DECADE SELECTOR TUBE

ET51

Trochotron type selector tube with a maximum counting speed above 1Mc/s, and an output current of 5.5mA.

PRELIMINARY DATA

The ET51 consists of a thermionic cathode and thirty other electrodes formed into ten similar groups of three electrodes. Each group consists of a target (or output) electrode, a spade (or beam locking) electrode and a grid (or switching) electrode.

All the ten target and ten spade electrodes are brought out individually to the valve base. Alternate grid electrodes are connected together so as to form a set of 'odd number' grids and a set of 'even number' grids. The drive pulses are fed alternately to the 'odd' and 'even' grids.

HEATER

For parallel operation only, a.c. or d.c.

V_h	6.3	V
I_h	300	mA

RECOMMENDED OPERATING CONDITIONS

All voltages measured with respect to cathode

Target supply voltage	100		200	V
Target resistor (*Note 1*)	3.3		18	kΩ
Output voltage (across target resistor)	18		100	V
Spade supply voltage		100		V
Spade resistor (each spade) (*Note 2*)		100 (±1%)		kΩ
Grid bias voltage		+30		V
Grid circuit resistance R_g (*Note 3*)		<10		kΩ
Negative grid input pulse amplitude		75		V
Voltage of all spades to clear the tube (*Note 4*)		0		V
Spade '0' voltage to reset the tube (*Note 4*)		0		V
Input pulse frequency range		0 to 1		Mc/s

CHARACTERISTICS (measured with a spade voltage of 100V)

Target current (conducting target)	5.5±1.0	mA
Target current uniformity within one tube	±10	%
Spade current (conducting spade)	1	mA
Cathode current	6.5±1.5	mA
Grid current (approx.)	50	μA
	(*See curve C1*)	

CAPACITANCES

$C_{g(odd)-all}$	9	pF
$C_{g(even)-all}$	9	pF
$C_{g(odd)-g(even)}$	300	mpF
C_{t-all}	5	pF

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LIMIT OPERATING CONDITIONS (absolute values)

All voltages measured with respect to cathode

Maximum target supply voltage	250	V
Conducting target voltage		
Maximum	120	V
Minimum		
*R_g = 10kΩ	75	V
100kΩ	95	V
Spade supply voltage		
Tube in clear or non-conducting condition		
Maximum	200	V
Tube in conducting condition		
Maximum		
*R_g = 10kΩ	110	V
100kΩ	103	V
Minimum	90	V
Positive grid bias voltage		
Maximum	100	V
Minimum		
*R_g = 10kΩ	25	V
100kΩ	50	V
Minimum negative grid voltage for switching (*Note 5*)		
0 to 100kc/s	25	V
0 to 1Mc/s	35	V
Spade voltage below which all tubes will clear (*Note 4*)	40	V
Spade '0' voltage below which all tubes will reset to zero (*Note 4*)	+5	V
Maximum negative spade voltage	−5	V

*See *Note 3*.

LIMITING VALUES (absolute ratings)

Maximum target voltage	300	V
Maximum spade voltage	300	V
Maximum grid voltage	300	V
Maximum heater-to-cathode voltage	±90	V
Maximum target dissipation (each target)	1	W

NOTES

1. The target supply voltage may have any value between 100V and 200V. For voltages greater than 120V a resistor must be connected in series with each target, so that the conducting target voltage is within the values stated in the limit operating conditions. Targets not required to give a useful output may be grouped together and given a common resistor. For supply voltages less than 120V no target resistor is necessary unless a useful output is required.

2. This should be a high stability resistor.
3. The grid circuit resistance, R_g, is the total d.c. resistance between the grid and a fixed potential.
4. When the tube is switched on it will normally be in the 'cleared' or non-conducting condition and must be set to zero by reducing the spade '0' voltage to the cathode potential.

   To reset the tube to zero during normal operation, the tube must first be cleared by either disconnecting the spade supply voltage or reducing the potential of all spades as specified. The tube can be reset to '0' or any other position by reducing the appropriate spade voltage to cathode potential.
5. These values added to the positive grid bias give the absolute minimum input pulse for reliable switching at the frequency given.

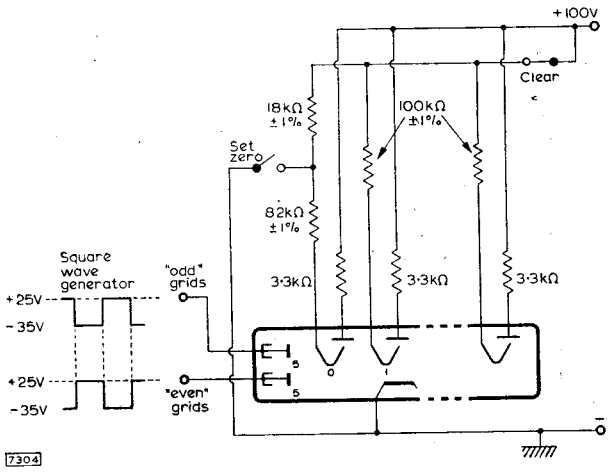
OPERATING NOTES

The magnet of the tube should not be struck or allowed to contact any other magnetic material.

