BRIMAR

Radio Valve

AND

Teletube Manual

No.7

RADIO VALVES

TELETUBES

METAL RECTIFIERS

GERMANIUM DIODES

BRIMISTORS

TRANSISTORS

RESISTORS

PRICE SIX SHILLINGS

Oliver Sutton
Jan 1958.

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TRANSISTORS

BVA

Standard Telephones and Cables Limited

RADIO RECEIVER VALVE DIVISION

FOOTSCRAY, SIDCUP, KENT

Telephone : FOOtscray 3333

STC

PRICE 6/-

Introduction

The No. 7 edition of the Brimar Radio Valve and Teletube Manual has been revised and enlarged to accommodate many new Brimar Types, including those for Frequency Modulation and Band 3 Television transmissions.

The attention of Equipment Designers is drawn to the range of Recommended Types for New Equipment on pages 4 and 5. The Brimar Application Report Service outlined on page 231 provides comprehensive information on many of these types.

Replacement Types are included for Service Engineers and others who wish to refer to their characteristics in order to substitute modern types, but Obsolete Types have been deleted (see page 9).

A well-balanced range of Special Quality "T" Valves for use in Industry and Communications is featured, and a new section for S.T.C. Special Valves has been added for the first time.

The Teletube Section now includes several Electrostatic Focus Tubes and two Monitoring Tubes types C14HM/1 and C17HM/1. Data is also given on some of the Sentercel Selenium Rectifiers K, Q, D and V types and advance information on a range of Contact Cooled Rectifiers and S.T.C. High Grade Carbon Resistors.

Revised information is given on Television, FM and Amateur Transmissions and the Circuit Section has been brought up to date by the inclusion of many Transistor Circuits.

Contents

RECOMMENDED BRIMAR TYPES FOR NEW EQUIPMENT

CLASSIFICATION		MINIATURES B7G & B9A Battery	Vf	If	Mains	Vh	Ih	OCTALS Mains	Vh	Ih
FREQUENCY CHANGERS	Special Heptode	DK96	1.4	0.025	6BE6	6.3	0.3			
		1AC6	1.4	0.05	12BE6	12.6	0.15			
		1R5	1.4	0.05	12AD6	12.6	0.15			
	Triode Pentodes				ECF82/6U8	6.3	0.45			
					PCF82/9U8	9.5	0.3			
	Triode Heptodes				12AH8	6.3 or 12.6	0.3 or 0.15			
					20D4	6.3	0.3			
	Double Triodes				ECC85	6.3	0.435			
					6J6	6.3	0.45			
					12AT7	6.3 or 12.6	0.3 or 0.15			
					6BQ7A	6.3	0.4			
	Triodes				6AM4	6.3	0.225			
HEPTODES	Gating Valve				†7032	6.3	0.3			
R.F. PENTODES	Vari-Mu 0-2.5mA/V	DF96	1.4	0.025	9D6	6.3	0.2			
		1T4	1.4	0.05	12AC6	12.6	0.15			
	Vari-Mu 3.0-10.0 mA/V				6BA6	6.3	0.3			
					6BJ6	6.3	0.15			
					9D7	6.3	0.3			
					12BA6	12.6	0.15			
	Straight 0-2.5mA/V	1L4	1.4	0.05	6BR7	6.3	0.15			
	Straight 3.0-5.0mA/V				6AU6	6.3	0.3			
					6BH6	6.3	0.15			
					12AU6	12.6	0.15			
	Straight above 5.0 mA/V				6AK5	6.3	0.175			
					6AM6	6.3	0.3			
					6BW7	6.3	0.3			

CLASSIFICATION		MINIATURES B7G & B9A Battery	Vf	If	Mains	Vh	Ih	OCTALS Mains	Vh	Ih
OUTPUT BEAM TETRODES AND PENTODES	A.F. Power	DL96	1.4 or 2.8	0.05 or 0.025	EL84	6.3	0.76	†5B/254G	6.3	0.9**
		3V4	1.4 or 2.8	0.1 or 0.05	6AK6	6.3	0.15	†5B/254M	6.3	0.9*
					6AM5	6.3	0.2	†5B/255M	6.3	0.9*
					6AQ5	6.3	0.45	†5B/257M	12.0	0.47*
					6BW6	6.3	0.45	†5B/258M	19.0	0.3*
					9BW6	9.0	0.3			
					19AQ5	19.0	0.15			
					50C5	50.0	0.15			
	R.F.				†5763	6.0	0.75	†5B/254G	6.3	0.9**
					†6870	6.3 or 12.6	0.6 or 0.3	†5B/254M	6.3	0.9*
					†F/7001	6.3	0.45	†5B/255M	6.3	0.9*
								†5B/257M	12.0	0.47*
								†5B/258M	19.0	0.3*
								†807 (UX Base)	6.3	0.9
								†6146	6.3	1.25
	Line Output							6CD6G	6.3	2.5
								50CD6G	50.0	0.3
	Pulse							†3D21A	6.3 or 12.6	1.7 or 0.85
	Video				6CH6	6.3	0.75			
					†6870	6.3 or 12.6	0.6 or 0.3			
TRIODE PENTODES	A.F. and Timebase				ECL82	6.3	0.78			
					PCL82	16.0	0.3			
	Video				PCL84	15.0	0.3			
HALF-WAVE RECTIFIERS	Normal				35W4		0.15			
					†R17	6.3	0.8			
					†R18	6.3	1.1			
	Booster Diodes				EY83	6.3	1.0	6U4GT	6.3	1.2
					PY83	20.0	0.3			
	E.H.T.				R.19	1.25	0.2			

			6CH6 6.3 0.75 †6870 { 6.3 0.6 or 12.6 0.3 †5A/170K 6.3 0.3	
A.F. PENTODE AMPLIFIERS		1L4 1.4 0.05	6BR7 6.3 0.15 †6BS7 6.3 0.15	
A.F. PENTODES WITH DIODES		DAF96 1.4 0.025 1S5 1.4 0.05 1U5 1.4 0.05		
SINGLE TRIODES			6AF4A 6.3 0.225 6AM4 6.3 0.225 6C4 6.3 0.15	†3A/167M 6.3 0.45*
TRIODES WITH DIODES	Double Diodes		6AT6 6.3 0.3 6AV6 6.3 0.3 12AE6 12.6 0.15 12AT6 12.6 0.15 12AV6 12.6 0.15	
	Triple Diodes		EABC80 6.3 0.45 6T8 6.3 0.45 19T8 19.0 0.15	
DOUBLE TRIODES			ECC84 6.3 0.335 ECC85 6.3 0.435 PCC84/7AN7 7.0 0.3 6BQ7A 6.3 0.4 6J6 6.3 0.45 12AT7, 12AU7, 12AX7 } 6.3 0.3 or 12.6 0.15 12BH7, †13D3 } 6.3 0.6 or 12.6 0.3 †5965 { 6.3 0.45 or 12.6 0.225	†13D1 25.0 0.15 †13D2 6.3 0.6
DOUBLE DIODES			6AL5 6.3 0.3	
TUNING INDICATORS			EM85 6.3 0.3 EM840 6.3 0.25	6U5G 6.3 0.3 12U5G 12.6 0.15

FULL-WAVE RECTIFIERS	Directly Heated			†5R4GY 5.0 2.0 5U4G 5.0 3.0 5Y3GT 5.0 2.0 †83 5.0 3.0 (UX Base)
	Indirectly Heated		6X4 6.3 0.6 EZ80/6V4 6.3 0.6 EZ81 6.3 1.0	5Z4G 5.0 2.0 5V4G 5.0 2.0
VOLTAGE REGULATORS	Gas filled		†OA2 — — †OB2 — — †G50/1G — — (Sub-miniature) †G55/1K — — †G400/1K— —	†OA3 (VR75/30) †OC3 (VR105/30) †OD3 (VR150/30)
	Vacuum			†6BD4 6.3 0.6
THYRATRON			†2D21 6.3 0.6	
COLD CATHODE TRIODES			†G1/236G— — (Sub-miniature)	†G150/2D — — †G240/2D — —
TRIGGER TUBE			†G1/371K— —	
COUNTER TUBE				†G10/241E — — (B12E Base)
THERMAL DELAY SWITCH			†VLS631 6.3 0.5	

TELETUBES

14″	C14PM	Duodecal Base	6.3 volts	0.3 amp
17″	C17PM	,, ,,	6.3 volts	0.3 amp.
17″	C17SM	,, ,,	6.3 volts	0.3 amp.
21″	C21SM	,,	6.3 volts	0.3 amp.

† *Industrial Types.*
* *Loctal base.*
** *Wired in Loctal base.*

VALVE RATINGS

The majority of the valve ratings given in this catalogue are based upon the "design centre" system. Others are based on "absolute" ratings. Both these ratings systems are defined below.

"ABSOLUTE RATINGS." For those types of valve where absolute ratings are applied the maximum ratings shown are limiting values and must not be exceeded under any conditions of use. If these ratings are exceeded the life and performance of the valve may be impaired. It is the duty of the equipment designer to make due allowances for supply voltage variations and for tolerances in the components used, such that the stated values are never exceeded. In cases where an "absolute" rating applies this is specifically mentioned.

"DESIGN CENTRE RATINGS." Most receiving valves are rated on a "design centre" rating. Such ratings make due allowance for variations in supply voltages normally encountered. The maximum ratings shown have been so chosen that the valves will give satisfactory life and performance in equipment operated from power supplies, of which the normal voltage including normal fluctuations falls within $\pm$10 per cent of the nominal value.

The allowance made does not include any variations due to tolerances in components used in equipment and it is the duty of a designer to make sure that the ratings are not exceeded with limit values of components and with supply mains of the nominal value applied to the appropriate input connections.

In circumstances where it is known that abnormal supply mains variations are likely to be encountered appropriately lower maximum ratings should be employed.

GENERAL RECOMMENDATIONS

FILAMENTS. The rating of valves in equipment operated from lead-acid accumulators assumes a nominal voltage of 2.0 volts per cell and a variation of $\pm$0.2 volts from this value. If due to the use of chargers a larger variation is encountered the maximum ratings should be reduced accordingly.

When the filaments of valves of the 1.4 volt type are operated other than from a single dry cell, they should be maintained within a range of 1.25 to 1.4 volts with a nominal value of 1.3 volts. If such valves are operated in series from batteries or supply mains it is usually necessary to employ shunting resistors across individual 1.4 volt sections of filament.

HEATERS. (Indirectly heated valves.)

The heater voltage unless otherwise stated should be maintained within the limits $\pm$ 10 per cent. The heater current of valves operated in series should not vary more than $\pm$ 5 per cent. Under-running may be as detrimental as over-running to the life of the valve. Surges during initial warming-up of series operated valves should be avoided by the use of "Brimistors." (See Brimistor Section.)

HEATER-CATHODE Insulation.

The maximum potential difference between heater and cathode should not exceed 250 volts except for special valves intended for use in A.C./D.C. equipment such as rectifiers. Certain A.C. valves have maximum values lower than 250 volts and in all cases of doubt information will be supplied on request.

The Heater-cathode voltage rating, unless otherwise qualified shall be interpreted as the maximum instantaneous value of combined alternating and steady voltage either positive or negative in respect of cathode.

A valve should not be rendered inoperative by disconnecting the cathode unless there is a resistor not exceeding 250,000 ohms between the heater and cathode.

D.C. Connections between cathode and all other electrodes.

Valves should not be operated without a D.C. connection between cathode and each electrode, nor should any internal or external screens be left floating.

Control Grid Voltages.

The resistance between the grid and cathode should be kept as low as practicably possible.

Indirectly heated R.F. pentodes and frequency changers should not use values higher than 1 megohm unless autobias is employed. With autobias, values up to 3.5 megohms may be used, but the value should be proportionately reduced if a resistor is common to more than one valve grid circuit.

Mains output valves should not use grid resistors in excess of 0.1 megohm when fixed bias is employed or 0.5 megohm when autobias is used.

1.4 volt battery valves when operated at zero bias are an exception in that a minimum value of about 0.5 megohms should be used as a grid leak or as part of the A.V.C. decoupling and diode load. This is because variation in contact potential may cause grid current to flow, damping the circuit and so producing wide variations in gain between valves if the grid return is made directly to the negative filament. Values of up to 10 megohms may be safely employed in the grid circuit of 1.4 volt types.

Valves should not be run under conditions which result in appreciable grid current unless such conditions are stated on the data sheet or otherwise approved.

When valves are operated at low values of bias as in R.C. amplifiers, grid current may flow, damping the input circuit, unless the bias is of sufficient value to exceed the contact potential. This potential will vary with individual samples and with life. The value of this potential rarely exceeds 1.2 volts and a minimum bias of this order is recommended.

Screen Grid Voltages.

The screen grid voltage for frequency changers and beam tetrodes should be obtained from a potentiometer, the resistor values employed being as low as practicably possible so that the variation in screen current between different valves does not affect appreciably the screen voltage. This is particularly important where more than one valve is supplied from the same potentiometer. R.F. pentodes with unaligned grids may employ a series screen resistor but the resultant lengthening of the grid base should be borne in mind if A.V.C. is used.

Suppressor Grid Voltage.

The suppressor grid should normally be maintained at cathode potential but it is permissible for certain applications to connect it to the negative end of the cathode resistor. In no circumstances must the suppressor grid be biased so far negative as to cause the safe screen dissipation to be exceeded nor should it be biased positively unless the data indicates that the valve has been designed for this use. When pentodes are connected as triodes the suppressor grid should be connected to the cathode.

Magnetic Fields.

The modern trend in miniature equipment may result in valves being mounted in close proximity to the magnets of loud-speakers. The presence of a strong magnetic field will cause changes in the characteristics of the valve. The 1.4 volt battery types are particularly liable to be affected and due regard should be paid to this in the layout of equipment.

Rectifiers.

The value of limiting resistor specified includes the effective supply impedance of the mains transformer, or in certain A.C./D.C. receivers the mains dropping resistor, so that additional resistance may be required to build up to the value given. This resistance will be required to carry the R.M.S. rectifier current which will be greater than the D.C. output current by the factor indicated on p. 271. If the value of the reservoir condenser to be used is greater than the maximum specified, the limiting resistance must be increased to ensure that the peak current rating is not exceeded.

If rectifiers are to be operated in parallel a resistance of approximately 100 Ω should be connected in each anode lead to ensure balance of load distribution.

Series Operation of Filamentary Types.

In this mode of operation the total filament current is the sum of the current due to the filament supply and the anode and screen currents returning to H.T. negative via the valve filaments. It is, therefore, necessary to connect shunt resistors across each filament section to by-pass this electrode current in order to maintain the correct filament voltage.

Base Connection Symbols

Symbols used in this Manual are based on British Standard Specification No. 1409.

ELECTRODE SYMBOLS

a = anode.
a′, a″ etc., = anode 1, anode 2 etc.
bp = beam plates.
g = grid.
g_1, g_2 etc. = grid 1, grid 2 etc.
h = heater.
f = filament.
k = cathode.
t = fluorescent target.
s = internal shield.
M = external metalizing

VALVE SYMBOLS

The following symbols are used to distinguish between two or more sections in the same valve :—

d = diode.
h = hexode or heptode.
p = pentode.
q = tetrode.
r = rectifier.
t = triode.

Example g_{2h} = 2nd grid of the hexode section.

The following symbols are used to distinguish between similar electrodes in two or more sections in the same valve.

Example :

a′ = anode of Section 1
a″ = „ „ „ 2
g_1' = grid 1 of Section 1
g_1'' = „ 1 „ „ 2

OTHER SYMBOLS

*IC = internal connection.
NC = no connection.
NP = no pin.
J = jumper.
SC = side contact.
TC = top contact.

*Pin marked IC—in no circumstances should this pin be employed. The valve maker is at liberty to make any internal connection to pins so labelled.

List of Obsolete Types Deleted

To relieve congestion the following obsolete types have been deleted from the No. 7 Brimar Valve and Teletube Manual :

1A4E	6L7G	12SJ7	35Z3
1A6	6N6G	12SK7	35Z5GT
1C6	6P8G	12SQ7	36
1LA4E	6SA7	12SR7	37
1LA6E	6SG7	12Z3	39/44
1LD5	6SH7	18	41/41E
1LH4	6SJ7	19	42, 42E
1LN5	6SK7	20A1	45
1N5G/GT	6SQ7	24A, 24E	47, 47E
2A5	6ZY5G	25A7G	50B5
5X4G	7A7	25B8GT	70L7GT
5Y4G	7A8	25RE, 25Y5	79
6A3	7B5E	25U4GT	84/6Z4
6A6	7B8	25Z5	85
6B5	7C7	25Z6G	117L/M7GT
6B6G	8A1	27	117N7GT
6B7, 6B7E	9A1	30	117P7GT
6F5	10D1	32E	117Z3
6F7, 6F7E, 6F7B	11A2	32L7GT	117Z6GT
6G5G	12A7	34E	2151
6K5G	12SA7	35RE	R14

It is recommended that you keep your No. 6 Manual for future reference, or, if in difficulty when requiring data for these types, write to the Publicity Dept., Standard Telephones and Cables Limited, Footscray, Sidcup, Kent.

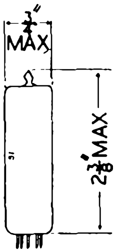
(see type VR75/30)

(see type VR105/30)

(see type VR150/30)

VALVE SECTION

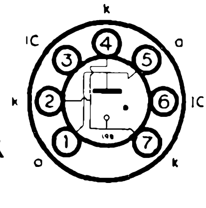
Industrial Type



TYPE **0A2**

MINIATURE

VOLTAGE REGULATOR



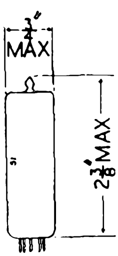
B7G Base

CHARACTERISTICS

Minimum Starting Voltage	...	185 volts
Nominal Operating Voltage	...	150 volts
Minimum Operating Current	...	5 mA
Maximum Operating Current	...	30 mA
Maximum Peak Current (10 secs. max.)	...	75 mA
Regulation (minimum to maximum currents)	Nominal ...	2 volts
	Maximum ...	6 volts

Note.—*The correct polarity must be observed, i.e. anode positive with respect to cathode.*

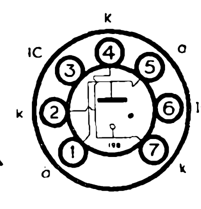
Industrial Type



TYPE **0B2**

MINIATURE

VOLTAGE REGULATOR

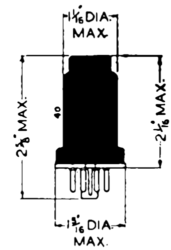


B7G Base

CHARACTERISTICS

Minimum Starting Voltage	...	133 volts
Nominal Operating Voltage	...	108 volts
Minimum Operating Current	...	5 mA
Maximum Operating Current	...	30 mA
Maximum Peak Current (10 secs. max.)	...	75 mA
Regulation (minimum to maximum currents)	Nominal ...	1 volt
	Maximum ...	4 volts

Note.—The correct polarity must be observed, i.e. anode positive with respect to cathode.



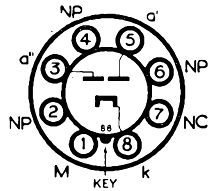
Replacement Type

TYPE 0Z4

(OCTAL BASE)

FULL-WAVE RECTIFIER

For Car Radio



OPERATING CHARACTERISTICS

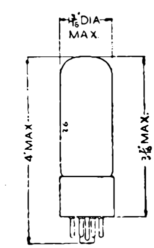
The BRIMAR type 0Z4 is a full-wave gas filled rectifier with an ionic heated cathode, no external heater supply being required.

A minimum anode to cathode potential of 300 volts peak is necessary for consistent starting and this value increases somewhat during life.

Type 0Z4 is fitted with a metal shell which must be efficiently earthed to prevent the radiation of R.F. interference to other parts of the receiver.

