$ |
| Output pulse produced across the above                             | 35 V           |

## Characteristics

|                                |               |
|--------------------------------|---------------|
| Running voltage at 350 $\mu$ A | 190 V approx. |
|--------------------------------|---------------|

## Recommended Operating Conditions

|                                            |                       |
|--------------------------------------------|-----------------------|
| *Anode current                             | 350 $\mu$ A $\pm$ 10% |
| **Guide bias                               | +18 V                 |
| Bias on output cathode resistor            | —20 V                 |
| Forced resetting pulse                     | —120 V                |
| Double pulse drive—amplitude               | —80 V $\pm$ 10 V      |
| Double pulse drive—durations               | 300 $\mu$ S           |
| Integrated pulse drive—amplitude           | —145 V $\pm$ 15 V     |
| Integrated pulse drive—duration            | 350 $\mu$ S           |
| Integrated pulse drive—min. quiescent time | 650 $\mu$ S           |
| Sine wave drive—amplitude                  | 40—75 V r.m.s.        |

\* The required anode current may be obtained from a 475 V supply via an 820 k $\Omega$  resistor.

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



# GC10/2P

## Miniature Bi-directional 10-way Computing Tube

### Mechanical Data

Mounting position

Any.

For visual indication the tube is viewed through the dome of the bulb.

Alignment

Cathode "O" is approximately aligned with pin No. 5.

Weight

13 g (nominal).

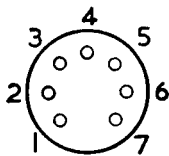
Escutcheon

N.84338.

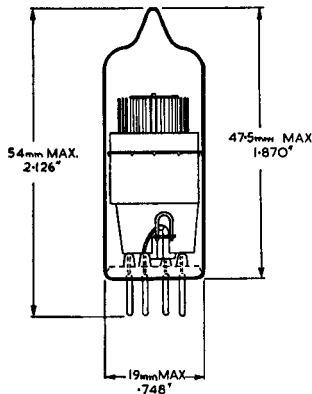
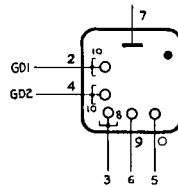
Base

B7G

Base Connections  
(underside view)



- Pin 1 Do not connect  
 2 1st Guides  
 3 Common cathodes  
 4 2nd Guides  
 5 Cathode 0  
 6 Cathode 9  
 7 Anode



## Limit Ratings

|                                                            |                |
|------------------------------------------------------------|----------------|
| Maximum counting rate : sine wave and rectangular pulses   | 4,000 p.p.s.   |
| Maximum total anode current                                | 550 $\mu$ A    |
| Minimum total anode current                                | 250 $\mu$ A    |
| Minimum anode supply voltage<br>(normal room illumination) | 350 V          |
| Maximum potential difference between guides and cathodes   | 140 V          |
| Maximum output cathode load                                | 150 k $\Omega$ |

## Characteristics

|                                |               |
|--------------------------------|---------------|
| Running voltage at 300 $\mu$ A | 191 V approx. |
|--------------------------------|---------------|

## Recommended Operating Conditions

|                                  |       |                       |
|----------------------------------|-------|-----------------------|
| *Anode current                   |       | 310 $\mu$ A $\pm$ 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 $\pm$ 10 V      |
| Double pulse drive-durations     |       | 60 $\mu$ S            |
| Integrated pulse drive-amplitude |       | -145 V $\pm$ 15 V     |
| Integrated pulse drive-duration  |       | 80 $\mu$ S            |
| 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 k $\Omega$  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 |

**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  $\pm 12^\circ$ .

Weight

43 g (nominal).

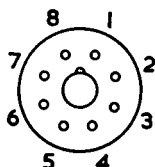
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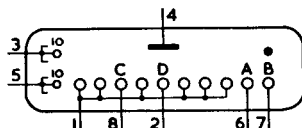
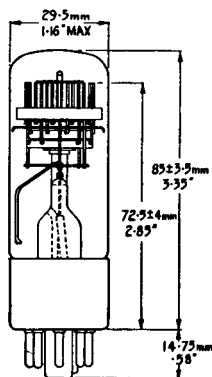
Base

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 $\mu$ A    |
| Minimum total anode current                                | 250 $\mu$ A    |
| Minimum anode supply voltage<br>(normal room illumination) | 350 V          |
| Maximum potential difference between guides and cathodes   | 140 V          |
| Maximum output cathode load                                | 150 k $\Omega$ |

## Characteristics

|                                |               |
|--------------------------------|---------------|
| Running voltage at 300 $\mu$ A | 191 V approx. |
|--------------------------------|---------------|

## Recommended Operating Conditions

|                                  |       |                       |
|----------------------------------|-------|-----------------------|
| *Anode current                   |       | 310 $\mu$ A $\pm$ 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 $\pm$ 10 V      |
| Double pulse drive-durations     |       | 60 $\mu$ S            |
| Integrated pulse drive-amplitude |       | -145 V $\pm$ 15 V     |
| Integrated pulse drive-duration  |       | 80 $\mu$ S            |
| 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 k $\Omega$  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  $\pm 10^\circ$ .

Weight

43 g (nominal).

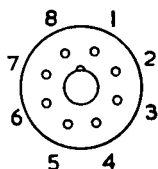
Escutcheon

N79369 Brass

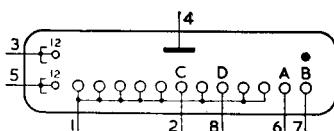
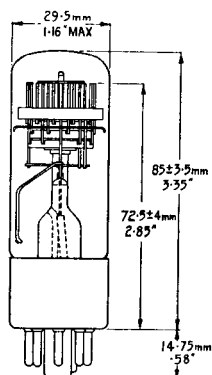
Base

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"



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

**GCA10G**  
**GSA10G**

## UNDER REVISION

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 k $\Omega$ |
| Maximum routing guide resistor           | 4.7 k $\Omega$ |

\*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**

**UNDER REVISION**

**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 $\pm$ 25 V   |
| Main anode current                                   | 0.62 mA          |
| Auxiliary anode current                              | 2.0 mA           |
| Cathode load resistor                                | 3.3 k $\Omega$   |
| Main anode resistor                                  | 390 k $\Omega$   |
| Auxiliary anode resistors (Digitron readout Fig. 1)  | 220 k $\Omega$   |
| Auxiliary biasing resistor (Digitron readout Fig. 1) | 1 M $\Omega$     |
| Auxiliary anode resistors (no readout Fig. 2)        | 33 k $\Omega$    |
| Auxiliary anode biasing resistor (no readout Fig. 2) | 100 k $\Omega$   |
| Forced resetting pulse amplitude                     | —100 V nom.      |
| Forced resetting pulse duration                      | 50 $\mu$ S min.  |
| Paired pulse drive Fig. 3 amplitude                  | 120 V nom.       |
| Paired pulse drive Fig. 3 duration                   | 30 $\mu$ S       |
| Paired pulse drive Fig. 3 guide two delay            | 28 $\mu$ S       |
| Single pulse drive Fig. 4 amplitude                  | 150 V nom.       |
| Single pulse drive Fig. 4 duration                   | 100 $\mu$ S nom. |



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

## GCA10G GSA10G

### UNDER REVISION

#### 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  $\pm 5^\circ$

Base

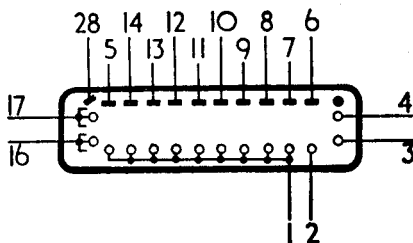
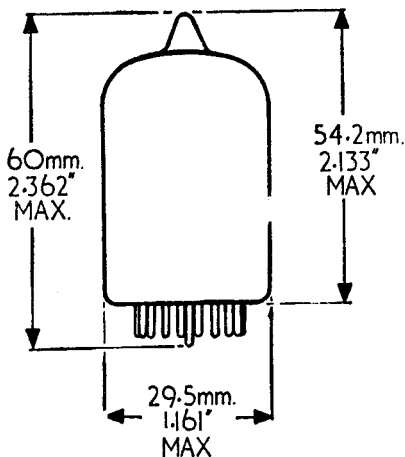
Modified B26A

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

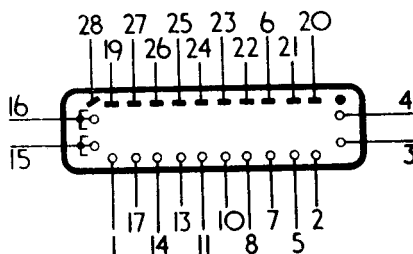
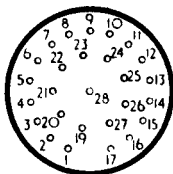


**GCA10G**  
**GSA10G**

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

**UNDER REVISION**

GSA10G Base Connections  
(Underside View)



Pin 1 Cathode 1  
2 Cathode 0  
3 Routing Guide 2  
4 Routing Guide 1  
5 Cathode 9  
6 Auxiliary Anode 8  
7 Cathode 8  
8 Cathode 7  
9 Do not connect

Pin 10 Cathode 6  
11 Cathode 5  
12 Do not connect  
13 Cathode 4  
14 Cathode 3  
15 Guide 2  
16 Guide 1  
17 Cathode 2  
19 Auxiliary Anode 1

Pin 20 Auxiliary Anode 0  
21 Auxiliary Anode 9  
22 Auxiliary Anode 7  
23 Auxiliary Anode 6  
24 Auxiliary Anode 5  
25 Auxiliary Anode 4  
26 Auxiliary Anode 3  
27 Auxiliary Anode 2  
28 Main Anode

[illegible]

GCA10G  
GSA10G

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

UNDER REVISION

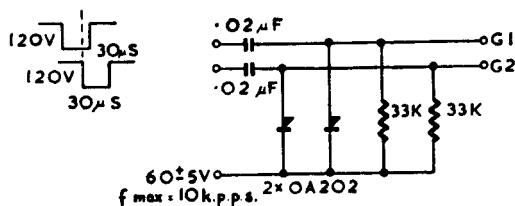


Fig. 3 Paired Pulse Drive.

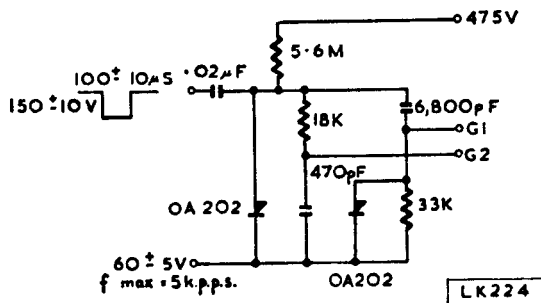


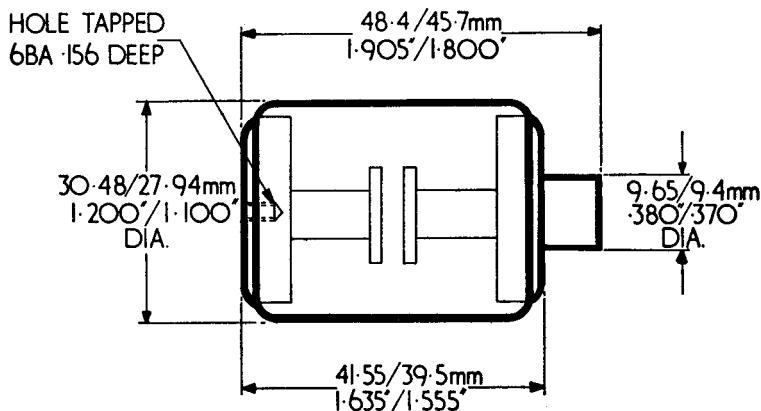
Fig. 4 Single Pulse Drive.



## Discharge Tube

GD2V

|                           |                   |
|---------------------------|-------------------|
| Breakdown Voltage         | 2 kV $\pm$ 100 V  |
| Maximum discharge energy  | 16J               |
| Maximum storage capacitor | 8 $\mu$ F         |
| Insulation at 1.5 kV      | 10M $\Omega$ min. |



## NOTES

- (1) When the applied voltage has a very fast rise time, it is essential that some light reaches the tube. For slow capacitor charging waveforms, the tube may be used in complete darkness.
- (2) As supplied, the gap is symmetrical. Discharges introduce asymmetry, and the life will be shortened if the polarity is changed after some discharges have taken place.
- (3) The standard tube has one end cap and one tapped hole. End caps with threaded stud suitable for fitting into the tapped hole will be supplied on request.





# Voltage Stabilizer

**GD 75 P**

---

## Limit Ratings

|                                          |                |
|------------------------------------------|----------------|
| Minimum anode current                    | 2 mA           |
| Maximum anode current                    | 60 mA          |
| Maximum striking voltage (light or dark) | 115 V          |
| Maximum negative anode voltage           | 50 V           |
| Bulb temperature limits                  | — 55° to +90°C |
| Maximum storage temperature              | +70°C          |

## Characteristics

|                                                                    |              |
|--------------------------------------------------------------------|--------------|
| Running voltage at 30 mA                                           | 75—81 V      |
| Maximum change in $V_R$ for a current change from<br>2 to 60 mA    | 8 V          |
| Typical incremental resistance over a current<br>range of 10—60 mA | 130 $\Omega$ |

N.B.—Equilibrium conditions are reached after three minutes operation.



# GD 75 P

## Voltage Stabilizer

### Mechanical Data

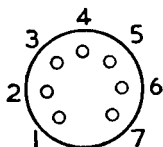
Mounting position

Any

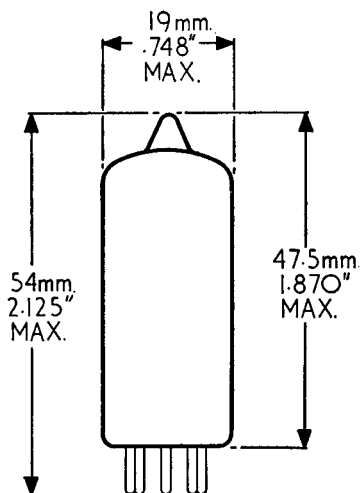
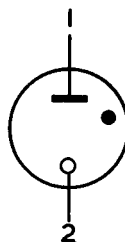
Base

B7G

Base Connections  
(underside view)



|     |   |                |
|-----|---|----------------|
| Pin | 1 | Anode          |
|     | 2 | Cathode        |
|     | 3 | Do not connect |
|     | 4 | " " "          |
|     | 5 | " " "          |
|     | 6 | " " "          |
|     | 7 | " " "          |



## Low Noise Miniature Reference Tube

# GD 83 M

### Limit Ratings

|                                       |        |
|---------------------------------------|--------|
| Minimum anode current                 | 3.5 mA |
| Maximum anode current                 | 6.0 mA |
| Minimum anode supply voltage (Note 1) | 130 V  |
| Maximum negative anode voltage        | 50 V   |
| Maximum starting current (Note 2)     | 10 mA  |
| Maximum bulb temperature (Note 3)     |        |
| During operation                      | 150°C  |
| During storage and standby            | 100°C  |

### Characteristics (at preferred operating current of 4.5 mA (Note 4))

|                                                                         |                |
|-------------------------------------------------------------------------|----------------|
| Initial values (measured at 25 to 30°C)                                 |                |
| Running voltage                                                         | 83.0 to 84.5 V |
| *Incremental resistance                                                 |                |
| Maximum                                                                 | 350 $\Omega$   |
| Minimum                                                                 | 110 $\Omega$   |
| *Maximum voltage jump (3.5—6.0 mA)                                      | 1 mV           |
| Typical r.m.s. noise voltage (30 c/s—10 kc/s)                           | 100 $\mu$ V    |
| *Nominal temperature coefficient over the range<br>25 to 120°C (Note 6) | —2.5 mV/°C     |
| *See Note 5.                                                            |                |

### Life Performance

Typical variations of running voltage at 25°C over  
the period indicated.

For continuous operation at 4.5 mA

|                    |                  |
|--------------------|------------------|
| 0—300 hours        | 0 to +0.35 V     |
| 300—2,500 hours    | 0 to +0.2 V      |
| 2,500—10,000 hours | +0.05 to +0.35 V |

For storage or standby, the variations that can be expected up to  
3,000 hours are negligible.

### Notes

- (1) This value holds good over life, in light or dark. In total darkness an ignition delay of up to 5 seconds may occur.
- (2) To be restricted for long life to approximately 30 seconds once or twice in each 8 hours use.
- (3) During conduction the bulb temperature is approximately 20°C above ambient temperature.
- (4) Equilibrium conditions are reached within 1 minute.
- (5) Information to date indicates that these values hold good with little or no change over life.
- (6) The characteristics curve connecting temperature coefficient and bulb temperature is continuous and repeatable.



# GD 83 M

## Low Noise Miniature Reference Tube

### Mechanical Data

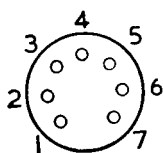
Mounting position

Any

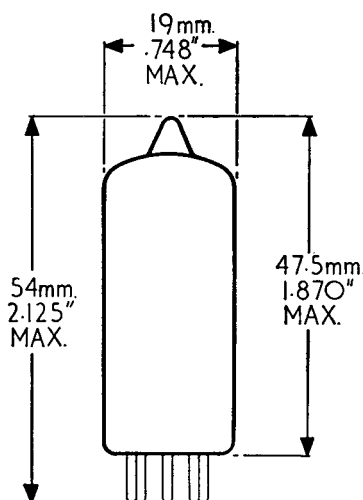
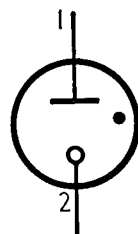
Base

B7G

Base Connections  
(underside view)



|       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | Do not connect |
| 4     |                |
| 5     |                |
| 6     |                |
| 7     |                |



# Miniature Reference Tube

**GD 85 M/S**  
(CV.449 Issue 4)

## Limit Rating

|                                                                      |            |
|----------------------------------------------------------------------|------------|
| Minimum anode current                                                | 1.0 mA     |
| Maximum anode current                                                | 10 mA      |
| Maximum striking voltage (normal room lighting<br>5/50 ft. (candles) | 115 V      |
| Maximum temperature coefficient<br>(over range +25 to +85°C)         | —3.5 mV/°C |

## Characteristics

|                                                                                                       |             |
|-------------------------------------------------------------------------------------------------------|-------------|
| Running voltage at 6.0 mA                                                                             | 85 ± 2 V    |
| Regulation (5.8 to 6.2 mA)                                                                            | 0.18 V      |
| Regulation (1.0 to 10 mA)                                                                             | 4.0 V       |
| Maximum incremental resistance at 6.0 mA                                                              | 450 Ω       |
| Maximum voltage jump (anode resistance 5kΩ,<br>1 to 10 mA)                                            | 100 mV peak |
| Maximum variation of running voltage during a life<br>period of 1,000 hrs. at 6.0 mA                  | 0.5%        |
| Maximum variation of running voltage after the first<br>300 hrs. at 6.0 mA                            | 0.2%        |
| Minimum short term (100 hrs. max.) variation of<br>running voltage after the first 200 hrs. at 6.0 mA | 0.1%        |

N.B.—Equilibrium conditions are reached after three minutes' operation.



# GD85M/S

(CV.449 Issue 4)

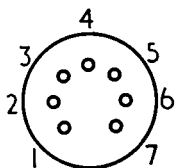
## Miniature Reference Tube

### Mechanical Data

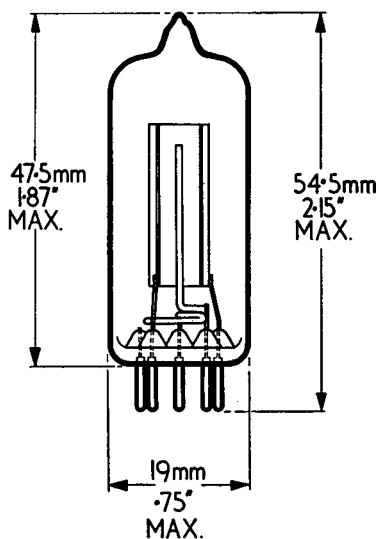
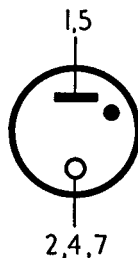
Mounting position  
Base

Any  
B7G

Base Connections  
(underside view)



|       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | Do not connect |
| 4     | Cathode        |
| 5     | Anode          |
| 5     | Do not connect |
| 7     | Cathode        |



**Ruggedized Miniature Reference Tube****GD 85 M/R****Limit Rating**

|                                                                     |            |
|---------------------------------------------------------------------|------------|
| Minimum anode current                                               | 1.0 mA     |
| Maximum anode current                                               | 10 mA      |
| Maximum striking voltage (normal room lighting<br>5/50 ft. candles) | 115 V      |
| Maximum temperature coefficient<br>(over range +25 to +85°C)        | —3.5 mV/°C |
| Maximum vibration (continuous operation)                            | 2.5 g      |
| Maximum shock (short duration)                                      | 500 g      |

**Characteristics**

|                                                                                                       |              |
|-------------------------------------------------------------------------------------------------------|--------------|
| Running voltage at 6.0 mA                                                                             | 85 ± 2 V     |
| Regulation (5.8 to 6.2 mA)                                                                            | 0.18 V       |
| Regulation (1.0 to 10 mA)                                                                             | 4.0 V        |
| Maximum incremental resistance at 6.0 mA                                                              | 450 Ω        |
| Maximum voltage jump (anode resistance 5kΩ,<br>1 to 10 mA)                                            | 100 mV peak  |
| Vibration noise, 20-500 c.p.s. at 2.5 g                                                               | 5 mV r.m.s.  |
| 500-2,000 c.p.s. at 2.5 g                                                                             | 15 mV r.m.s. |
| Maximum variation of running voltage during a life<br>period of 1,000 hrs. at 6.0 mA                  | 0.5%         |
| Maximum variation of running voltage after the first<br>300 hrs. at 6.0 mA                            | 0.2%         |
| Maximum short term (100 hrs. max.) variation of<br>running voltage after the first 300 hrs. at 6.0 mA | 0.1%         |

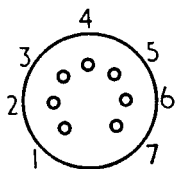


**GD 85 M/R****Ruggedized Miniature Reference Tube****Mechanical Data**

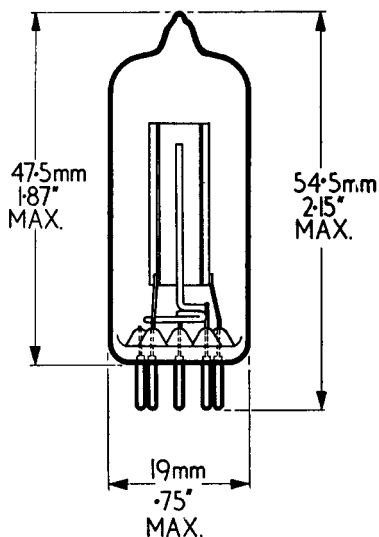
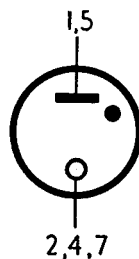
Mounting position  
Base

Any  
B7G

Base Connections  
(underside view)



|       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | Do not connect |
| 4     | Cathode        |
| 5     | Anode          |
| 6     | Do not connect |
| 7     | Cathode        |



## Reliable-Miniature Reference Tube

**GD 85P/RS**  
 (CV.4048)

**Limit Ratings**

|                                                                                                 |                                  |
|-------------------------------------------------------------------------------------------------|----------------------------------|
| Minimum anode current                                                                           | 1.0 mA                           |
| Maximum anode current                                                                           | 10 mA                            |
| Maximum striking voltage (normal room lighting<br>5/50 ft. candles)                             | 115 V                            |
| Maximum temperature coefficient<br>(over range $-55^{\circ}\text{C}$ to $+25^{\circ}\text{C}$ ) | $-10\text{ mV}/^{\circ}\text{C}$ |
| (over range $+25^{\circ}\text{C}$ to $+90^{\circ}\text{C}$ )                                    | $-5\text{ mV}/^{\circ}\text{C}$  |
| Maximum acceleration (continuous operation)                                                     | 2.5 g                            |
| Maximum shock (short duration)                                                                  | 500 g                            |

**Characteristics**

|                                                                               |                     |
|-------------------------------------------------------------------------------|---------------------|
| Running voltage at 6.0 mA                                                     | $85 \pm 2\text{ V}$ |
| Regulation (5.8 to 6.2 mA)                                                    | 0.18 V              |
| (1.0 to 10 mA)                                                                | 4.0 V               |
| Incremental resistance at 6 mA                                                | 450 $\Omega$        |
| Maximum voltage jump (Anode resistance 5 k $\Omega$ .<br>1 to 10 mA)          | 100 mV peak         |
| Maximum variation of running voltage at 6 mA                                  |                     |
| During the first 300 hours                                                    | 0.3%                |
| During the subsequent 10,000 hours                                            | 0.2%                |
| Typical drift of running voltage per 1,000 hours<br>after the first 300 hours | 0.1%                |

N.B.—Equilibrium conditions are reached after three minutes operation at 6.0 mA



**GD 85P/RS**  
(CV.4048)

## Reliable-Miniature Reference Tube

### TESTS

To be performed in addition to those applicable in K1001.

**Test Conditions**—unless otherwise specified.

Va(b)  
(V)  
(Note 1)

R lim.  
(ohms)  
5K

Ia  
(mA)  
6.0 (Note 2)

A d.c. voltage not exceeding 100 volts shall be applied between Anode and Cathode and shall be increased steadily at a rate not exceeding 25 volts/second until the valve strikes. The ripple content of the supply shall not exceed 0.25%.