The operation of the tube will be adversely affected by stray magnetic fields. It should be mounted at least two inches away from any magnetic material and four inches from any other tube of this type.

In order to attain the maximum switching speed the stray capacitance at the spade electrode should be kept to a minimum by wiring the spade resistors directly to the tube socket.

The standard method of driving a trochotron is to employ a gate circuit which feeds the drive pulses alternatively to the 'odd' and 'even' grids. A convenient way of doing this is to use the two anode outputs of a bistable multivibrator to feed the trochotron grids. The multivibrator is triggered by the input pulses.



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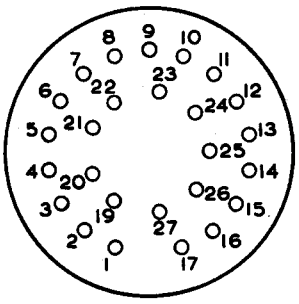
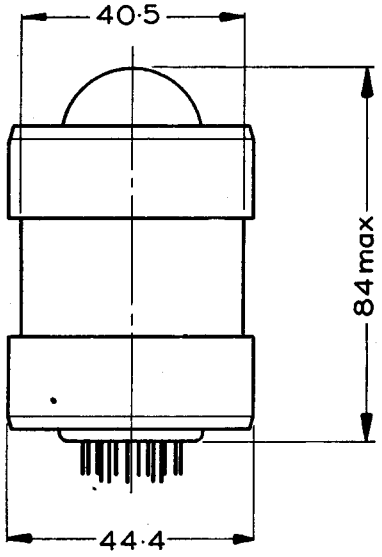


B26A Base



All dimensions in mm

5923

Pin No.	Connection	Pin No.	Connection
1	Spade 0	14	Spade 2
2	Target 9	15	Target 1
3	Target 8	16	Grid 'even'
4	Grid 'odd'	17	Target 0
5	Target 7		
6	Spade 7	19	Spade 9
7	Target 6	20	Spade 8
8	Target 5	21	Heater
9	Spade 5	22	Spade 6
10	Target 4	23	Spade 4
11	I.C.	24	Spade 3
12	Target 3	25	Heater
13	Target 2	26	Spade 1
		27	Cathode

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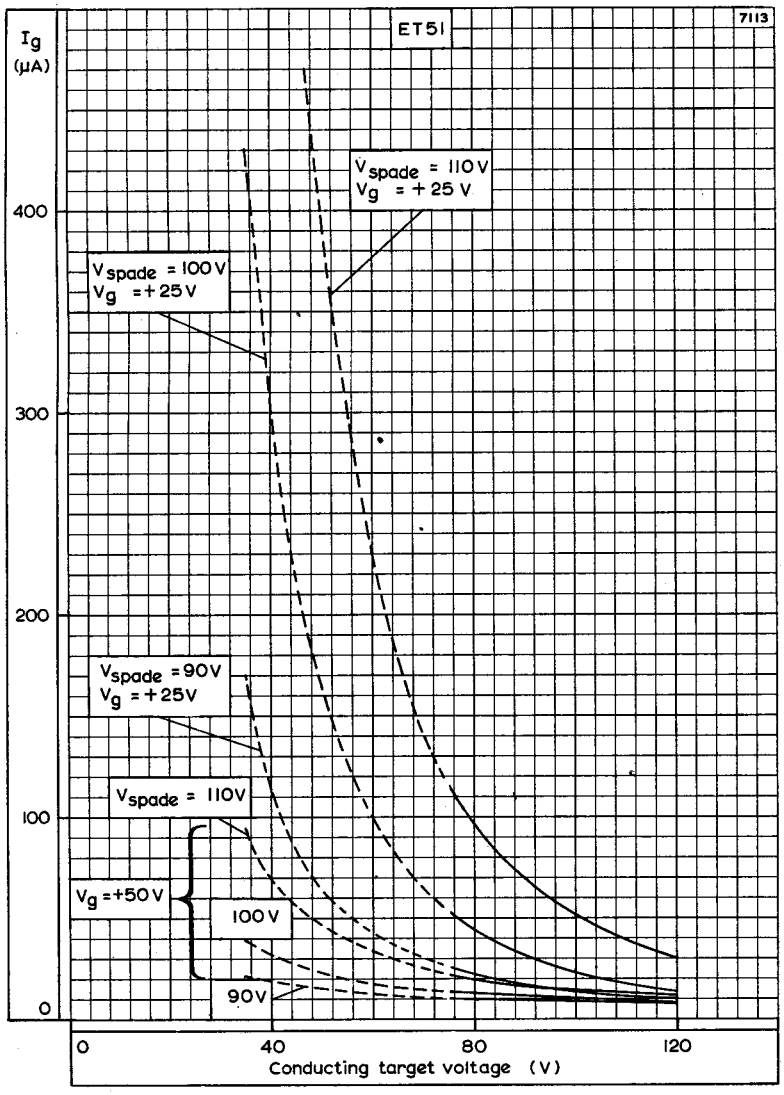

GRID CURRENT PLOTTED AGAINST CONDUCTING TARGET VOLTAGE