(*Heater supply —not required*)

Starting Peak Voltage	300 volts min.
Peak Anode to Anode Voltage	1,000 volts max.
Peak Anode Current (each anode)	200 mA max.
D.C. Output Voltage	300 volts max.
D.C. Output Current	30 mA min. 75 mA max.
Voltage Drop...	24 volts



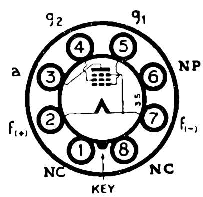
Replacement Type

TYPE 1A5G/GT

(OCTAL BASE)

LOW-DRAIN BATTERY

POWER PENTODE

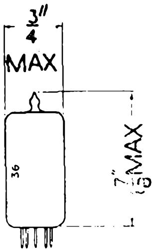


CHARACTERISTICS

Filament Voltage	1.4 volts	Grid (g_1) Voltage	–4.5 volts
Filament Current	0.05 amp.	Anode Impedance	0.3 meg.
Anode Voltage	90 volts	Mutual Conductance ...	0.85 mA/V
Anode Current	4.0 mA	Amp. Factor	255
Screen (g_2) Voltage	90 volts	Optimum Load	25,000 ohms
Screen Current	0.8 mA	Power Output	0.115 watts

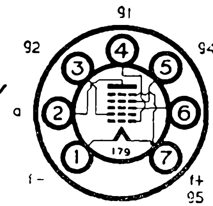
Harmonic Distortion ... 7 per cent.

Current Equipment Type



B7G Base

TYPE 1AC6
MINIATURE BATTERY HEPTODE FREQUENCY CHANGER



The BRIMAR 1AC6 is a new battery heptode frequency changer featuring improved short-wave performance and reduction in H.T. current consumption compared with type 1R5. The provision of separate connections for the oscillator anode and screen grid allow the use of conventional oscillator circuits and a much improved oscillator performance. As a self oscillating frequency changer it operates uniformly up to 30 Mc/s.

RATINGS

Filament Voltage	1.4 volts
Filament Current	0.05 amp.
Anode Voltage	90 volts max.
Screen (g_4) Voltage	90 volts max.
Oscillator Anode (g_2) Voltage	60 volts max.
Cathode Current	4 mA max.

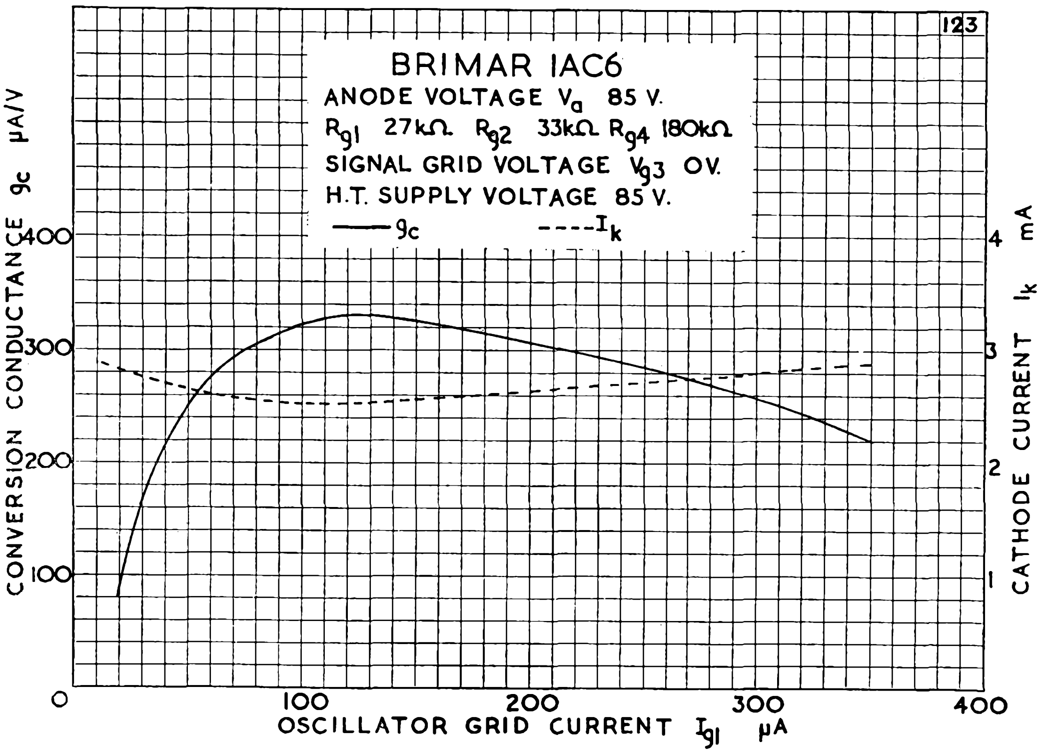
OPERATING CHARACTERISTICS

Anode Voltage	85 volts
Anode Current	0.7 mA
Screen Voltage	60 volts
Screen Current	0.15 mA
Oscillator Anode Voltage	30 volts
Oscillator Anode Current	1.6 mA
Oscillator Grid Resistor*	27kΩ
Oscillator Grid Current	115μA
Conversion Conductance	325 μA/V
Control Grid Bias (For conversion of 3.25μA/V.)	—6 volts
Anode Impedance	0.65 meg.

INTER-ELECTRODE CAPACITANCES
(with no external shield)

R.F. input ($c_{g_3,\,all}$)	7.5 pF.
I.F. output ($c_{a,\,all}$)	8.5 pF.
Oscillator input ($c_{g_1,\,all}$)	4.0 pF.
Oscillator output ($c_{g_2,\,all}$)	5.0 pF.
$c_{g_3,\,g_1}$	0.2 pF. max.
$c_{g_3,\,a}$	0.4 pF. max.

* The oscillator grid resistor should be returned to the positive filament connection pin 7.



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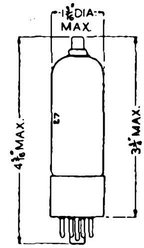
BRIMAR 1AC6
ANODE VOLTAGE V_a 85 V.
R_{g1} 27kΩ R_{g2} 33kΩ R_{g4} 180kΩ
SIGNAL GRID VOLTAGE V_{g3} 0V.
H.T. SUPPLY VOLTAGE 85 V.
—— g_c ---- I_k
CONVERSION CONDUCTANCE g_c µA/V
100
200
300
400
CATHODE CURRENT I_k mA
1
2
3
4
0
100
200
300
400
OSCILLATOR GRID CURRENT I_{g1} µA

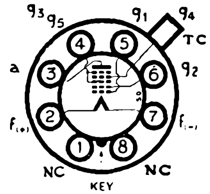
1AC6

Replacement Types

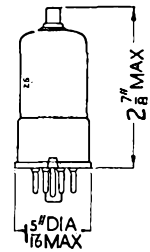
TYPES **1A7G, 1A7GT**



1A7G



Note.—Type 1A7GT *has Pin* 1 *connected to metal shell.*



1A7GT

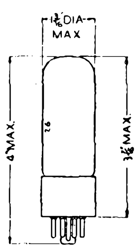
BATTERY HEPTODE FREQUENCY CHANGERS (OCTAL BASE)

CHARACTERISTICS

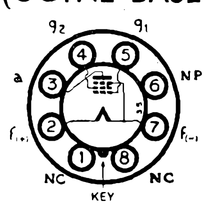
Filament Voltage	1.4 volts	Oscillator Anode Voltage ...	90 volts
Filament Current	0.05 amp.	Oscillator Anode Current ...	1.2 mA
Anode Voltage	90 volts	Oscillator Grid (g_1) Resistor	0.2 meg.
Anode Current	0.55 mA	Oscillator Grid Current ...	0.035
Screen Supply Voltage ...	90 volts	Control Grid (g_4) Voltage ...	0 volts
Screen Series Resistor ...	70,000 ohms	Anode Impedance	0.6 meg.
Screen Current	0.6 mA	Conversion Conductance ...	0.25 mA/V

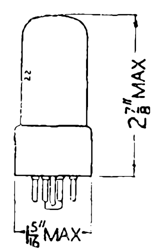
Replacement Types

TYPES **1C5G, 1C5GT**
(OCTAL BASE)



1C5G





1C5GT

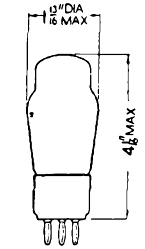
BATTERY POWER PENTODES

BRIMAR types 1C5G and 1C5GT are identical with the exception of their overall dimensions, which are shown in the drawings above.

OPERATING CHARACTERISTICS

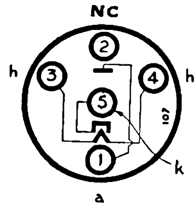
Filament Voltage	1.4 volts.	Filament Current	0.1 amps

Other characteristics as 3S4 (parallel filament connections).



Replacement Type

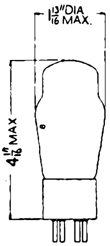
TYPE 1D5
(ENGLISH BASE)
HALF-WAVE A.C./D.C.
RECTIFIER



CHARACTERISTICS

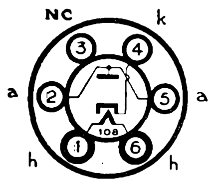
Heater Voltage ...	... ... 40 volts	R.M.S. Input	... 250 volts max.
Heater Current ...	... ... 0.2 amp.	Series Anode Limiting Resistor	50 ohms max.
Peak Inverse Voltage	... ... 700 volts max.	Rectified Current ...	... 100 mA max.
D.C. Heater-Cathode Potential	350 volts max.	Reservoir Condenser ...	... 16 μF max.

For characteristic curves refer to type 25Z4G.



Replacement Type

TYPE 1D6
(U.X. BASE)
HALF-WAVE A.C./D.C.
RECTIFIER



CHARACTERISTICS

BRIMAR type 1D6 is an indirectly heated rectifier for use in universal receivers. It is designed to replace types 25Z5, 25Y5 and 25RE where these valves are used in half-wave circuits. For voltage doubling applications two 1D6 valves are necessary.

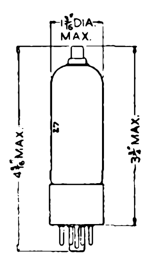
Heater Voltage ...	... ... 25 volts	Rectified Current ...	... 100 mA max.
Heater Current ...	... ... 0.3 amp.	Series Anode Limiting Resistor	50 ohms min.*
R.M.S. Input Voltage	... ... 250 volts max.	Reservoir Condenser ...	... 16 μF max.

* *For Input Voltages exceeding 117 volts R.M.S.*

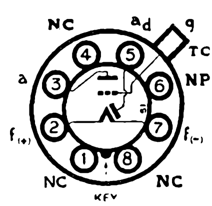
For further data concerning type 1D6 and characteristic curves refer to type 25Z4G.

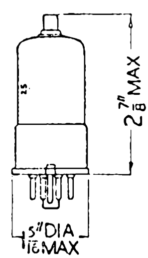
Replacement Types

TYPES 1H5G, 1H5GT
(OCTAL BASE)



1H5G





1H5GT

Note.—Type 1H5GT has Pin 1 connected to metal shell.

BATTERY SINGLE DIODE TRIODES

BRIMAR types 1H5G and 1H5GT are identical with the exception of their overall dimensions which are given in the drawings above.

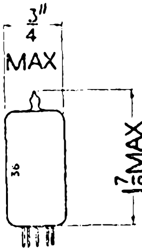
RATINGS

Filament Voltage ...	... 1.4 volts	Anode Voltage ...	... 110 volts max.
Filament Current ...	... 0.05 amp.		

CHARACTERISTICS

Anode Voltage ...	... ... 90 volts	Mutual Conductance ...	... 0.275 mA/V
Anode Current ...	... ... 0.15 mA	Anode Impedance ...	... 0.24 meg
Control Grid Voltage ..	... 0 volts*	Amplification Factor ...	... 65

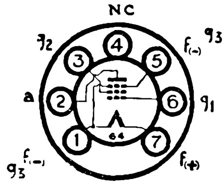
* *Grid returned to negative filament (Pin 7).*



B7G Base

Current Equipment Type

TYPE 1L4
MINIATURE BATTERY
R.F. PENTODE



BRIMAR type 1L4 may be used as R.F. or I.F. amplifier in stages where A.V.C. is not applied. It is also suitable for R.C. coupled A.F. amplifier operation.

RATINGS

Filament Voltage	1.4 volts
Filament Current	0.05 amp
Anode Voltage	110 volts max.
Screen (g_2) Voltage	90 volts max.
Cathode Current	6.5 mA max.

CHARACTERISTICS

Anode Voltage	90	90	volts
Anode Current...	2.9	4.5	mA
Screen Voltage	67.5	90	volts
Screen Current...	1.2	2.0	mA
Control Grid (g_1) Voltage	0	0	volts*
Mutual Conductance	0.93	1.03	mA/V
Anode Impedance	0.6	0.35	meg.
Control Grid Voltage	—6	—8	volts

(For Anode current of 0.01 mA)

RESISTANCE COUPLED OPERATION

Anode and Screen Supply Voltages ...	45	67.5	90	volts
Anode Load Resistor	0.5	0.5	1.0	meg.
Screen Series Resistor	0.66	1.5	2.0	meg.
Control Grid Resistor	1.0	1.0	1.0	meg.*
Peak Output	17	30	35	volts
Voltage Gain	30	45	55	—

(For 6 volts peak output, distortion 2%)

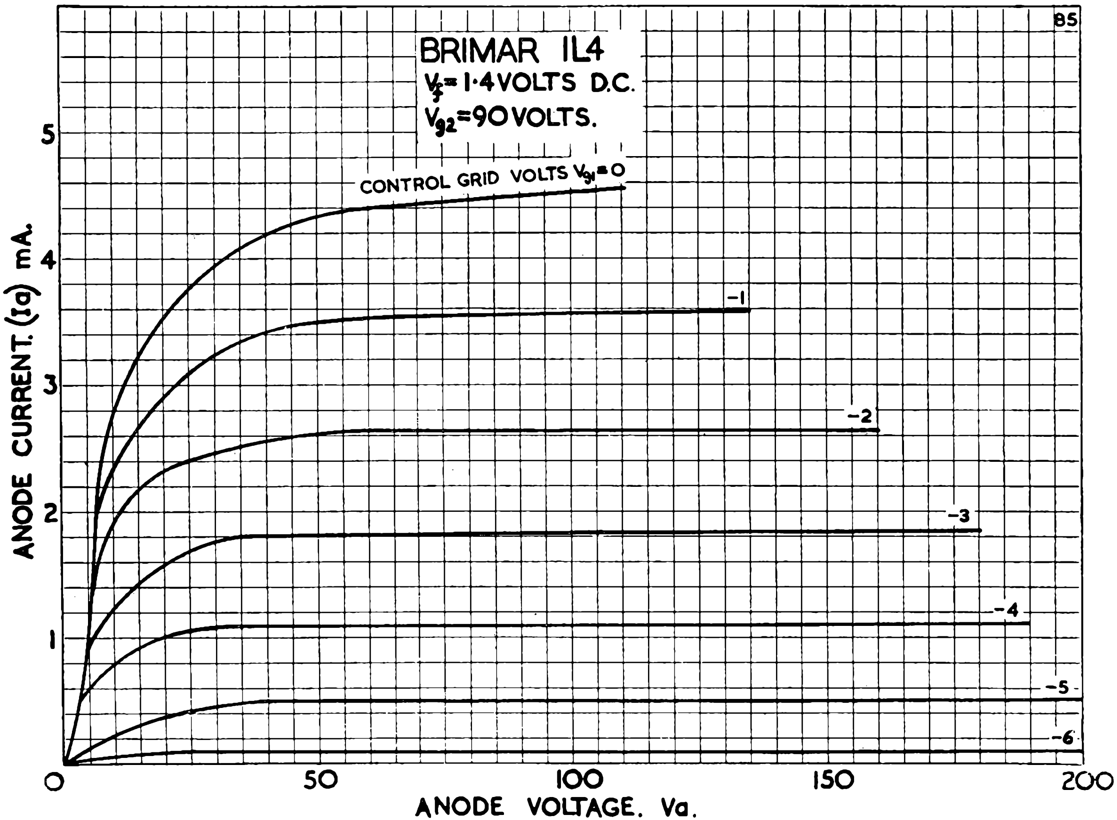
**The Grid return should be made to negative filament (pin 1) via a resistance of at least 0.5 meg. to minimize variations due to contact potential.*

INTER-ELECTRODE CAPACITANCES †

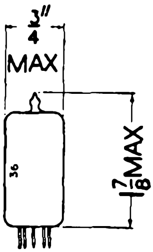
Input	3.6 pF
Output	7.5 pF
Control Grid to Anode	0.008 pF max.

† *With no external shield.*

Type 1L4 is a commercial equivalent to the CV1758


BRIMAR 1L4
V_f = 1·4 VOLTS D.C.
V_{g2} = 90 VOLTS.
85
CONTROL GRID VOLTS V_{g1} = 0
−1
−2
−3
−4
−5
−6
ANODE CURRENT. (Ia) mA.
0
1
2
3
4
5
50
100
150
200
ANODE VOLTAGE. Va.

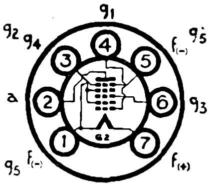
1L4



B7G Base

Current Equipment Type

TYPE **1R5**
MINIATURE
BATTERY HEPTODE
FREQUENCY CHANGER



BRIMAR type 1R5 is a miniature battery operated frequency changer particularly suitable for all-wave receivers. The control grid (g_3) has vari-mu characteristics and A.V.C. may be applied. When used in the recommended circuits type 1R5 has a high effective oscillator slope and will operate satisfactorily at frequencies up to 20 Mc/s. Its small size and low filament drain features are particularly applicable to compact lightweight equipment.

RATINGS

Filament Voltage	1.4 volts
Filament Current	0.05 amp.
Anode Voltage	90 volts max.
Screen (g_2, g_4) Voltage	67.5 volts max.
Cathode Current	5.5 mA max.

OPERATING CHARACTERISTICS

Anode Voltage	45	90	90	volts
Anode Current	0.7	0.8	1.6	mA
Screen Voltage	45	45	67.5	volts
Screen Current	1.9	1.9	3.2	mA
Oscillator Grid (g_1) Resistor	0.1	0.1	0.1	meg.
Oscillator Grid Current	0.15	0.15	0.25	mA
Control Grid (g_3) Voltage	0	0	0	volts
Anode Impedance	0.6	0.8	0.6	meg.
Conversion Conductance	0.24	0.25	0.3	mA/V
Control Grid Bias	–9	–9	–14	volts

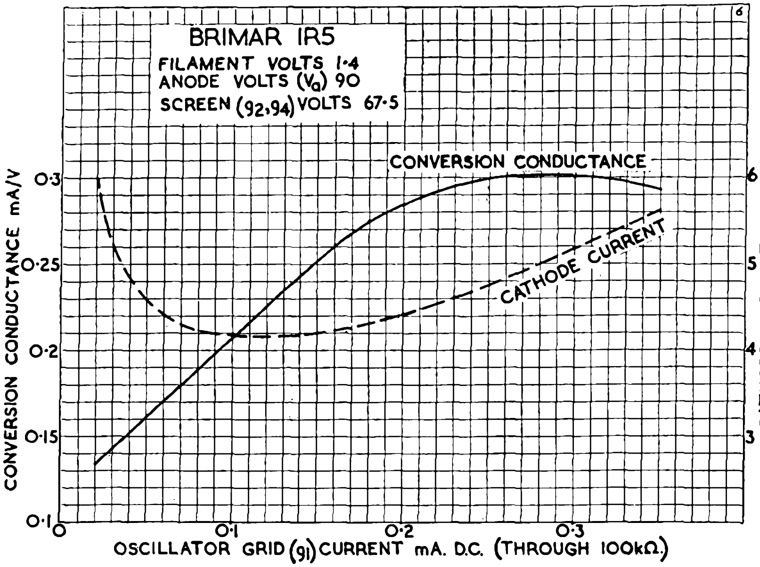
(For conversion conductance of 0.005 mA/V)

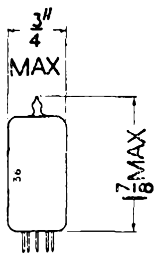
INTER-ELECTRODE CAPACITANCES *

R.F. Input (Control Grid to all other electrodes)	7.0 pF
I.F. Output (Anode to all other electrodes)	7.0 pF
Oscillator Input (Oscillator Grid to other electrodes)	3.8 pF
Control Grid to Oscillator Grid	0.2 pF max.
Oscillator Grid to Anode	0.1 pF max.
Control Grid to Anode	0.4 pF max.

** With no external shield.*

Type 1R5 is a commercial equivalent to the CV782.



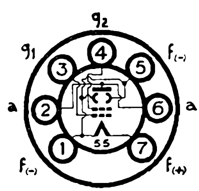


B7G Base

Replacement Type

TYPE 1S4

MINIATURE BATTERY OUTPUT BEAM TETRODE



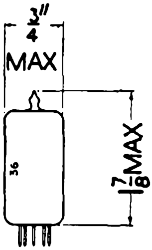
BRIMAR type 1S4 is one of the range of miniature battery valves introduced for replacement use in existing "personal" receivers. It has now been superseded by type 3S4.