After the valve has struck, the supply voltage shall be further increased until the anode current is 6.0 mA. It shall be maintained constant for 3 minutes before any characteristic, other than striking voltage, is measured.

| K1001 | Test                | Test Conditions | AQL % | Insp. Level | Symbol | Limits |      | Units | Notes |
|-------|---------------------|-----------------|-------|-------------|--------|--------|------|-------|-------|
|       |                     |                 |       |             |        | Min.   | Max. |       |       |
| 7.1   | Glass Strain        | No Voltages     | 6.5   | I           |        |        |      |       |       |
|       | <b>Group A</b>      |                 |       |             |        |        |      |       |       |
|       | Striking Voltage    |                 |       | 100%        | Va     | —      | 115  | V     | 1     |
|       | Maintaining Voltage |                 |       | 100%        | Vb     | 83     | 87   | V     |       |



## Reliable-Miniature Reference Tube

**GD 85P/RS**  
 (CV.4048)
**Tests (cont.)**

| K1001 | Test              | Test Conditions                                      | AQL % | Insp. Level | Symbol | Limits |      | Units        | Notes |
|-------|-------------------|------------------------------------------------------|-------|-------------|--------|--------|------|--------------|-------|
|       |                   |                                                      |       |             |        | Min.   | Max. |              |       |
|       | Regulation<br>(1) | $\delta V_a$ for change of $I_a$ from 5.8 to 6.2 mA  |       | 100%        |        |        | 0.18 | V            |       |
|       | Voltage Jumps     | $I_a$ varied from 1.0 to 10.0 mA<br>$R_a = 500$ ohms |       | 100%        |        |        | 100  | mV p/p       | 2     |
|       | Oscillation       | $I_a$ varied from 1.0 to 10.0 mA<br>$R_a = 500$ ohms |       | 100%        |        |        | 5    | mV p/p       |       |
|       | Microphonic Noise | $R_a = 500$ ohms                                     |       | 100%        |        |        | 15   | mV p/p       | 4     |
|       | Leakage Current   | Supply Voltage = 55 V d.c.<br>$R_a = 1$ megohm       |       | 100%        |        |        | 5    | $\mu A$ d.c. |       |



**GD 85P/RS**  
(CV.4048)

# Reliable-Miniature Reference Tube

## Tests (cont.)

| K1001 | Test                        | Test Conditions                                                              | AQL % | Insp. Level | Symbol | Limits |      | Units | Notes |
|-------|-----------------------------|------------------------------------------------------------------------------|-------|-------------|--------|--------|------|-------|-------|
|       |                             |                                                                              |       |             |        | Min.   | Max. |       |       |
|       | <b>Group B</b>              |                                                                              |       |             |        |        |      |       |       |
|       | Temperature Coefficient (1) | Temperature varied from —55°C to +25°C                                       |       | TA          |        |        |      |       | 3, 6  |
|       | Temperature Coefficient (2) | Temperature varied from + 25°C to + 90°C                                     |       | TA          |        |        |      |       | 3, 6  |
|       | Striking Voltage            | Measure at Temperature = —50°C                                               |       | TA          |        |        | 115  | V     | 1     |
|       | Regulation                  | $\delta V_a$ for change of $I_a$ from 1.0 to 10.0 mA<br>Temperature = + 90°C |       |             |        |        |      |       | 3, 6  |



## Reliable-Miniature Reference Tube

**GD 85P/RS**  
 (CV.4048)
**Tests (cont.)**

| K1001 | Test                           | Test Conditions                                  | AQL % | Insp. Level | Symbol  | Limits |      | Units  | Notes |
|-------|--------------------------------|--------------------------------------------------|-------|-------------|---------|--------|------|--------|-------|
|       |                                |                                                  |       |             |         | Min.   | Max. |        |       |
|       | <b>Group C</b>                 |                                                  |       |             |         |        |      |        |       |
|       | Striking Voltage (Dark Strike) |                                                  | 2.5   | I           | Va      |        | 115  | V      | 5     |
|       | Regulation (2)                 | $\delta$ Va for change of Ia from 1.0 to 10.0 mA | 2.5   | I           |         |        | 4.0  | V      |       |
| 7.2   | <b>Group D</b>                 |                                                  |       |             |         |        |      |        |       |
|       | Base Strain                    | No voltages                                      | 6.5   | IA          |         |        |      |        |       |
|       | 11.2 Resonance Search (1)      | Ra = 27K<br>Frequency = 25 to 500 c/s            |       | IC          |         |        |      |        |       |
|       | 11.1 Vibration Noise Output    |                                                  | 2.5   |             | Va (AC) |        | 5    | mV RMS |       |
|       | Resonance Search (2)           | Ra = 27K<br>Frequency = 500 to 2500 c/s          |       | IC          |         |        |      |        |       |



**GD 85P/RS**  
(CV.4048)

# Reliable-Miniature Reference Tube

## Tests (cont.)

| K1001 | Test                   | Test Conditions                                                                                       | AQL % | Insp. Level | Symbol                 | Limits |      | Units     | Notes |
|-------|------------------------|-------------------------------------------------------------------------------------------------------|-------|-------------|------------------------|--------|------|-----------|-------|
|       |                        |                                                                                                       |       |             |                        | Min.   | Max. |           |       |
| 11-1  | Vibration Noise Output |                                                                                                       | 2-5   |             | V <sub>a</sub><br>(AC) |        | 15   | mV<br>RMS |       |
| 11-3  | Fatigue Test           | I <sub>a</sub> = 0<br>Duration<br>30 + 30 +<br>39 hours.<br>Acceleration = 5g.<br>Frequency = 170 c/s |       | 1A          |                        |        |      |           |       |
|       | Post Fatigue Test      | Combined AQL                                                                                          | 4-0   |             |                        |        |      |           |       |
|       | Anode Voltage Change   |                                                                                                       | 2-5   |             | δ V <sub>a</sub>       |        | ±0.7 | V         |       |
| 11-1  | Vibration Noise        |                                                                                                       | 2-5   |             |                        |        | 30   | mV<br>p/p |       |



## Reliable-Miniature Reference Tube

GD 85P/RS  
(CV.4048)

## Tests (cont.)

| K1001 | Test                 | Test Conditions                | AQL % | Insp. Level | Symbol       | Limits |           | Units  | Notes |
|-------|----------------------|--------------------------------|-------|-------------|--------------|--------|-----------|--------|-------|
|       |                      |                                |       |             |              | Min.   | Max.      |        |       |
| 11-4  | Shock Test           | Ia = 0<br>Acceleration = 500g. |       | IA          |              |        |           |        |       |
|       | Post Shock Test      | Combined AQL                   | 4-0   |             |              |        |           |        |       |
|       | Anode Voltage Change |                                | 2-5   | IA          | $\delta V_a$ |        | $\pm 0.7$ | V      |       |
| 11-1  | Vibration Noise      |                                | 2-5   |             |              |        | 30        | mV p/p |       |
| AVI/5 | Group E Life Test    |                                |       |             |              |        |           |        |       |
|       | End Point 1000 Hours |                                |       |             |              |        |           |        |       |
|       | Inoperatives         |                                | 2-5   | IA          |              |        |           |        |       |
|       | Striking Voltage     |                                | 2-5   |             | Va           |        | 115       | V      |       |



**GD 85P/RS**  
(CV.4048)

# Reliable-Miniature Reference Tube

## Tests (cont.)

| K1001      | Test                                             | Test Conditions                                 | AQL % | Insp. Level | Symbol | Limits |      | Units | Notes |
|------------|--------------------------------------------------|-------------------------------------------------|-------|-------------|--------|--------|------|-------|-------|
|            |                                                  |                                                 |       |             |        | Min.   | Max. |       |       |
|            | Change of maintaining voltage during life        |                                                 | 2.5   |             |        |        | 0.4  | V     |       |
|            | Regulation                                       |                                                 | 2.5   |             |        |        | 0.18 | V     |       |
| AIX/<br>25 | <b>Group F</b>                                   |                                                 |       |             |        |        |      |       |       |
|            | Electrical Re-test after 28 days holding period. |                                                 |       | 100%        |        |        |      |       |       |
|            | Inoperatives                                     |                                                 | 0.5   |             |        |        |      |       |       |
|            | Striking Voltage                                 |                                                 | 0.5   | 100%        |        |        | 115  | V     |       |
|            | Maintaining Voltage                              |                                                 | 0.5   | 100%        |        | 83     | 87   | V     |       |
|            | Regulation (1)                                   | $\delta$ Va for change of Ia from 5.8 to 6.2 mA | 0.5   | 100%        |        |        | 0.18 | V     |       |



**Reliable-Miniature Reference Tube****GD 85P/RS**  
(CV.4048)**Notes**

1. Test to be conducted in normal ambient room lighting (5/50 ft. candles).
2. A calibrated amplifier detector with C.R.T. indicator having a substantially linear response over the range 50/5000 c/s is to be connected between the anode and cathode. The anode current is to be varied slowly from 1.0—10.0 mA and back to 1.0 mA at least three times.
3. The tube voltage drop shall be measured at 10°C steps over the temperature range specified.
4. The valve shall be tapped and the noise shall not exceed the limit specified.
5. This test is to be conducted in total darkness after the valves have been held in total darkness for 24 hours.
6. In group B, the first two tests and the last test are under review. Limit figures for these tests will be supplied when known.



**GD 85P/RS**  
(CV.4048)

## Reliable-Miniature Reference Tube

### Mechanical Data

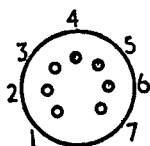
Mounting Position

Any

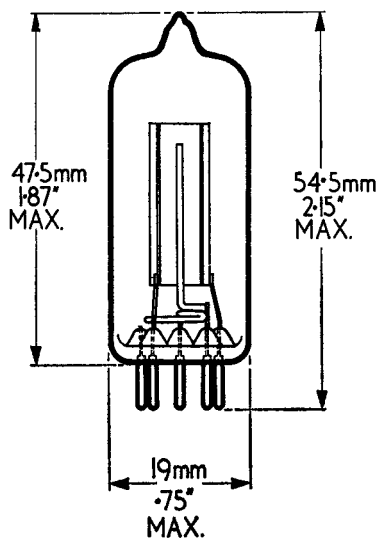
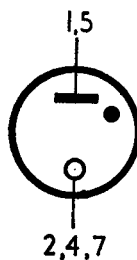
Base

B7G

Base Connections  
(underside view)



- |       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | Do not connect |
| 4     | Cathode        |
| 5     | Anode          |
| 6     | Do not connect |
| 7     | Cathode        |



# Ruggedized Sub-Miniature Voltage Reference Tube

# GD 85 WR

## Limit Ratings

|                                                   |           |
|---------------------------------------------------|-----------|
| Minimum anode current                             | 0.5 mA    |
| Maximum anode current                             | 5.0 mA    |
| Minimum supply voltage                            |           |
| (In total darkness or normal room illumination)   | 125 V     |
| Maximum temperature coefficient                   |           |
| —60° to +25°C                                     | —10 mV/°C |
| +25° to +90°C                                     | —7 mV/°C  |
| Maximum acceleration in accordance with B.S.G.100 |           |
| —Vibration Grade 1.                               |           |

## Characteristics (at +25°C)

|                                     |                         |
|-------------------------------------|-------------------------|
| Running voltage at 1.5 mA           | 85 V $\pm$ 3 V<br>— 1 V |
| Regulation 1.2 to 2.0 mA            | 1 V                     |
| 0.5 to 5.0 mA                       | 5 V                     |
| Maximum noise over working range    | 2 mV p.p.               |
| Vibration noise                     |                         |
| (Acceleration 5g min. at 50 c.p.s.) | 50 mV p.p. max.         |
| Voltage Jumps 1.0 to 5.0 mA         | 5 mV pk. max.           |
| 0.5 to 1.0 mA                       | 100 mV pk. max.         |



# GD 85 WR

## Ruggedized Sub-Miniature Voltage Reference Tube

### Mechanical Data

Mounting position

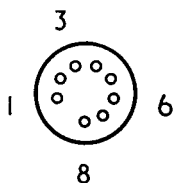
Any

Base

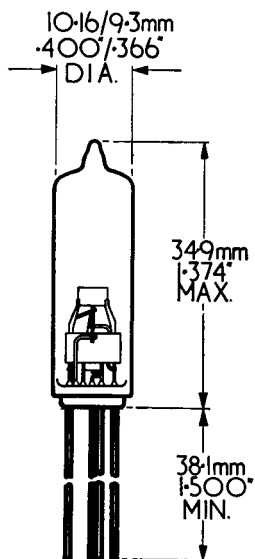
B8D/F (4 wire flying-lead)

N.B.—Direct soldered connections to the leads must be at least 5 mm ( $\frac{1}{4}$ " ) from the seal and any bending of the leads must be at least 1.5 mm ( $\frac{1}{16}$ " ) from the seal.

Base Connections  
(underside view)



- 1 Cathode
- 2 Lead omitted
- 3 Anode
- 4 Lead omitted
- 5 Lead omitted
- 6 Cathode
- 7 Lead omitted
- 8 Anode



## Reference Tube

**GD 86 W/S**  
(CV.2321)

### Limit Ratings

|                                                                     |               |
|---------------------------------------------------------------------|---------------|
| Minimum anode current                                               | 50 $\mu$ A    |
| Maximum anode current                                               | 1.0 mA        |
| Maximum striking voltage (normal room illumination)                 | 125 V         |
| Temperature coefficient<br>(over range 20-100°C.)                   | —5 mV per °C. |
| N.B.—Equilibrium conditions are reached after 90 seconds operation. |               |

### Characteristics

|                                                                                                 |                    |
|-------------------------------------------------------------------------------------------------|--------------------|
| Running voltage at 500 $\mu$ A                                                                  | 86 $\pm$ 1.5 V     |
| Recommended current range when used as a reference tube                                         | 400 $\mu$ A—1.0 mA |
| Impedance over range 400 $\mu$ A—1.0 mA                                                         | 5,500 $\Omega$     |
| Maximum noise generated by the tube over a band width of 50—5,000 c/s at 500 $\mu$ A            | 220 $\mu$ V r.m.s. |
| Maximum % variation of $V_R$ during the first 3,000 hours at 500 $\mu$ A                        | 2%                 |
| Typical drift of $V_R$ per 1,000 hours after the first 1,500 hours                              | 0.09%              |
| There is no step or discontinuity in the $I_a/E_a$ curve for currents greater than 400 $\mu$ A. |                    |

# GD 86 W/S

(CV.231)

## Reference Tube

### Mechanical Data

Mounting position

Any

Weight

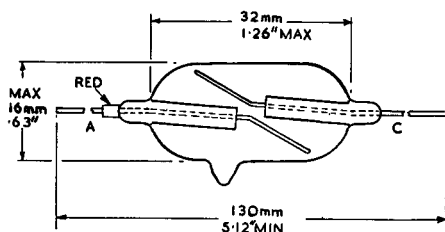
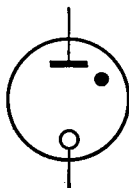
7.0 g (nominal)

Connections

Wire leads

The anode lead is taken from the end nearest the exhaust pip, and is marked with a red spot.

To prevent damage to the tube, the leads should not be soldered or bent nearer than 5 mm. ( $\frac{1}{4}$ " ) from the glass seal.



**Miniature Voltage Reference Tube****GD 87M** (CV.2573)  
(5651)**Limit Ratings**

|                                                                                                                     |        |
|---------------------------------------------------------------------------------------------------------------------|--------|
| Minimum anode current                                                                                               | 1.5 mA |
| Maximum anode current                                                                                               | 3.5 mA |
| Maximum striking voltage (in either normal<br>room illumination or in total darkness after<br>24 hours in the dark) | 115 V  |

**Characteristics**

|                               |             |
|-------------------------------|-------------|
| Running voltage at 1.5 mA     | 82 V min.   |
| Running voltage at 3.5 mA     | 92 V max.   |
| Regulation (1.5 to 3.5 mA)    | 3.0 V max.  |
| Voltage jumps (1.5 to 3.5 mA) | 100 mV max. |



# GD 87 M (CV.2573) (5651)

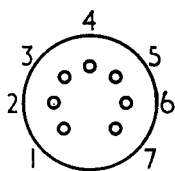
## Miniature Voltage Reference Tube

### Mechanical Data

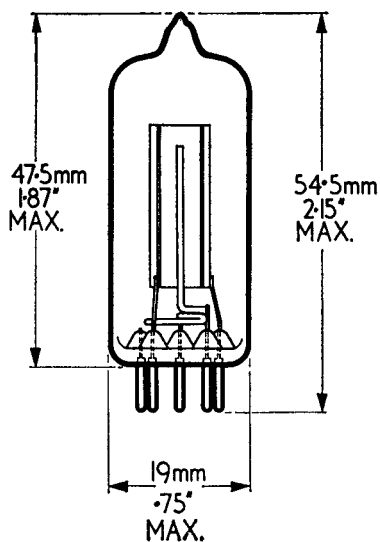
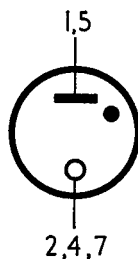
Mounting position  
Base

Any  
B7G

Base Connections  
(Underside view)



- 1 Anode
- 2 Cathode
- 3 Do not connect
- 4 Cathode
- 5 Anode
- 6 Do not connect
- 7 Cathode



# Voltage Stabilizer

**GD90M**

---

## Limit Ratings

|                                                     |               |
|-----------------------------------------------------|---------------|
| Minimum anode current                               | 1 mA          |
| Maximum anode current                               | 40 mA         |
| Maximum striking voltage (normal room illumination) | 115 V         |
| Maximum ambient temperature limits                  | —55° to +90°C |

## Characteristics

|                                                                 |                   |
|-----------------------------------------------------------------|-------------------|
| Running voltage at 20 mA                                        | 86—94 V           |
| Maximum change in $V_R$ for a current change from<br>1 to 40 mA | 14 V              |
| Incremental resistance at 20 mA                                 | 350 $\Omega$ nom. |

N.B.—Equilibrium conditions are reached after  
three minutes operation.



# GD 90 M

## Voltage Stabilizer

### Mechanical Data

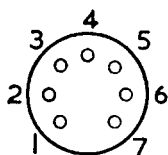
Mounting Position

Any

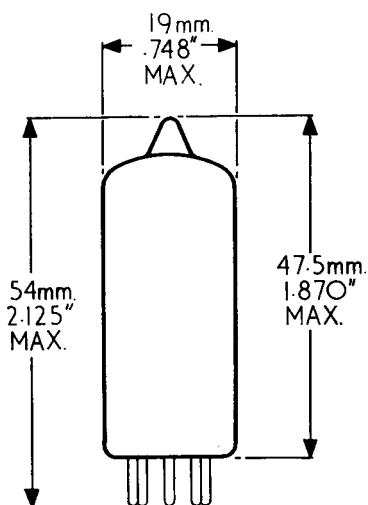
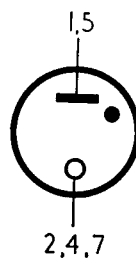
Base

B7G

Base Connections  
(underside view)



- |       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | Do not connect |
| 4     | Cathode        |
| 5     | Anode          |
| 6     | Do not connect |
| 7     | Cathode        |



**Voltage Stabilizer****GD 108 M** (CV.1833)**OB 2****Limit Ratings**

|                                                                    |               |
|--------------------------------------------------------------------|---------------|
| Minimum anode current                                              | 5 mA          |
| Maximum anode current                                              | 30 mA         |
| Minimum anode supply voltage to ensure striking<br>(Light or dark) | 127 V         |
| Maximum negative anode voltage                                     | 75 V          |
| Maximum starting current                                           | 75mA          |
| Ambient temperature limits for operation                           | -55 to +90°C. |

**Characteristics**

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
| Minimum running voltage at 5 mA                                                   | 105 V       |
| Maximum running voltage at 30 mA                                                  | 112 V       |
| Maximum change in running voltage for a current<br>change from 5 to 30 mA         | 3.5 V       |
| Maximum noise over the range 50—5,000 c.p.s. for a<br>current range of 30 to 5 mA | 5 mV r.m.s. |
| Typical delay in striking. (In total darkness)                                    |             |
| Supply Voltage 130 V                                                              | 20 mS       |
| Supply Voltage 170 V                                                              | 5 mS        |

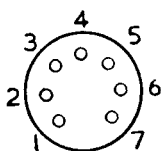


**GD108M** (CV.1833)**OB 2****Voltage Stabilizer****Mechanical Data**

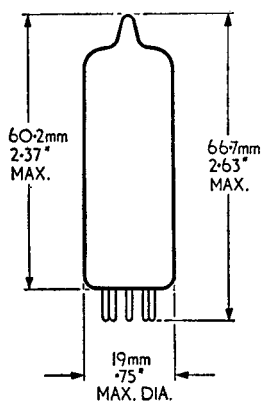
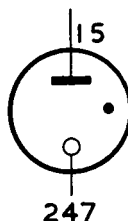
Mounting position  
Base

Any  
B7G

Base Connections  
(underside view)



- Pin 1 Anode  
 2 Cathode  
 3 Do not connect  
 4 Cathode  
 5 Anode  
 6 Do not connect  
 7 Cathode



**Voltage Stabilizer****GD120 A/S**  
(CV.1110)**Limit Ratings**

|                              |       |
|------------------------------|-------|
| Minimum anode current        | 10 mA |
| Maximum anode current        | 75 mA |
| Minimum anode supply voltage | 180 V |

**Characteristics**

|                                                                  |           |
|------------------------------------------------------------------|-----------|
| Running voltage at 75 mA                                         | 115—135 V |
| Maximum change in $V_R$ for a current change from<br>10 to 75 mA | 10 V      |

N.B. Equilibrium conditions are reached after  
10 minutes operation.



# GD120 A/S

(CV.1110)

## Voltage Stabilizer

### Mechanical Data

Mounting position

Any.

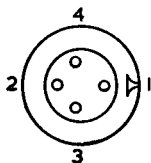
Weight

54 g (nominal).

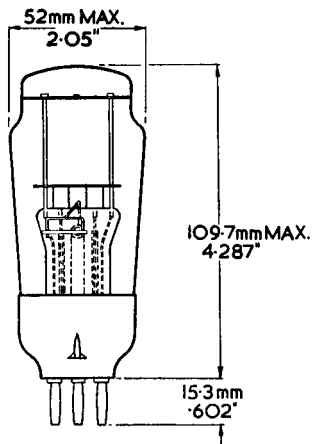
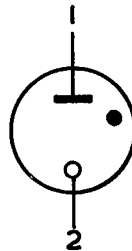
Base

British 4 pin.

Base Connections  
(underside view)



- |       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | No connections |
| 4     |                |



# Voltage Stabilizer

**GD 150 A/S**  
(CV.216)

## Limit Ratings

|                              |       |
|------------------------------|-------|
| Minimum anode current        | 5 mA  |
| Maximum anode current        | 40 mA |
| Minimum anode supply voltage | 180 V |

*N.B.*—Equilibrium conditions are reached after operation for 3 minutes.

## Characteristics

|                                                               |                           |
|---------------------------------------------------------------|---------------------------|
| Minimum running voltage at 5 mA                               | 145 V                     |
| Maximum running voltage at 40 mA                              | 162 V                     |
| Maximum change in $V_R$ for a current change of<br>5 to 40 mA | 5.5 V                     |
| Impedance                                                     | 250 $\Omega$              |
| Maximum noise within working range                            | 10 mV r.m.s.              |
| Noise at 30 mA                                                | 180 $\mu$ V r.m.s. (nom.) |



# GD150 A/S

(CV.216)

## Voltage Stabilizer

### Mechanical Data

Mounting position

Weight

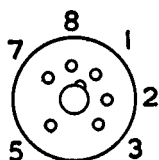
Base

Any

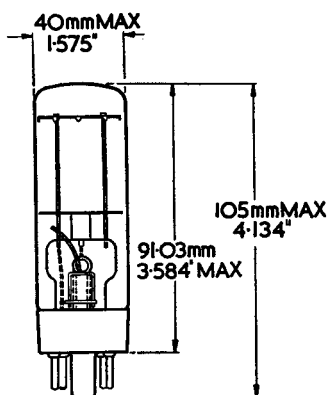
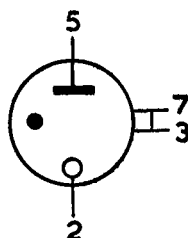
35 g (nominal)

I.O.

Base Connections  
(underside view)



- Pin 1 —  
 2 Cathode  
 3 Internally connected to pin 7  
 4 —  
 5 Anode  
 6 —  
 7 Internally connected to pin 3  
 8 —



# Voltage Stabilizer

# GD150 M

## Limit Ratings

|                              |       |
|------------------------------|-------|
| Minimum anode current        | 5 mA  |
| Maximum anode current        | 30 mA |
| Minimum anode supply voltage | 180 V |

## Characteristics

|                                                    |             |   |
|----------------------------------------------------|-------------|---|
| Minimum running voltage at 5 mA                    | 143 V       | ← |
| Running voltage at 15 mA                           | 145—155 V   |   |
| Maximum running voltage at 30 mA                   | 156 V       | ← |
| Maximum change in $V_R$ over a range of 5 to 30 mA | 5 V         | ← |
| Maximum noise within the working range             | 5 mV r.m.s. |   |

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



# GD150 M

## Voltage Stabilizer

### Mechanical Data

Mounting position

Weight

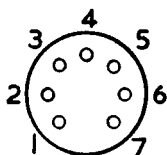
Base

Any

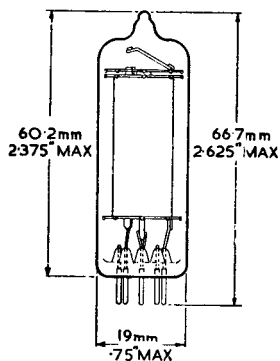
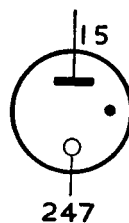
10 g (nominal)

B7G

Base Connections  
(underside view)



- Pin 1 Anode  
 2 Cathode  
 3 Do not connect  
 4 Cathode  
 5 Anode  
 6 Do not connect  
 7 Cathode



Voltage Stabilizer

**GD 150 M/S**  
(CV.1832)

---

**Limit Ratings**

|                              |       |
|------------------------------|-------|
| Minimum anode current        | 5 mA  |
| Maximum anode current        | 30 mA |
| Minimum anode supply voltage | 180 V |

**Characteristics**

|                                                    |             |
|----------------------------------------------------|-------------|
| Minimum running voltage at 5 mA                    | 142 V       |
| Maximum running voltage at 30 mA                   | 165 V       |
| Maximum change in $V_R$ over a range of 5 to 30 mA | 6 V         |
| Maximum noise within the working range             | 5 mV r.m.s. |



# GD150 M/S

(CV.1832)

## Voltage Stabilizer

### Mechanical Data

Mounting position

Weight

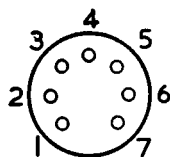
Base

Any

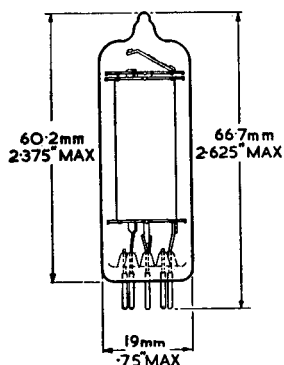
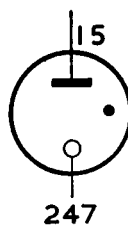
10 g (nominal)

B7G

Base Connections  
(underside view)



- |       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | Do not connect |
| 4     | Cathode        |
| 5     | Anode          |
| 6     | Do not connect |
| 7     | Cathode        |



# Voltage Stabilizer

# GD150P

(CV.2225)

---

## Limit Ratings

|                                                            |                |
|------------------------------------------------------------|----------------|
| Minimum anode current                                      | 5 mA           |
| Maximum anode current                                      | 15 mA          |
| Minimum anode supply voltage<br>(normal room illumination) | 180 V          |
| Ambient temperature limits                                 | − 55° to +90°C |

## Characteristics

|                                                    |              |
|----------------------------------------------------|--------------|
| Running voltage at 10 mA                           | 145—154 V    |
| Maximum change in $V_R$ over a range of 5 to 15 mA | 5 V          |
| Typical incremental resistance                     | 250 $\Omega$ |

# GD150P

(CV.2225)

## Voltage Stabilizer

### Mechanical Data

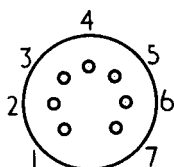
Mounting position

Base

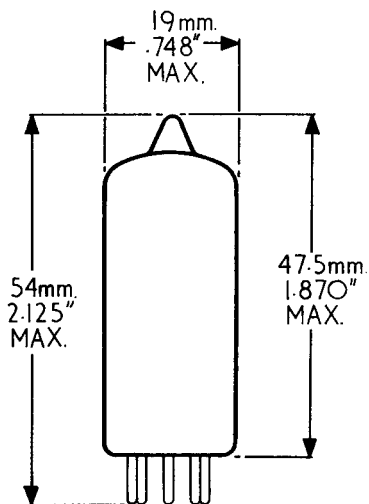
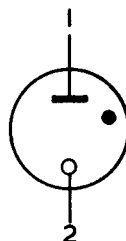
Any

B7G

Base Connections  
(underside view)



|       |                |
|-------|----------------|
| Pin 1 | Anode          |
| 2     | Cathode        |
| 3     | Do not connect |
| 4     | " " "          |
| 5     | " " "          |
| 6     | " " "          |
| 7     | " " "          |



# Corona Voltage Stabilizer

# GD 340 W

## Limit Ratings

|                                        |                           |
|----------------------------------------|---------------------------|
| Minimum tube current                   | 3 $\mu$ A ←               |
| Maximum tube current                   | 200 $\mu$ A               |
| Minimum supply voltage                 | 420 V                     |
| Maximum capacity in parallel with tube | 0.1 $\mu$ F               |
| Ambient operating temperature          | — 30°C min. to +60°C max. |
| Temperature coefficient                | 0.03% per °C approx.      |

## Characteristics

|                                                                                           |               |
|-------------------------------------------------------------------------------------------|---------------|
| Running voltage at 12 $\mu$ A                                                             | 330-360V ←    |
| Maximum change in $V_R$ for a current change of 3 to 12 $\mu$ A                           | 2V ←          |
| Maximum change in $V_R$ for a current change of 12 to 200 $\mu$ A                         | 5V            |
| Maximum noise output over the working range over a band width of 50 c.p.s. to 100k c.p.s. | 100 mV r.m.s. |

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



# GD340W

## Corona Voltage Stabilizer

### Mechanical Data

Mounting position

Any

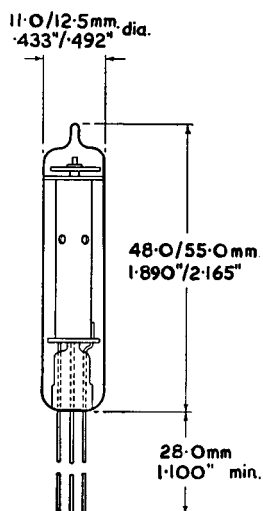
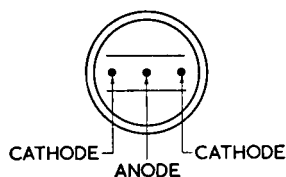
Weight

6.7 g (nominal)

Base

Pinch foot with flying-leads  
(Leads are 0.4 mm. dia. tinned wire)

Base Connections  
(underside view)



N.B.—To prevent damage to the tube, the leads should not be soldered or bent nearer than 5 mm. ( $\frac{1}{4}$ " ) from the glass seal.