RATINGS

Filament Voltage	1.4 volts
Filament Current	0.1 amp.

For characteristics refer to type 3S4 (parallel filament connection).

Type 1S4 is a commercial equivalent to the CV783

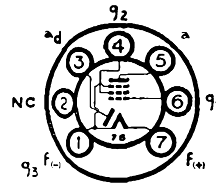


B7G Base

Current Equipment Type

TYPE 1S5

MINIATURE BATTERY DIODE PENTODE



BRIMAR type 1S5 is one of the series of miniature battery valves introduced for portable radio equipment. It is designed for use as detector, A.V.C. and audio amplifier valve in superheterodyne receivers. Special care has been taken in the manufacture of type 1S5 to reduce noise and microphony to a low level.

RATINGS

Filament Voltage	1.4 volts
Filament Current	0.05 amp.
Anode Voltage	90 volts max.
Screen (g_2) Voltage	90 volts max.
Cathode Current	3.0 mA max.

CHARACTERISTICS

Anode Voltage	45	67.5 volts
Anode Current	0.75	1.6 mA
Screen Voltage	45	67.5 volts
Screen Current	0.18	0.4 mA
Control Grid (g_1) Voltage	0	0 volts*
Mutual Conductance	0.50	0.625 mA/V
Anode Impedance	1.0	0.6 meg.

RESISTANCE COUPLED OPERATION

Anode and Screen Supply Voltage ...	45	67.5	90	volts
Anode Load Resistor	1.0	1.0	1.0	meg.
Screen Series Resistor	1.9	2.2	2.5	meg.
Control Grid Resistor	10	10	10	meg.*
Peak Output	14	17	31	volts
Voltage gain	31	36	45	

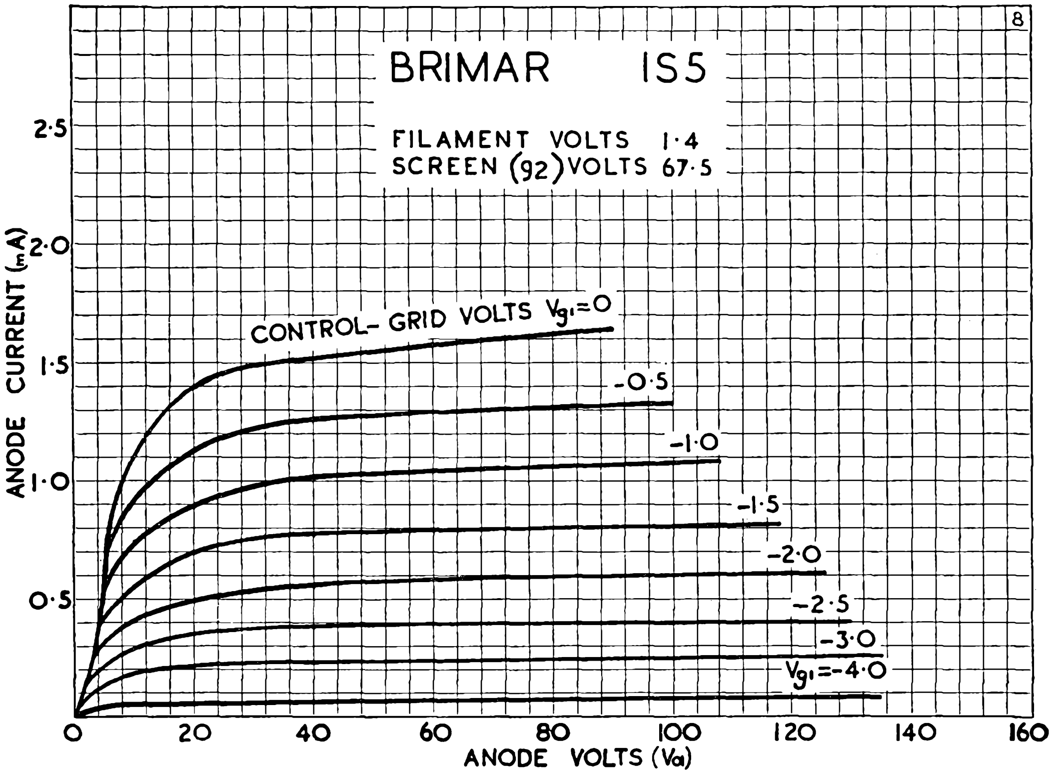
* *Control grid return taken to negative filament (Pin 1).*

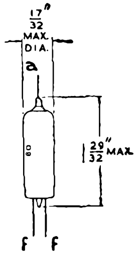
INTER-ELECTRODE CAPACITANCES †

Input	2.2 pF
Output	2.4 pF
Control Grid to Anode	0.2 pF
Diode to all other electrodes	3.0 pF

† *With no external shield.*

Type 1S5 is a commercial equivalent to the CV784


8
BRIMAR 1S5
FILAMENT VOLTS 1·4
SCREEN (g2) VOLTS 67·5
CONTROL- GRID VOLTS Vg1=0
-0·5
-1·0
-1·5
-2·0
-2·5
-3·0
Vg1=-4·0
ANODE CURRENT (mA)
2·5
2·0
1·5
1·0
0·5
0
20
40
60
80
100
120
140
160
ANODE VOLTS (Va)



Replacement Type

TYPE **1T2/R16**
(WIRE ENDED)
HIGH VOLTAGE
RECTIFIER

The BRIMAR type 1T2/R16 is a directly heated half-wave rectifier designed for use in the E.H.T. supply of television receivers. The low filament consumption permits operation from the line fly-back pulses, while the absence of base enables the valve to be wired close to the line output transformer.

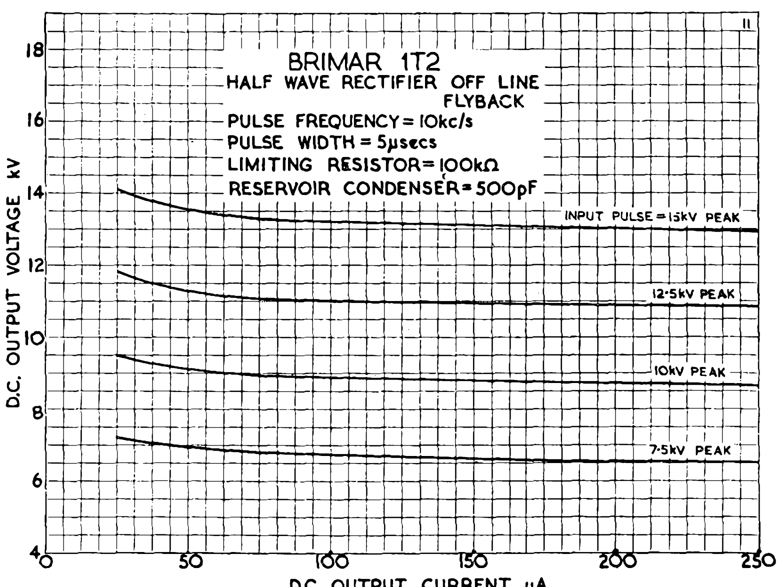
RATINGS

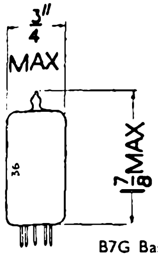
Filament Voltage	1.4 volts*
Filament Current	0.14 amp.
Peak Inverse Voltage	15 kV. max.
Peak Anode Current	12 mA max.
Direct Anode Current	2 mA max.

INTER-ELECTRODE CAPACITANCES

Anode to Filament (c_a, f)	0.65 pF

** Correct filament operation is essential in order to secure long life. Filament temperature during normal operation may be compared with that of a second valve running from a low frequency filament supply whose voltage can be accurately measured. At least 1 inch of leads should be allowed when soldering the valve into position to avoid damage to the glass seals.*

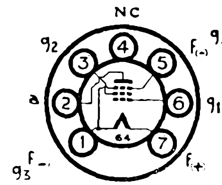




B7G Base

Current Equipment Type

TYPE 1T4
MINIATURE VARI-MU
BATTERY R.F. PENTODE



BRIMAR type 1T4 is one of the series of miniature battery valves introduced for portable radio equipment. It is suitable for the R.F. or I.F. stages of receivers employing A.V.C. Type 1T4 is well screened internally and will function satisfactorily as a high gain amplifier in deaf aid or other audio apparatus.

RATINGS

Filament Voltage	1.4 volts
Filament Current	0.05 amp.
Anode Voltage	90 volts max.
Screen (g_2) Voltage	67.5 volts max.
Cathode Current	5.5 mA max.

CHARACTERISTICS

Anode Voltage	45	90	90	volts
Anode Current	1.7	1.8	3.5	mA
Screen Voltage	45	45	67.5	volts
Screen Current	0.7	0.65	1.4	mA
Control Grid (g_1) Voltage	0	0	0	volts*
Mutual Conductance	0.7	0.75	0.9	mA/V
Anode Impedance	0.35	0.8	0.5	meg.
Control Grid Bias	–10	–10	–16	volts
(for Mutual Conductance of 0.01 mA/V).				

RESISTANCE COUPLED OPERATION

Anode and Screen Supply Voltages ...	45	67.5	90	volts
Anode Load Resistor	0.5	0.5	0.5	meg.
Screen Series Resistor	0.75	1.0	1.0	meg.
Control Grid Resistor	1.0	1.0	1.0	meg.*
Peak Output	7.5	15	20	volts
Voltage Gain	30	50	56	

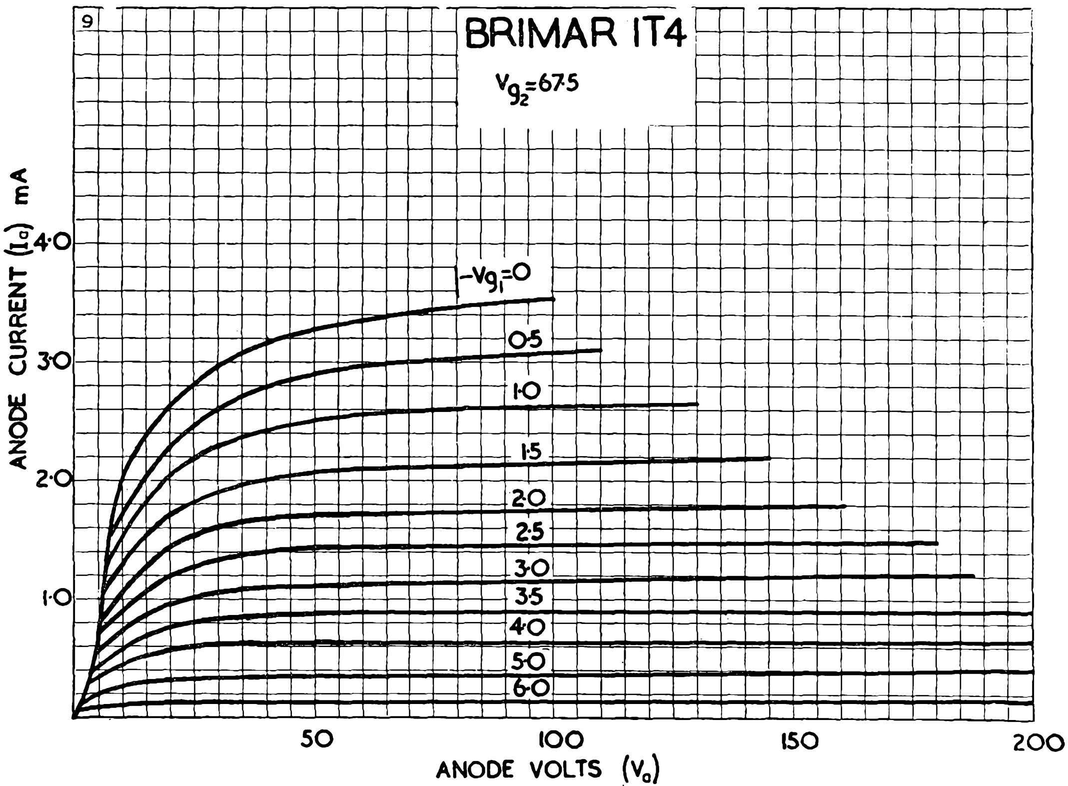
* *Control grid return taken to negative filament (Pin 1).*

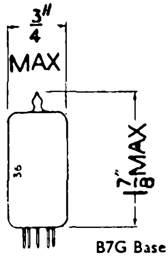
INTER-ELECTRODE CAPACITANCES †

Input	3.6 pF
Output	7.5 pF
Control Grid to Anode	0.01 pF max.

† *With external shield connected to Pin 1.*

Type 1T4 is a commercial equivalent to the CV785

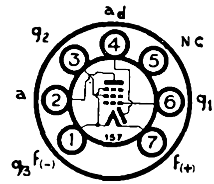

9
BRIMAR 1T4
V_{g_2}=67·5
$-V_{g_1}$=0
0·5
1·0
1·5
2·0
2·5
3·0
3·5
4·0
5·0
6·0
ANODE CURRENT (I_a) mA
4·0
3·0
2·0
1·0
50
100
150
200
ANODE VOLTS (V_a)



B7G Base

Current Equipment Type

TYPE 1U5
MINIATURE BATTERY DIODE PENTODE

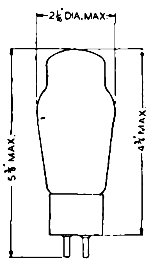


BRIMAR type 1U5 features low microphony and reduced feedback. The electrical characteristics are similar to those of type 1S5 but the new pin connections permit a more rugged structure and better internal shielding.

RATINGS

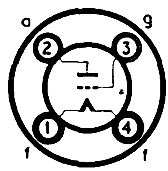
Filament Voltage	1.4 volts	Filament Current	0.05 amp.
Grid to Diode Capacity ...	0.03 pF	Grid to Anode Capacity ...	0.1 pF

All other characteristics are identical to those of type 1S5.



Replacement Type

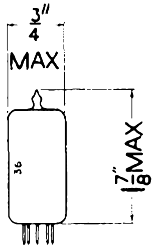
TYPE 2A3
(U.X. BASE)
POWER TRIODE



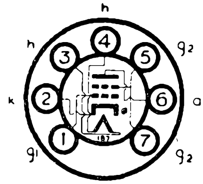
CHARACTERISTICS (CLASS "A")

Filament Voltage	2.5 volts	Cathode Bias Resistor ...	750 ohms
Filament Current	2.5 amp.	Mutual Conductance ...	5.2 mA/V
Anode Voltage	250 volts	Anode Impedance	800 ohms
Anode Current	60 mA	Optimum Load	2,500 ohms
Control Grid Voltage ...	−45 volts	Power Output	3.5 watts

Industrial Type



TYPE 2D21
MINIATURE
HOT CATHODE
GAS FILLED
THYRATRON



RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.6 amp.
Cathode Heating Time ...	10 secs. min.
Peak Forward Anode Voltage ...	650 volts max.
Peak Inverse Voltage ...	1,300 volts max.
Peak Screen Grid Voltage before Conduction ...	–100 volts max.
†Average Voltage during Conduction ...	–10 volts max.
Peak Control Grid Voltage before Conduction ...	–100 volts max.
Peak Cathode Current ...	0.5 amp. max.
†Average Cathode Current ...	0.1 amp. max.
Surge Current (Duration 0.1 sec. max.) ...	10 amps. max.
†Average Screen Current ...	0.01 amp. max.
†Average Control Grid Current ...	0.01 amp. max.
Grid Circuit Resistance ...	10 MΩ max.
Peak Heater-Cathode Voltage, Heater Negative ...	100 volts max.
Peak Heater-Cathode Voltage, Heater Positive ...	25 volts max.
Ambient Temperature Range ...	–75°C. to 90°C.

† *Averaged over any interval of 30 seconds.*

OPERATING CHARACTERISTICS

Voltage Drop ...	8 volts approx.
Control Grid Control Ratio ($Rg_1 = 0\,\Omega$) ...	250 approx.
Screen Grid Control Ratio ($Rg_2 = 0\,\Omega$) ...	1,000 approx.

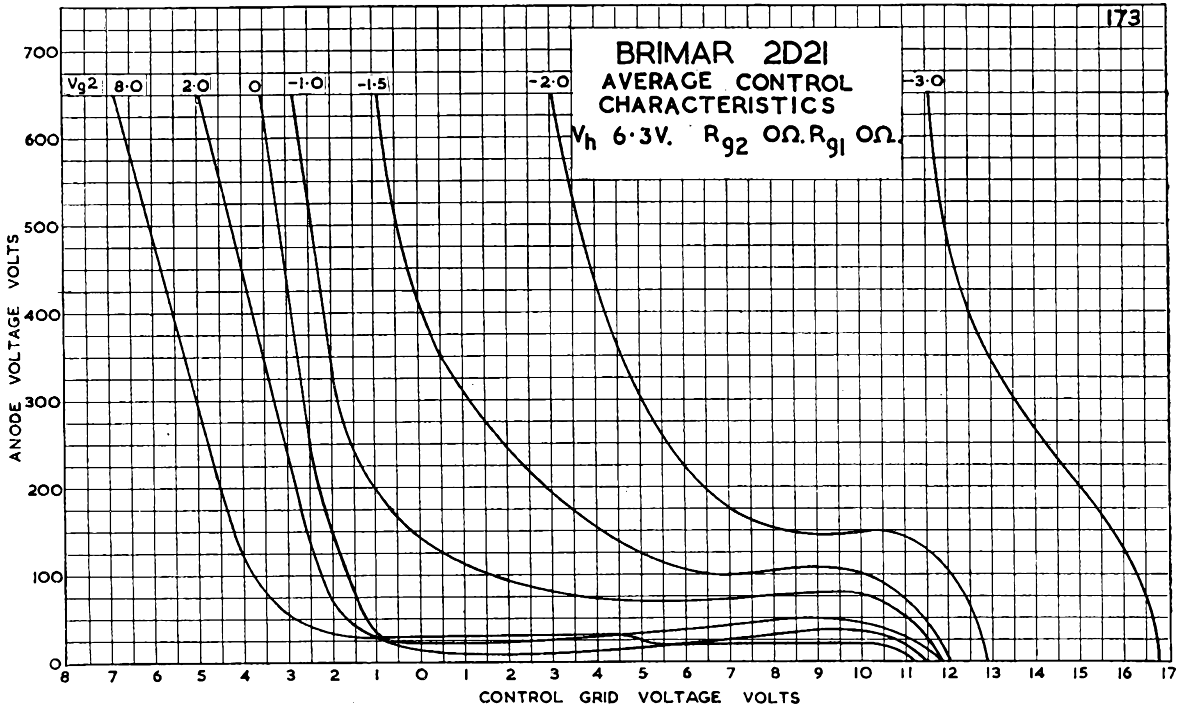
RELAY SERVICE

Anode Voltage ...	117	460	volts R.M.S.
Direct Screen Grid Voltage ...	0	0	volts
Control Grid Voltage (180° out of phase with Va) ...	5	—	volts R.M.S.
Direct Control Grid Voltage ...	—	-6	volts
Control Grid Signal Voltage ...	5	6	volts peak
Control Grid Circuit Resistance ...	1.0	1.0	MΩ
*Anode Circuit Resistance ...	1.2	2.0	kΩ

* *Anode circuit resistance, including the valve load, must be sufficient to prevent the cathode current from exceeding the valve ratings.*

INTER-ELECTRODE CAPACITANCES

Grid to Anode ...	0.026 pF	Output ...	1.6 pF
Input ...	2.4 pF		


173
BRIMAR 2D21
AVERAGE CONTROL CHARACTERISTICS
Vh 6·3V. Rg2 0Ω. Rg1 0Ω.
Vg2
8·0
2·0
0
-1·0
-1·5
-2·0
-3·0
ANODE VOLTAGE VOLTS
700
600
500
400
300
200
100
0
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
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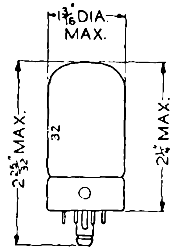
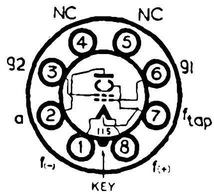
15
16
17
CONTROL GRID VOLTAGE VOLTS



Replacement Type

TYPE 3D6 (LOCTAL BASE) BATTERY OUTPUT BEAM TETRODE

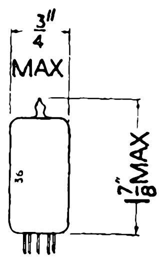


RATINGS

Filament Voltage	2.8	or 1.4	volts
Filament Current	0.11	or 0.22	amp.
Anode Voltage		180	volts max. (Absolute)
Screen (g_2) Voltage		135	volts max.
Cathode Current		30	mA max.

OPERATING CHARACTERISTICS (Parallel Filaments)

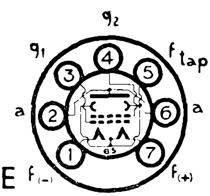
Anode Voltage	90	135	volts
Anode Current	9.5	9.8	mA
Screen Voltage	90	90	volts
Screen Current	1.6	1.2	mA
Control Grid (g_1) Voltage	–4.5	–4.5	volts
Anode Impedance	0.10	0.15	meg.
Mutual Conductance	2.4	2.4	mA/V
Optimum Load	8,000	12,000	ohms
Power Output	0.27	0.5	watts



B7G Base

Replacement Type

TYPE 3Q4 MINIATURE BATTERY OUTPUT BEAM TETRODE



Except for the base connections, type 3Q4 is identical to type 3V4, to which reference should be made

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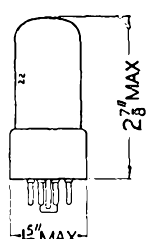
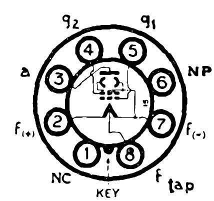
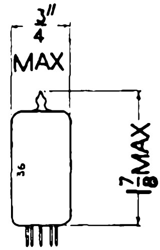


Replacement Type

TYPE 3Q5GT BATTERY OUTPUT BEAM TETRODE



For characteristics refer to type 3V4.

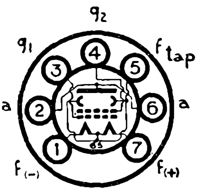


B7G Base

Replacement Type

TYPE 3S4

MINIATURE BATTERY OUTPUT BEAM TETRODE



BRIMAR type 3S4 completes the range of miniature valves for use in battery receivers and compact portable equipment. The filament is in two sections which may be series or parallel connected. When series connected type 3S4 may be used in conjunction with other valves in the range and the filament operated from a high voltage source where the current is limited to 50 mA. When parallel connected this valve has indentical characteristics to BRIMAR type 1S4 which it supersedes.

RATINGS

	Parallel Filaments	Series Filaments†	
Filament Voltage	1.4	2.8	volts
Filament Current	0.1	0.05	amp.
Anode Voltage	90	90	volts max.
Screen (g_2) Voltage	67.5	67.5	volts max.
Cathode Current (no signal) ...	9.0	4.5††	mA max.
Cathode Current (max. signal) ...	11.0	5.5††	mA max.

OPERATING CHARACTERISTICS

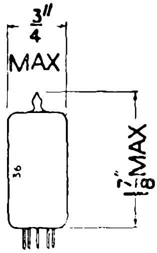
	Parallel Filaments		Series Filaments†		
Anode Voltage	67.5	90	67.5	90	volts
Anode Current	7.2	7.4	6.0	6.1	mA
Screen Voltage	67.5	67.5	67.5	67.5	volts
Screen Current	1.5	1.4	1.2	1.1	mA
Control Grid (g_1) Voltage ...	−7.0	−7.0	−7.0	−7.0	volts*
Mutual Conductance	1.55	1.575	1.4	1.425	mA/V
Anode Impedance	0.1	0.1	0.1	0.1	meg.
Optimum Load	5,000	8,000	5,000	8,000	ohms
Power Output	0.18	0.27	0.16	0.235	watts
Harmonic Distortion	10	12	12	13	per cent.

† *For series operation of the sections, a shunting resistor must be connected across the section between Pins No. 1 and No. 5 to by-pass any cathode current in excess of the rated maximum per section. When other tubes in series-filament arrangement contribute to the filament current of the 3S4, an additional shunting resistor may be required between Pins 1 and No. 7.*

†† *Values are for each 1.4 volt section.*

* *Control grid volts measured from negative filament (Pin 5 in parallel connection, Pin 1 in series connection).*

Type 3S4 is a commercial equivalent to the CV820



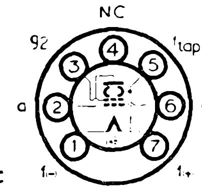
B7G Base

Current Equipment Type

TYPE 3V4

BATTERY

OUTPUT BEAM TETRODE



BRIMAR type 3V4 is an output valve for use in battery and A.C./D.C. Battery receivers where the H.T. supply is 90 volts. Compared with type 3S4 it features increased power sensitivity and reduced harmonic distortion.

RATINGS

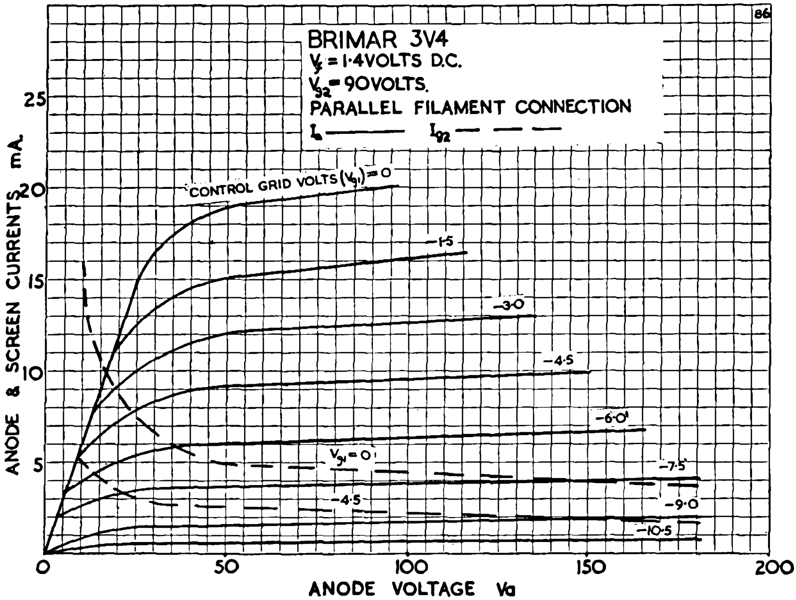
	Series Filaments †	Parallel Filaments	
Filament Voltage	2.8	1.4	volts
Filament Current	0.05	0.1	amp.
Anode Voltage	90	90	volts max.
Screen (g_2) Voltage	90	90	volts max.
Cathode Current	6 *	12	mA max.

OPERATING CHARACTERISTICS

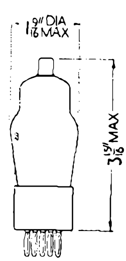
	Series Filaments †	Parallel Filaments	
Anode Voltage	90	90	volts
Anode Current	7.7	9.5	mA
Screen Voltage	90	90	volts
Screen Current	1.7	2.1	mA
Control Grid (g_1) Voltage	—4.5	—4.5	volts
Mutual Conductance	2.0	2.15	mA/V
Anode Impedance	0.12	0.1	meg.
Optimum Load	10,000	10,000	ohms.
Power Output	0.24	0.27	watts
Harmonic Distortion	7	7	per cent.

† *For series operation of the sections, a shunting resistor must be connected across the section between Pins No. 1 and No. 5 to by-pass any cathode current in excess of the rated maximum per section. When other types in series-filament arrangement contribute to the filament current of the 3V4, an additional shunting resistor may be required between Pins No. 1 and No. 7.*

* *Values are for each 1.4 volt section.*

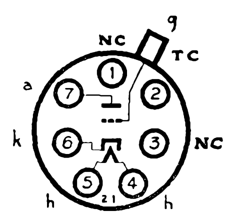


Replacement Type



TYPE **4D1**

(ENGLISH BASE) GENERAL PURPOSE TRIODE



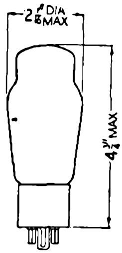
CHARACTERISTICS

Heater Voltage	13 volts	Cathode Bias Resistor ...	300 ohms
Heater Current	0.2 amp.	Mutual Conductance ...	4.0 mA/V
Anode Voltage	250 volts max.	Anode Impedance ...	10,000 ohms
Anode Current	10 mA	Amplification Factor ...	40
Control Grid Voltage	—3 volts		

OPERATION AS LEAKY GRID DETECTOR

Anode Supply Voltage	250 volts	Grid Condenser	200 pF
Anode Load Resistor	25,000 ohms	Grid Leak	1—2 meg.

5R4GY

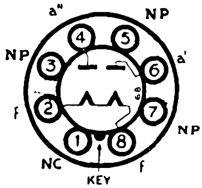


Industrial Type

TYPE **5R4GY**

(OCTAL BASE)

FULL-WAVE RECTIFIER



The BRIMAR type 5R4GY is a directly heated full-wave rectifier for use in A.C. mains equipment where a large output is required.

RATINGS

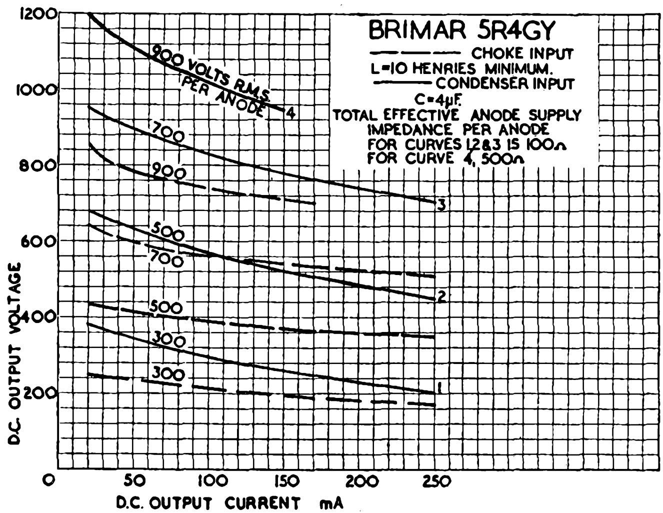
Filament Voltage	5.0 volts		
Filament Current	2.0 amp.		
Peak Current (each Anode)	650 mA max.		
Peak Inverse Voltage (no load)	2,100	2,400	2,800 volts max.
Rectified Current (Condenser Input) ...	250	175	150 mA max.
Rectified Current (Choke Input)	250	250	175 mA max.

CHARACTERISTICS AS FULL-WAVE RECTIFIER

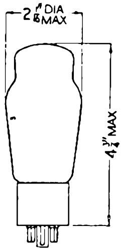
	Condenser Input*		Choke Input		
R.M.S. Input per Anode	750	1,000	850	1,000	volts max.
Supply Impedance per Anode	250	575	–	–	ohms min.
Reservoir Condenser	4	4	–	–	µF max.
Input Choke Inductance	–	–	5	10	Henries min.
Rectified Current...	250	150	250	175	mA max.

* *NOTE :—DELAYED SWITCHING of approximately 10 seconds MUST BE EMPLOYED when the following ratings are exceeded with a condenser input Filter.*

550 volts R.M.S. at 250 mA D.C.	700 volts R.M.S. at 150 mA D.C.
600 volts R.M.S. at 200 mA D.C.	800 volts R.M.S. at 115 mA D.C.
650 volts R.M.S. at 175 mA D.C.	900 volts R.M.S. at 75 mA D.C.

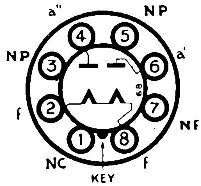


CD36



Current Equipment Type

TYPE 5U4G
(OCTAL BASE)
FULL-WAVE RECTIFIER



The BRIMAR type 5U4G is a full-wave directly heated rectifier for use in A.C. equipments which require more power than type 5V4G will provide.

RATINGS

Filament Voltage	5.0 volts
Filament Current	3.0 amp.
Peak Inverse Voltage	1,550 volts max.
Peak Current (each Anode)	675 mA max.

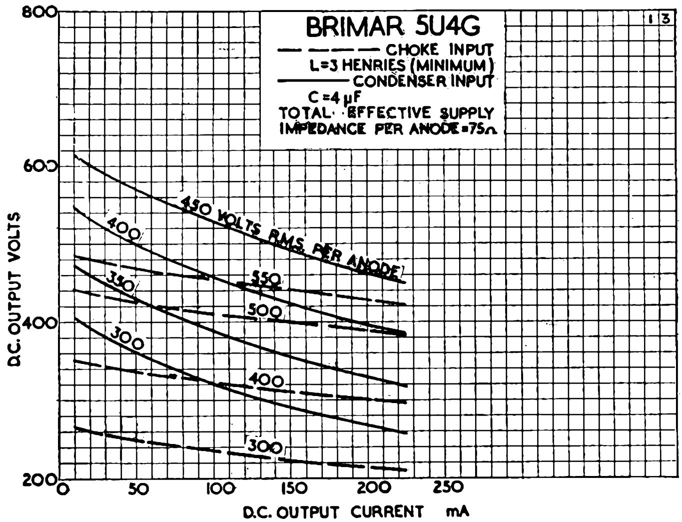
CHARACTERISTICS AS FULL-WAVE RECTIFIER

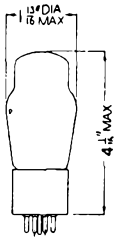
CONDENSER INPUT

R.M.S. Input per Anode	450 volts max.
Supply Impedance per Anode...	75 ohms min.
Rectified Current	225 mA max.
Reservoir Condenser	32 μF max.

CHOKE INPUT

R.M.S. Input per Anode	550 volts max.
Input Choke Inductance	3 Henries min.
Rectified Current	225 mA max.



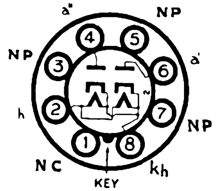


Current Equipment Type

TYPE 5V4G

(OCTAL BASE)

FULL-WAVE RECTIFIER



The BRIMAR type 5V4G is an indirectly heated full-wave rectifier for operation from A.C. mains. It will provide rather more output current than type 5Z4G and has a lower internal impedance.

RATINGS

Heater Voltage ...	5.0 volts
Heater Current...	2.0 amp.
Peak Inverse Voltage ...	1,400 volts max.
Peak Current (each Anode) ...	525 mA max.

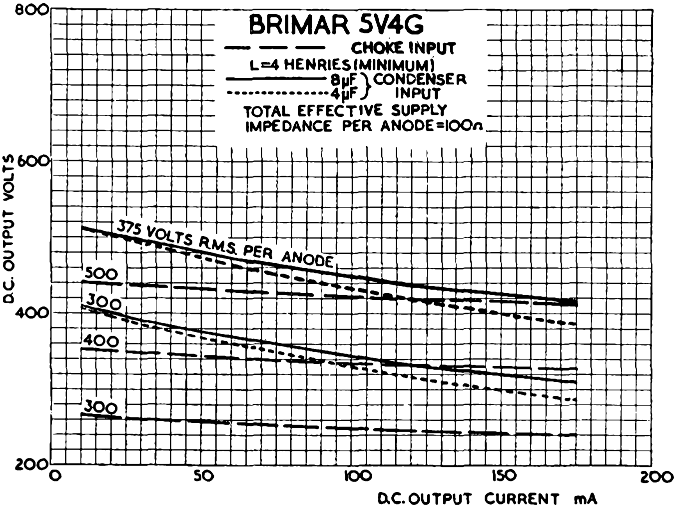
CHARACTERISTICS AS FULL-WAVE RECTIFIER

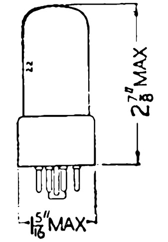
CONDENSER INPUT

R.M.S. Input per Anode ...	375 volts max.
Supply Impedance per Anode...	100 ohms min.
Rectified Current ...	175 mA max.
Reservoir Condenser ...	32 μF max.

CHOKE INPUT

R.M.S Input per Anode ...	500 volts max.
Input Choke Inductance ...	4 Henries min.
Rectified Current ...	175 mA max.



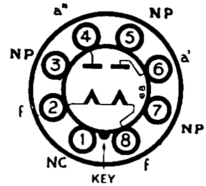


Current Equipment Type

TYPE 5Y3GT

(OCTAL BASE)

FULL-WAVE RECTIFIER



The BRIMAR type 5Y3GT is a directly heated full-wave rectifier for A.C. mains equipment of moderate power requirements.

RATINGS

Filament Voltage	5.0 volts
Filament Current	2.0 amp.
Peak Inverse Voltage	1,400 volts max.
Peak Current (each Anode)	400 mA max.

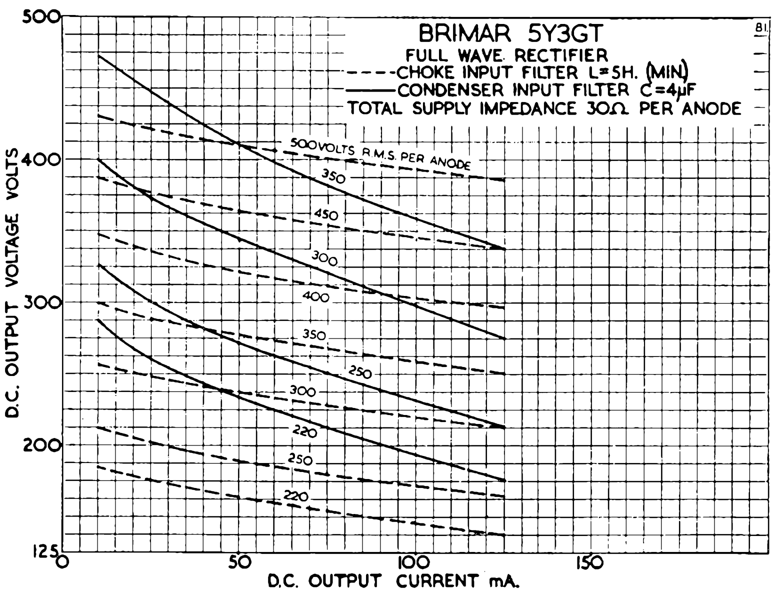
OPERATION AS FULL-WAVE RECTIFIER

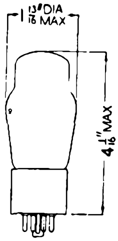
CONDENSER INPUT

R.M.S. Input per Anode	350 volts max.
Supply Impedance per Anode...	30 ohms. min.
Rectified Current	125 mA max.
Reservoir Condenser	32 μF max.

CHOKE INPUT

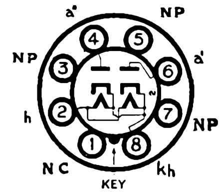
R.M.S. Input per Anode	500 volts max.
Input Choke Inductance	10 Henries min.
Rectified Current	125 mA max.





Current Equipment Type

TYPE 5Z4G
(OCTAL BASE)
FULL-WAVE RECTIFIER



The BRIMAR type 5Z4G is an indirectly heated full-wave rectifier for A.C. mains operation.

RATINGS

Heater Voltage	5.0 volts
Heater Current...	2.0 amp.
Peak Inverse Voltage	1,400 volts max.
Peak Current (each Anode)	375 mA max.

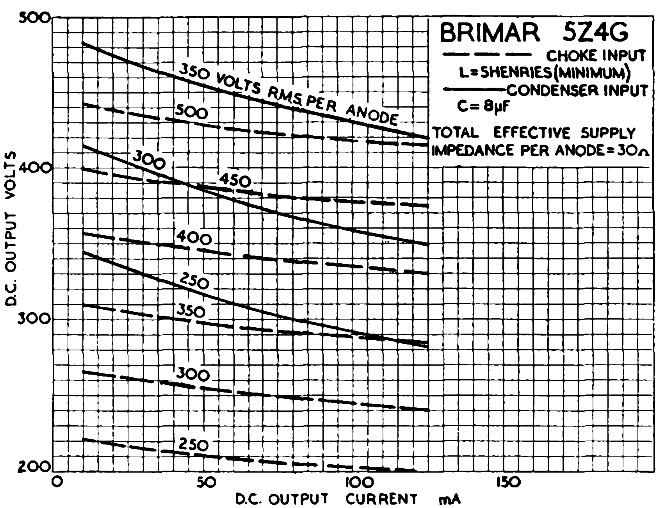
CHARACTERISTICS AS FULL-WAVE RECTIFIER

CONDENSER INPUT

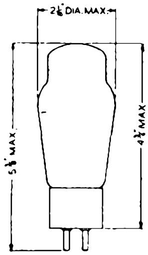
R.M.S. Input per Anode	350 volts max.
Supply Impedance per Anode...	30 ohms min.
Rectified Current	125 mA max.
Reservoir Condenser	32 μF max.

CHOKE INPUT

R.M.S. Input per Anode	500 volts max.
Input Choke Inductance	5 Henries min.
Rectified Current	125 mA max.