## Corona Voltage Stabilizers

## GD 350 X, GD 350 Y

---

| Limit Ratings        | GD350X      | GD350Y      |
|----------------------|-------------|-------------|
| Minimum tube current | 3 $\mu$ A   | 3 $\mu$ A ← |
| Maximum tube current | 200 $\mu$ A | 200 $\mu$ A |

## Characteristics

|                                                                   |                              |                             |
|-------------------------------------------------------------------|------------------------------|-----------------------------|
| Running voltage at 12 $\mu$ A                                     | 341-359V<br>(350V $\pm$ 2½%) | 333-367V<br>(350V $\pm$ 5%) |
| Maximum change in $V_R$ for a<br>current change of 3-12 $\mu$ A   | 2V                           | 2V ←                        |
| Maximum change in $V_R$ for a<br>current change of 12-200 $\mu$ A | 5V                           | 5V                          |

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

# GD 350 X, GD 350 Y

## Corona Voltage Stabilizers

### Mechanical Data

Mounting position

Any

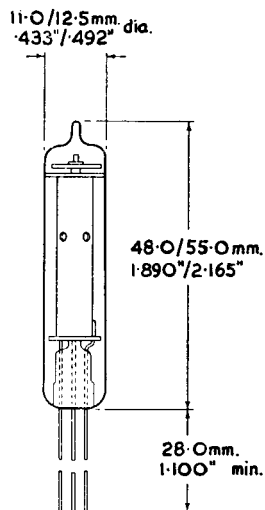
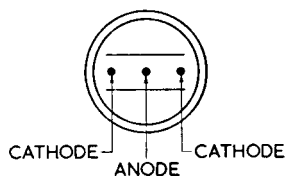
Weight

6.7 g. (nominal)

Base

Pinch foot with flying-leads  
(Leads are 0.4 mm. dia. tinned wire)

Base Connections  
(underside view)



**N.B.**—To prevent damage to the tube, the leads should not be soldered or bent nearer than 5 mm. ( $\frac{1}{4}$ " ) to the glass seal.

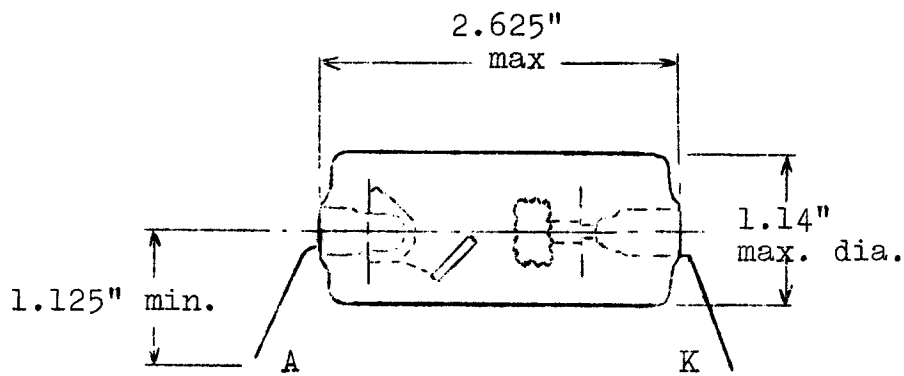
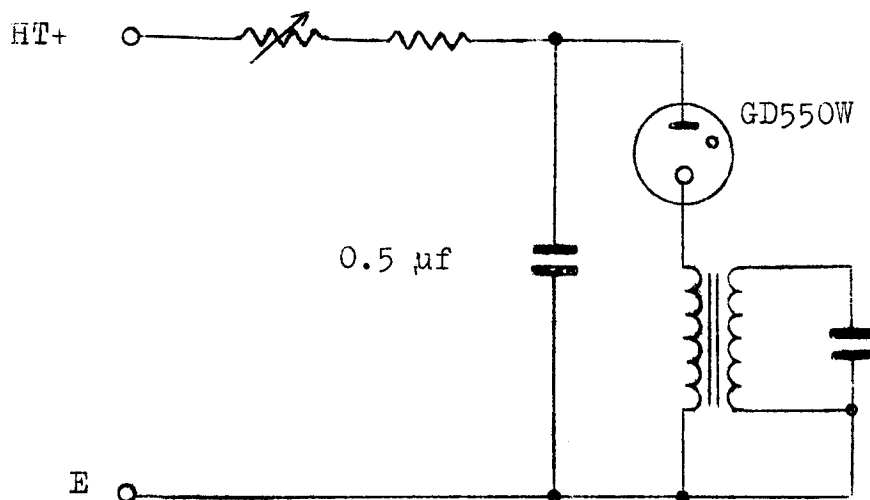
# TENTATIVE DATA SHEET

SPARK GAP

GD550W

Striking Voltage - 500-630V  
Max. Discharge Energy - 1.5J  
Leakage current at 450V -  $<1\mu\text{A}$   
Max. Repetition Rate - 10 p.sec.

Typical number of discharges -  $40 \times 10^6$  (in circuit below with discharge energy of .07J and rate of 1 per sec.)



# Primed Trigger Tube

**GDT120M**

An inexpensive trigger tube with light diode  
suitable for operation in poor light conditions

## Limit Ratings

|                                                                                                         |                                                           |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Maximum anode voltage to prevent self-ignition in all tubes (Trigger voltage 0 V)                       | +340 V                                                    |
| Maximum trigger to cathode voltage at which breakdown will not occur in any tubes (anode voltage 315 V) | Cathode 0 V, Trigger +105 V<br>Trigger 0 V, Cathode +70 V |
| Minimum trigger voltage necessary to cause breakdown in all tubes (anode voltage 315 V)                 | +155 V                                                    |
| Maximum cathode current                                                                                 | 9 mA                                                      |
| Minimum cathode current                                                                                 | 3 mA                                                      |
| Minimum supply voltage for priming diode                                                                | 315 V                                                     |

## Characteristics

|                                                                                               |                  |
|-----------------------------------------------------------------------------------------------|------------------|
| Anode running voltage at 4.5 mA<br>(N.B.—Tubes may exhibit jumps of up to 20 V in operation). | 94—130 V         |
| Deionization time ( $I_a = 4.5$ mA)                                                           | 3 mS max. ←      |
| Ionisation time ( $V_T = 175$ V pulse)                                                        | 500 $\mu$ S max. |

## Recommended Operating Conditions

|                                                                            |               |
|----------------------------------------------------------------------------|---------------|
| Anode supply voltage                                                       | 315 V         |
| Cathode current                                                            | 3.4 mA        |
| Anode load resistor                                                        | 47 k $\Omega$ |
| Trigger bias with respect to cathode<br>(Trigger resistor 330 k $\Omega$ ) | +80 V         |
| Light anode to be connected via 10 M $\Omega$ to +315 V.                   |               |
| Light cathode to be connected via 10 M $\Omega$ to 0 V.                    |               |

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



# GDT120M

## Primed Trigger Tube

An inexpensive trigger tube with light diode  
suitable for operation in poor light conditions

### Mechanical Data

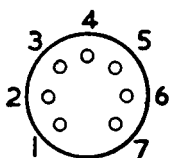
Mounting position

Any

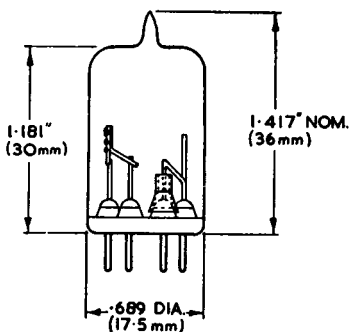
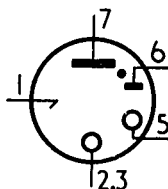
Base

B7G

Base Connections  
(underside view)



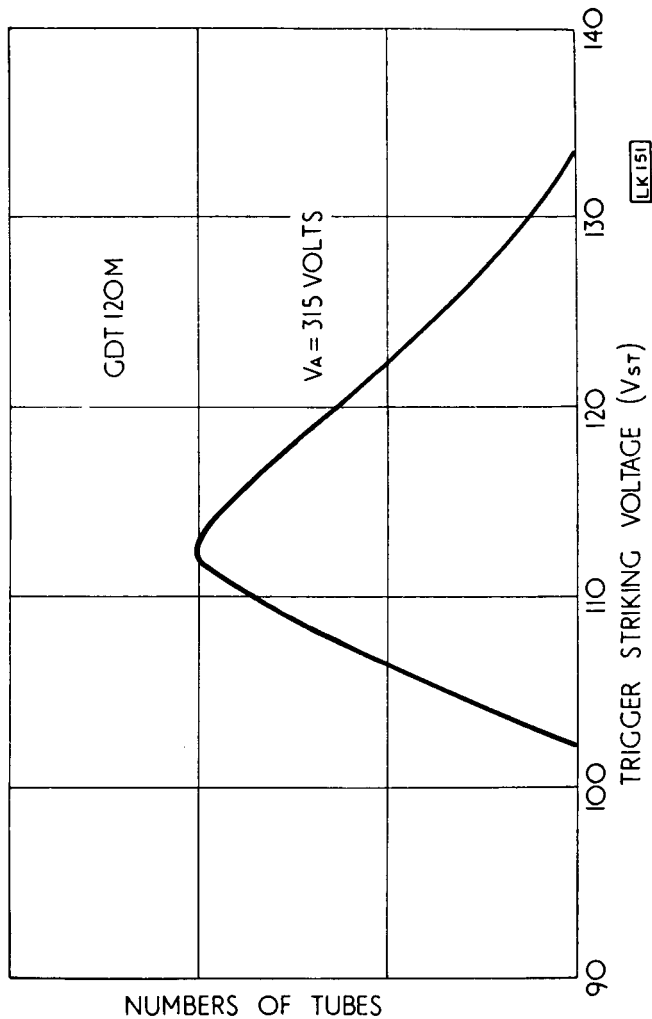
- 1 Trigger
- 2 } Cathode
- 3 }
- 4 Do not connect
- 5 Light cathode
- 6 Light anode
- 7 Anode



# Primed Trigger Tube

GDT120M

An inexpensive trigger tube with light diode  
suitable for operation in poor light conditions



Distribution of Trigger Striking Volts





## Primed Trigger Tube

# GDT120 T

**A high current inexpensive trigger tube with light diode suitable for operation in poor light conditions**

### Limit Ratings

|                                                                                                         |                                                           |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| Maximum anode voltage to prevent self-ignition in all tubes (trigger voltage 0 V)                       | 400 V                                                     |
| Maximum trigger to cathode voltage at which breakdown will not occur in any tubes (anode voltage 315 V) | Cathode 0 V, Trigger +100 V<br>Trigger 0 V, Cathode +80 V |
| Minimum trigger voltage necessary to cause breakdown in all tubes (anode voltage 315 V)                 | +155 V                                                    |
| Maximum cathode current (D.C.)                                                                          | 25 mA                                                     |
| Maximum cathode current (peak) max. duration 100 mS.                                                    | 60 mA                                                     |
| Minimum cathode current                                                                                 | 5 mA                                                      |
| Minimum supply voltage for priming diode                                                                | 315 V                                                     |

### Characteristics

|                                                                                                             |             |
|-------------------------------------------------------------------------------------------------------------|-------------|
| Anode running voltage at 25 mA<br>(N.B.—Tubes may exhibit jumps of up to 20 V in operation at low currents) | 94–130 V ←  |
| Deionization time ( $I_a = 25$ mA)                                                                          | 5 mS max. ← |
| Ionization time ( $V_T = 175$ V pulse)                                                                      | 1 mS        |

### Recommended Operating Conditions

|                                                                            |                |
|----------------------------------------------------------------------------|----------------|
| Anode supply voltage                                                       | 315 V          |
| Cathode current                                                            | 25 mA          |
| Anode load resistor                                                        | 8.2 k $\Omega$ |
| Trigger bias with respect to cathode<br>(Trigger resistor 100 k $\Omega$ ) | +80 V          |
| Light anode to be connected via 10 M $\Omega$ to +315 V                    |                |
| Light cathode to be connected via 10 M $\Omega$ to 0 V                     |                |

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



# GDT120T

## Primed Trigger Tube

A high current inexpensive trigger tube with light diode suitable for operation in poor light conditions

### Mechanical Data

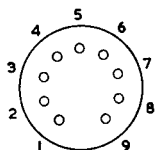
Mounting position

Any

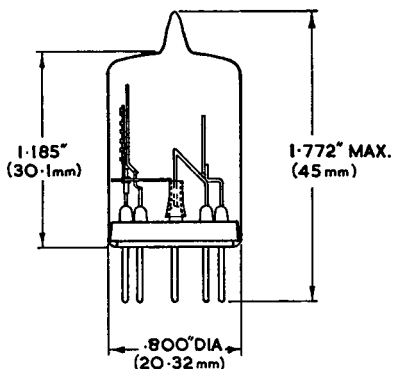
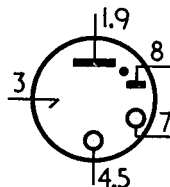
Base

B9A

Base Connections  
(underside view)



- 1 Anode
- 2 Do not connect
- 3 Trigger
- 4 } Cathode
- 5 }
- 6 Do not connect
- 7 Light cathode
- 8 Light anode
- 9 Anode



## Trigger Pentode

**GPE175M**

Primed trigger tube with two trigger electrodes suitable for use in bi-directional ring counters and in "OR" gates

### Limit Ratings

|                                                                                                                                                      |                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Maximum anode voltage to prevent self ignition in all tubes (trigger voltage + 173 V)                                                                | +310 V               |
| Minimum trigger voltage necessary to cause either trigger to breakdown in all tubes (anode voltage 300 V)                                            | +183 V               |
| Maximum trigger voltage at which trigger breakdown will not occur in any tube (anode voltage 300 V)                                                  | +173 V               |
| (During the first 3,000 hours of operating life the trigger breakdown voltage will not drift outside the limit ratings specified above.)             |                      |
| Maximum trigger to anode voltage                                                                                                                     | +200 V               |
| Minimum trigger to cathode current necessary to cause transfer in all tubes (anode voltage 300 V)                                                    | 100 $\mu$ A          |
| Minimum trigger to cathode current necessary to cause transfer in all tubes, with 100 pF capacitor between cathode and trigger (anode voltage 300 V) | 8 $\mu$ A            |
| Maximum cathode current                                                                                                                              |                      |
| Peak—maximum duration 20 $\mu$ S                                                                                                                     | 50 mA                |
| —maximum duration 50 mS in 10 S                                                                                                                      | 6 mA                 |
| D.C.                                                                                                                                                 | 3.5 mA               |
| Maximum speed of operation, determined by circuit conditions                                                                                         | Approx. 1,000 c.p.s. |

### Characteristics

|                                                                                            |                  |
|--------------------------------------------------------------------------------------------|------------------|
| Anode running voltage at 2.5 mA                                                            | 150 $\pm$ 5 V    |
| Trigger running voltage                                                                    | 135 V nom.       |
| Auxiliary cathode current (Aux. cathode returned to a minimum of -95 V via 10 M $\Omega$ ) | 25 $\mu$ A nom.  |
| De-ionization time                                                                         | 600 $\mu$ S max. |
| Minimum current at which all tubes will remain conducting (Ra 470 k $\Omega$ )             | 200 $\mu$ A      |

### Recommended Operating Conditions

|                                                                   |            |
|-------------------------------------------------------------------|------------|
| Anode supply voltage                                              | 280—310 V  |
| Anode to cathode current                                          | 2.5 mA     |
| Trigger bias with respect to cathode                              |            |
| Trigger resistor less than 470 k $\Omega$                         | 165 V max. |
| Trigger resistor greater than 470 k $\Omega$                      | 170 V max. |
| Minimum pulse required for operation (Pulse duration 100 $\mu$ S) | +25 V      |



# GPE175M

## Trigger Pentode

Primed trigger tube with two trigger electrodes suitable for use in bi-directional ring counters and in "OR" gates

### Mechanical Data

Mounting position

Weight

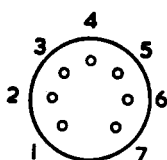
Base

Any

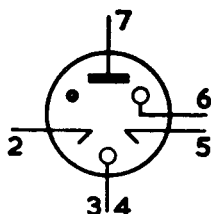
6.5 g (nominal)

B7G

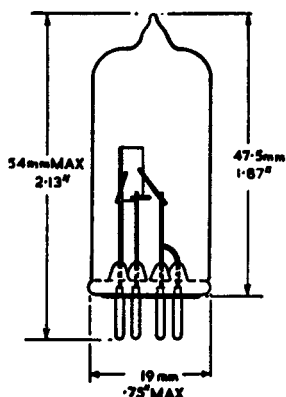
Base Connections  
(underside view)



- |       |                                  |                        |
|-------|----------------------------------|------------------------|
| Pin 1 | }                                | Trigger T <sub>1</sub> |
| 2     |                                  |                        |
| 3     | }                                | Cathode K <sub>1</sub> |
| 4     |                                  |                        |
| 5     | Trigger T <sub>2</sub>           |                        |
| 6     | Auxiliary cathode K <sub>2</sub> |                        |
| 7     | Main anode A                     |                        |



N.B.—This tube must not be enclosed in a metal screen or can.



## Trigger Pentode

**GPE175 M**

**Primed trigger tube with two trigger electrodes suitable for use in bi-directional ring counters and in "OR" gates**

---

### Notes on Operation

Rectangular pulses of at least 100  $\mu$ S duration are applied via a 1,000 pF capacitor to the triggers which are returned through 1 M $\Omega$  to +170 V bias. The tube will not fire with pulses of amplitude less than 5 V and will fire with pulses greater than 25 V.

To extinguish the main discharge, the anode-cathode potential must be reduced to below the running voltage (150 V) for a time dependent on the de-ionization characteristic. (600  $\mu$ S minimum).

Alternatively the tube may be extinguished by means of a capacitor in parallel with the A-K gap forming a self-quenching circuit.

When the tube is not conducting, the triggers are isolated from each other, but when anode current flows, both triggers have a low impedance to cathode and to each other.

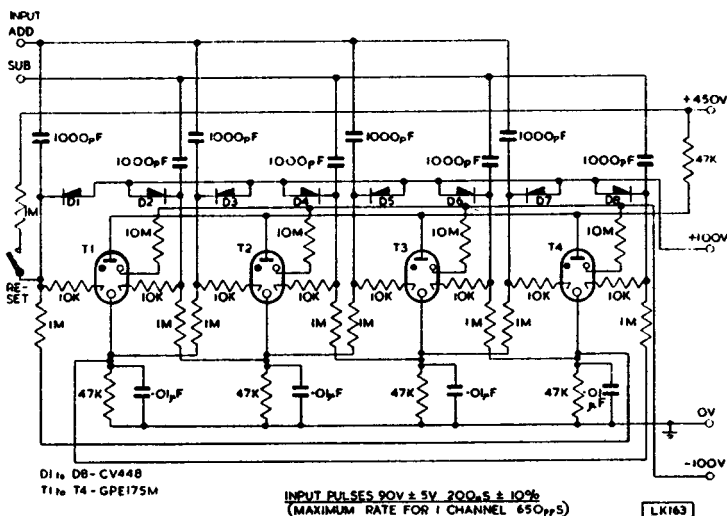
Typical bi-directional ring counter and coupling circuits are shown overleaf.



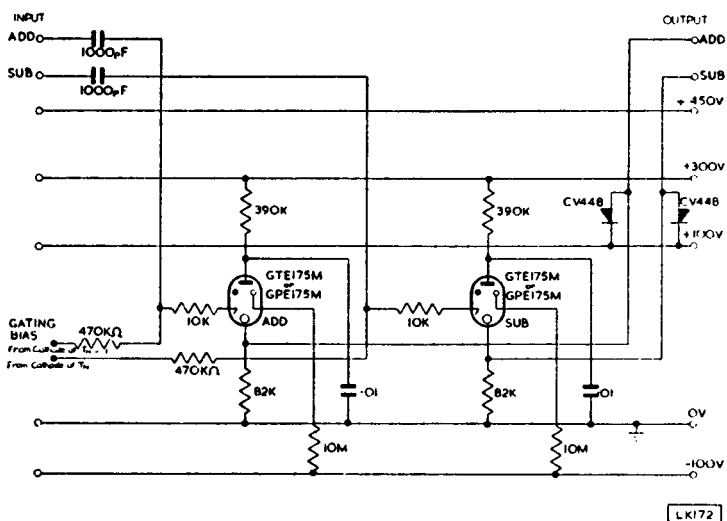
# GPE175M

## Trigger Pentode

Primed trigger tube with two trigger electrodes suitable for use in bi-directional ring counters and in "OR" gates



### Four Stage Bi-directional Ring Counter using GPE175M tubes



### Coupling Circuit for Bi-directional Counter LK163



**\*DIGITRON-2 Character Side-Viewing  
Cold-Cathode + and — Register Tube****GR2G****Limit Ratings**

|                                               |       |
|-----------------------------------------------|-------|
| Maximum cathode current (+ sign)              | 5 mA  |
| Maximum cathode current (— sign)              | 3 mA  |
| Minimum voltage necessary to ensure breakdown | 180 V |

**Characteristics**

|                                                                                                       |       |
|-------------------------------------------------------------------------------------------------------|-------|
| Nominal running voltage                                                                               | 168 V |
| A cathode left floating will assume some potential between that of the anode and the glowing cathode. |       |

**Recommended Operating Conditions**

Under the recommended D.C. operating conditions with the characters switched sequentially every 24 hours, an average life of 4,000 hours can be expected.

|                           |              |
|---------------------------|--------------|
| Anode supply voltage      | 250 V        |
| Cathode + series resistor | 15k $\Omega$ |
| Cathode — series resistor | 27k $\Omega$ |

\* Registered Trade Mark



# GR2G

## DIGITRON-2 Character Side-Viewing Cold-Cathode + and - Register Tube

### Mechanical Data

Mounting position

Base

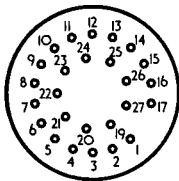
Socket

Any

B26A

B17A, B26A or B27A

Base Connections  
(underside view)



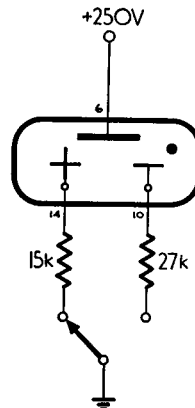
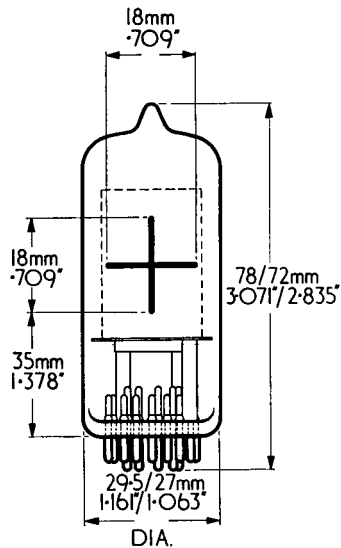
FRONT

Pin 6 Anode

Pin 10 —

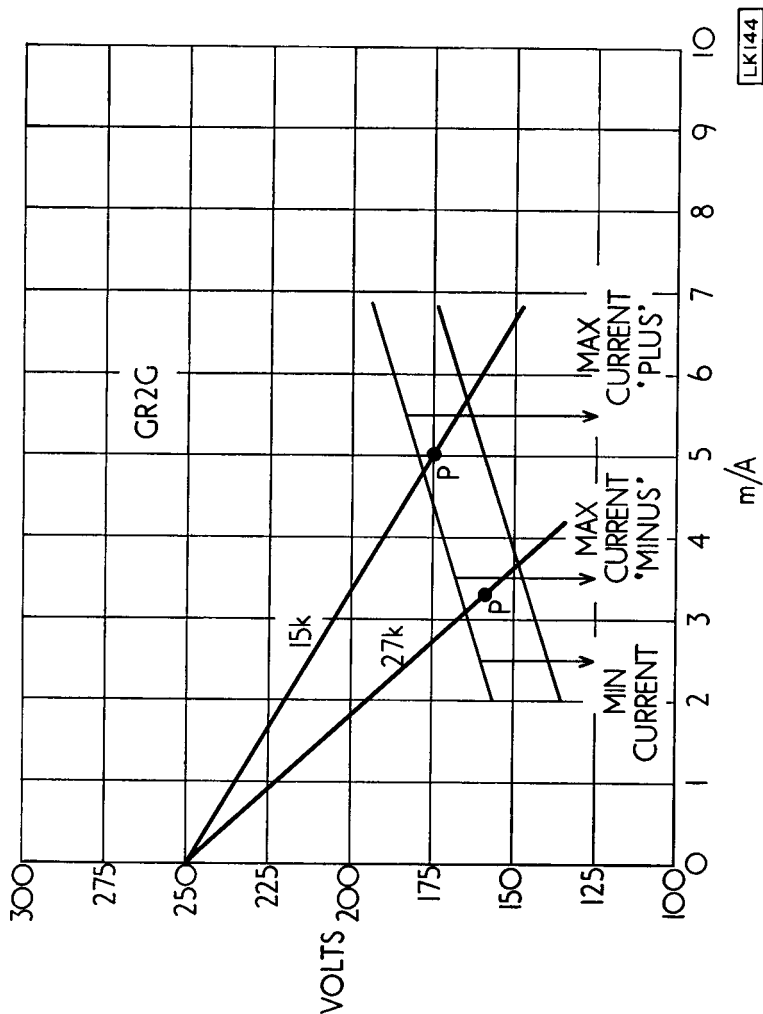
Pin 14 +

Note—All other pins are to be left unconnected.



**\*DIGITRON-2 Character Side-Viewing  
Cold-Cathode + and - Register Tube**

**GR2G**



LK144

Operating Characteristics

\*Registered Trade Mark



R



~~PERMANENT DATA SHEET~~  
**MAINTENANCE TYPE ONLY**

**\* DIGITRON -2 Character End-Viewing  
Cold-Cathode + and - Register Tubes**

**GR 2 H**

---

**Limit Ratings**

|                                               |        |
|-----------------------------------------------|--------|
| Maximum cathode current (+ sign)              | 2 mA   |
| Maximum cathode current (- sign)              | 1.5 mA |
| Minimum voltage necessary to ensure breakdown | 150V   |

**Characteristics**

|                                                                                                  |      |
|--------------------------------------------------------------------------------------------------|------|
| Nominal running voltage                                                                          | 130V |
| A cathode left floating will assume some potential between that of the anode and glowing cathode |      |

**Recommended Operating Conditions**

|                           |               |
|---------------------------|---------------|
| Anode supply voltage      | 250V          |
| Cathode + series resistor | 82k $\Omega$  |
| Cathode - series resistor | 120k $\Omega$ |

**\* Registered Trade Mark**



**GR 2 H**

**MAINTENANCE TYPE ONLY**  
**DIGITRON - 2 Character End-Viewing**  
**Cold-Cathode + and - Register Tubes**

**Mechanical Data**

Mounting Position

Any

The characters are viewed through the dome of the bulb. They will appear upright (within  $\pm 10^\circ$ ) when the tube is mounted with the line through pins 3 and 12 vertical, pin 12 being uppermost.

Base

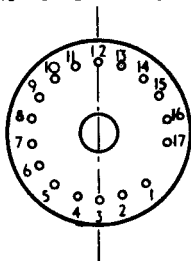
B17

Socket

B17A

Base Connections  
(underside view)

CENTRE LINE OF CHARACTERS

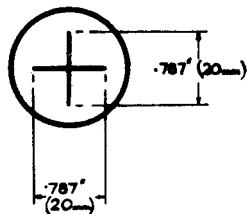
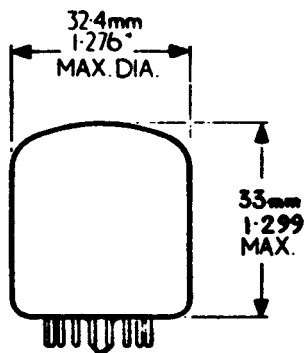
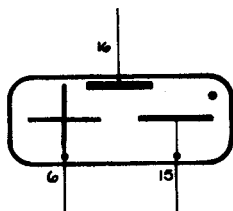


Pin 16 Anode

Pin 6 +

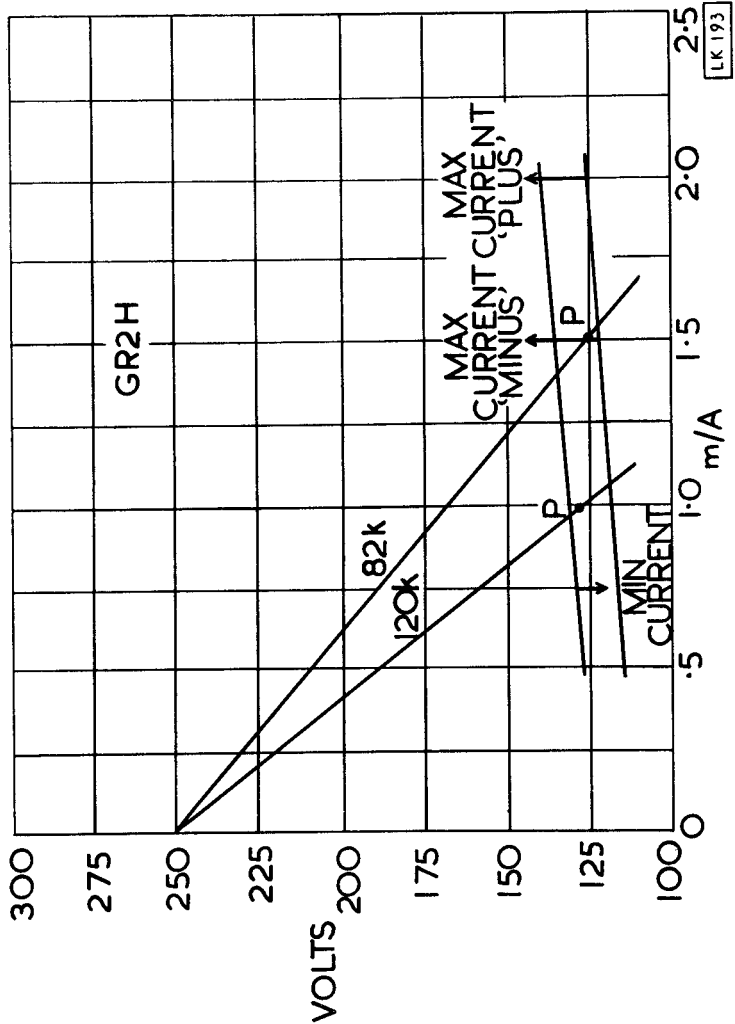
Pin 15 -

Note - All other pins are to be left unconnected.



\* DIGITRON -2 Character End-Viewing  
 Cold-Cathode + and - Register Tubes

GR 2 H



Operating Characteristics

\* Registered Trade Mark





# **\*DIGITRON—4 Character Side Viewing Cold-Cathode Fraction Register Tube**

**GR4G**

## **Limit Ratings**

|                                                                        |       |
|------------------------------------------------------------------------|-------|
| Maximum cathode current—1                                              | 5 mA  |
| Maximum cathode current— $\frac{1}{4}$ , $\frac{1}{2}$ , $\frac{3}{4}$ | 7 mA  |
| Minimum voltage necessary to ensure breakdown                          | 200 V |

## **Characteristics**

|                                                                                                       |       |
|-------------------------------------------------------------------------------------------------------|-------|
| Nominal running voltage $I_a = 5$ mA                                                                  | 170 V |
| A cathode left floating will assume some potential between that of the anode and the glowing cathode. |       |

## **Recommended Operating Conditions**

Under the recommended D.C. operating conditions with the characters switched sequentially every 24 hours, an average life of 3,500 hours can be expected.

D.C. operation

|                                          |       |
|------------------------------------------|-------|
| Anode supply voltage — $R_a = 12k\Omega$ | 250 V |
|------------------------------------------|-------|

A.C. operation

(Unsmoothed half-wave rectified 50 c.p.s. A.C.)

|                                          |                  |
|------------------------------------------|------------------|
| Anode supply voltage — $R_a = 12k\Omega$ | 200-220 V r.m.s. |
|------------------------------------------|------------------|

|                   |                  |
|-------------------|------------------|
| $R_a = 18k\Omega$ | 220-250 V r.m.s. |
|-------------------|------------------|

|                               |              |
|-------------------------------|--------------|
| Cathode 1 equalizing resistor | 10k $\Omega$ |
|-------------------------------|--------------|

\* Registered Trade Mark



# GR4G

## DIGITRON-4 Character Side Viewing Cold-Cathode Fraction Register Tube

### Mechanical Data

Mounting position

Any

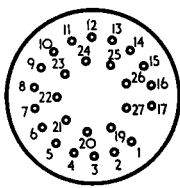
Base

B26A

Socket

B17, B26A or B27A

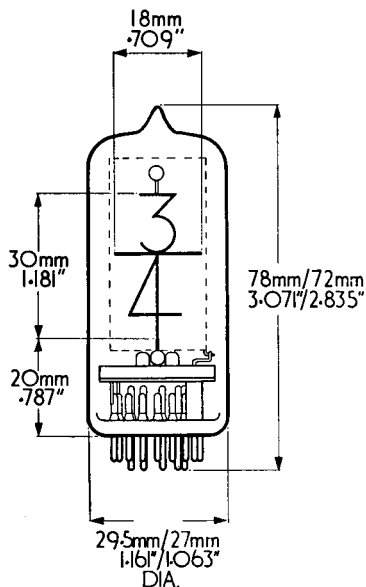
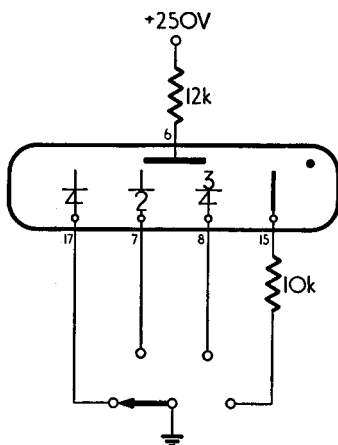
Base Connections  
(underside view)



|     |    |               |
|-----|----|---------------|
| Pin | 6  | Anode         |
|     | 7  | $\frac{1}{2}$ |
|     | 8  | $\frac{3}{4}$ |
|     | 15 | 1             |
|     | 17 | $\frac{1}{4}$ |

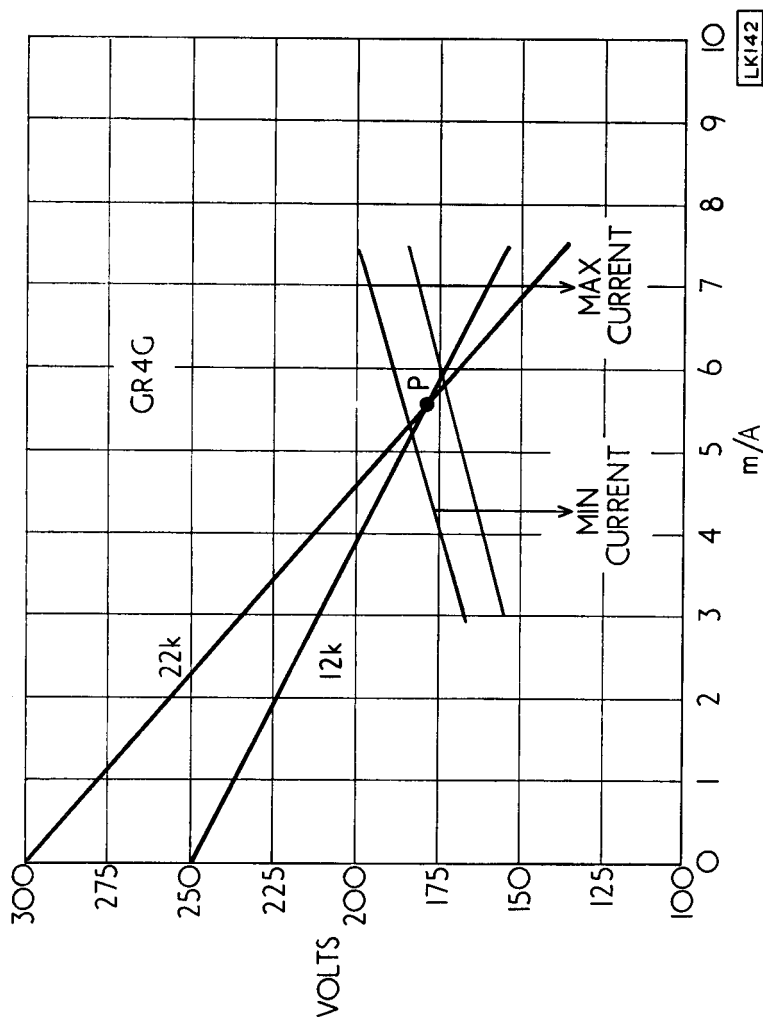
All other pins to be left unconnected.

FRONT



**\*DIGITRON—4 Character Side-Viewing  
Cold-Cathode Fraction Register Tube**

**GR4G**



Operating Characteristics

\*Registered Trade Mark





# **\*DIGITRON—Long Life 7 Character End-Viewing GR 7 M**

## **Cold Cathode Register Tube Containing**

Characters +, -, V, A,  $\Omega$ , %, and ~

### **Characteristics & Recommended Operating Conditions** (at room temperature unless otherwise stated)

|                                                            |               |
|------------------------------------------------------------|---------------|
| Minimum anode to cathode voltage to ensure breakdown       | 160V          |
| Nominal running voltage at 2mA                             | 140V          |
| D.C. Operation -                                           |               |
| Recommended Cathode Current                                | 2mA           |
| Min. Positive bias on non-conducting cathodes (See Note 1) | 60V           |
| Half-wave A.C. Supply -                                    |               |
| Recommended Cathode Current, average                       | 1.5mA         |
| peak                                                       | 7mA           |
| Min. Positive bias on non-conducting cathodes (See Note 1) | 40V           |
| Life Expectancy (2mA Cathode Current)                      |               |
| Continuous ionisation of one Cathode                       | >5,000 hours  |
| Sequentially Switching Cathodes every 100 hours or less    | >30,000 hours |

### **Absolute Maximum Ratings**

|                                         |        |
|-----------------------------------------|--------|
| Cathode current (each character) -      |        |
| Maximum average (averaging time = 20mS) | 2.5mA  |
| Maximum peak                            | 10mA   |
| Minimum for D.C. operation              | 1.0mA  |
| Bulb temperature -                      |        |
| Maximum                                 | + 70°C |
| Minimum                                 | -50°C  |

#### **Notes:-**

- (1) Under limit conditions some deterioration of the glow appearance may occur during life. To minimise this, the voltage between the conducting and non-conducting cathodes should be as high as possible.

\* Registered Trade Mark



# GR 7 M \*DIGITRON—Long Life 7 Character End-Viewing Cold-Cathode Register Tube Containing Characters +, -, V, A, $\Omega$ , %, and ~

## Mechanical Data

Mounting position

Base

Socket

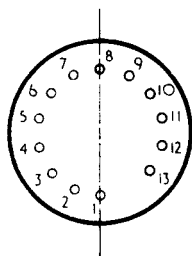
Any

B13B

B13B

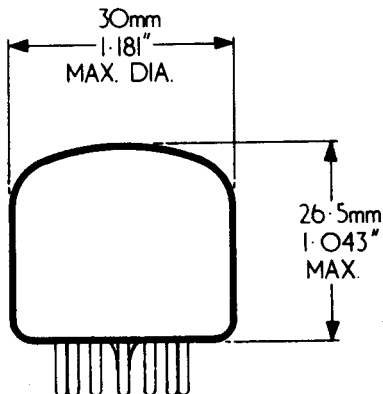
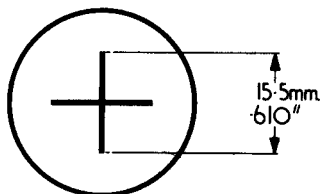
Base Connections  
(underside view)

CENTRE LINE OF CHARACTERS

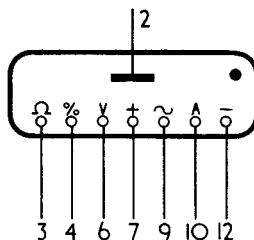


- Pin 2 Anode  
 3 Cathode  $\Omega$   
 4 Cathode %  
 6 Cathode V  
 7 Cathode +  
 9 Cathode ~  
 10 Cathode A  
 12 Cathode -

Note - All other pins are  
to be left unconnected.



The dome of the tube  
is filter coated



\* Registered Trade Mark



# 10-way Register Or Indicator Tube

**GR10 A**  
(CV5291)

## Limit Ratings

|                                                                                                |         |
|------------------------------------------------------------------------------------------------|---------|
| Minimum anode to cathode voltage to ensure breakdown (normal room illumination)                | 129 V ← |
| Maximum voltage across tube and 500 kΩ resistors to ensure tube extinguishes                   | 105 V ← |
| Maximum potential difference between any two cathodes (Cathode resistors min. value of 300 kΩ) | 120 V ← |
| Maximum total anode current                                                                    | 250 μA  |
| Minimum total anode current                                                                    | 50 μA   |

## Characteristics

|                          |               |
|--------------------------|---------------|
| Running voltage at 60 μA | 108 V approx. |
|--------------------------|---------------|

## Recommended Operating Conditions

|               |       |
|---------------|-------|
| Anode current | 60 μA |
|---------------|-------|

To ensure correct operation the cathode potential must change by a voltage  $V_o$  where :—

$$\begin{aligned}V_o &> V_s - V_x \\ &> 129-105, \text{ i.e., } 24 \text{ volts}\end{aligned}$$

$$V_s = \text{Striking voltage}$$

$$V_x = \text{Extinction voltage}$$

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



# GR10 A

(CV5291)

## 10-way Register Or Indicator Tube

### Mechanical Data

Mounting position

Any.

The tube is viewed through the dome of the bulb.

Alignment

Cathode No. 2 is aligned with pin No. 11 to an accuracy of  $\pm 12^\circ$ .

Weight

50 g.

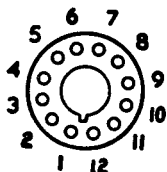
Escutcheon

N.80977.

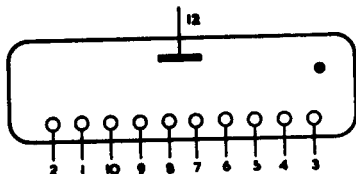
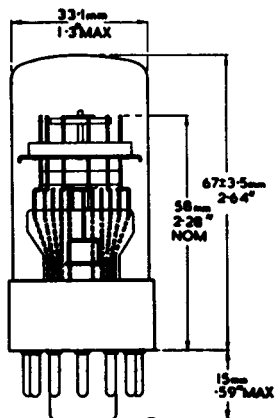
Base

Duodecal.

Base Connections  
(underside view)



| Pin | Cathode |  |
|-----|---------|--|
| 1   | 1       |  |
| 2   | 0       |  |
| 3   | 9       |  |
| 4   | 8       |  |
| 5   | 7       |  |
| 6   | 6       |  |
| 7   | 5       |  |
| 8   | 4       |  |
| 9   | 3       |  |
| 10  | 2       |  |
| 11  | —       |  |
| 12  | Anode   |  |



# **\*DIGITRON—10 Digit Side-Viewing Cold-Cathode Numerical Register Tube**

**GR10G**

## **Limit Ratings**

|                                               |       |
|-----------------------------------------------|-------|
| Maximum cathode current                       | 9 mA  |
| Minimum voltage necessary to ensure breakdown | 220 V |

## **Characteristics**

|                                                                                                       |       |
|-------------------------------------------------------------------------------------------------------|-------|
| Nominal running voltage                                                                               | 180 V |
| A cathode left floating will assume some potential between that of the anode and the glowing cathode. |       |

## **Recommended Operating Conditions**

Under the recommended D.C. operating conditions with the characters switched sequentially every 24 hours, an average life of 5,000 hours can be expected.

### **D.C. operation**

|                                          |       |
|------------------------------------------|-------|
| Anode supply voltage — $R_a = 10k\Omega$ | 250 V |
|------------------------------------------|-------|

### **A.C. operation**

(Unsmoothed half-wave rectified 50 c.p.s. A.C.)

|                                          |                  |
|------------------------------------------|------------------|
| Anode supply voltage — $R_a = 12k\Omega$ | 200-220 V r.m.s. |
| $R_a = 18k\Omega$                        | 220-250 V r.m.s. |

|                               |               |
|-------------------------------|---------------|
| Cathode 1 equalizing resistor | 8.2k $\Omega$ |
|-------------------------------|---------------|

|                               |               |
|-------------------------------|---------------|
| Cathode 7 equalizing resistor | 4.7k $\Omega$ |
|-------------------------------|---------------|

\* Registered Trade Mark



# GR10G

MAINTENANCE TYPE ONLY

## DIGITRON-10 Digit Side-Viewing Cold-Cathode Numerical Register Tube

### Mechanical Data

Mounting position

Base

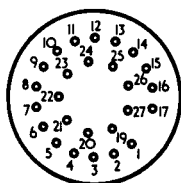
Socket

Any

B26A

B17, B26A or B27A

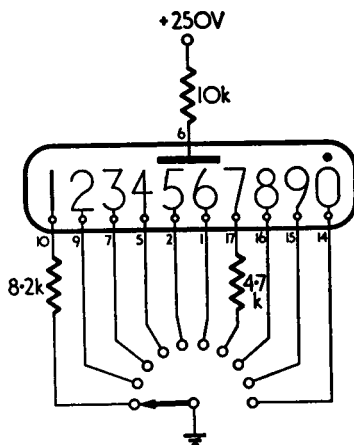
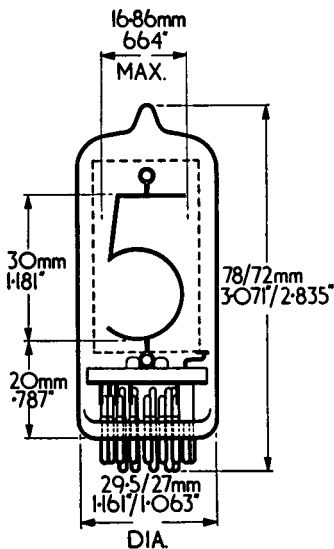
Base Connections  
(underside view)



FRONT

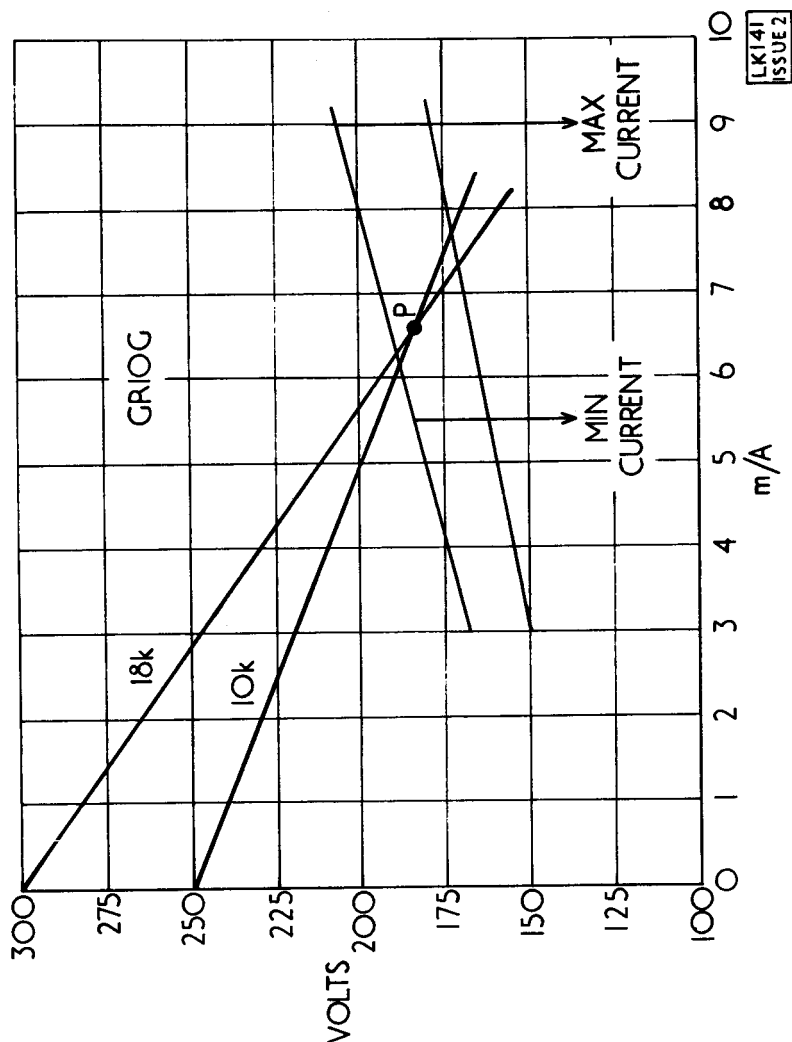
|     |    |           |
|-----|----|-----------|
| Pin | 1  | Cathode 6 |
|     | 2  | Cathode 5 |
|     | 5  | Cathode 4 |
|     | 6  | Anode     |
|     | 7  | Cathode 3 |
|     | 9  | Cathode 2 |
|     | 10 | Cathode 1 |
|     | 14 | Cathode 0 |
|     | 15 | Cathode 9 |
|     | 16 | Cathode 8 |
|     | 17 | Cathode 7 |

Note—All other pins are to be left unconnected.



**\*DIGITRON — 10 Digit Side-Viewing  
Cold-Cathode Numerical Register Tube**

**GR10G**



Operating Characteristics

\*Registered Trade Mark





# \*DIGITRON – 10 Digit End-Viewing Cold-Cathode Numerical Register Tube

GR10H

## Limit Ratings

|                                     |        |
|-------------------------------------|--------|
| Maximum cathode current             | 2.5 mA |
| Minimum voltage to ensure breakdown | 150 V  |

## Characteristics

|                                                                                                                                                                                                                                                         |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Nominal running voltage at 2 mA                                                                                                                                                                                                                         | 140 V  |
| Minimum pre-bias voltage (glowing cathode at 0 V)                                                                                                                                                                                                       | +25 V  |
| Maximum pre-bias voltage (glowing cathode at 0 V)                                                                                                                                                                                                       | +100 V |
| A cathode left floating will assume some potential between that of the anode and the glowing cathode. Pre-biasing ensures that the non-glowing electrodes are clamped at a predetermined level and cathodes are selected bringing them to the 0 V line. |        |

## Recommended Operating Conditions

Under the recommended operating conditions, with the cathodes switched sequentially every 24 hours, an average life of 4000 hours can be expected.

### D.C. operation

|                                                  |       |
|--------------------------------------------------|-------|
| Anode supply voltage— $R_a = 82 \text{ k}\Omega$ | 250 V |
| $R_a = 47 \text{ k}\Omega$                       | 200 V |

### A.C. operation

(Unsmoothed half-wave rectified 50 c.p.s. A.C.)

|                                             |                  |
|---------------------------------------------|------------------|
| Anode supply voltage— $R_a = 120 \text{ k}$ | 220-250 V r.m.s. |
| $R_a = 82 \text{ k}$                        | 200-220 V r.m.s. |

\*Registered Trade Mark



GR10H

**\*DIGITRON—10 Digit End-Viewing  
Cold-Cathode Numerical Register Tube**

**Mechanical Data**

Mounting position

Any

Base

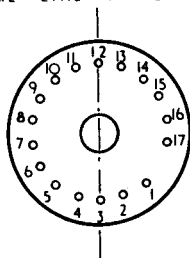
B17A

Socket

B17A

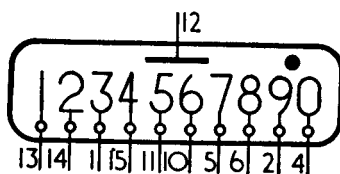
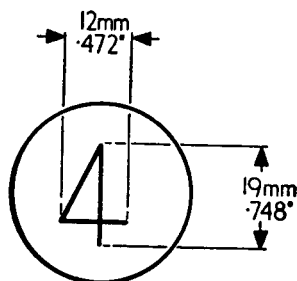
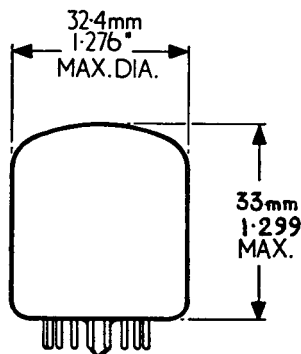
Base Connections  
(underside view)

CENTRE LINE OF CHARACTERS



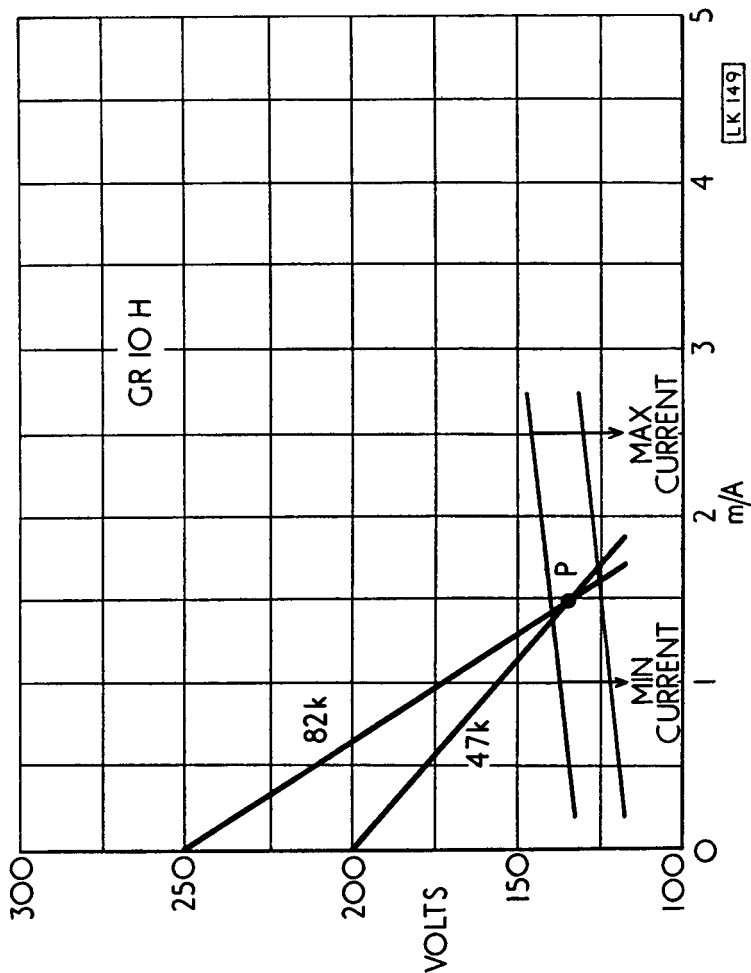
- Pin 1 Cathode 3
- 2 Cathode 9
- 4 Cathode 0
- 5 Cathode 7
- 6 Cathode 8
- 10 Cathode 6
- 11 Cathode 5
- 12 Anode
- 13 Cathode 1
- 14 Cathode 2
- 15 Cathode 4

Note: All other pins are to be left unconnected.