CD13

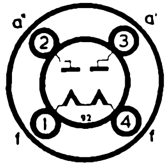


Replacement Type

TYPE 5Z3

(U.X. BASE)

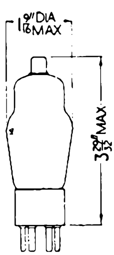
FULL-WAVE RECTIFIER



CHARACTERISTICS

Filament Voltage	5.0 volts
Filament Current	3.0 amp. max.
Peak Inverse Voltage...	1,550 volts
Peak Current per Anode	675 mA max.
R.M.S. Input per Anode	450 volts max.
Supply Impedance per Anode	75 ohms min.
Rectified Current	225 mA max.
Reservoir Condenser	32 μF max.

For characteristic curves refer to type 5U4G



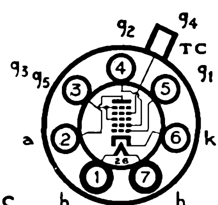
Replacement Types

TYPES **6A7, 6A7E**

(U.X. BASE)

HEPTODE

FREQUENCY CHANGERS



CHARACTERISTICS

Heater Voltage ... ... 6.3 volts Heater Current ... ... 0.3 amp.

INTER-ELECTRODE CAPACITANCES*

R.F. Input ...	8.5 pF	Control Grid (g_4) to Oscillator Grid (g_1) ...	0.15 pF
I.F. Output ...	9.0 pF	Control Grid to Anode	0.3 pF
Oscillator Input ...	7.0 pF	Control Grid to Oscillator Anode (g_2)	0.15 pF
Oscillator Output...	5.5 pF	Oscillator Grid to Oscillator Anode	1.0 pF

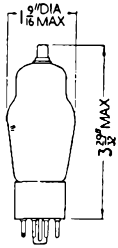
* *With close fitting shield connected to cathode.*

For further information refer to type 6A8G/GT.

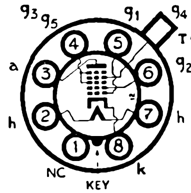
6A8G/GT
6AB8
(see type ECL80)

Replacement Types

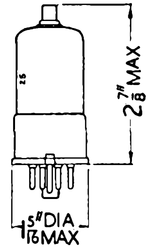
TYPES **6A8G, 6A8GT**
(OCTAL BASE)



6A8G



Note.—Type 6A8GT *has Pin* 1 *connected to metal shell.*



6A8GT

HEPTODE FREQUENCY CHANGERS

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	1.0 watts max.
Screen(g_3, g_5) Voltage...	100 volts max.
Screen Dissipation	0.3 watts max.
Oscillator Anode (g_2) Voltage	200 volts max.
Oscillator Anode Dissipation...	0.75 watts max.
Total Cathode Current	14 mA max.

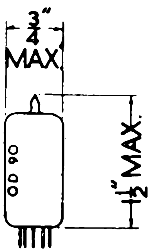
OPERATING CHARACTERISTICS

Anode Voltage	100	250 volts
Anode Current	1.1	3.5 mA
Screen Voltage	50	100 volts
Screen Current	1.3	2.7 mA
Oscillator Anode Supply Voltage	100	250 volts
Oscillator Anode Resistor	–	20,000 ohms
Oscillator Anode Current	2.0	4.0 mA
Control Grid (g_4) Voltage	−1.5	−3 volts
Auto Bias Resistor	300	300 ohms
Oscillator Grid (g_1) Resistor	50,000	50,000 ohms
Oscillator Grid Current	0.25	0.4 mA
Anode Impedance	0.6	0.36 meg.
Conversion Conductance	0.36	0.55 mA/V
Control Grid Voltage	−20	−35 volts
(For conversion of 0.005 mA/V).		

INTER-ELECTRODE CAPACITANCES *

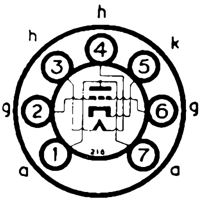
R.F. Input (Control Grid to all other electrodes)	9.5 pF
I.F. Output (Anode to all other electrodes)	12.0 pF
Oscillator Input (Oscillator Grid to all except Oscillator Anode) ...	6.0 pF
Oscillator Output (Oscillator Anode to all except Oscillator Grid) ...	4.6 pF
Control Grid to Oscillator Grid	0.16 pF
Control Grid to Anode	0.26 pF
Control Grid to Oscillator Anode	0.19 pF
Oscillator Grid to Oscillator Anode	1.1 pF

* *With close fitting shield connected to Cathode.*



Current Equipment Type

TYPE **6AF4A** MINIATURE U.H.F. OSCILLATOR TRIODE



The BRIMAR 6AF4A is intended for use as a U.H.F. oscillator valve up to 1000 Mc/s.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.225 amp.
Anode Voltage	150 volts max.
Anode Dissipation	2.25 watts max.
D.C. Grid Voltage	—50 volts max.
D.C. Grid Current	8mA max.
Grid Circuit Resistance using Cathode Bias	500 KΩ max.
D.C. Cathode Current	28 mA max.
Peak Heater-Cathode Voltage—Heater negative	50 volts max.
Heater positive	50 volts max. *

* *D.C. component 25 volts max.*

OPERATING CHARACTERISTICS

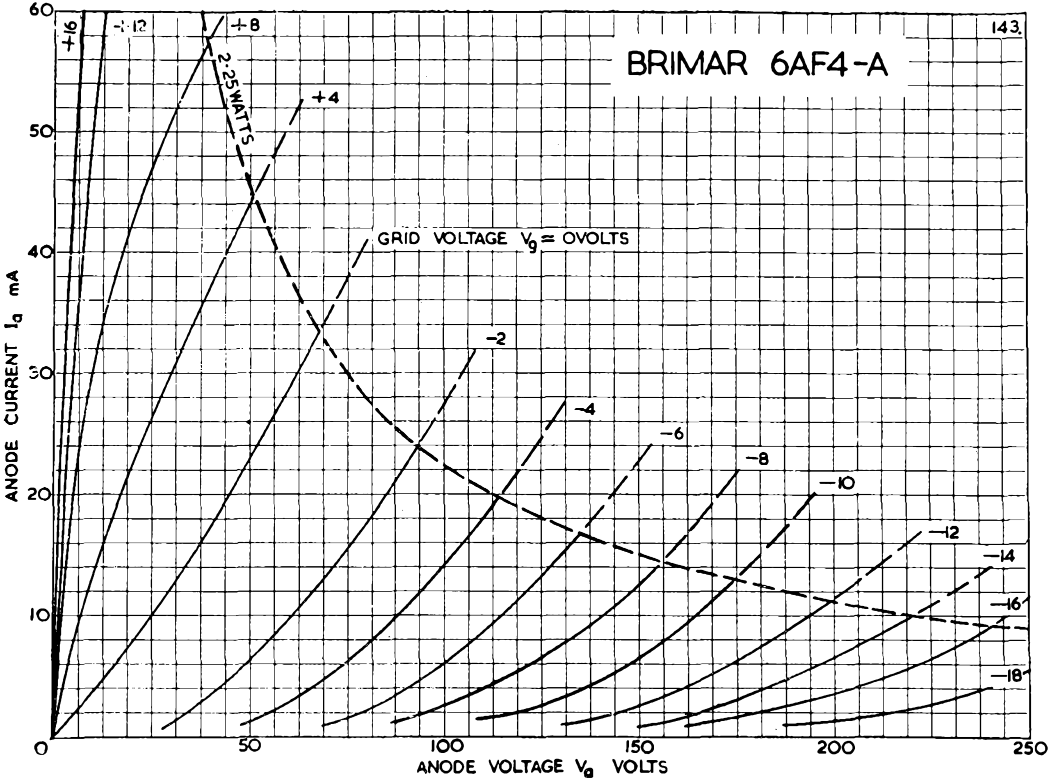
Anode Voltage	80	100 volts
Cathode Bias Resistor	150	150Ω
Anode Current	16	20 mA
Mutual Conductance	6.6	7.5 mA/V
Anode Impedance	2.27	2.13 KΩ
Amplification Factor	15	16

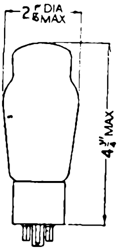
TYPICAL CONDITIONS AS AN OSCILLATOR AT 950 Mc/s.

Anode Voltage	100 volts
Grid Resistance	10 KΩ
Anode Current	22 mA
Grid Current	400 μA
Power Output	160 mW

INTER-ELECTRODE CAPACITANCES

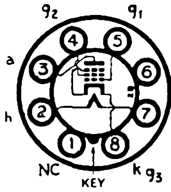
Input	2.2 pF
Output	0.45 pF
Grid to Anode	1.9 pF


BRIMAR 6AF4-A
143.
ANODE CURRENT I_a mA
ANODE VOLTAGE V_a VOLTS
GRID VOLTAGE V_g = OVOLTS
2·25WATTS
+16
+12
+8
+4
−2
−4
−6
−8
−10
−12
−14
−16
−18
0
50
100
150
200
250
10
20
30
40
50
60



Replacement Type

TYPE 6AG6G
(OCTAL BASE)
HIGH SLOPE
OUTPUT PENTODE



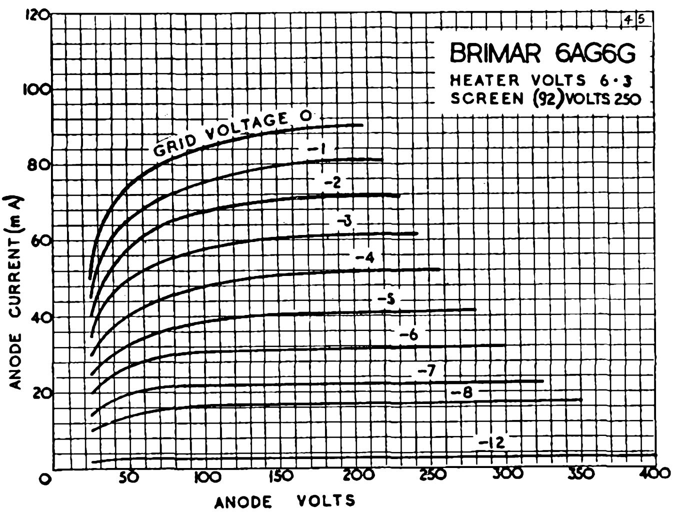
The BRIMAR type 6AG6G is an indirectly heated output pentode of high sensitivity for use in the output stage of radio receivers.

RATINGS

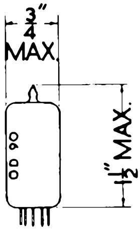
Heater Voltage	6.3 volts
Heater Current	1.2 amp.
Anode Voltage	250 volts max.
Anode Dissipation	10 watts max.
Screen (g_2) Voltage	250 volts max.
Screen Dissipation	2.5 watts max.

OPERATING CHARACTERISTICS

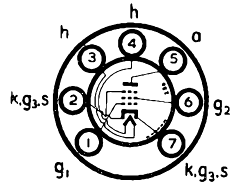
Anode Voltage	150	200	250	volts
Anode Current	30	31	32	mA
Screen Voltage	150	200	250	volts
Screen Current	5.5	6.0	6.0	mA
Control Grid (g_1) Voltage	–2	–4	–6	volts
Cathode Bias Resistor	60	100	150	ohms
Anode Impedance	40,000	50,000	60,000	ohms
Mutual Conductance	9	10	10	mA/V
Optimum Load	8,900	8,700	8,500	ohms
Power Output	1.3	2.5	3.75	watts



Current Equipment Type



TYPE 6AK5
MINIATURE
HIGH SLOPE
R.F. PENTODE



The BRIMAR type 6AK5 is a miniature R.F. Pentode intended for use as an R.F. or I.F. amplifier, particularly in wide-band applications. It is useful as an amplifier up to 400 Mc/s.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.175 amp.
Anode Voltage	180 volts max.
Anode Dissipation	1.7 watts max.
Screen (g_2) Voltage	90 volts max.
Screen Voltage ($Ig_2 = 0$)	180 volts max.
Screen Dissipation	0.5 watts max.
Peak Heater-Cathode Voltage	120 volts max.

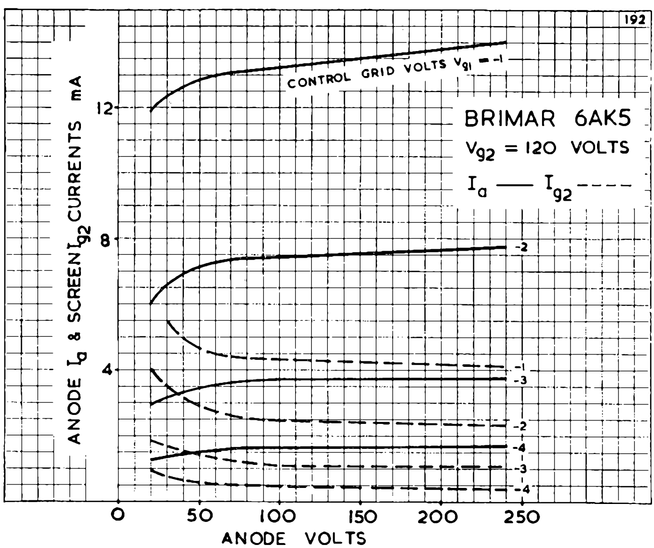
OPERATING CHARACTERISTICS

Anode Voltage	120	180	volts
Anode Current	7.5	7.7	mA
Screen Voltage	120	120	volts
Screen Current	2.5	2.4	mA
Cathode Bias Resistor	180	180	ohms
Mutual Conductance	5.0	5.1	mA/V
Anode Impedance (approx.)	0.3	0.5	megohm.
Control Grid (g_1) Voltage for anode current of 10μA (approx.)	—8.5	—8.5	volts

INTER-ELECTRODE CAPACITANCES *

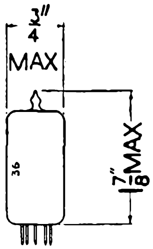
Input	4.0 pF
Output	2.1 pF
Control Grid to Anode	0.03 pF max.

* *Measured without external shield.*



BRIMAR

Current Equipment Type

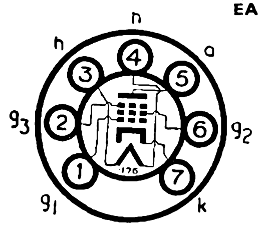


B7G Base

TYPE 6AK6

MINIATURE

POWER PENTODE



The BRIMAR type 6AK6 is a miniature output pentode with low heater consumption suitable for use in both AC and AC/DC equipment. It is particularly suitable where power economy and small physical size are of prime importance.

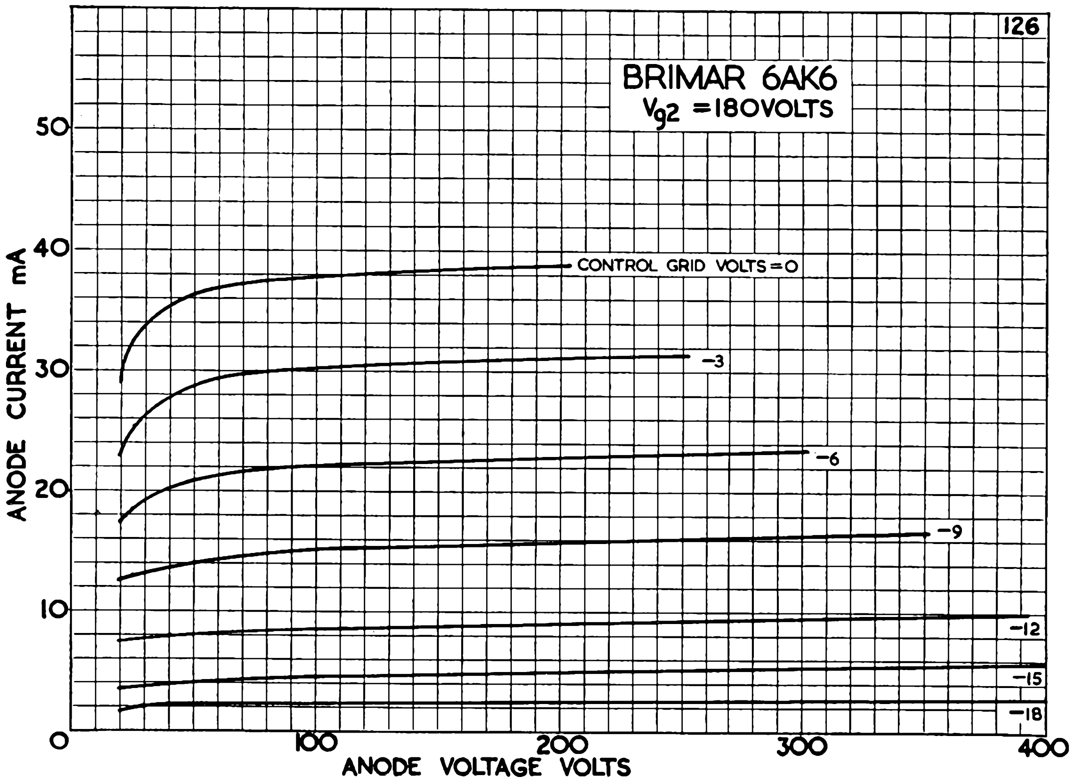
RATINGS

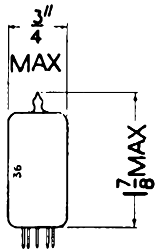
Heater Voltage	6.3 volts
Heater Current	0.15 amp.
Anode Voltage	275 volts max.
Anode Dissipation	2.75 watts max.
Screen (g_2) voltage	250 volts max.
Screen Dissipation	0.75 watts max.
D.C. Cathode Current	21 mA max.

OPERATING CHARACTERISTICS (CLASS A)

Anode Voltage	180 volts
Anode Current	15 mA
Screen Voltage	180 volts
Screen Current	2.5 mA
Control Grid (g_1) Voltage	—9 volts
Cathode Bias Resistor	520 ohms
Anode Impedance	200,000 ohms
Mutual Conductance	2.3 mA/V
Inner Amplification Factor ($\mu_{g1,g2}$)	10.5
Optimum Load	10,000 ohms
Power Output	1.1 watts
Harmonic Distortion	10 per cent

Type 6AK6 *is a commercial equivalent to the* CV1762


126
BRIMAR 6AK6
V_{g2} =180VOLTS
ANODE CURRENT mA
0
10
20
30
40
50
CONTROL GRID VOLTS=0
−3
−6
−9
−12
−15
−18
100
200
300
400
ANODE VOLTAGE VOLTS

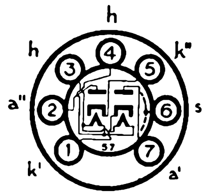


B7G Base

Current Equipment Type

TYPE **6AL5**

MINIATURE DOUBLE DIODE



RATINGS

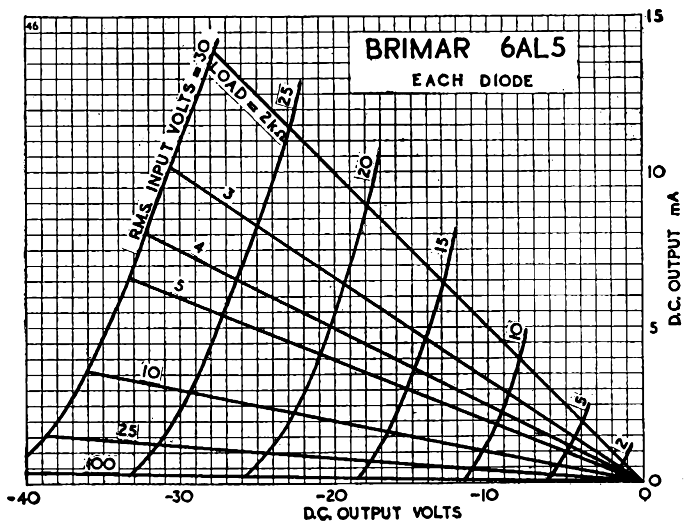
Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Peak Inverse Voltage	420 volts max.
Peak Anode Current (each Anode)	54 mA max.
Resonant Frequency (each Section)	700 Mc/s approx.

OPERATION AS HALF-WAVE RECTIFIER

R.M.S. Input per Anode	150 volts max.
Supply Impedance per Anode	300 ohms min.
Rectified Current per Anode	9 mA max.