**\*DIGITRON – 10 Digit End-Viewing  
Cold-Cathode Numerical Register Tube**

**GR10H**



Operating Characteristics

\*Registered Trade Mark





**\*DIGITRON - Long Life 10 Digit Side-Viewing  
Cold-Cathode Numerical Register Tube**

**GR10J****Limit Ratings**

|                                               |       |
|-----------------------------------------------|-------|
| Maximum cathode current                       | 4 mA  |
| Minimum voltage necessary to ensure breakdown | 150 V |

**Characteristics**

|                                                                                                       |       |
|-------------------------------------------------------------------------------------------------------|-------|
| Nominal running voltage                                                                               | 145 V |
| A cathode left floating will assume some potential between that of the anode and the glowing cathode. |       |

**Recommended Operating Conditions**

Under the recommended d.c. operating conditions with the characters switched sequentially every 24 hours, an average life of 10,000 hours can be expected.

D.C. operation

|                                        |       |
|----------------------------------------|-------|
| Anode supply voltage $R_a = 33k\Omega$ | 250 V |
|----------------------------------------|-------|

A.C. operation

(Unsmoothed half-wave rectifier 50 c.p.s. a.c.)

|                                          |                 |
|------------------------------------------|-----------------|
| Anode supply voltage - $R_a = 39k\Omega$ | 200-220V r.m.s. |
| $R_a = 47k\Omega$                        | 220-250V r.m.s. |

**Filters**

For many applications the use of a light filter may be advantageous. 'Circular polarized' filters (Type HNCP, supplied by Polarizers (U.K.) Ltd., 28, Stamford Street, London, S.E. 1) eliminate reflected light and improve contrast. Coloured filters of glass, Perspex or Gelatine can also be used to advantage, amber or red tinted filters making Long Life Digitrons appear identical with other Digitrons.

\*Registered Trade Mark



# TENTATIVE DATA SHEET

## GR10J

### DIGITRON - Long Life 10 Digit Side-Viewing Cold-Cathode Numerical Register Tube

#### Mechanical Data

Mounting position

Any

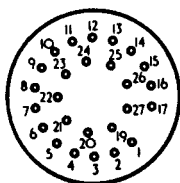
Base

B26A

Socket

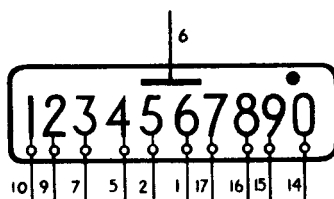
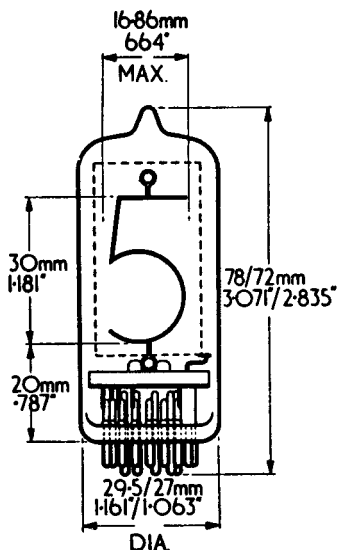
B17A, B26A or B27A

Base Connections  
(underside view)



FRONT

- Pin 1 Cathode 6
- 2 Cathode 5
- 5 Cathode 4
- 6 Anode
- 7 Cathode 3
- 9 Cathode 2
- 10 Cathode 1
- 14 Cathode 0
- 15 Cathode 9
- 16 Cathode 8
- 17 Cathode 7



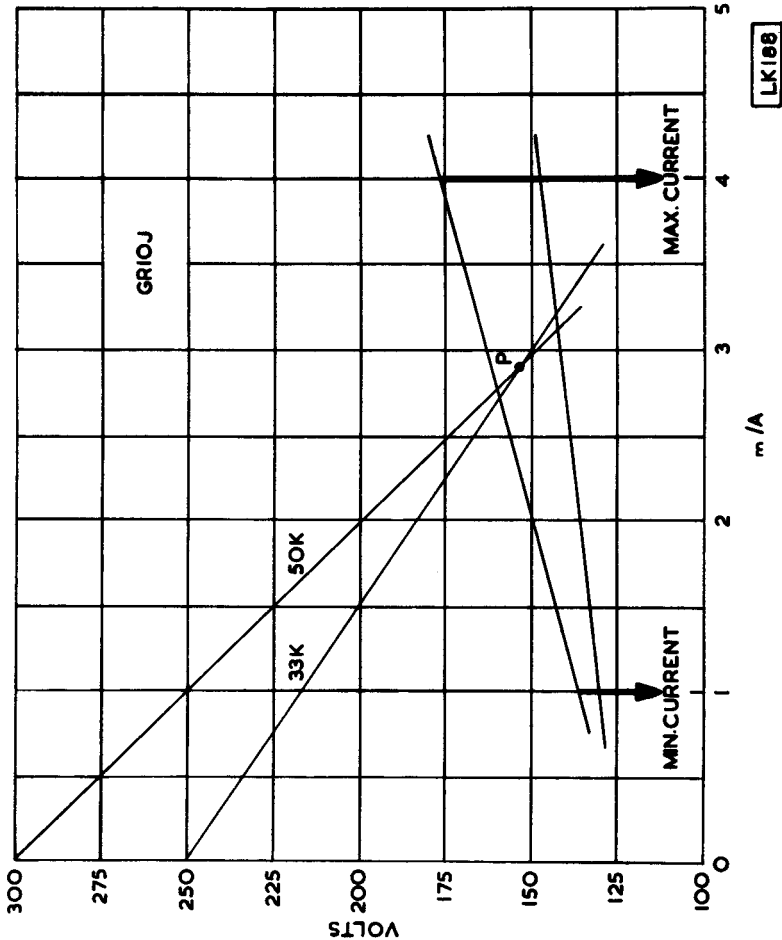
Note: All other pins are  
to be left unconnected.



# TENTATIVE DATA SHEET

**\*DIGITRON - Long Life 10 Digit Side-Viewing  
Cold-Cathode Numerical Register Tube**

**GR10J**



Operating Characteristics

\* Registered Trade Mark





**\*DIGITRON - Long Life 10 Digit End-Viewing  
Cold-Cathode Numerical Register Tube**

**GR10K  
(CV.5842)**

### Limit Ratings

|                                     |        |
|-------------------------------------|--------|
| Maximum cathode current             | 1.8 mA |
| Minimum voltage to ensure breakdown | 150 V  |

### Characteristics

|                                                                                                       |       |
|-------------------------------------------------------------------------------------------------------|-------|
| Nominal running voltage at 1.4 mA                                                                     | 140 V |
| A cathode left floating will assume some potential between that of the anode and the glowing cathode. |       |

### Recommended Operating Conditions

Under the recommended d.c. operating conditions with the cathodes switched sequentially every 24 hours, an average life of 10,000 hours can be expected.

#### D.C. operation

|                                        |       |
|----------------------------------------|-------|
| Anode supply voltage $R_a = 82k\Omega$ | 250 V |
| $R_a = 47k\Omega$                      | 200 V |

#### A.C. operation

(Unsmoothed half-wave rectified 50 c.p.s. a.c.)

|                                    |                 |
|------------------------------------|-----------------|
| Anode supply voltage - $R_a = 82k$ | 200-220V r.m.s. |
| $R_a = 120k$                       | 220-250V r.m.s. |

### Filters

For many applications the use of a light filter may be advantageous. 'Circular polarized' filters (Type HNCP, supplied by Polarizers (U.K.) Ltd., 28, Stamford Street, London, S.E. 1) eliminate reflected light and improve contrast. Coloured filters of glass, Perspex or Gelatine can also be used to advantage, amber or red tinted filters making Long Life Digitrons appear identical with other Digitrons.

\*Registered Trade Mark



**GR10K**  
(CV.5842)

**DIGITRON - Long Life 10 Digit End-Viewing  
Cold-Cathode Numerical Register Tube**

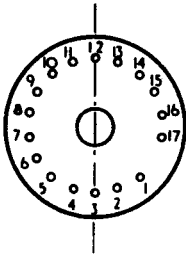
**Mechanical Data**

Mounting position  
Base  
Socket

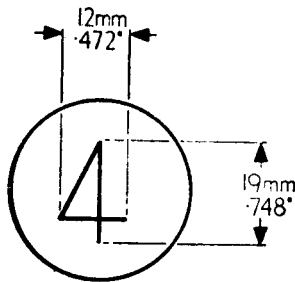
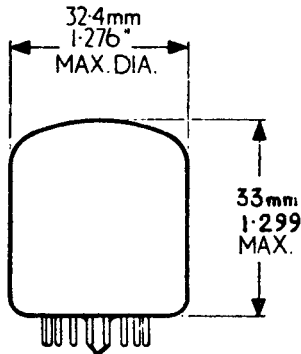
Any  
B17A  
B17A

Base Connections  
(underside view)

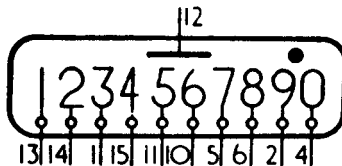
CENTRE LINE OF CHARACTERS



Pin 1 Cathode 3  
2 Cathode 9  
4 Cathode 0  
5 Cathode 7  
6 Cathode 8  
10 Cathode 6  
11 Cathode 5  
12 Anode  
13 Cathode 1  
14 Cathode 2  
15 Cathode 4



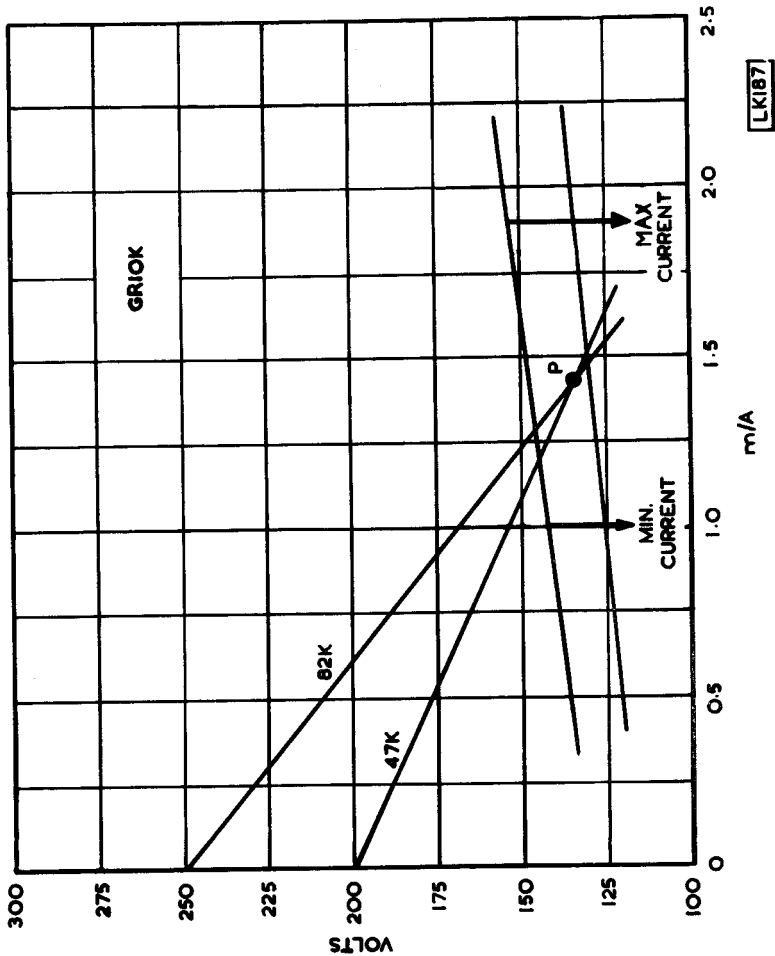
Note: All other pins are  
to be left unconnected.



# TENTATIVE DATA SHEET

\*DIGITRON - Long Life 10 Digit End-Viewing  
Cold-Cathode Numerical Register Tube

**GR10K**  
(CV. 5842)



Operating Characteristics

\*Registered Trade Mark





# **\*DIGITRON—Long Life 10 Digit End-Viewing Cold Cathode Numerical Register Tube**

# **GR10M**

## **Characteristics and Recommended Operating Conditions** (at room temperature unless otherwise stated)

|                                                                   |                |
|-------------------------------------------------------------------|----------------|
| Minimum anode to cathode voltage to ensure breakdown (see Note 1) | 170 V          |
| Nominal running voltage at 2 mA                                   | 140 V          |
| D.C. Operation—                                                   |                |
| Recommended Cathode Current                                       | 2 mA           |
| Minimum positive bias on non-conducting cathodes (See Note 2)     | 60 V           |
| Half wave A.C. supply                                             |                |
| Recommended Cathode Current, average                              | 1.5 mA         |
| peak                                                              | 7 mA           |
| Minimum positive bias on non-conducting cathodes (See Note 2)     | 40 V           |
| Life expectancy (2 mA cathode current) (See Note 3)               |                |
| Continuous ionisation of one cathode                              | > 5,000 hours  |
| Sequentially switching cathodes every 100 hours or less           | > 30,000 hours |

## **Absolute Maximum Ratings**

### **Cathode current (each digit)—**

|                                          |        |
|------------------------------------------|--------|
| Maximum average (averaging time = 20 mS) | 2.5 mA |
| Maximum peak                             | 10 mA  |
| Minimum for D.C. operation               | 1.0 mA |

### **Bulb temperature—**

|                      |        |
|----------------------|--------|
| Maximum              | + 70°C |
| Minimum (See Note 3) | — 50°C |

### **Notes—**

- (1) At temperatures below 0°C anode supply should be at least 200 V.
- (2) Under limit conditions some deterioration of the glow appearance may occur during life. To minimise this, the voltage between the conducting and non-conducting cathodes should be as high as possible.
- (3) At —50°C the life expectancy of the tube is reduced.

\* Registered Trade Mark



# \*DIGITRON—Long Life 10 Digit End-Viewing Cold Cathode Numerical Register Tube

# GR10M

## Mechanical Data

Mounting position

Base

Socket

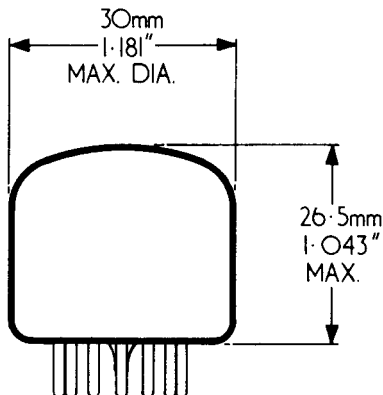
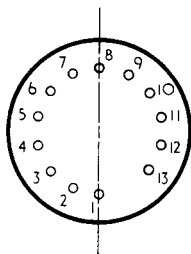
Any

B13B

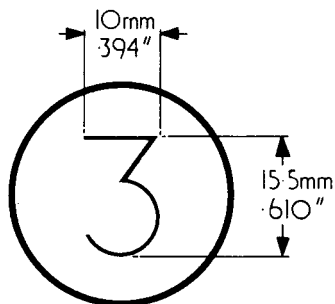
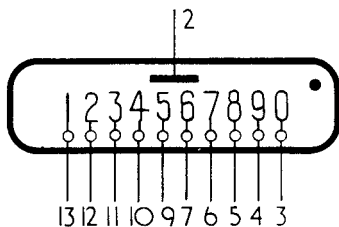
B13B

Base Connections  
(underside view)

CENTRE LINE OF CHARACTERS

The dome of the tube  
is filter coated

- Pin 2 Anode  
3 Cathode 0  
4 Cathode 9  
5 Cathode 8  
6 Cathode 7  
7 Cathode 6  
9 Cathode 5  
10 Cathode 4  
11 Cathode 3  
12 Cathode 2  
13 Cathode 1

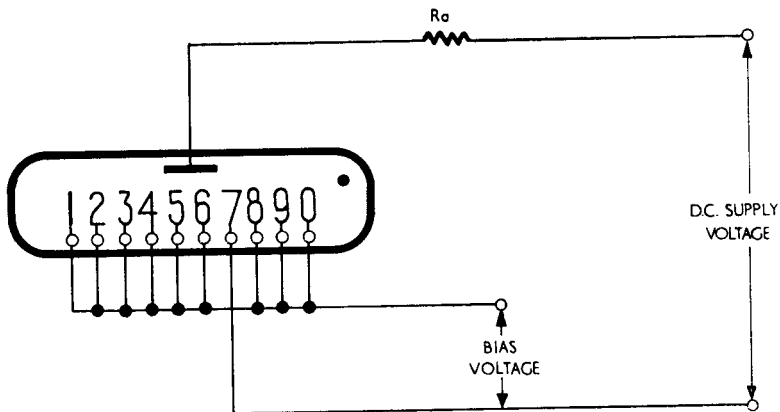
Note—All other pins are  
to be left unconnected

\* Registered Trade Mark

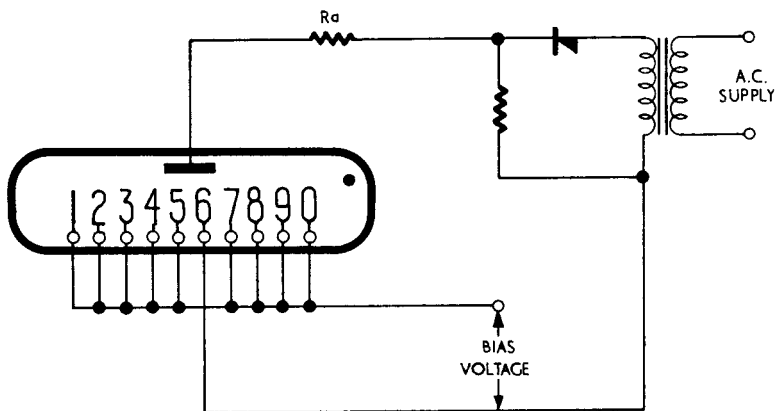


**\*DIGITRON—Long Life 10 Digit End-Viewing  
Cold-Cathode Numerical Register Tube**

**GR10M**



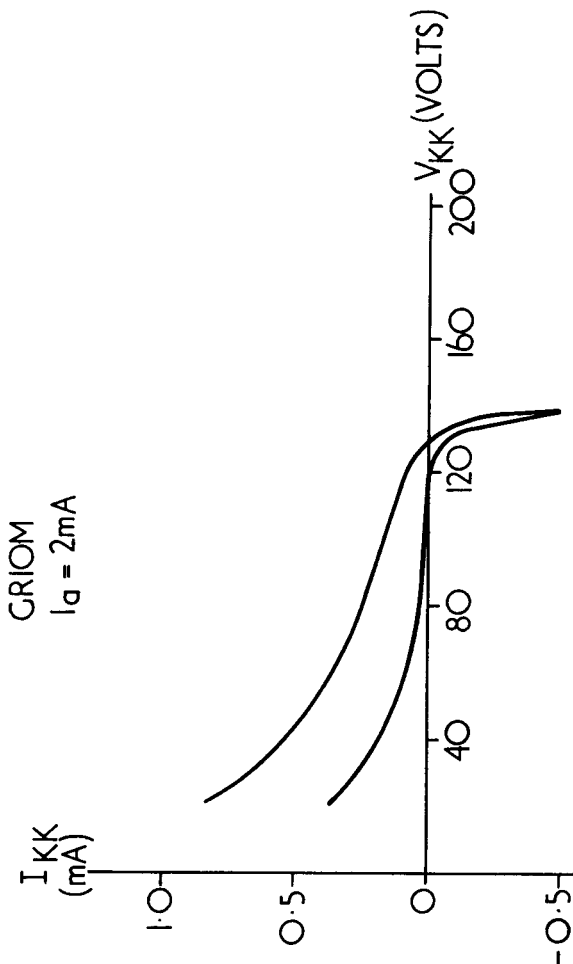
**Typical Circuit for D.C. Operation**



**Typical Circuit for A.C. Operation**

\*Registered Trade Mark



**GR10M****\*DIGITRON—Long Life 10 Digit End-Viewing  
Cold-Cathode Numerical Register Tube**

Sum of the Total Probe Current to all Non-Illuminating Cathodes  
Plotted against Cathode Bias Voltage.

\*Registered Trade Mark



# **\*DIGITRON—10 Digit Side-Viewing Miniature Cold-Cathode Numerical Register Tube, with flying leads**

**GR10W**

## **Limit Ratings**

|                                               |       |
|-----------------------------------------------|-------|
| Maximum cathode current                       | 4 mA  |
| Minimum voltage necessary to ensure breakdown | 220 V |

## **Characteristics**

|                                                                                                       |       |
|-------------------------------------------------------------------------------------------------------|-------|
| Nominal running voltage                                                                               | 160 V |
| A cathode left floating will assume some potential between that of the anode and the glowing cathode. |       |

## **Recommended Operating Conditions**

Under the recommended D.C. operating conditions with the characters switched sequentially every 24 hours, an average life of ~~3,000~~ <sup>2,000</sup> hours can be expected.

### **D.C. operation**

|                                          |       |
|------------------------------------------|-------|
| Anode supply voltage — $R_a = 18k\Omega$ | 220 V |
|------------------------------------------|-------|

### **A.C. operation**

(Unsmoothed half-wave rectified 50 c.p.s. A.C.)

|                                          |                  |
|------------------------------------------|------------------|
| Anode supply voltage — $R_a = 27k\Omega$ | 200-220 V r.m.s. |
| $R_a = 47k\Omega$                        | 220-250 V r.m.s. |

\* Registered Trade Mark



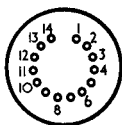
# GR10 W DIGITRON—10 Digit Side-Viewing Miniature Cold-Cathode Numerical Register Tube, with flying leads

## Mechanical Data

Mounting position  
Base

Any  
Flying lead

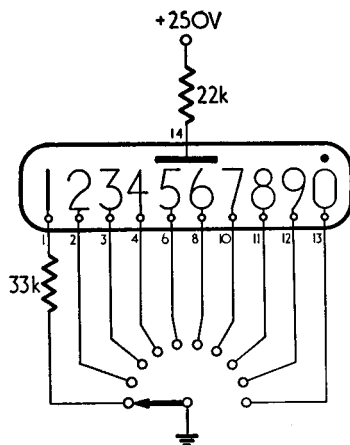
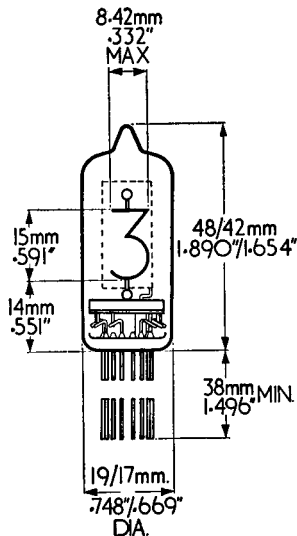
Base Connections  
(underside view)



FRONT

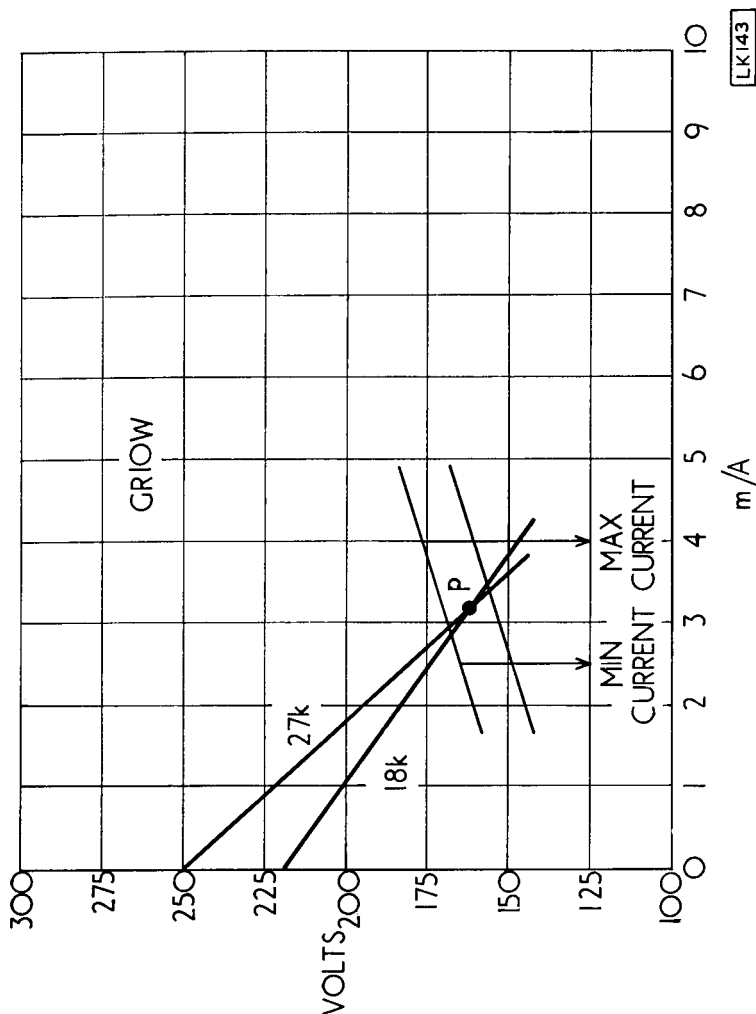
|      |    |           |
|------|----|-----------|
| Lead | 1  | Cathode 1 |
|      | 2  | Cathode 2 |
|      | 3  | Cathode 3 |
|      | 4  | Cathode 4 |
|      | 5  | Omitted   |
|      | 6  | Cathode 5 |
|      | 7  | Omitted   |
| Lead | 8  | Cathode 6 |
|      | 9  | Omitted   |
|      | 10 | Cathode 7 |
|      | 11 | Cathode 8 |
|      | 12 | Cathode 9 |
|      | 13 | Cathode 0 |
|      | 14 | Anode     |

N.B.—To prevent damage to the tube, the leads should not be soldered or bent nearer than 5 mm ( $\frac{1}{4}$ " ) from the glass seal.



**\*DIGITRON—10 Digit Side-Viewing  
Miniature Cold-Cathode Numerical  
Register Tube, with flying leads**

**GR10W**



Operating Characteristics

\*Registered Trade Mark





~~CONFIDENTIAL DATA SHEET~~  
**MAINTENANCE TYPE ONLY**

**\* DIGITRONS - 12 Character Side-Viewing  
Cold-Cathode Letter Tubes**

**GR 12 G**  
**GR 12 H**

GR12G Tube contains the letters A to L inclusive

GR12H Tube contains the letters L to X excluding P and Q  
but additionally including E.

**Limit Ratings**

Maximum cathode current:-

|                   |        |
|-------------------|--------|
| Letter I          | 5 mA   |
| Letters L and T   | 5.5 mA |
| Letters J and F   | 7.5 mA |
| Remaining letters | 9.0 mA |

Minimum voltage necessary to ensure breakdown 220V

**Characteristics**

Nominal running voltage:-

|                             |      |
|-----------------------------|------|
| Letter I at 4.5 mA          | 170V |
| Letters L and T at 5.0 mA   | 175V |
| Letters J and F at 6.25 mA  | 185V |
| Remaining letters at 7.5 mA | 175V |

A cathode left floating will assume some potential  
between that of the anode and the glowing cathode.

It should be noted that non-glowing cathodes must not  
be returned to a bias rail, but should be left  
disconnected.

**Recommended Operating Conditions**

D.C. operation

Anode Supply Voltage -  $R_a = 10k\Omega$  250V

A.C. operation

(Unsmoothed half-wave rectified 50 c.p.s. A.C.)

|                                          |                   |
|------------------------------------------|-------------------|
| Anode Supply Voltage - $R_a = 12k\Omega$ | 200-220V r. m. s. |
| $R_a = 18k\Omega$                        | 220-250V r. m. s. |

Cathode equalizing resistors ( $V_a = 250V$  only).

|                 |               |
|-----------------|---------------|
| Letter I        | 8.2k $\Omega$ |
| Letters L and T | 4.7k $\Omega$ |



**TEMPERATURE DATA SHEET**  
**MAINTENANCE TYPE ONLY**

**GR 12 G**  
**GR 12 H**

**DIGITRONS -12 Character Side-Viewing**  
**Cold-Cathode Letter Tubes**

**Mechanical Data**

Mounting Position

Base

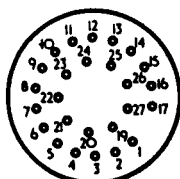
Socket

Any

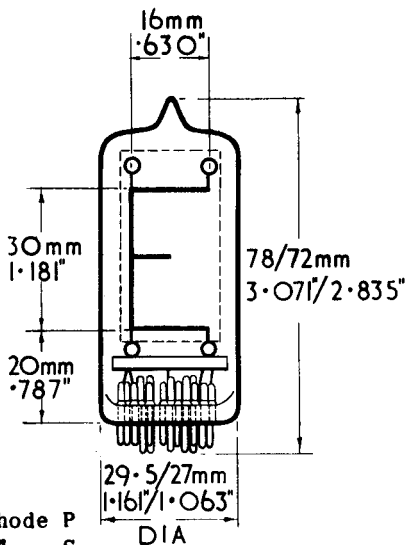
B26A

B17, B26A or B27A

Base Connections  
 (Underside view)



↑  
**FRONT**

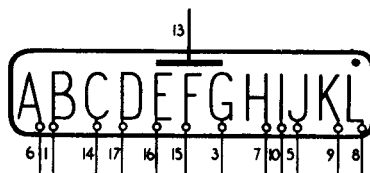


**G12G**

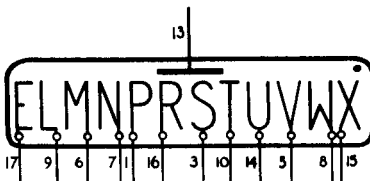
**GR12H**

| Pin | 1       | Cathode | B |
|-----|---------|---------|---|
| 3   | "       | G       |   |
| 5   | "       | J       |   |
| 6   | "       | A       |   |
| 7   | "       | H       |   |
| 8   | "       | L       |   |
| 9   | "       | K       |   |
| 10  | "       | I       |   |
| 13  | Anode   |         |   |
| 14  | Cathode | C       |   |
| 15  | "       | F       |   |
| 16  | "       | E       |   |
| 17  | "       | D       |   |

| Pin | 1       | Cathode | P |
|-----|---------|---------|---|
| 3   | "       | S       |   |
| 5   | "       | V       |   |
| 6   | "       | M       |   |
| 7   | "       | N       |   |
| 8   | "       | W       |   |
| 9   | "       | L       |   |
| 10  | "       | T       |   |
| 13  | Anode   |         |   |
| 14  | Cathode | U       |   |
| 15  | "       | X       |   |
| 16  | "       | R       |   |
| 17  | "       | E       |   |



**GR 12 G**



**GR 12 H**

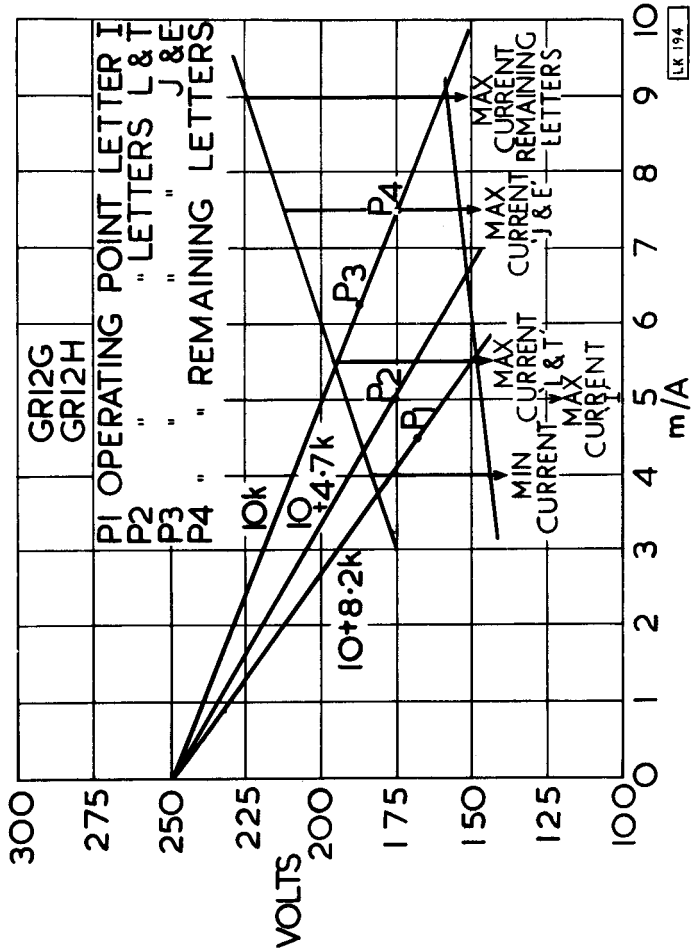
**Note: Pins 2, 4, 11 and 12 must be left unconnected.**



**MAINTENANCE TYPE ONLY**

\* DIGITRONS -12 Character Side-Viewing  
Cold-Cathode Letter Tubes

**GR 12 G**  
**GR 12 H**



Operating Characteristics

\* Registered Trade Mark





---

**Limit Ratings**

|                                                                                   |                |
|-----------------------------------------------------------------------------------|----------------|
| Maximum counting rate : sine wave and rectangular pulses                          | 4,000 p.p.s.   |
| Maximum total anode current                                                       | 550 $\mu$ A    |
| Minimum total anode current                                                       | 250 $\mu$ A    |
| Minimum anode supply voltage<br>(normal room illumination)                        | 400 V          |
| Maximum potential difference between cathodes<br>and guides                       | 140 V          |
| Maximum output cathode load                                                       | 150 k $\Omega$ |
| Maximum output available at 4 kc/s with a 150 k $\Omega$<br>cathode load resistor | 35 V           |

**Characteristics**

|                                |               |
|--------------------------------|---------------|
| Running voltage at 325 $\mu$ A | 192 V approx. |
|--------------------------------|---------------|

**Recommended Operating Conditions**

|                                  |                       |
|----------------------------------|-----------------------|
| *Anode current                   | 325 $\mu$ A $\pm$ 20% |
| **Guide bias                     | +36 V                 |
| Forced resetting pulse           | —120 V                |
| Double pulse drive-amplitude     | —80 V $\pm$ 10 V      |
| Double pulse drive-durations     | 60 $\mu$ S            |
| Integrated pulse drive-amplitude | —145 V $\pm$ 15 V     |
| Integrated pulse drive-duration  | 80 $\mu$ S            |
| 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 k $\Omega$  resistor.

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



**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  $\pm 12^\circ$ .

Weight

53 g. (nominal).

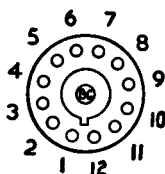
Escutcheon

N.80977

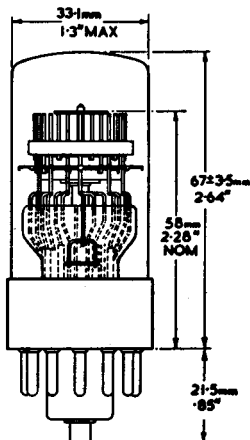
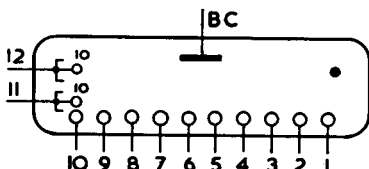
Base

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 10-way Selector Tube

# GS10D

## Limit Ratings

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

## Characteristics

|                                |               |
|--------------------------------|---------------|
| Running voltage at 800 $\mu$ A | 208 V approx. |
|--------------------------------|---------------|

## Recommended Operating Conditions

|                                                            |                      |   |
|------------------------------------------------------------|----------------------|---|
| *Anode current                                             | 800 $\mu$ A          |   |
| **Guide bias                                               | +50 $\pm$ 5 V        |   |
| Cathode load resistors                                     | 47 k $\Omega$ max.   | ← |
| Forced resetting pulse                                     | —140 V               |   |
| ***Double pulse drive—amplitude                            | —120 V $\pm$ 10 V    |   |
| Double pulse drive—duration                                | 30 $\mu$ S $\pm$ 20% |   |
| Double pulse drive—pulse overlap at<br>the 90% pulse level | 10 $\pm$ 5 $\mu$ S   | ← |
| ****Integrated pulse drive—amplitude                       | —145 V $\pm$ 15 V    |   |
| Integrated pulse drive—duration                            | 33 $\mu$ S $\pm$ 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 k $\Omega$   $\pm$  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  $\frac{1}{4}$ " (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/ $\mu$ S 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/ $\mu$ S and a droop of less than 5 V. See circuit LK.101, Issue 2.

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



# GS10D

## 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 1 is aligned with pin No. 11 to an accuracy of  $\pm 12^\circ$ .

Weight

53 g (nominal)

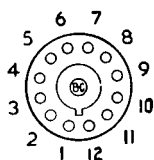
Base

Duodecal with bottom cap.

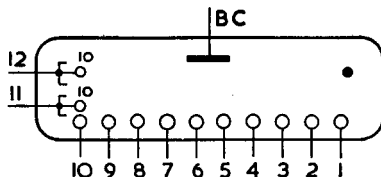
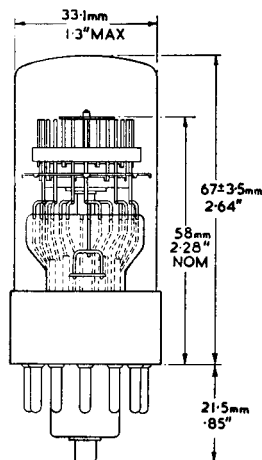
Escutcheon

N80977.

Base Connections  
(underside view)

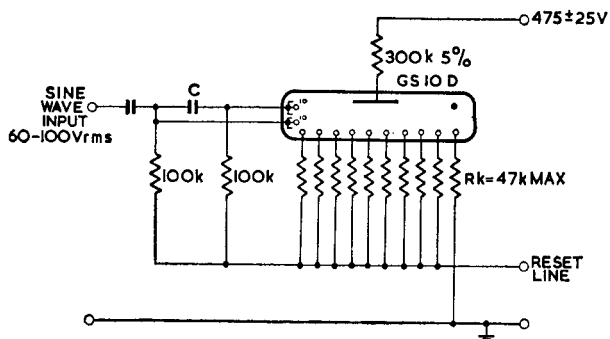


|       |            |
|-------|------------|
| Pin 1 | Cathode 0  |
| 2     | " 9        |
| 3     | " 8        |
| 4     | " 7        |
| 5     | " 6        |
| 6     | " 5        |
| 7     | " 4        |
| 8     | " 3        |
| 9     | " 2        |
| 10    | " 1        |
| 11    | 2nd Guides |
|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



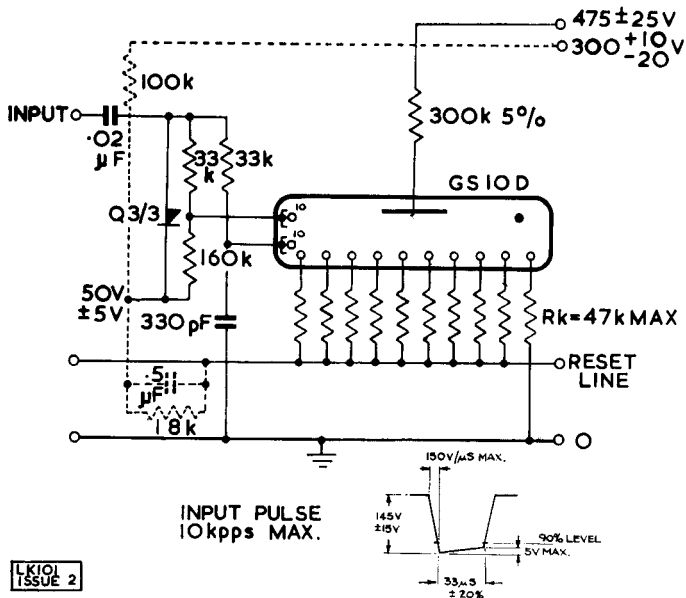
# Bi-directional 10-way Selector Tube

# GS10 D



| FREQUENCY | 20   | 15   | 10   | 5    | 2     | 1     | 500  | 200  | 100  | 50  |
|-----------|------|------|------|------|-------|-------|------|------|------|-----|
|           | kc/s | kc/s | kc/s | kc/s | kc/s  | kc/s  | c/s  | c/s  | c/s  | c/s |
| C         | 270  | 330  | 470  | 680  | 0.002 | 0.005 | 0.01 | 0.02 | 0.05 | 0.1 |
|           | pF   | pF   | pF   | pF   | μF    | μF    | μF   | μF   | μF   | μF  |

## Continuous Sine-Wave Drive



## Integrated-Pulse Drive



# Bi-directional 10-way Selector Dekatron with Routing Guides

# GS10H

Although the seated height of this tube is less than  $1\frac{1}{2}$ ", the electrical characteristics are similar to the Dekatrons with phenolic bases.

## Limit Ratings

|                                                                     |             |
|---------------------------------------------------------------------|-------------|
| Maximum counting rate                                               | 5000 p.p.s. |
| Maximum anode current                                               | 370 $\mu$ A |
| Minimum anode current                                               | 250 $\mu$ A |
| Minimum supply voltage<br>(normal room illumination)                | 380 V       |
| Maximum potential difference between electrodes<br>other than anode | 140 V       |
| Maximum cathode output voltage                                      | 28 V        |

## Characteristics

|                                |               |
|--------------------------------|---------------|
| Running voltage at 310 $\mu$ A | 187 V nominal |
|--------------------------------|---------------|

## Recommended Operating Conditions for a maximum counting rate of 4000 p.p.s.\*

|                                        |                                   |
|----------------------------------------|-----------------------------------|
| **Cathode resistors                    | 82 K $\Omega$                     |
| ***Anode resistor                      | 820 K $\Omega$                    |
| Supply voltage, with 1% anode resistor | 475 V $\pm$ 10%                   |
| with 5% anode resistor                 | 475 V $\pm$ 5%                    |
| Guide Bias                             | + 35 V                            |
| Forced resetting pulse                 | — 120 V                           |
| Double Pulse Circuit, Fig. 2           |                                   |
| Pulse amplitudes                       | — 70 $\pm$ 7 V                    |
| Pulse durations                        | 80 $\pm$ 5 $\mu$ S                |
| Integrated Pulse Circuit, Fig. 1       |                                   |
| Input pulse amplitude                  | — 145 $\pm$ 15 V                  |
| Input pulse duration                   | 75 $\mu$ S min.<br>1/3f secs max. |
| Continuous Sine Wave Circuit, Fig. 3   |                                   |
| Amplitude                              | 55 $\pm$ 15 V r.m.s.              |

\* The manufacturers will design circuits to suit individual cases where the counting rate exceeds 4 kps.

\*\* Each cathode must have a return path to the negative rail via 82 K $\Omega$ , even though an output pulse is not required.

\*\*\* To reduce the effect of stray capacity to a minimum, it is essential that the anode resistor be wired not more than  $\frac{1}{4}$ " (5 mm) from the anode tag on the valve holder.



# 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  $\pm 3^\circ$ .

Base

B17A

Escutcheon

N79368

Valveholder, printed circuit

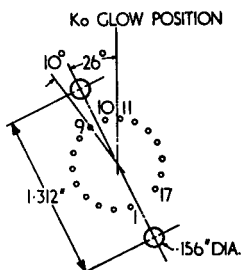
E.T.L. code HFD 13534

Valveholders, tags

A.E.I. type VH26/1703

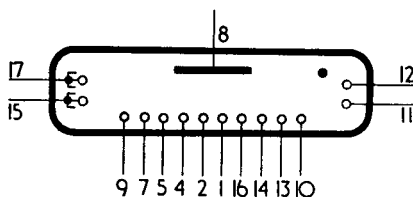
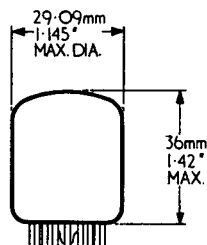
E.T.L. code HFD 13045

Valveholder connections and fixing (under-chassis view).



Valveholder requires 1.0" dia. hole in chassis.

- Pin 1 Cathode 6  
 2 Cathode 5  
 3 Do not connect  
 4 Cathode 4  
 5 Cathode 3  
 6 Do not connect  
 7 Cathode 2  
 8 Anode  
 9 Cathode 1



- Pin 10 Cathode 0  
 11 Routing Guide 2  
 12 Routing Guide 1  
 13 Cathode 9  
 14 Cathode 8  
 15 Commoned Guide 2  
 16 Cathode 7  
 17 Commoned Guide 1

**Bi-directional 10-way Selector  
Dekatron with Routing Guides**

**GS10H**

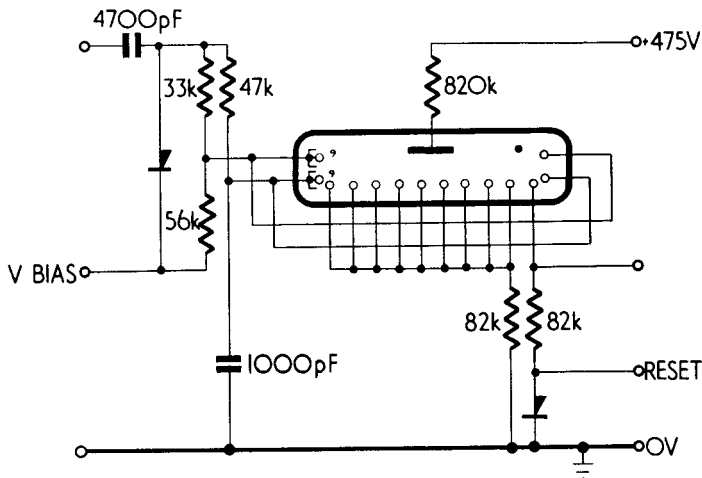


**Fig. 1 Integrated Pulse Drive**

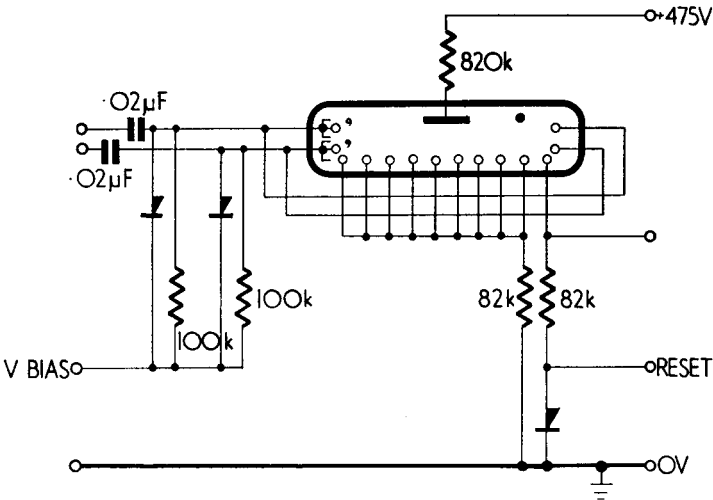
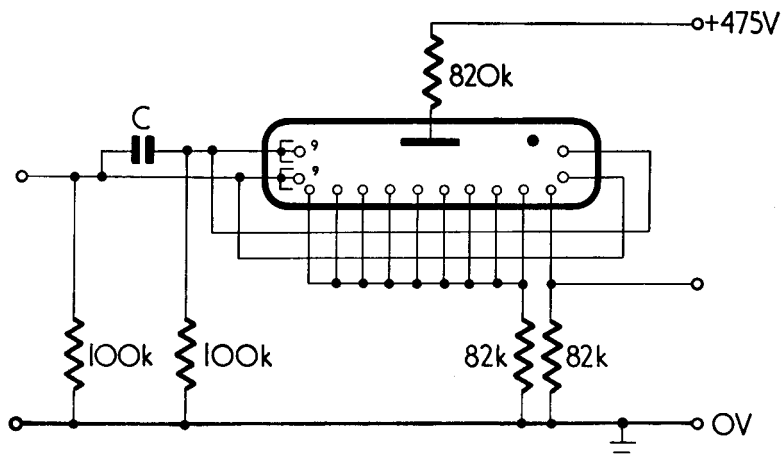


**Fig. 2 Double Pulse Drive**



## 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 0A202 or equivalent.

Components and Voltages 10% tol. unless specified in data.

**Limit Ratings**

|                                                                           |                |
|---------------------------------------------------------------------------|----------------|
| Maximum counting rate: sine wave and rectangular pulses                   | 4,000 p.p.s.   |
| Maximum total anode current                                               | 350 $\mu$ A    |
| Minimum total anode current                                               | 190 $\mu$ A    |
| Minimum anode supply voltage<br>(normal room illumination)                | 400 V          |
| Maximum potential difference between cathodes<br>and guides               | 140 V          |
| Maximum output cathode load                                               | 270 k $\Omega$ |
| Maximum output available across a 270 k $\Omega$ cathode<br>load resistor | 35 V           |

**Characteristics**

|                                |       |
|--------------------------------|-------|
| Running voltage at 270 $\mu$ A | 191 V |
|--------------------------------|-------|

**Recommended Operating Conditions**

|                                  |                       |
|----------------------------------|-----------------------|
| *Anode current                   | 270 $\mu$ A $\pm$ 20% |
| **Guide bias                     | +36 V                 |
| Forced resetting pulse           | —120 V                |
| Double pulse drive-amplitude     | —80 V $\pm$ 10 V      |
| Double pulse drive-durations     | 60 $\mu$ S            |
| Integrated pulse drive-amplitude | —145 V $\pm$ 15 V     |
| Integrated pulse drive-duration  | 80 $\mu$ S            |
| Sine wave drive-amplitude        | 40—70 V r.m.s.        |

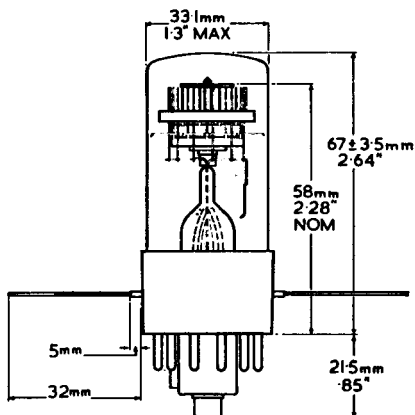
**Mechanical Data**

|                   |                                                                                |
|-------------------|--------------------------------------------------------------------------------|
| Mounting position | Any.<br>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 $\pm$ 10°.          |
| Weight            | 50 g (nominal).                                                                |
| Escutcheon        | N.84538.                                                                       |
| Base              | Duodecal with bottom cap and two flying leads.                                 |

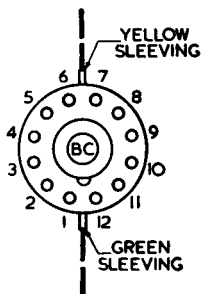
\* The required anode current may be obtained from a 475 V supply via a 910 k $\Omega$  resistor.

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

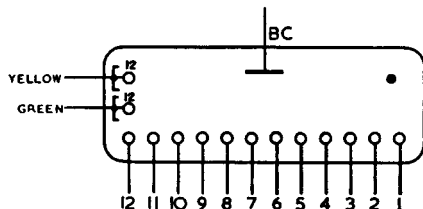




Base Connections  
(underside view)



| 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

## Primed Sub-Miniature Trigger Tube

GTE120Y

## Limit Ratings

|                                                                                       |         |
|---------------------------------------------------------------------------------------|---------|
| Maximum anode voltage to prevent self ignition in all tubes                           | + 275 V |
| Minimum trigger voltage necessary to cause trigger breakdown in all tubes             | + 122 V |
| Maximum trigger voltage at which trigger breakdown will not occur in any tube         | + 114 V |
| Minimum primer supply voltage (light or dark, either positive or negative to cathode) | 220 V   |
| Preferred continuous cathode current                                                  | 1—5 mA  |

A current of 0.5—1mA may be used if a rise of up to 10% in trigger striking voltage in 1,000 hours of conduction can be accommodated.

Pulse currents greater than 5mA are permitted. The manufacturers will be pleased to advise on specific cases.

## Characteristics

|                              |                   |
|------------------------------|-------------------|
| Anode running voltage at 2mA | 103—110 V         |
| Trigger running voltage      | 95 V nominal      |
| Primer current               | 8 $\mu$ A nominal |

Primer connected to 250V via 10M $\Omega$ . The resistor must be wired directly to the lead, keeping stray capacitance to a minimum.

|                                                                          |                      |
|--------------------------------------------------------------------------|----------------------|
| Typical trigger current at a voltage just less than the striking voltage | $2 \times 10^{-8}$ A |
|--------------------------------------------------------------------------|----------------------|

Minimum anode voltage to take-over the trigger discharge:—

|                                                    |       |
|----------------------------------------------------|-------|
| (a) $I_t = 30\mu\text{A}$                          | 200 V |
| (b) $C_t = 470\text{pF}$ , $R_t = 1\text{M}\Omega$ | 150 V |

Ionization time, trigger pulsed to 5 V more positive than its striking voltage:—

|                            |             |
|----------------------------|-------------|
| (a) with primer conducting | 100 $\mu$ S |
| (b) primer not connected   | 5mS         |

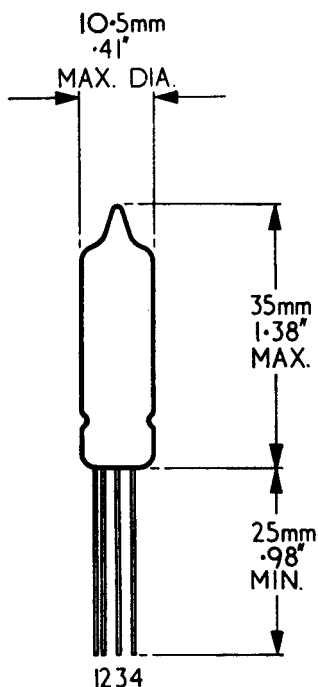
For short pulses, or slowly changing trigger voltage such as occurs in R.C. timers, the primer must be connected. For d.c. switching applications the primer is not required.



**GTE120Y****Primed Sub-Miniature Trigger Tube****Mechanical Data**

Base                      4 flying leads of 0.4 mm (.0157") dia. tinned  
copper wire.

The spacing between primer and cathode leads is much less than the other two spacings.