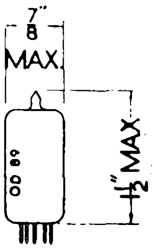
INTER-ELECTRODE CAPACITANCES

Diode 1 to Cathode 1 and Heater	3.2 pF
Diode 2 to Cathode 2 and Heater	3.2 pF
Cathode 1 to Diode 1 and Heater	3.6 pF
Cathode 2 to Diode 2 and Heater	3.6 pF
Diode 1 to Diode 2	0.026 pF max.

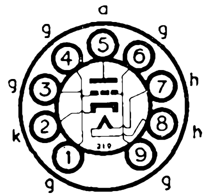


Type 6AL5 *is a commercial equivalent to the* CV140

Current Equipment Type



TYPE **6AM4**
MINIATURE
GROUNDED GRID
AMPLIFIER TRIODE



The BRIMAR 6AM4 is a miniature B9A based triode suitable for grounded grid amplifier or mixer use in the frequency range 470 to 890 Mc/s.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.225 amp.
Anode Voltage	200 volts max.
Anode Dissipation	2.0 watts
Positive D.C. Grid Voltage	0 volts max.
Heater-Cathode Potential—Heater Positive	80 volts max.
Heater Negative	250 volts max.

OPERATING CHARACTERISTICS

Anode Voltage	200 volts
Cathode Bias Resistor	100 ohms
Anode Current	10 mA
Mutual Conductance	9.8 mA/V
Anode Impedance	8,700 ohms
Amplification Factor	85
Grid Voltage for $I_a = 10\mu A$	—6.5 volts

NOTE: Fixed bias operation is not recommended.

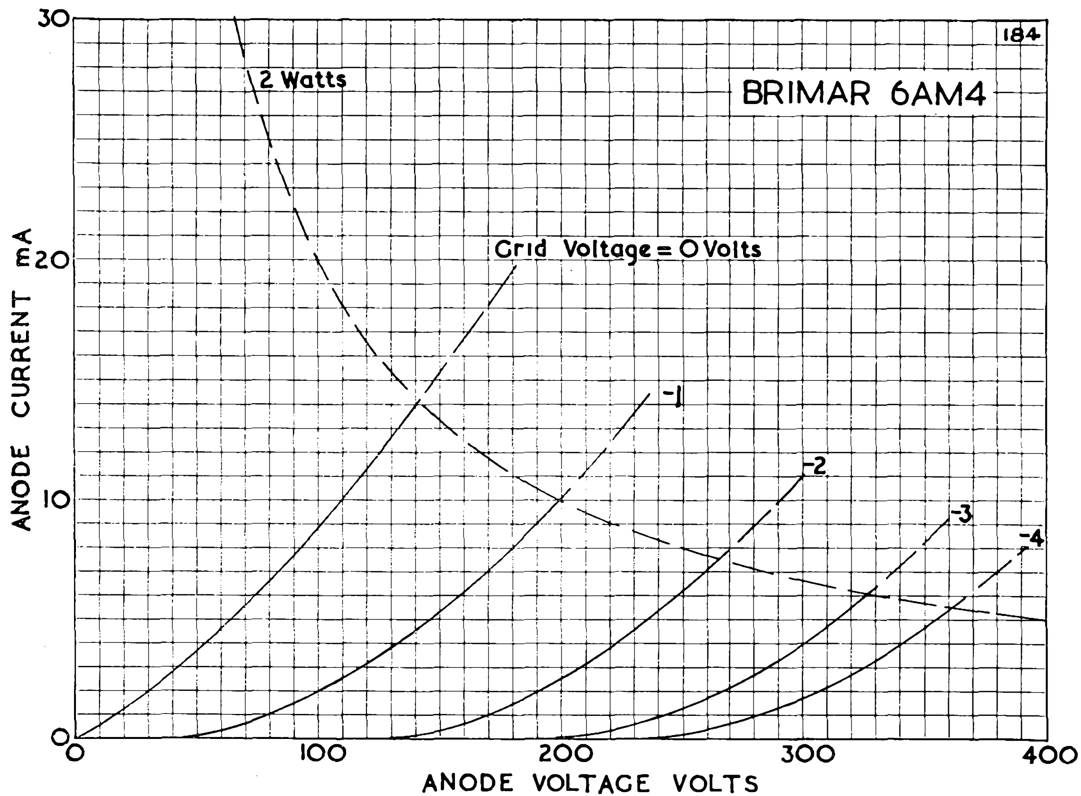
TYPICAL OPERATION AS A MIXER

Anode Voltage	100 volts
Cathode Bias Resistor	220 ohms
Peak Heterodyne Voltage	1.0 volt
Anode Current	3.6 mA
Conversion Conductance	2.25 mA/V

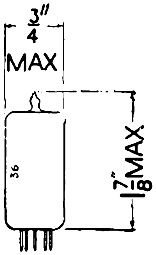
INTER-ELECTRODE CAPACITANCES

	With external screen *	Without external screen
Anode to Cathode	0.16	0.16 pF
Cathode to Grid plus Heater	4.6	4.4 pF
Anode to Grid plus heater	2.8	2.4 pF
Heater to Cathode	1.8	1.8 pF

* Connected to Grid



184
BRIMAR 6AM4
2 Watts
Grid Voltage = 0 Volts
-1
-2
-3
-4
ANODE CURRENT mA
30
20
10
0
0
100
200
300
400
ANODE VOLTAGE VOLTS

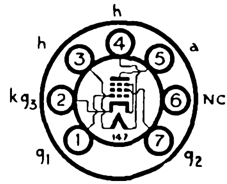


B7G Base

Current Equipment Type

TYPE **6AM5**

POWER PENTODE



RATINGS

Heater Voltage	6.3 volts
Heater Current	0.2 amp.
Anode Voltage	250 volts max.
Anode Dissipation	4.0 watts max.
Screen (g_2) Voltage	250 volts max.
Screen Dissipation	0.60 watt max.
Heater to Cathode potential	150 volts max.

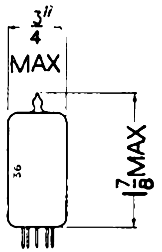
OPERATING CHARACTERISTICS (CLASS A)

	Single Valve	2 Valves	
Anode Voltage	250	250	volts
Anode Current	16	22	mA
Screen Voltage	250	250	volts
Screen Current	2.4	3.2	mA
Control Grid (g_1) Voltage	—13.5	—15	volts
Cathode Bias Resistor	680	600	ohms
Anode Impedance	0.15	—	meg.
Mutual Conductance	2.6	—	mA/V
Inner Amplification Factor ($\mu_{g1,g2}$) ...	12	—	
Optimum Load	16,000	24,000	ohms
Power Output	1.4	4.0	watts
Harmonic Distortion	10	3.2	per cent.

INTER-ELECTRODE CAPACITANCES

Input	4.2 pF
Output...	3.2 pF
Grid to Anode	0.5 pF max.

Type 6AM5 is a commercial equivalent to the CV136



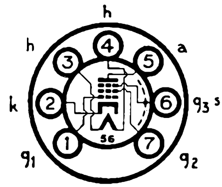
B7G Base

Current Equipment Type

TYPE 6AM6

(Previously Coded 8D3)

MINIATURE
HIGH SLOPE
R.F. PENTODE



The BRIMAR type 6AM6 is an indirectly heated high slope pentode of the "all glass" construction, fitted with a miniature type base. It is particularly suitable for use in wide band amplifiers and television receivers, where it may be employed in the R.F., I.F. or V.F. stages. In conjunction with a suitable oscillator the 6AM6 will function satisfactorily as a frequency changer at frequencies up to 100 Mc/s.

RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.3 amp.
Anode Voltage ...	275 volts max.
Anode Dissipation ...	2.5 watts max.
Screen (g_2) Voltage ...	275 volts max.
Screen Dissipation ...	0.8 watts max.
Heater to Cathode potential ...	150 volts max.

OPERATING CHARACTERISTICS

[Suppressor Grid (g_3) connected to Cathode]

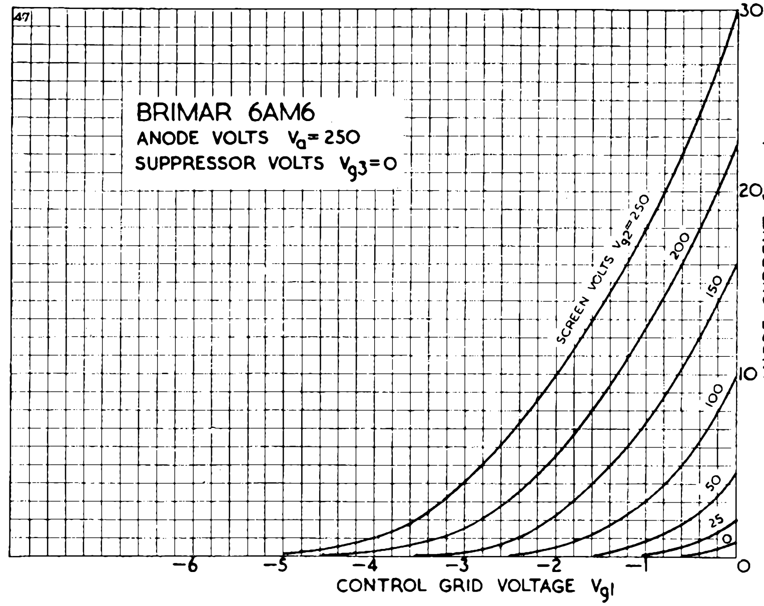
Anode Voltage ...	200	250	volts
Anode Current ...	9.0	10.0	mA
Screen Voltage ...	200	250	volts
Screen Current ...	2.25	2.6	mA
Control Grid (g_1) Voltage ...	−1.5	−2.0	volts
Cathode Bias Resistor ...	135	160	ohms
Anode Impedance (Approx.) ...	0.8	1.0	meg.
Mutual Conductance ...	7.5	7.5	mA/V
Input Resistance at 45 Mc/s. ...	7,000	8,200	ohms
Control Grid Voltage ... (For Cathode Current cut-off)	−4.5	-5.5	volts
Working Input Capacity ...	10.4	10.1	pF
Change in Input Capacity ... (g_1 biased to cut-off)	2.3	2.0	pF
Inner Amplification Factor ($\mu_{g1, g2}$) ...	70	70	

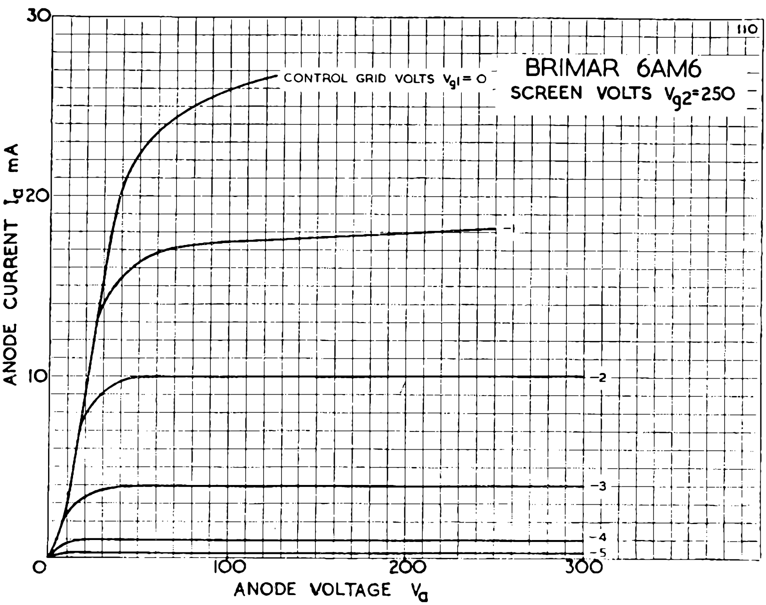
INTER-ELECTRODE CAPACITANCES*

Input ...	7.5 pF
Output ...	3.2 pF
Control Grid to Anode ...	0.01 pF

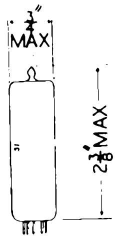
* *With close fitting shield connected to Cathode.*

Type 6AM6 is a commercial equivalent of the CV138


47
BRIMAR 6AM6
ANODE VOLTS $V_a = 250$
SUPPRESSOR VOLTS $V_{g3} = 0$
SCREEN VOLTS $V_{g2} = 250$
200
150
100
50
25
0
30
20
10
0
ANODE CURRENT I_a mA
−6
−5
−4
−3
−2
−1
CONTROL GRID VOLTAGE V_{g1}

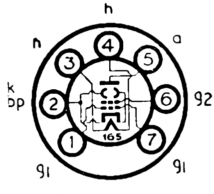

110
BRIMAR 6AM6
SCREEN VOLTS $V_{g2} = 250$
CONTROL GRID VOLTS $V_{g1} = 0$
−1
−2
−3
−4
−5
30
20
10
0
ANODE CURRENT I_a mA
100
200
300
ANODE VOLTAGE V_a

Current Equipment Type



TYPE 6AQ5

MINIATURE OUTPUT BEAM TETRODE



B7G Base

The BRIMAR type 6AQ5 is a miniature output tetrode for use in A.C. equipment. The characteristics are similar to those of type 6V6GT.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.45 amp.
Anode Voltage	250 volts max.
Anode Dissipation	12 watts max.
Screen (g_2) Voltage	250 volts max.
Screen Dissipation	2.0 watts max.
Heater-Cathode Potential	250 volts max.
D.C. Cathode Current	65mA max.

OPERATING CHARACTERISTICS

Anode Voltage	180	250 volts
Anode Current	29	45 mA
Screen Voltage	180	250 volts
Screen Current	3.0	4.5 mA
Control Grid (g_1) Voltage	–8.5	–12.5 volts
Cathode Bias Resistor	270	240 ohms
Anode Impedance	58,000	52,000 ohms
Mutual Conductance	3.7	4.1 mA/V
Inner Amp. Factor ($\mu_{g1,g2}$)	10	10
Optimum Load	5,500	5,000 ohms
Power Output	2.0	4.5 watts
Harmonic Distortion	8.0	8.0 per cent.

INTER-ELECTRODE CAPACITANCES *

Input	7.6 pF
Output	6.0 pF
Control Grid to Anode	0.35 pF

* *With no external shield.*

The characteristic curves of the 6BW6 apply to the 6AQ5 within its ratings.

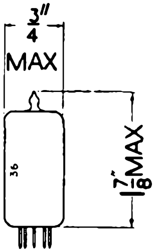
Type 6AQ5 is a commercial equivalent to the CV1862

Current Equipment Type

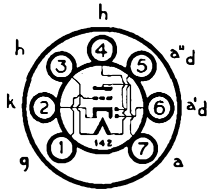
TYPE 6AT6

DOUBLE DIODE

TRIODE



B7G Base



RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Diode Current	1.0 mA max.

OPERATING CHARACTERISTICS

Anode Voltage	250 volts
Anode Current	1.0 mA
Grid Voltage	—3 volts
Anode Impedance	58,000 ohms
Mutual Conductance	1.2 mA/V
Amplification Factor...	70

OPERATING AS RESISTANCE COUPLED AMPLIFIER

Anode Supply Voltage	100	250	250 volts
Anode Load Resistor	0.5	0.25	0.25 meg.
Grid Resistor	1.0	1.0	1.0 meg.
Cathode Bias Resistor	9,000	3,000	0 ohms
Peak Output	16	43	40 volts
*Stage Gain	33	42	42
*Harmonic Distortion	2	1	5 per cent.

** Figures are for 12 volts peak output*

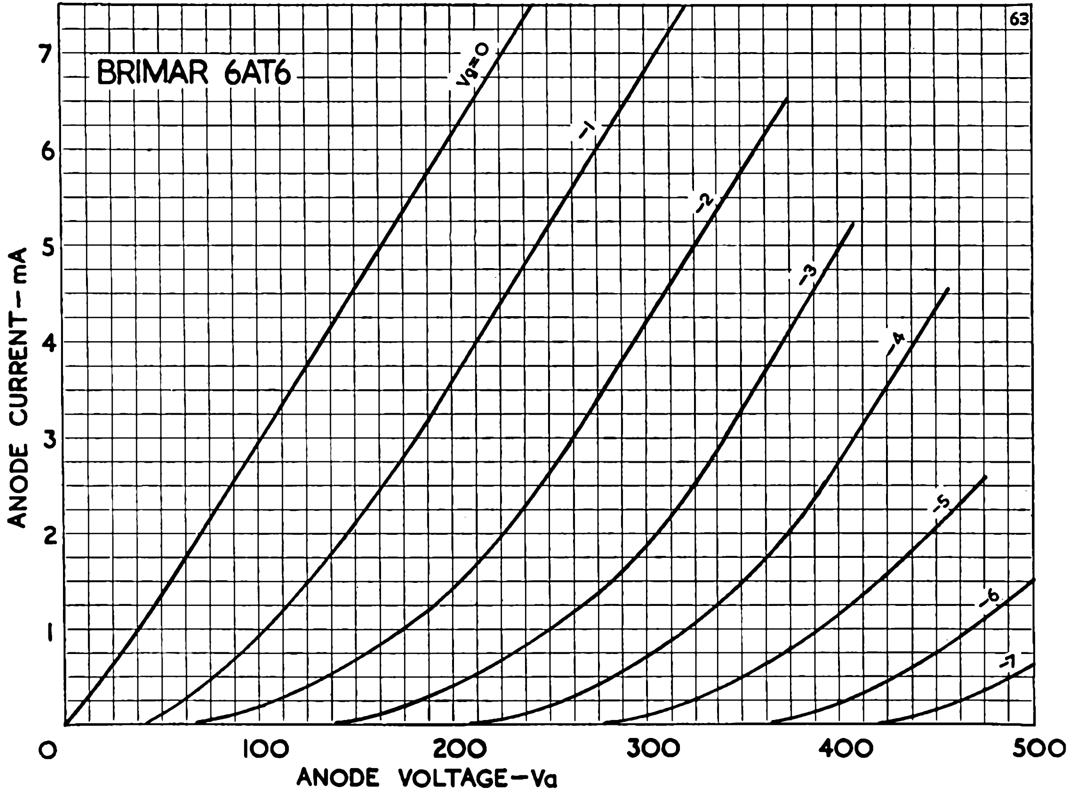
INTER-ELECTRODE CAPACITANCES *

Grid to Cathode	2.3 pF
Anode to Cathode	1.1 pF
Grid to Anode	2.1 pF
Diode Anode (a″d) to Grid...	0.025 pF max.

** With no external shield*

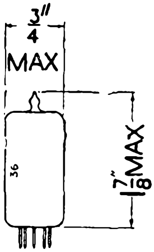
Type 6AT6 is a commercial equivalent of the CV452

BRIMAR


BRIMAR 6AT6
63
ANODE CURRENT—mA
ANODE VOLTAGE—Va
0
100
200
300
400
500
1
2
3
4
5
6
7
Vg=0
-1
-2
-3
-4
-5
-6
-7

6AT6

6AU6



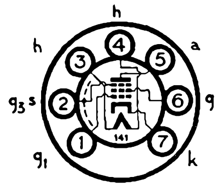
B7G Base

Current Equipment Type

TYPE **6AU6**

HIGH SLOPE

R.F. PENTODE



Type 6AU6 is a sharp cut-off pentode suitable for use as R.F. or A.F. amplifier, limiter or sync. separator.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	3.0 watts max.
Screen (g_2) Supply Voltage	300 volts
Screen (g_2) Voltage	150 volts max.
Screen Dissipation	0.65 watts max.