1. Primer
2. Cathode
3. Anode
4. Trigger



# Primed Trigger Tube

Close Tolerance Tube with stable characteristics  
intended for quadrant I operation

**GTE130T**  
(CV.2434)

## Limit Ratings

|                                                                                                |             |
|------------------------------------------------------------------------------------------------|-------------|
| Maximum anode voltage to prevent self ignition in all tubes                                    | +290 V      |
| Maximum trigger to cathode voltage at which breakdown will not occur in any tube $V_a = 280$ V | $\pm 128$ V |
| Minimum trigger voltage necessary to cause breakdown in all tubes $V_a = 280$ V                | +137 V      |
| Maximum increase in trigger striking volts when anode voltage is changed from 290 V to 170 V   | 1.0%        |
| Maximum peak positive trigger current (Note 1)                                                 | 8.0 mA      |
| Maximum cathode current      d.c.                                                              | 25 mA       |
| Peak                                                                                           | 100 mA ←    |
| Minimum auxiliary anode supply voltage                                                         | 150 V       |

## Characteristics

|                                          |              |
|------------------------------------------|--------------|
| Anode to cathode running volts (Note 2)  | 105 V nom.   |
| De-ionization time    1k (pk)    0—20 mA | 3.5 mS nom.  |
| 20—100 mA                                | ←            |
| (Note 3)                                 | 12 mS nom. ← |
| Ionization time $V_T = V_{TS} + 0.5$ V   | 2 mS nom.    |
| $V_T = V_{TS} + 4.0$ V                   | 0.1 mS nom.  |

### Trigger transfer characteristics

#### Current triggering

Trigger Current necessary for anode takeover,  
with no trigger capacitor ( $V_a = 240$  V)      25  $\mu$ A

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



**Characteristics (cont.)**

Capacitive triggering (High impedance source)  
Minimum trigger capacitor to ensure anode take-over (Note 4)

|                       |           |
|-----------------------|-----------|
| $V_a = 170 \text{ V}$ | 2,700 pf. |
| $V_a = 200 \text{ V}$ | 1,000 pf. |
| $V_a = 240 \text{ V}$ | 500 pf.   |

**Recommended Operating Conditions**

|                                          |               |
|------------------------------------------|---------------|
| Anode supply voltage                     | 170—290 V     |
| Auxiliary anode series resistor (Note 5) | 10 M $\Omega$ |

**Notes**

1. During anode conduction the trigger is held by the discharge at 90 V above the cathode potential and if the trigger input voltage is raised or lowered about this potential, trigger current will flow. In the condition where the voltage is below 90 V current flows in a reverse direction and the trigger acts as a cathode. This condition is harmful to the tube and in applications such as those where the anode and trigger are extinguished by relay contacts it is desirable to extinguish the main anode discharge before the trigger discharge. If the trigger supply voltage rises above 90 V the tube will not be affected, providing the resultant forward current is limited to the value stated.
2. Oscillations of up to 10 V pk to pk superimposed on the running voltage.
3. In self extinguishing circuits the deionization time is much shorter.
4. To limit the positive peak current a resistor of 2.2 k $\Omega$  is required for trigger capacitors between 4,700 and 15,000 pf., and a resistor of 5.6 k $\Omega$  for trigger capacitors of over 15,000 pf.
5. It is recommended that the auxiliary anode resistor is soldered direct to pin 6. Stray capacitance between the auxiliary anode and the cathode must be kept to a minimum.



# Primed Trigger Tube

Close Tolerance Tube with stable characteristics  
intended for quadrant I operation

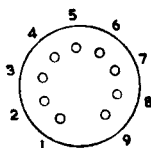
**GTE130T**  
(CV.2434)

## Mechanical Data

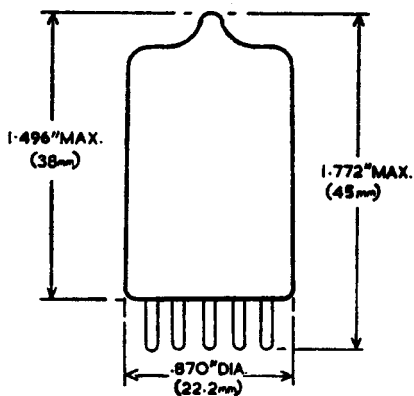
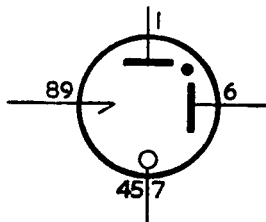
Mounting position  
Base

Any  
B9A

Base connections  
(underside view)



- |       |                 |
|-------|-----------------|
| Pin 1 | Main anode      |
| 2     | Do not connect  |
| 3     | Do not connect  |
| 4     | Cathode         |
| 5     | Cathode         |
| 6     | Auxiliary anode |
| 7     | Cathode         |
| 8     | Trigger         |
| 9     | Trigger         |





# Trigger Tetrode

**GTE175M**

Designed for Dekatron coupling circuits  
and as a general purpose trigger tube

## Limit Ratings

|                                                                                                                                                      |                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Maximum anode voltage to prevent self ignition in all tubes (trigger voltage + 173 V)                                                                | +310 V               |
| Minimum trigger voltage necessary to cause trigger breakdown in all tubes (anode voltage 300 V)                                                      | +183 V               |
| Maximum trigger voltage at which trigger breakdown will not occur in any tube (anode voltage 300 V)                                                  | +173 V               |
| During the first 3,000 hours of operating life the trigger breakdown voltage will not drift outside the limit ratings specified above.               |                      |
| Maximum trigger to anode voltage                                                                                                                     | +200 V               |
| Minimum trigger to cathode current necessary to cause transfer in all tubes (anode voltage 300 V)                                                    | 100 $\mu$ A          |
| Minimum trigger to cathode current necessary to cause transfer in all tubes, with 100 pF capacitor between cathode and trigger (anode voltage 300 V) | 8 $\mu$ A            |
| Maximum cathode current                                                                                                                              |                      |
| Peak—maximum duration 20 $\mu$ S                                                                                                                     | 50 mA ←              |
| —maximum duration 50 mS in 10 S                                                                                                                      | 6 mA ←               |
| D.C.                                                                                                                                                 | 3.5 mA ←             |
| Maximum speed of operation, determined by circuit conditions                                                                                         | Approx. 1,000 c.p.s. |

## Characteristics

|                                                                                            |                  |
|--------------------------------------------------------------------------------------------|------------------|
| Anode running voltage at 2.5 mA                                                            | 150 $\pm$ 5 V    |
| Trigger running voltage                                                                    | 135 V nom.       |
| Auxiliary cathode current (Aux. cathode returned to a minimum of —95 V via 10 M $\Omega$ ) | 25 $\mu$ A nom.  |
| De-ionization time                                                                         | 600 $\mu$ S max. |
| Minimum current at which all tubes will remain conducting (Ra 470 k $\Omega$ )             | 200 $\mu$ A      |

## Recommended Operating Conditions

|                                                                   |              |
|-------------------------------------------------------------------|--------------|
| Anode supply voltage                                              | 280—310 V    |
| Anode to cathode current                                          | 2.5 mA       |
| Trigger bias with respect to cathode                              |              |
| Trigger leak less than 470 k $\Omega$                             | 165 V max. ← |
| Trigger leak greater than 470 k $\Omega$                          | 170 V max.   |
| Minimum pulse required for operation (Pulse duration 100 $\mu$ S) | + 25 V       |

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

# GTE175M

## Trigger Tetrode

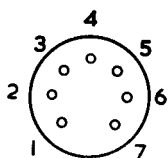
Designed for Dekatron coupling circuits  
and as a general purpose trigger tube

### Mechanical Data

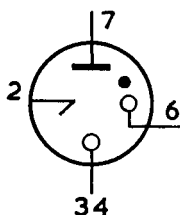
Mounting position  
Weight  
Base

Any  
6.5 g (nominal)  
B7G

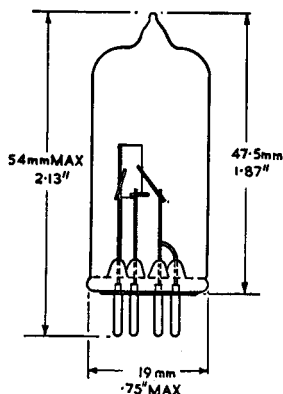
Base Connections  
(underside view)



- Pin 1 } Trigger T  
2 }  
3 } Cathode K<sub>1</sub>  
4 }  
5 Do not connect  
6 Auxiliary cathode K<sub>2</sub>  
7 Main anode A



N.B.—This tube must not be enclosed in a metal screen or can.



## Trigger Tetrode

**GTE 175 M**

Designed for Dekatron coupling circuits  
and as a general purpose trigger tube

---

### Notes on Operation

Rectangular pulses of at least 100  $\mu$ S duration are applied via a 1,000 pF capacitor to the trigger, which is returned through  $1\text{M}\Omega$  to +170 V bias. The tube will not fire with pulses of amplitude less than 5 V and will fire with pulses greater than 25 V.

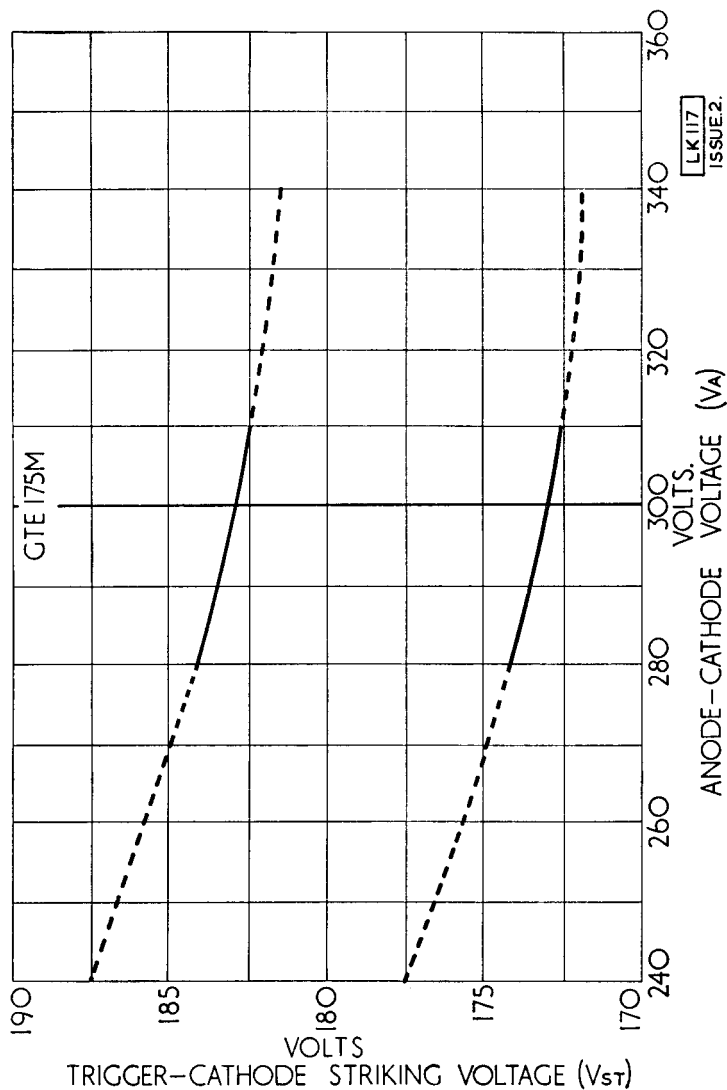
To extinguish the main discharge, the anode-cathode potential must be reduced to below the running voltage (150 V) for a time dependent on the de-ionization characteristic.

Alternatively the tube may be extinguished by means of a capacitor in parallel with the A—K gap forming a self-quenching circuit. A typical example is the Cold Cathode coupling circuit used with the 4 kc/s Dekatron tubes.

# GTE 175M

## Trigger Tetrode

Designed for Dekatron coupling circuits  
and as a general purpose trigger tube



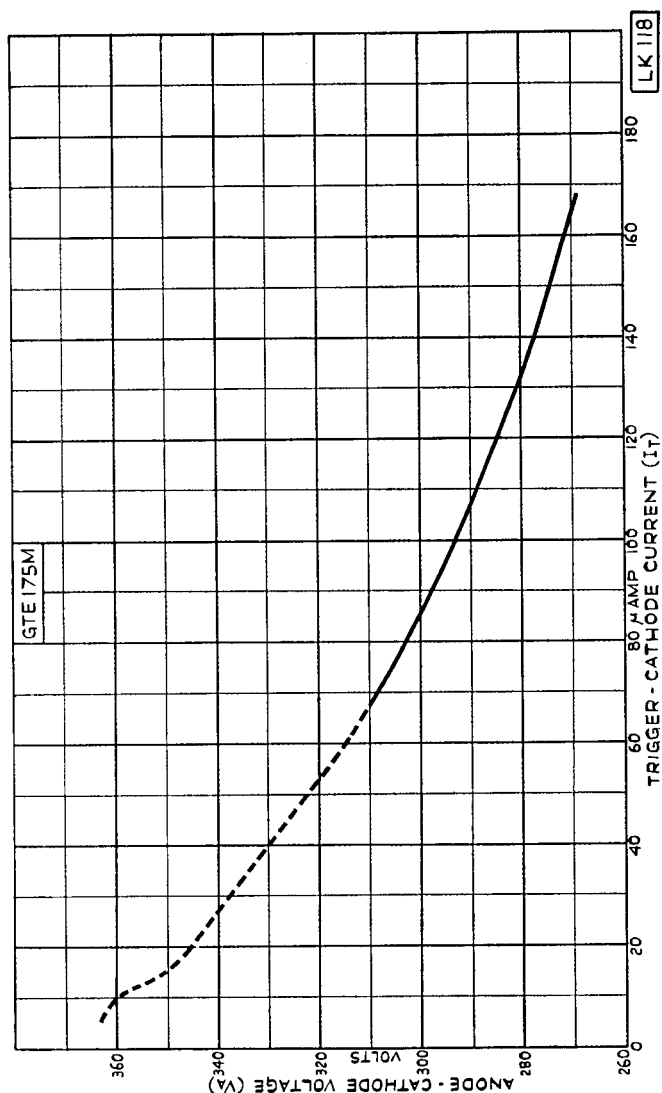
Limits of Trigger Striking Voltage



# Trigger Tetrode

Designed for Dekatron coupling circuits  
and as a general purpose trigger tube

## GTE175M

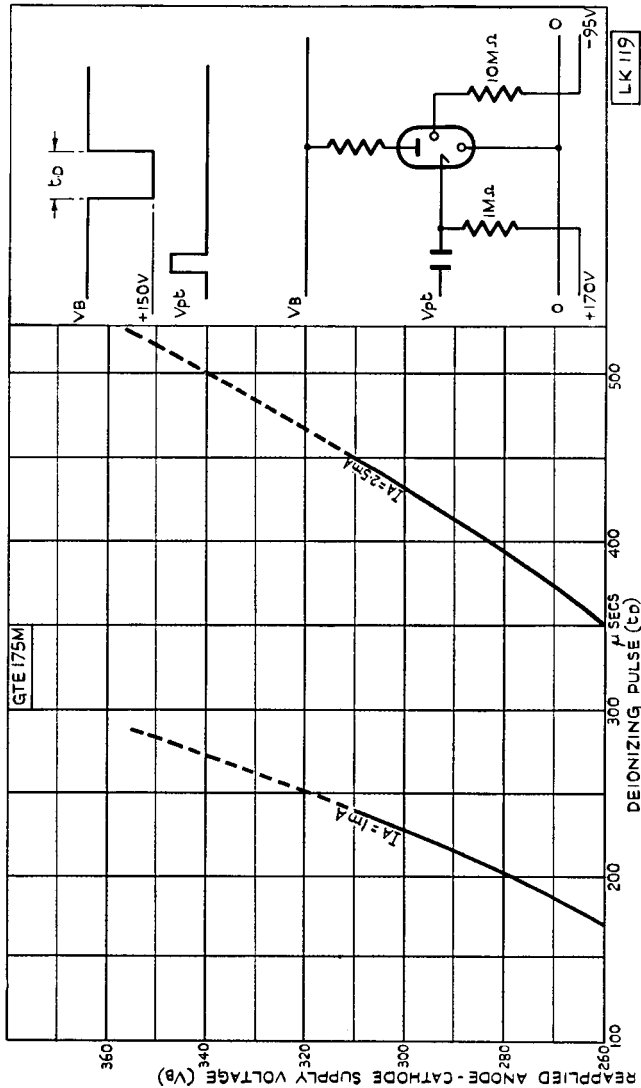


Typical Transfer Characteristic

# GTE175M

## Trigger Tetrode

**Designed for Dekatron coupling circuits  
and as a general purpose trigger tube**



### Typical De-ionization Characteristic

## Voltage Stabilizer

**GTR 75M**  
(CV.284)

---

### Limit Ratings

|                                                                               |       |
|-------------------------------------------------------------------------------|-------|
| Minimum anode current                                                         | 2 mA  |
| Maximum anode current                                                         | 22 mA |
| Minimum anode supply voltage<br>(Primer connected to anode via 15k $\Omega$ ) | 110 V |

### Characteristics

|                                                                                   |              |
|-----------------------------------------------------------------------------------|--------------|
| Running voltage at 10 mA                                                          | 70—80 V      |
| Maximum change in $V_R$ over a range of 20 to 2 mA                                | 6 V          |
| Maximum noise over the range 50—5,000 c.p.s. for<br>a current range of 20 to 2 mA | 15 mV r.m.s. |



# GTR 75M

(CV.284)

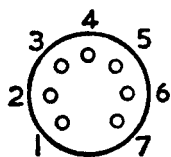
## Voltage Stabilizer

### Mechanical Data

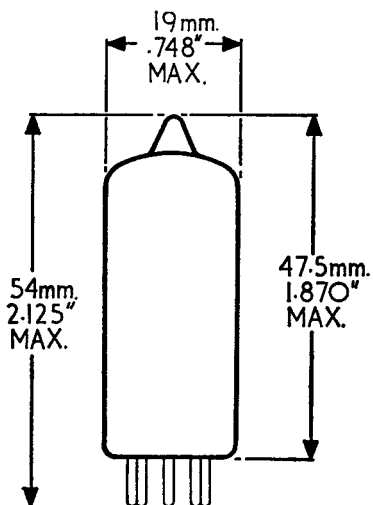
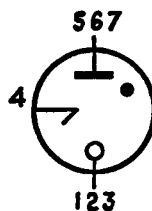
Mounting position  
Base

Any  
B7G

Base Connections  
(underside view)



Pin 1 }  
2 } Cathode  
3 }  
4 Primer  
5 }  
6 } Anode  
7 }



# Low Current Primed Sub-Miniature Reference Tube

# GTR83W

## Limit Ratings

|                                                   |                |
|---------------------------------------------------|----------------|
| Minimum cathode current                           | 50 $\mu$ A     |
| Maximum cathode current                           | 250 $\mu$ A    |
| Minimum anode supply voltage:— (in light or dark) |                |
| with primer not connected                         | 135 V          |
| with primer passing 10 $\mu$ A                    | 95 V           |
| Minimum primer supply voltage                     | 150 V          |
| Maximum primer series resistance                  | 5.6 M $\Omega$ |

## Characteristics

|                                                                                           |                  |
|-------------------------------------------------------------------------------------------|------------------|
| Running voltage at 50 $\mu$ A                                                             | 82—86 V          |
| *Maximum change in running voltage for a<br>current change from 50 $\mu$ A to 250 $\mu$ A | 5.0 V            |
| Primer Running Volts                                                                      | 95 V nominal     |
| Noise                                                                                     | 1 mV p.t.p. max. |
| * The tube characteristic is linear and jump-free.                                        |                  |

## Recommended Operation

|                                                         |             |
|---------------------------------------------------------|-------------|
| Primer connected via 2.7M $\Omega$ to anode supply rail |             |
| Supply volts                                            | > 150 V     |
| Cathode current                                         | 100 $\mu$ A |

## Life

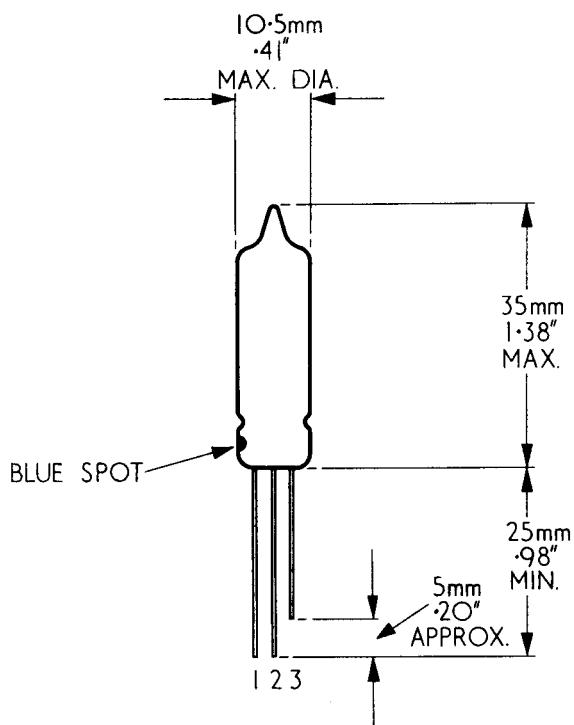
At 100 $\mu$ A, the maximum change in running voltage per 1,000 hours is 1%.



**GTR83W****Low Current  
Primed Sub-Miniature Reference Tube****Mechanical Data**

Base 3 flying leads of 0.4 mm (.0157") dia.  
tinned copper

Anode lead is indicated by a blue spot adjacent to the lead-out wire.



1. Anode
2. Cathode
3. Primer

**Primed Sub-Miniature Reference Tube****GTR83X****Limit Ratings**

|                                                              |        |
|--------------------------------------------------------------|--------|
| Minimum anode current                                        | 0.5 mA |
| Maximum anode current                                        | 2.5 mA |
| Minimum anode supply voltage                                 | 130 V  |
| Minimum primer supply voltage ( $R_p = 390\text{ k}\Omega$ ) | 150 V  |

**Characteristics**

|                                                              |                |
|--------------------------------------------------------------|----------------|
| Running voltage at 0.5 mA                                    | 82—86 V        |
| *Regulation (0.5 — 2.5 mA)                                   | 4.5 V          |
| Jump noise (2.5 — 0.5 mA)                                    | 1 mV ptp. max. |
| Anode takeover voltage ( $V_p$ 150 V, $R_p$ 390 k $\Omega$ ) | 90 V max.      |

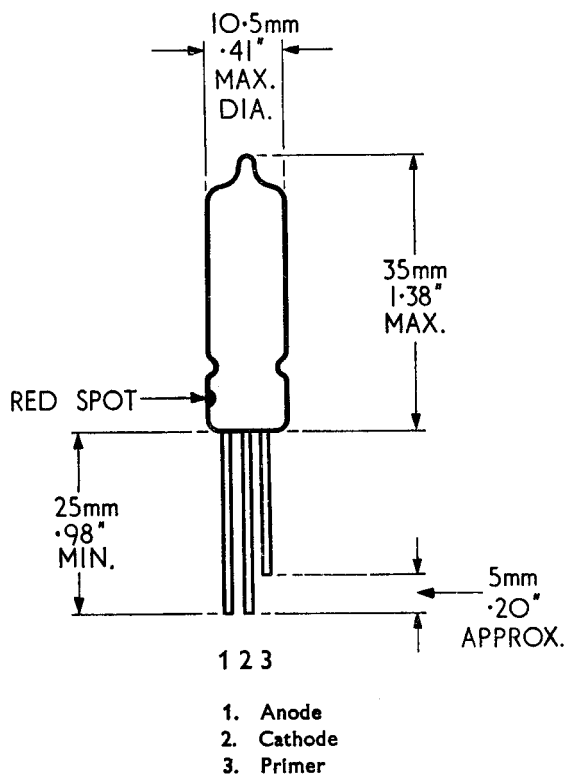
\*The tube characteristics are reasonably linear between 0.5 and 2.5 mA providing that the primer is passing at least 150  $\mu\text{A}$ .



**GTR83X****Primed Sub-Miniature Reference Tube****Mechanical Data**

Base 3 flying leads of 0.4 mm (.0157") dia.  
tinned copper

Anode lead is indicated by a red spot adjacent to the lead-out wire.



# Primed Voltage Stabilizer

**GTR95 M/S**  
(CV.286)

## Limit Ratings

|                                                                       |       |
|-----------------------------------------------------------------------|-------|
| Minimum anode current                                                 | 2 mA  |
| Maximum anode current                                                 | 10 mA |
| Minimum anode supply voltage when primer is<br>connected as (1) below | 110 V |
| (2) below                                                             | 125 V |

## Primer Connections

1. To +150 V via 270 k $\Omega$ , or any other arrangement causing the primer current to be between 150 and 500  $\mu$ A.
2. Through 3.3 k $\Omega$  to the main anode.

## Characteristics

|                                                                 |                            |
|-----------------------------------------------------------------|----------------------------|
| Running voltage at 5 mA                                         | 90—100 V                   |
| Maximum change in $V_R$ for a current change from<br>2 to 10 mA | 5 V                        |
| Impedance                                                       | 350 $\Omega$               |
| Primer striking volts                                           | 125 V                      |
| Primer $V_R$ before anode take-over                             | 108 V                      |
| Maximum noise within the working range                          | 15 mV r.m.s.               |
| Noise at 2 mA                                                   | Approx. 350 $\mu$ V r.m.s. |



# GTR95M/S

(CV.286)

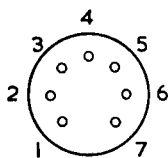
## Primed Voltage Stabilizer

### Mechanical Data

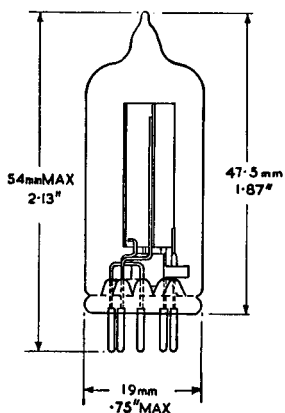
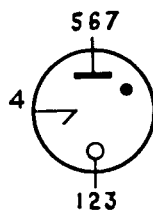
Mounting position  
Weight  
Base

Any  
7.1 g (nominal)  
B7G

Base Connections  
(underside view)



Pin 1 } Cathode  
2 }  
3 }  
4 } Primer  
5 }  
6 } Anode  
7 }



**Primed Voltage Stabilizer****GTR 120 A/S**  
(CV.45)**Limit Ratings**

|                                                                           |       |
|---------------------------------------------------------------------------|-------|
| Minimum anode current                                                     | 10 mA |
| Maximum anode current                                                     | 75 mA |
| Minimum anode supply voltage when the primer<br>is connected as (1) below | 135 V |
| Minimum anode supply voltage when the primer<br>is connected as (2) below | 190 V |

**Primer Connections**

- (1) To +190 V via 47 k $\Omega$  or any other arrangement causing the primer current to be approx. 1.3 mA.
- (2) Through 15 k $\Omega$  to the main anode.

**Characteristics**

|                                                                  |                 |
|------------------------------------------------------------------|-----------------|
| Running voltage at 75 mA                                         | 115—135 V       |
| Maximum change in $V_R$ for a current change from<br>10 to 75 mA | 10 V            |
| Primer striking voltage                                          | 190 V           |
| Primer running voltage                                           | 120 V (nominal) |

*N.B.*—Equilibrium conditions are reached after  
10 minutes operation.



# GTR 120 A/S

(CV.45)

## Primed Voltage Stabilizer

### Mechanical Data

Mounting position

Any

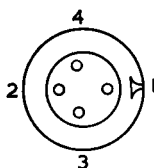
Weight

54 g (nominal)

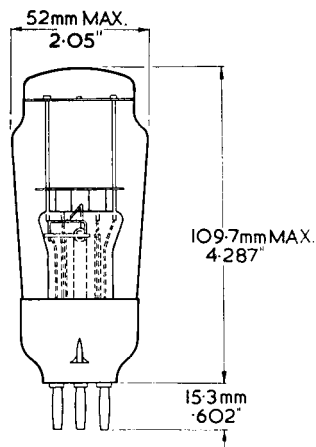
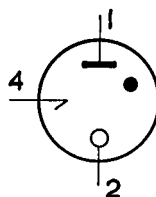
Base

British 4 pin

Base Connections  
(underside view)



- Pin 1 Anode  
 2 Cathode  
 3 No connection  
 4 Primer



## Trigger Tube

# GTR120W

An inexpensive sub-miniature tube especially designed for computer applications

### Limit Ratings

|                                                                                         |        |
|-----------------------------------------------------------------------------------------|--------|
| Maximum anode voltage to prevent self-ignition in all tubes (trigger voltage 0 V)       | +310 V |
| Maximum trigger-cathode voltage at which breakdown will not occur in any tube           |        |
| Cathode 0, Trigger +110, Anode +310                                                     |        |
| Cathode 0, Trigger -100, Anode +150                                                     |        |
| Minimum trigger voltage necessary to cause breakdown in all tubes (anode voltage 290 V) | +170 V |
| Maximum cathode current                                                                 | 9 mA   |
| Minimum cathode current                                                                 | 3 mA   |

### Characteristics

|                                                                                                 |                            |
|-------------------------------------------------------------------------------------------------|----------------------------|
| Anode-Cathode running voltage at 4.5 mA<br>(Tubes may exhibit jumps of up to 10 V in operation) | 95-140 V                   |
| Trigger-Cathode running voltage ( $R_T=220\text{ k}\Omega$ )                                    |                            |
| $I_a=0\text{ mA}$                                                                               | 63 V nominal ←             |
| $I_a=4.5\text{ mA}$                                                                             | 73 V nominal ←             |
| Trigger current required to cause the anode to take-over the discharge (anode voltage 290 V)    |                            |
| De-ionization time                                                                              | 25 $\mu\text{A}$ nominal ← |
| Ionization time (with trigger pulsed to +200 V)                                                 | 3 mS                       |
|                                                                                                 | 90 $\mu\text{S}$ max       |

### Recommended Operating Conditions

|                                                                                    |               |
|------------------------------------------------------------------------------------|---------------|
| Anode supply voltage                                                               | 180-310 V     |
| Cathode current                                                                    | 4.5 mA        |
| Trigger bias with respect to cathode<br>(Trigger resistor 220 k $\Omega$ )         | 100 V         |
| Minimum trigger coupling capacitor<br>(Trigger resistor exceeding 200 k $\Omega$ ) | 150 pF        |
| Minimum ambient illumination                                                       | 5 ft. candles |

N.B.—If tubes stand in the off condition for 150 hours or more, self-ignition may occur at anode voltages above 280, unless a current of 3 mA is passed through all tubes for at least 1 second before commencing normal operation of the circuit.

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



# GTR120W

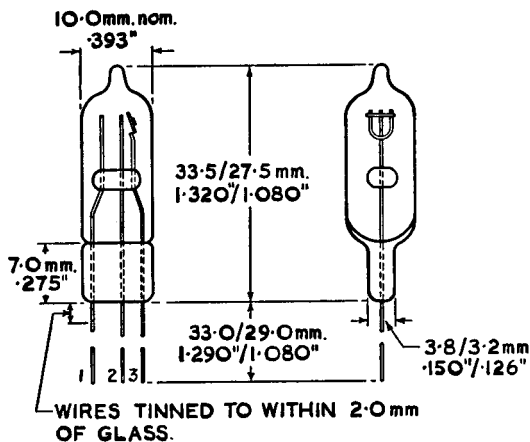
## Trigger Tube

An inexpensive sub-miniature tube especially designed for computer applications

### Mechanical Data

|                   |                                                              |
|-------------------|--------------------------------------------------------------|
| Mounting position | Any                                                          |
| Weight            | 2.2 g (nominal)                                              |
| Base              | 3 flying leads of 0.35 mm. dia.<br>(28 s.w.g.) tinned copper |

N.B.—It is recommended that the wires are not soldered or bent nearer than 10 mm. ( $\frac{1}{2}$ " ) from the glass.



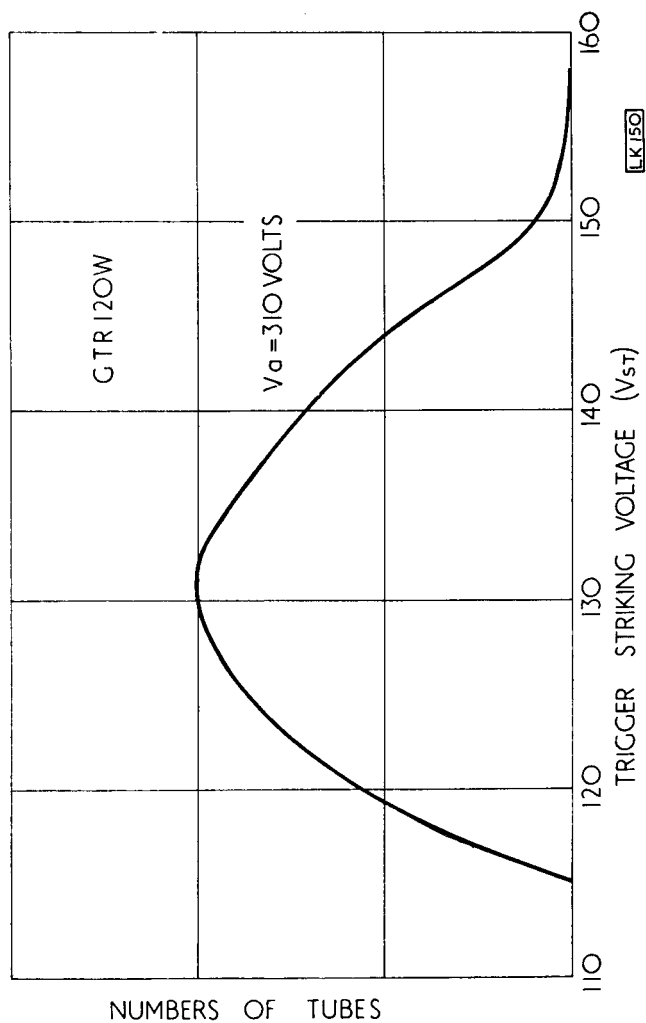
#### Lead Wires

- 1—Anode
- 2—Trigger
- 3—Cathode

## Trigger Tube

An inexpensive sub-miniature tube especially designed for computer applications

# GTR120W



Distribution of Trigger Striking Volts





# Primed Voltage Stabilizer

**GTR150 M/S**  
(CV.287)

## Limit Ratings

|                                                                    |       |
|--------------------------------------------------------------------|-------|
| Minimum anode current                                              | 2 mA  |
| Maximum anode current                                              | 20 mA |
| Minimum anode supply voltage when primer is connected as (1) below | 170 V |
| (2) below                                                          | 200 V |

## Primer connections

1. To + 240 V via 270 k $\Omega$ , or any other arrangement causing the primer current to be between 300 and 500  $\mu$ A.
2. Through 68 k $\Omega$  to the main anode.

## Characteristics

|                                                                        |                            |
|------------------------------------------------------------------------|----------------------------|
| Running voltage at 10 mA                                               | 145—160 V                  |
| Maximum change in running voltage for a current change from 2 to 20 mA | 5 V                        |
| Impedance                                                              | 350 $\Omega$               |
| Primer striking volts                                                  | 200 V                      |
| Primer $V_R$ before anode take-over                                    | 150 V                      |
| Maximum noise within the working range                                 | 15 mV r.m.s.               |
| Noise at 2 mA                                                          | Approx. 550 $\mu$ V r.m.s. |



# GTR150 M/S

(CV.287)

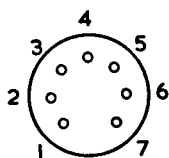
## Primed Voltage Stabilizer

### Mechanical Data

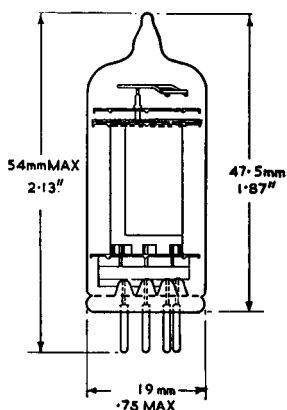
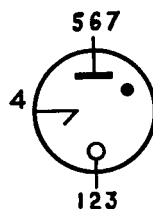
Mounting position  
Weight  
Base

Any  
8.2 g (nominal)  
B7G

Base Connections  
(underside view)



Pin 1 } Cathode  
2 }  
3 }  
4 } Primer  
5 }  
6 } Anode  
7 }



**Primed Sub-Miniature Reference Tube****GTR150W****Limit Ratings**

|                                                   |             |
|---------------------------------------------------|-------------|
| Minimum cathode current                           | 500 $\mu$ A |
| Maximum cathode current                           | 2 mA        |
| Minimum anode supply voltage:— (in light or dark) |             |
| with primer not connected                         | 210 V       |
| with primer passing 150 $\mu$ A                   | 170 V       |
| Maximum inverse voltage                           | 50 V        |
| Minimum primer supply voltage                     | 175 V       |

**Characteristics**

|                                                                                      |                   |
|--------------------------------------------------------------------------------------|-------------------|
| Running voltage at 1mA                                                               | 145—150 V         |
| Maximum change in running voltage for a current<br>change from 500 $\mu$ A to 1.5 mA | 3 V               |
| Typical change in running voltage for a current<br>change from 500 $\mu$ A to 2 mA   | 4 V               |
| Primer Running Volts                                                                 | 135 V nominal     |
| Noise                                                                                | 15 mV r.m.s. max. |

**Recommended Operation**

Primer connected via 270k $\Omega$  either to anode or to  
anode supply rail.

|                 |         |
|-----------------|---------|
| Supply volts    | > 175 V |
| Cathode current | 1 mA    |

**Life**

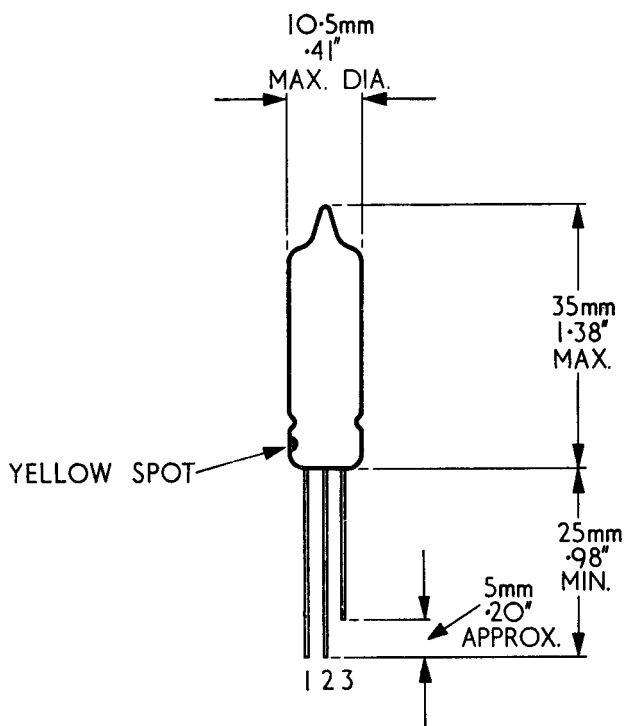
At 1mA, the maximum change in running voltage per 1,000  
hours is 1%.



**GTR150W****Primed Sub-Miniature Reference Tube****Mechanical Data**

Base 3 flying leads of 0.4 mm (.0157") dia.  
tinned copper

Anode lead is indicated by a yellow spot adjacent to the lead-out wire.



1. Anode
2. Cathode
3. Primer

## Cathode

Indirectly heated

## Heater

|                |       |
|----------------|-------|
| V <sub>h</sub> | 6.3 V |
| I <sub>h</sub> | 0.5 A |

## Limit Ratings

|                                                                  |                                                               |
|------------------------------------------------------------------|---------------------------------------------------------------|
| Maximum heater to cathode voltage                                | ±150 V                                                        |
| Maximum spade to cathode voltage (V <sub>S</sub> max.)           | 125 V                                                         |
| Minimum spade to cathode voltage (V <sub>S</sub> min.)           | 85 V ←                                                        |
| Minimum target to cathode voltage (V <sub>T</sub> min.)          | 50 V                                                          |
| Maximum target to cathode voltage (V <sub>T</sub> max.)          | 300 V                                                         |
| Minimum switching-grid to cathode voltage (V <sub>SG</sub> min.) | V <sub>S</sub> = 125 V 65 V ←<br>V <sub>S</sub> = 85 V 45 V ← |
| Minimum input duration                                           | 0.5 μs                                                        |

## Characteristics (V<sub>S</sub> = 108 V, R<sub>S</sub> = 100 kΩ)

|                       |                |
|-----------------------|----------------|
| Holding spade current | 1.2 mA nom. ←  |
| Target current        | 10.0 mA nom. ← |

## Recommended Operating Conditions (for counting up to 1 Mc/S)

|                |              |
|----------------|--------------|
| V <sub>S</sub> | 108 V ←      |
| R <sub>S</sub> | 100 kΩ ± 10% |

(Each spade must be connected to a separate load resistor with not more than ½" (10 mm) of connecting lead).

|                |         |
|----------------|---------|
| V <sub>T</sub> | 108 V ← |
| R <sub>T</sub> | 4.7 kΩ  |

(Any number of target connections may be taken to a common target resistor).

### Recommended Operating Conditions (for counting up to 1 Mc/S) *cont.*

|                          |          |
|--------------------------|----------|
| $V_{SG} = \frac{V_S}{2}$ | 54 V ←   |
| $V_{SG}$ pulse amplitude | −54 V ←  |
| $t$ pulse                | 0.5 μS   |
| $R_{SG}$                 | 22 kΩ ←  |
| C input                  | 330 pF ← |

Alternatively d.c. coupling may be used as shown in circuit LK. 125

\* Note :- The spade resistance is the total resistance, including resistors for beam formation etc.

### Mechanical Data

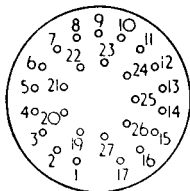
|                   |                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Mounting position | Any: providing that the tube is kept at least 2" from any magnetic material or 4" from a similar tube, a strong magnet or a mu-metal screen. |
| Weight            | 185 g                                                                                                                                        |
| Base              | B26A                                                                                                                                         |

**N.B. ← Indicates a change from previous data sheets.**

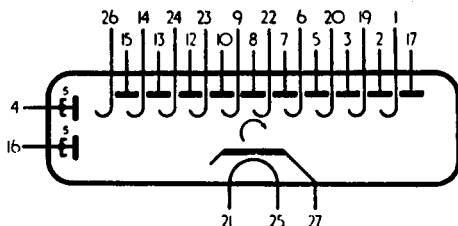
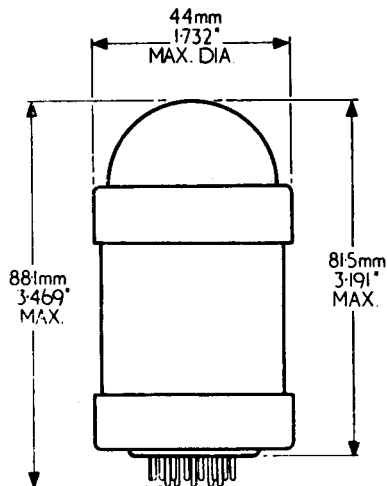


## Mechanical Data—cont.

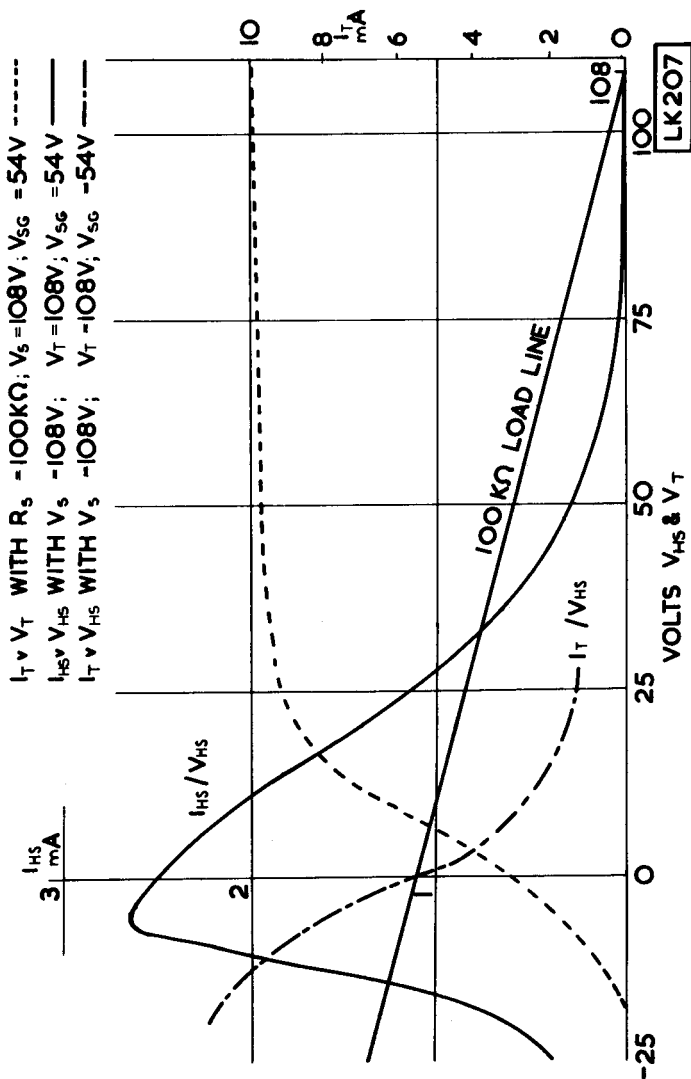
Base Connections  
(underside view)



- |       |                      |
|-------|----------------------|
| Pin 1 | Spade 0              |
| 2     | Target 9             |
| 3     | Target 8             |
| 4     | Odd Switching grids  |
| 5     | Target 7             |
| 6     | Spade 7              |
| 7     | Target 6             |
| 8     | Target 5             |
| 9     | Spade 5              |
| 10    | Target 4             |
| 11    | Do not connect       |
| 12    | Target 3             |
| 13    | Target 2             |
| 14    | Spade 2              |
| 15    | Target 1             |
| 16    | Even switching grids |
| 17    | Target 0             |
| 19    | Spade 9              |
| 20    | Spade 8              |
| 21    | Heater               |
| 22    | Spade 6              |
| 23    | Spade 4              |
| 24    | Spade 3              |
| 25    | Heater               |
| 26    | Spade 1              |
| 27    | Cathode              |







### VS10G Holding Spade and Target Characteristics





# Magnetically Screened High Current 10-way Trochotron Beam Switching Tube

**VS10G/M**

Electrical Characteristics identical to the VS10G

## Mechanical Data

Mounting position

Any.

This tube may be mounted in close proximity to similar tubes, and to magnetic material.

Weight

670 g

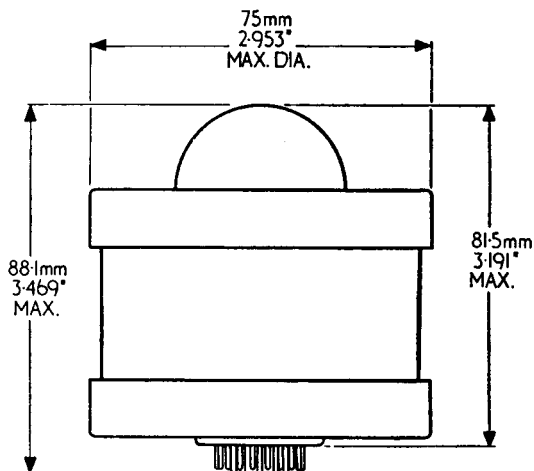
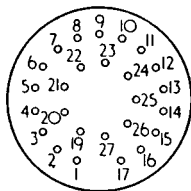
Base

B26A

Sockets

B26A or B27A

Base Connections  
(underside view)





# High Current 10-way Trochotron Beam Switching Tube

**VS10H**  
(VX.9210)

**Cathode** Indirectly heated

|               |    |        |
|---------------|----|--------|
| <b>Heater</b> | Vh | 6.3 V  |
|               | Ih | 0.55 V |

**Limit Ratings**

|                                                                             |                |
|-----------------------------------------------------------------------------|----------------|
| Maximum heater to cathode voltage                                           | $\pm 150$ V    |
| Maximum spade to cathode voltage ( $V_s$ max.)                              | + 145 V        |
| Minimum spade to cathode voltage ( $V_s$ min.)                              | + 80 V         |
| Minimum target to cathode voltage ( $V_T$ min.)                             | + 50 V         |
| Maximum target to cathode voltage ( $V_T$ max.)                             | + 300 V        |
| Minimum switching-grid to cathode voltage                                   |                |
| ( $V_{SG}$ min.) $V_s = 140$ V                                              | 75 V           |
| 125 V                                                                       | 55 V           |
| 80 V                                                                        | 45 V           |
| Minimum spade resistor ( $R_s$ min.)                                        |                |
| $V_s = 140$ V                                                               | 56 k $\Omega$  |
| 125 V                                                                       | 68 k $\Omega$  |
| 80 V                                                                        | 82 k $\Omega$  |
| Maximum spade resistor ( $R_s$ max.)                                        |                |
| $V_s = 140$ V                                                               | 150 k $\Omega$ |
| 125 V                                                                       | 175 k $\Omega$ |
| 80 V                                                                        | 270 k $\Omega$ |
| Minimum resolution time (for groups of pulses not exceeding nine in number) | 250 nS         |
| Maximum switching speed (for regular spaced pulses)                         | 2 Mc/S         |

**Characteristics**

|                                     |              |
|-------------------------------------|--------------|
| Holding spade current               | 1.0 mA nom.  |
| Target spade current $V_s = 140$ V  | 18.0 mA nom. |
| 125 V                               | 10.0 mA nom. |
| 80 V                                | 6.5 mA nom.  |
| Switching grid current on switching |              |
| $V_s = 140$ V                       | 2.0 mA nom.  |
| 125 V                               | 1.0 mA nom.  |
| 80 V                                | 0.2 mA nom.  |



**VS10H**  
(VX.9210)

# High Current 10-way Trochotron Beam Switching Tube

## Recommended Operating Conditions for 1 Mc/S Operation

|       |                |
|-------|----------------|
| $V_s$ | 125 V          |
| $R_s$ | 100 k $\Omega$ |

(Each spade must be connected to a separate load resistor with not more than  $\frac{1}{2}$ " (10 mm) of connecting lead).

|       |                |
|-------|----------------|
| $V_T$ | 125 V          |
| $R_T$ | 4.7 k $\Omega$ |

(Any number of target resistors may be taken to a common target resistor).

|                         |                      |
|-------------------------|----------------------|
| Minimum pulse—duration  | 0.25 $\mu$ S         |
| Minimum pulse—amplitude | — ( $V_{SG} + 5$ ) V |

## For 2 Mc/S Operation

|       |               |
|-------|---------------|
| $V_s$ | 125 V         |
| $R_s$ | 82 k $\Omega$ |

(Each Spade must be connected to a separate load resistor with not more than  $\frac{1}{2}$ " (10 mm) of connecting lead).

|       |                |
|-------|----------------|
| $V_T$ | 125 V          |
| $R_T$ | 4.7 k $\Omega$ |

(Any number of target resistors may be taken to a common target resistor).

|                         |                      |
|-------------------------|----------------------|
| Minimum pulse—duration  | 0.25 $\mu$ S         |
| Minimum pulse—amplitude | — ( $V_{SG} + 5$ ) V |



# High Current 10-way Trochotron Beam Switching Tube

**VS10H**  
(VX.9210)

## Mechanical Data

Mounting position

Any: providing that the tube is kept at least 2" from any magnetic material or 4" from a similar tube, a strong magnet or a mu-metal screen.

Weight

220 g

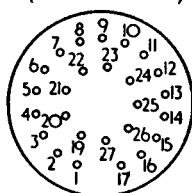
Base

B26A

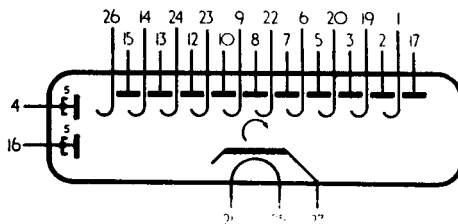
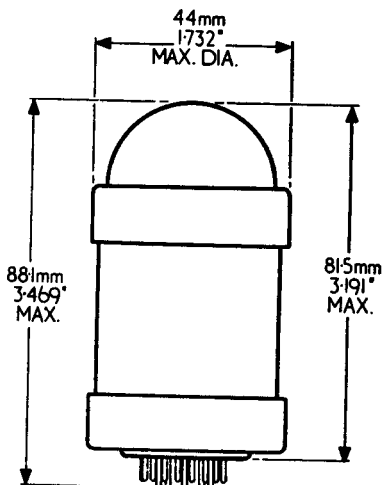
Sockets

B26A or B27A

Base Connections  
(underside view)



- |       |                      |
|-------|----------------------|
| Pin 1 | Spade 0              |
| 2     | Target 9             |
| 3     | Target 8             |
| 4     | Odd Switching grids  |
| 5     | Target 7             |
| 6     | Spade 7              |
| 7     | Target 6             |
| 8     | Target 5             |
| 9     | Spade 5              |
| 10    | Target 4             |
| 11    | Do not connect       |
| 12    | Target 3             |
| 13    | Target 2             |
| 14    | Spade 2              |
| 15    | Target 1             |
| 16    | Even Switching grids |
| 17    | Target 0             |
| 19    | Spade 9              |
| 20    | Spade 8              |
| 21    | Heater               |
| 22    | Spade 6              |
| 23    | Spade 4              |
| 24    | Spade 3              |
| 25    | Heater               |
| 26    | Spade 1              |
| 27    | Cathode              |





# Low Voltage 10-way Trochotron Beam Switching Tube

VS10K

**Cathode** Indirectly heated

|               |    |       |
|---------------|----|-------|
| <b>Heater</b> | Vh | 6.3 V |
|               | Ih | 0.5 A |

## Limit Ratings

|                                                            |                |
|------------------------------------------------------------|----------------|
| Maximum heater to cathode voltage                          | $\pm 75$ V     |
| Maximum spade to cathode voltage ( $V_S$ max.)             | 32 V           |
| Minimum spade to cathode voltage ( $V_S$ min.)             | 28 V           |
| Maximum target to cathode voltage ( $V_T$ max.)            | 150 V          |
| Minimum target to cathode voltage ( $V_T$ min.)            | 14 V           |
| Minimum switching-grid to cathode voltage ( $V_{SG}$ min.) | 15 V           |
| Minimum spade resistor $V_S = 28$ V                        | 100 k $\Omega$ |
| Maximum spade resistor $V_S = 28$ V                        | 150 k $\Omega$ |

## Characteristics ( $V_S = 30$ V, $R_S = 150$ k $\Omega$ )

|                       |                  |
|-----------------------|------------------|
| Holding spade current | 400 $\mu$ A nom. |
| Target current        | 1.7 mA nom.      |

## Recommended Operating Conditions (for counting up to 1 Mc/S)

|       |                         |
|-------|-------------------------|
| $V_S$ | 30 V                    |
| $R_S$ | 150 k $\Omega \pm 10\%$ |

(Each spade must be connected to a separate spade resistor with not more than  $\frac{1}{2}$ " (10 mm) of connecting lead).

|       |                |
|-------|----------------|
| $V_T$ | 30 V           |
| $R_T$ | 6.8 k $\Omega$ |

(Any number of targets may be taken to a common target resistor).

|                          |               |
|--------------------------|---------------|
| $V_{SG}$                 | 15 V          |
| $V_{SG}$ pulse amplitude | $-17$ V       |
| t pulse                  | 0.5 $\mu$ s   |
| $R_{SG}$                 | 47 k $\Omega$ |
| C input coupling         | 330 pF        |



# VS10K

## Low Voltage 10-way Trochotron Beam Switching Tube

### Mechanical Data

Mounting position

Any: providing that the tube is kept at least 2" from any magnetic material or 4" from a similar tube, a strong magnet or a mu-metal screen.

Weight

220 g

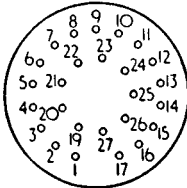
Base

B26A

Sockets

B26A or B27A

Base Connections  
(underside view)



- |       |                      |
|-------|----------------------|
| Pin 1 | Spade 0              |
| 2     | Target 9             |
| 3     | Target 8             |
| 4     | Odd Switching grids  |
| 5     | Target 7             |
| 6     | Spade 7              |
| 7     | Target 6             |
| 8     | Target 5             |
| 9     | Spade 5              |
| 10    | Target 4             |
| 11    | Do not connect       |
| 12    | Target 3             |
| 13    | Target 2             |
| 14    | Spade 2              |
| 15    | Target 1             |
| 16    | Even Switching grids |
| 17    | Target 0             |
| 19    | Spade 9              |
| 20    | Spade 8              |
| 21    | Heater               |
| 22    | Spade 6              |
| 23    | Spade 4              |
| 24    | Spade 3              |
| 25    | Heater               |
| 26    | Spade 1              |
| 27    | Cathode              |