OPERATING CHARACTERISTICS

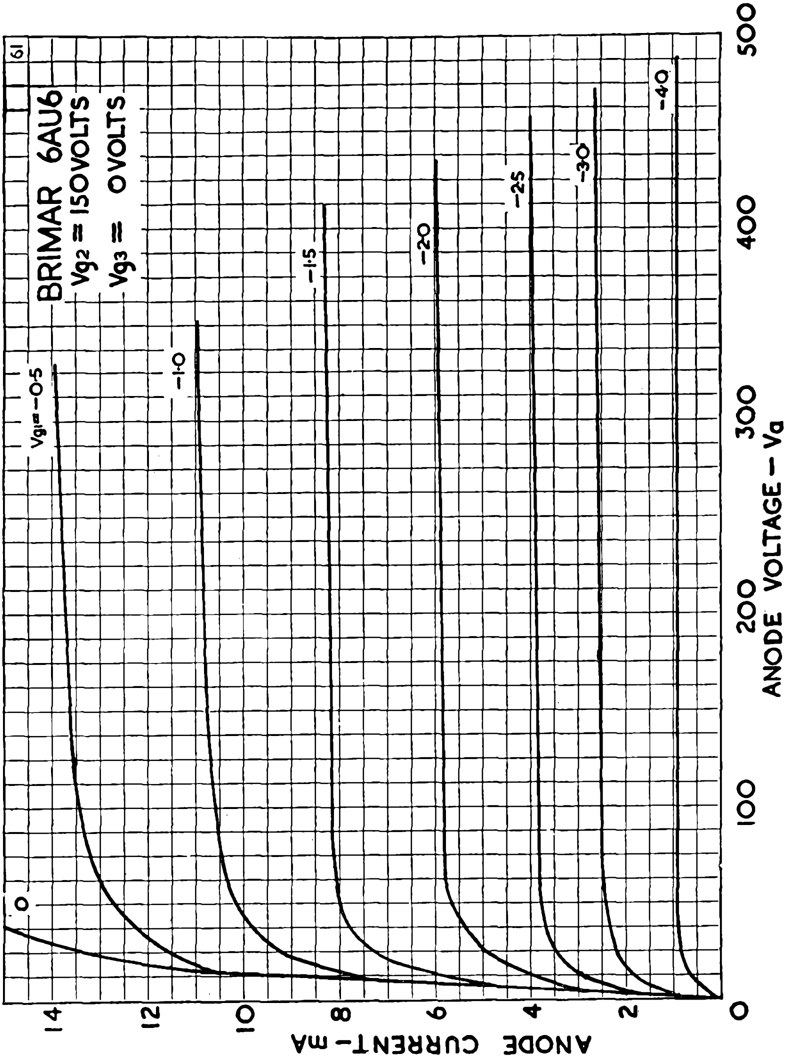
[Suppressor grid (g_3) connected to Cathode]

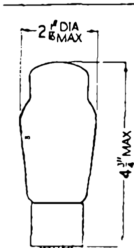
Anode Voltage	250	250	100	volts
Anode Current	10.8	7.6	5.2	mA
Screen Voltage	150	125	100	volts
Screen Current	4.3	3.0	2.0	mA
Control Grid (g_1) Voltage	—1	—1	—1	volts
Cathode Bias Resistor	68	100	140	ohms
Anode Impedance...	1.0	1.5	0.5	meg.
Mutual Conductance	5.2	4.4	3.9	mA/V
Inner Amplification Factor ($\mu_{g1,\ g2}$) ...	41	41	41	
Input Impedance (50 Mc/s)	3,500	—	—	ohms
Input Impedance (90 Mc/s)	900	—	—	ohms
Control Grid Voltage ... ... (For Anode Current Cut-off).	—6.2	—5.2	—4.2	volts

INTER-ELECTRODE CAPACITANCES *

Input	5.5	pF
Output	5.0	pF
Grid to Anode	0.0035	pF max.

* *With no external shield.*



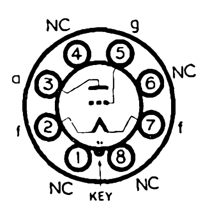


Replacement Type

TYPE 6B4G

(OCTAL BASE)

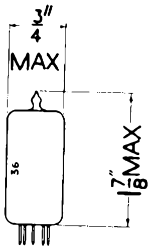
POWER TRIODE



CHARACTERISTICS

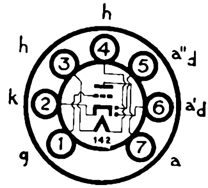
Filament Voltage	6.3 volts	Filament Current	1.0 amp.

For further information refer to type 6A3.



Current Equipment Type

TYPE 6AV6
DOUBLE DIODE
TRIODE



The BRIMAR 6AV6 is a miniature double diode triode for use in A.M. receivers for signal detection, A.G.C. and A.F. amplification.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amps.
Anode Voltage	300 volts max.
Anode Dissipation	1 watt max.
Diode Anode Current	1 mA max.

OPERATING CHARACTERISTICS (Triode Section)

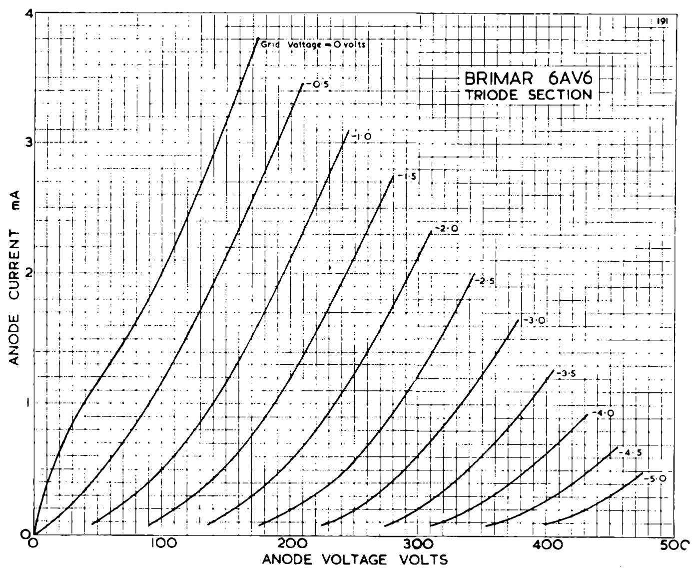
Anode Voltage	100	250	volts
Grid Voltage	—1	—2	volts
Anode Current	0.5	1.2	mA
Mutual Conductance	1.25	1.6	mA/V
Amplification Factor	100	100	
Anode Resistance	80	62.5	kilohms

OPERATION AS AN R.C. COUPLED AMPLIFIER

Anode Supply Voltage	100	250	volts
Anode Resistor	220	220	kilohms
Cathode Resistor	7.5	3.3	kilohms
Gain	45	62	
Peak Output Voltage	10	50	volts

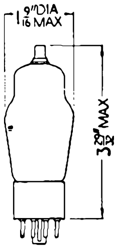
INTER-ELECTRODE CAPACITANCES

Triode Input	2.3 pF
Triode Output	1.1 pF
Triode Grid to Triode Anode	2.1 pF
Diode Anode to Grid	0.025 pF max.

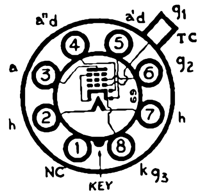


Replacement Types

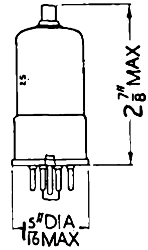
TYPES **6B8G, 6B8GT**
(OCTAL BASE)



6B8G.



Note.—Type 6B8GT has Pin 1 connected to metal shell.



6B8GT.

DOUBLE DIODE PENTODES

The BRIMAR types 6B8G, 6B8GT are multiple valves designed for use simultaneously as detectors and I.F. or L.F. amplifiers. The pentode sections have semi-vari-mu characteristics and a certain amount of A.V.C. bias may be applied without appreciable distortion.

RATINGS

Heater Voltage	6.3	volts
Heater Current	0.3	amp.
Anode Voltage	300	volts max.
Anode Dissipation	2.25	watts max.
Screen (g_2) Voltage	125	volts max.
Screen Dissipation	0.3	watts max.
Control Grid Resistor	1.0	meg. max.

OPERATING CHARACTERISTICS

Anode Voltage	100	180	250	250	volts
Anode Current	5.8	3.4	6.0	9.0	mA
Screen Voltage	100	75	100	125	volts
Screen Current	1.7	0.9	1.5	2.3	mA
Control Grid (g_1) Voltage ...	–3	–3	–3	–3	volts
Cathode Bias Resistor	400	700	400	250	ohms
Anode Impedance	0.3	1.0	0.8	0.6	meg.
Mutual Conductance	0.95	0.84	1.0	1.12	mA/V
Control Grid Cut-off Voltage...	–17	–13	–17	–21	volts

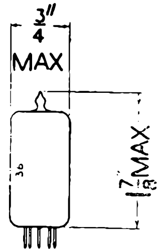
OPERATION AS RESISTANCE COUPLED AMPLIFIER

Anode and Screen Supply Voltage ...	90	180	300	volts
Anode Load Resistor	0.25	0.25	0.25	meg.
Screen Series Resistor	1.2	1.2	1.2	meg.
Cathode Bias Resistor	3,500	2,000	1,600	ohms
Peak Output	33	55	100	volts
Voltage gain	55	70	80	

INTER-ELECTRODE CAPACITANCES*	**6B8G**	**6B8GT**	
Input	3.6	4.5	pF
Output	9.5	10.0	pF
Control Grid to Anode	0.01	0.005	pF max.

* *With close fitting shield connected to cathode.*

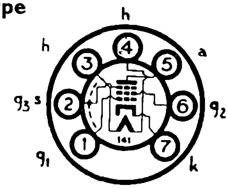
6BA6



B7G Base

Current Equipment Type

TYPE **6BA6**
HIGH SLOPE
VARI-MU
R.F. PENTODE



RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	3.0 watts max.
Screen (g_2) Supply Voltage	300 volts max.
Screen Voltage	125 volts max.
Screen Dissipation	0.6 watt max.

OPERATING CHARACTERISTICS
[Suppressor grid (g_3) connected to Cathode]

Anode Voltage	100	250	250	volts
Anode Current	10.8	11.0	11.0	mA
Screen Voltage	100	100	—	volts
Series Screen Resistor	—	—	33,000	ohms
Screen Current	4.4	4.2	4.2	mA
Control Grid (g_1) Voltage	−1	−1	−1	volts
Cathode Bias Resistor	68	68	68	ohms
Anode Impedance...	0.25	1.5	1.5	meg.
Mutual Conductance	4.3	4.4	4.4	mA/V
Input Impedance (45 Mc/s)	4,500	4,500	4,500	ohms
Input Impedance (90 Mc/s)	900	900	900	ohms
Control Grid Voltage	−21	−21	−51	volts

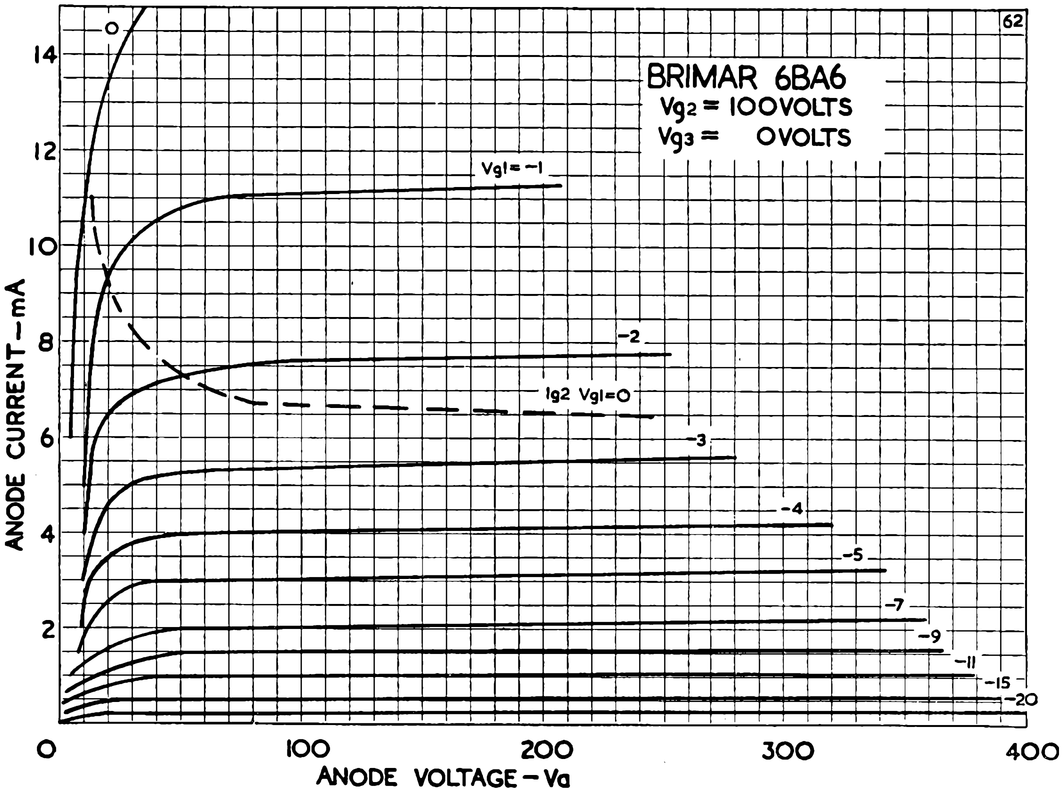
(For Mutual Conductance of 0.005 mA/V).

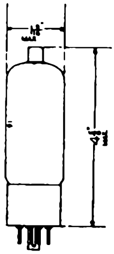
INTER-ELECTRODE CAPACITANCES *

Input...	5.5 pF
Output	5.0 pF
Grid to Anode	0.0035 pF max.

* *With no external shield.*

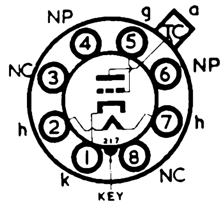
Type 6BA6 *is a commercial equivalent of the* CV454.


62
BRIMAR 6BA6
Vg2 = 100VOLTS
Vg3 = 0VOLTS
0
Vg1 = −1
−2
Ig2 Vg1 = 0
−3
−4
−5
−7
−9
−11
−15
−20
ANODE CURRENT — mA
14
12
10
8
6
4
2
0
100
200
300
400
ANODE VOLTAGE — Va



Industrial Type

TYPE 6BD4
E.H.T. VOLTAGE REGULATOR



The Brimar type 6BD4 is a special triode for use as a shunt connected E.H.T. voltage regulator in television picture monitors, colour television receivers, etc.

RATINGS

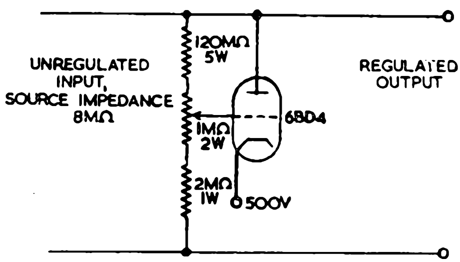
Heater Voltage ...	6.3 volts
Heater Current ...	0.6 amp.
Anode Voltage ...	20 kilovolts max.
Anode Current ...	1.5 mA max.
Anode Dissipation ...	20 watts max.
Negative D.C. Grid Voltage ...	—125 volts max.
Heater-Cathode Voltage ...	180 volts max.

TYPICAL OPERATING CONDITIONS

Unregulated Supply Voltage ...	29.8 kilovolts
Source Impedance...	8 megohms
Cathode Reference Voltage ...	500 volts
Source Impedance...	1 Kilohm

The Grid is fed from a resistive potentiometer chain, across the unregulated E.H.T. supply as shown in the drawing below:

D.C. Output Voltage, load current 0mA ...	20 kilovolts
D.C. Output Voltage, load current 1mA ...	19.7 kilovolts



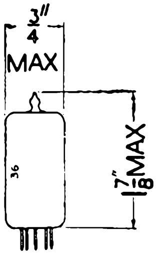
Adequate cooling must be provided for the envelope, free circulation of air, therefore, being necessary.

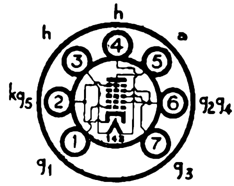
Anode voltages in excess of 16kv approx. will result in the production of X-rays. Adequate protective shielding of the valve must, therefore, be provided to prevent prolonged exposure to the radiation and thereby avoid any possible harmful effects.

INTER-ELECTRODE CAPACITANCES

Input ...	3.8 pF
Output ...	0.04 pF
Anode to Grid ...	1 pF

TYPE 6BE6
MINIATURE HEPTODE FREQUENCY CHANGER





B7G Base

Owing to its specialized structure, type 6BE6 may be employed as a self-oscillating frequency changer at frequencies exceeding 60 Mc/s, with excellent frequency stability.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	1.0 watt max.
Screen (g_2, g_4) Voltage	100 volts max.
Screen Dissipation	1.0 watt max.
Total Cathode Current	14 mA max.

OPERATING CHARACTERISTICS (SEPARATE EXCITATION)

Anode Voltage	250 volts
Anode Current	3.0 mA
Screen Voltage	100 volts
Screen Current	7.1 mA
Control Grid (g_3) Voltage	–1.5 volts
Anode Impedance	1.0 meg.
Oscillator Grid (g_1) Current	0.5 mA
Oscillator Grid Resistor	20,000 ohms
Oscillator Mutual Conductance	7.25 mA/V
Conversion Conductance	0.475mA/V†
Control Grid Voltage	–30 volts
(For Conversion Conductance of 0.005 mA/V).	

† *When used with self excitation this value depends on the position of the cathode tap up the coil.*

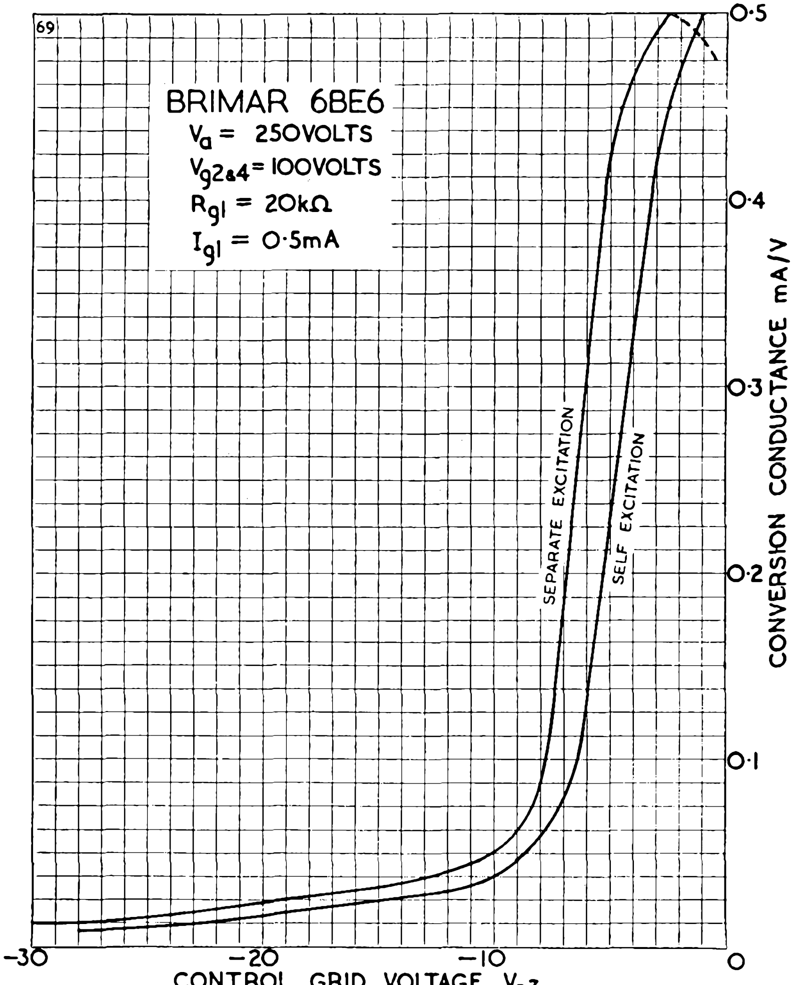
INTER-ELECTRODE CAPACITANCES *

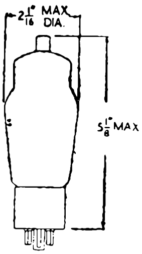
R.F Input	7.2 pF
I.F. Output	8.6 pF
Oscillator Input	5.5 pF
Control Grid to Anode	0.3 pF max.

* *Measured with no external shield*

Note : The characteristics shown with separate excitation approximate closely to those obtained with self excitation and zero bias.

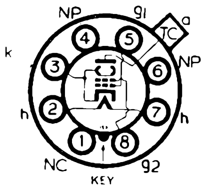
Type 6BE6 *is a commercial equivalent of the* CV453.


69
BRIMAR 6BE6
V_a = 250VOLTS
$V_{g2\&4}$ = 100VOLTS
R_{g1} = 20kΩ
I_{g1} = 0·5mA
SEPARATE EXCITATION
SELF EXCITATION
CONVERSION CONDUCTANCE mA/V
0·5
0·4
0·3
0·2
0·1
0
−30
−20
−10
CONTROL GRID VOLTAGE V_{g3}



Replacement Type

TYPE **6BG6G**
(OCTAL BASE)
LINE TIME BASE
OUTPUT VALVE



BRIMAR type 6BG6G is designed for use in the output stages of line time base generators in A.C. television receivers. The valve may be used in conjunction with BRIMAR type R12 rectifier to provide EHT from line fly-back pulses. For A.C./D.C. type television receivers the 19BG6G should be employed.

RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.9 amp.
Direct Anode Voltage ...	700 volts max.
Positive Surge Anode Voltage ...	6,000 volts max.*
Direct Anode Current ...	100 mA max.
Anode Dissipation ...	20 watts max.
Direct Screen (g_2) Voltage ...	350 volts max.
Screen Dissipation ...	3.2 watts max.
Direct Control Grid (g_1) Voltage ...	–50 volts max.
Negative Surge Control Grid Voltage ...	–400 volts max.*
Control Grid to Cathode Resistance ...	1.0 meg. max.
Heater to Cathode Potential ...	250 volts max.
Peak Cathode Current ...	300 mA. max.

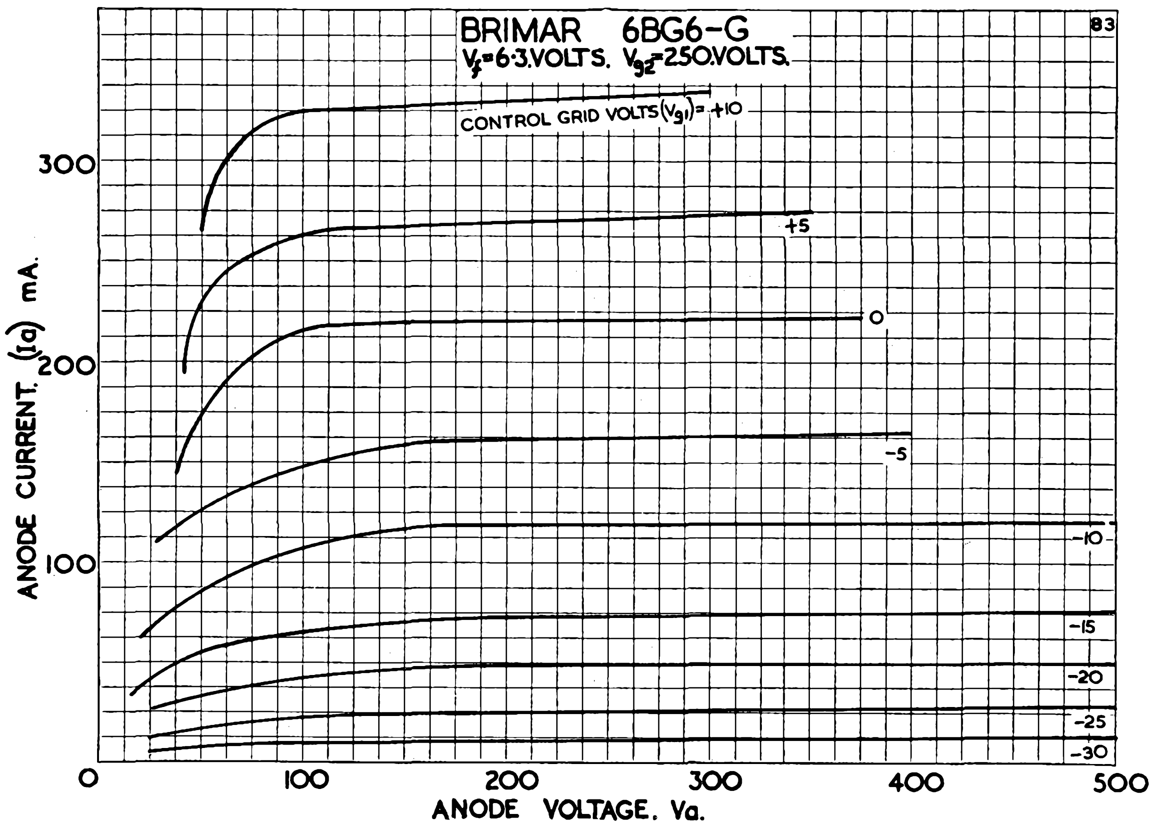
CHARACTERISTICS

Anode Voltage ...	300 volts
Anode Current ...	60 mA
Screen Voltage ...	250 volts
Screen Current ...	4 mA
Control Grid Voltage ...	–18 volts
Mutual Conductance ...	6.0 mA/V
Anode Impedance ...	30,000 ohms
Amplification Factor ($\mu_{g1 \cdot g2}$) ...	8

INTER-ELECTRODE CAPACITANCES

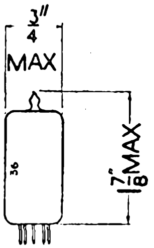
Input ...	11 pF
Output ...	6.5 pF
Grid to Anode ...	0.5 pF max.

* *The duty cycle must not exceed* 15 *per cent of the scanning cycle and its duration must be limited to* 15 *micro seconds.*


BRIMAR 6BG6-G
V_f=6·3 VOLTS. V_{g2}=250 VOLTS.
83
CONTROL GRID VOLTS (V_{g1}) = +10
+5
0
−5
−10
−15
−20
−25
−30
ANODE CURRENT. (Ia) mA.
300
200
100
0
100
200
300
400
500
ANODE VOLTAGE. Va.

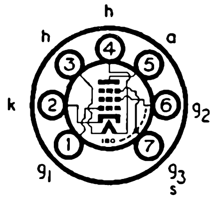
BRIMAR

Current Equipment Type



B7G Base

TYPE **6BH6**
MINIATURE
HIGH SLOPE
R.F. PENTODE



The BRIMAR 6BH6 is a medium slope, sharp cut-off R.F. Pentode designed for use in car radio and mobile equipment where economy of heater current is important.

RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.15 amp.
Anode Voltage ...	300 volts max.
Anode Dissipation ...	3.0 watts max.
Screen (g_2) Voltage ...	150 volts max.
Screen Dissipation ...	0.5 watt max.

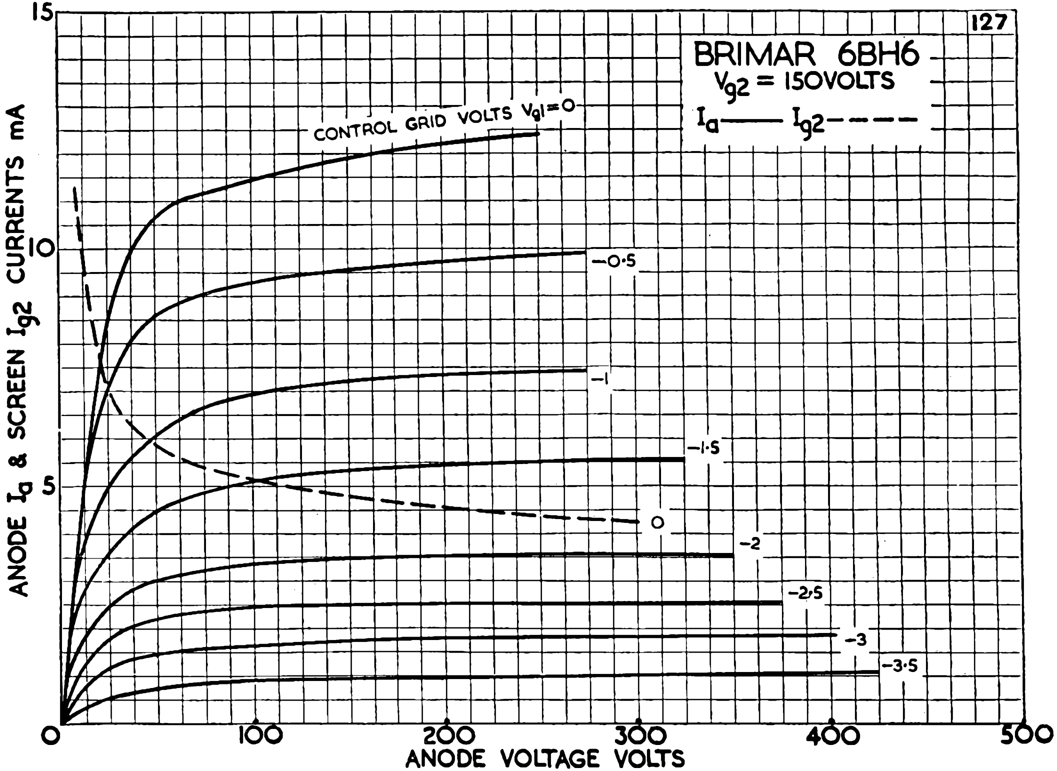
OPERATING CHARACTERISTICS
(Suppressor grid (g_3) connected to Cathode)

Anode Voltage ...	100	250	250	volts
Anode Current ...	3.6	7.4	7.4	mA
Screen Voltage ...	100	150	—	volts
Series Screen Resistor ...	—	—	33	kΩ
Screen Current ...	1.4	2.9	2.9	mA
Control Grid (g_1) Voltage ...	—1	—1	—1	volts
Cathode Bias Resistor ...	200	100	100	ohms
Anode Impedance ...	0.7	1.4	1.4	MΩ
Mutual Conductance ...	3.4	4.6	4.6	mA/V
Input Impedance at 50 mc/s ...	—	6,000	6,000	ohms
Input Impedance at 90 mc/s ...	—	3,000	3,000	ohms
Control Grid Voltage (for anode current cut-off) ...	—5	—7.7	—	volts

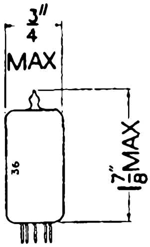
INTER-ELECTRODE CAPACITANCES *

Input ...	5.4 pF
Output ...	4.4 pF
Grid to Anode ...	0.0035 pF max.

* *With no external shield.*

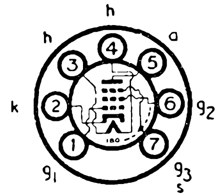

127
BRIMAR 6BH6
V_{g2} = 150 VOLTS
I_a —— I_{g2} - - - -
CONTROL GRID VOLTS V_{g1}=0
−0·5
−1
−1·5
0
−2
−2·5
−3
−3·5
ANODE I_a & SCREEN I_{g2} CURRENTS mA
15
10
5
0
100
200
300
400
500
ANODE VOLTAGE VOLTS

Current Equipment Type



B7G Base

TYPE 6BJ6
MINIATURE
VARI-MU
R.F. PENTODE



The BRIMAR 6BJ6 is a medium slope variable-mu R.F. Pentode designed for use in domestic radio equipment. It is particularly useful for car radio and mobile equipment where economy of heater current is important.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.15 amp.
Anode Voltage	300 volts max.
Anode Dissipation	3.0 watts max.
Screen (g_2) Voltage	125 volts max.
Screen Dissipation	0.6 watts max.

OPERATING CHARACTERISTICS

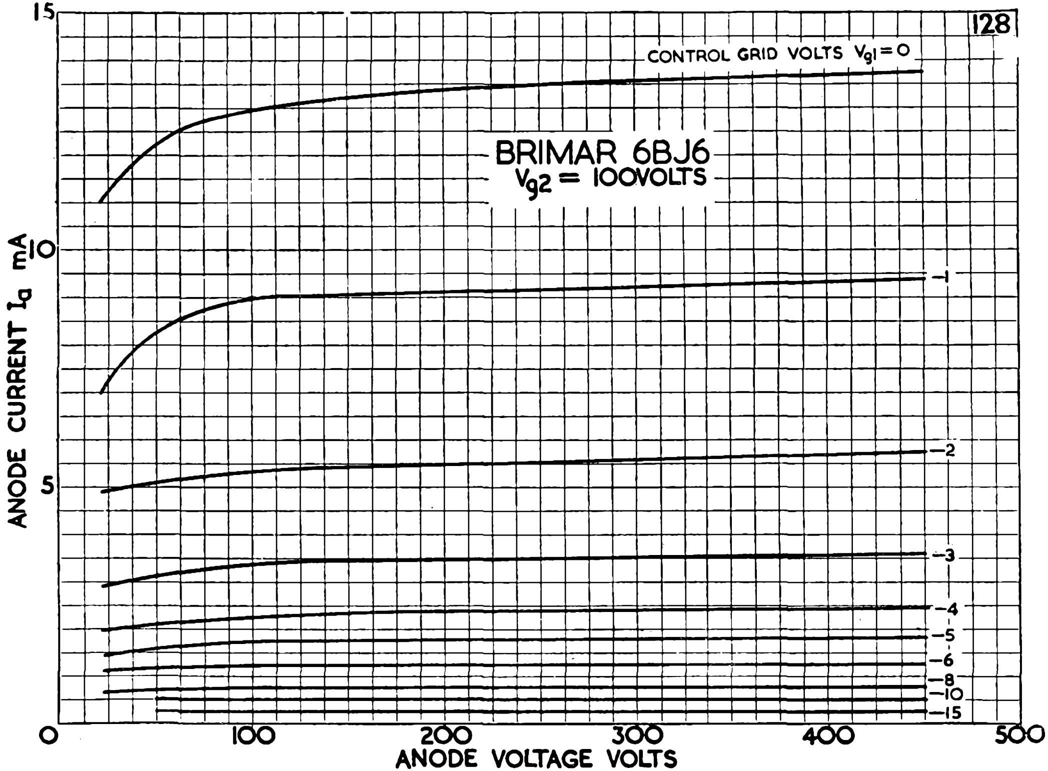
(Suppressor Grid (g_3) connected to Cathode)

Anode Voltage	100	250	250	volts
Anode Current	9.0	9.2	9.2	mA
Screen Voltage	100	100	—	volts
Series Screen Resistor	—	—	47	kΩ
Screen Current	3.5	3.3	3.3	mA
Control Grid (g_1) Voltage	—1	—1	—1	volts
Cathode Bias Resistor	82	82	82	ohms
Anode Impedance	0.25	1.3	1.3	MΩ
Mutual Conductance	3.65	3.80	3.80	mA/V
Input Impedance at 50 mc/s	—	7,500	7,500	ohms
Input Impedance at 90 mc/s	—	4,200	4,200	ohms
Control Grid Voltage (for gm 0.015 mA/V)	—20	—20	—	volts

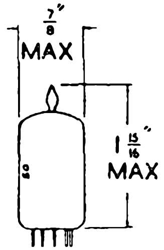
INTER-ELECTRODE CAPACITANCES *

Input	4.5 pF
Output	5.5 pF
Grid to Anode	0.0035 pF max.

* *With no external shield.*


128
CONTROL GRID VOLTS V_{g1} = 0
BRIMAR 6BJ6
V_{g2} = 100VOLTS
ANODE CURRENT I_a mA
ANODE VOLTAGE VOLTS
15
10
5
0
100
200
300
400
500
−1
−2
−3
−4
−5
−6
−8
−10
−15

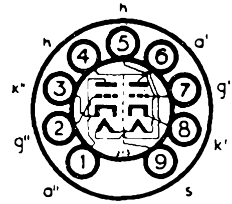
BRIMAR



B9A (Noval) Base

Current Equipment Type

TYPE **6BQ7A** MINIATURE HIGH SLOPE DOUBLE TRIODE



The BRIMAR 6BQ7A consists of two separate high slope triode units designed for use mainly in VHF, cascode amplifiers, but since the internal screen is brought out to a separate base pin the two triode sections may be used independently or in push-pull.

RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.4 amp.
Anode Voltage ($I_a = 0$) ...	300 volts max.
Anode Voltage ...	250 volts max.
Anode Dissipation (per section) ...	2 watts max.
Cathode Current (per section) ...	20mA max.
Heater-Cathode Voltage, Heater negative with respect to Cathode ...	200 volts max.†
Heater-Cathode Voltage, Heater positive with respect to Cathode ...	200 volts max.
Grid circuit resistance (using cathode bias) ...	500 k ohms max.

† *Under cut-off conditions in cascode circuits this may be 300 V.*

OPERATING CHARACTERISTICS

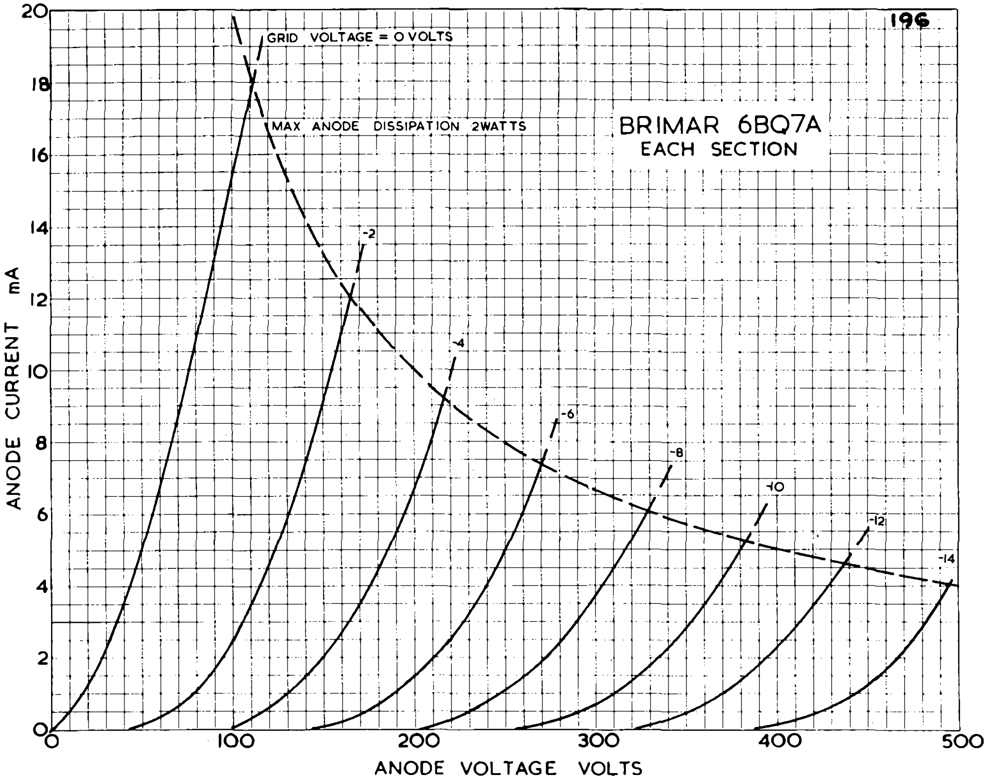
Anode Voltage ...	150 volts
Cathode Bias Resistor ...	220 ohms
Anode Current ...	9 mA
Mutual Conductance ...	6.4 mA/V
Amplification Factor ...	39
Anode Resistance ...	6,100 ohms

Grid voltage for anode current of 10 μA—10 volts approx.

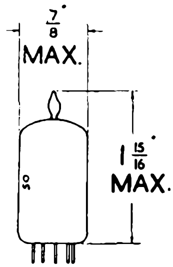
INTER-ELECTRODE CAPACITANCES *

	Triode 1		Triode 2
Grid to Anode ...	1.15		1.15 pF
Input ...	2.85		— pF
Input (grounded Grid) ...	—		4.95 pF
Output ...	1.35		— pF
Output (grounded Grid) ...	—		2.27 pF
Anode to Cathode ...	0.15		0.15 pF max.
Heater to Cathode ...	2.65		2.70 pF
Anode ′ to Anode ″ ...		0.010	pF max.
Anode ″ to Anode ′ plus Grid ′ ...		0.024	pF max.

* *Measured with external shield.*



196
BRIMAR 6BQ7A
EACH SECTION
GRID VOLTAGE = 0 VOLTS
MAX ANODE DISSIPATION 2WATTS
-2
-4
-6
-8
-10
-12
-14
ANODE CURRENT mA
ANODE VOLTAGE VOLTS
0
2
4
6
8
10
12
14
16
18
20
100
200
300
400
500



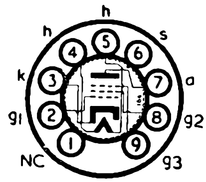
B9A (Noval) Base

Current Equipment Type

TYPE **6BR7**

(Previously Coded 8D5)

MINIATURE
LOW MICROPHONY
AMPLIFIER PENTODE



The BRIMAR type 6BR7 has been specially designed for use in the early stages of high gain A.F. amplifiers. Its thorough screening and rigid construction ensure low microphony and greatly reduced hum compared with existing types.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.15 amp.
Anode Voltage	300 volts max.
Anode Dissipation	0.75 watt max.
Screen (g_2) Voltage	125 volts max.
Screen Dissipation	0.3 watt max.

OPERATING CHARACTERISTICS

(g_3 connected to Cathode)

Anode Voltage	100	250	volts
Anode Current	2.0	2.1	mA
Screen Voltage	100	100	volts
Screen Current	0.7	0.6	mA
Control Grid (g_1) Voltage	−3	−3	volts
Anode Impedance	1.5	2.3	meg.
Mutual Conductance	1.1	1.25	mA/V

OPERATION AS RESISTANCE COUPLED AMPLIFIER

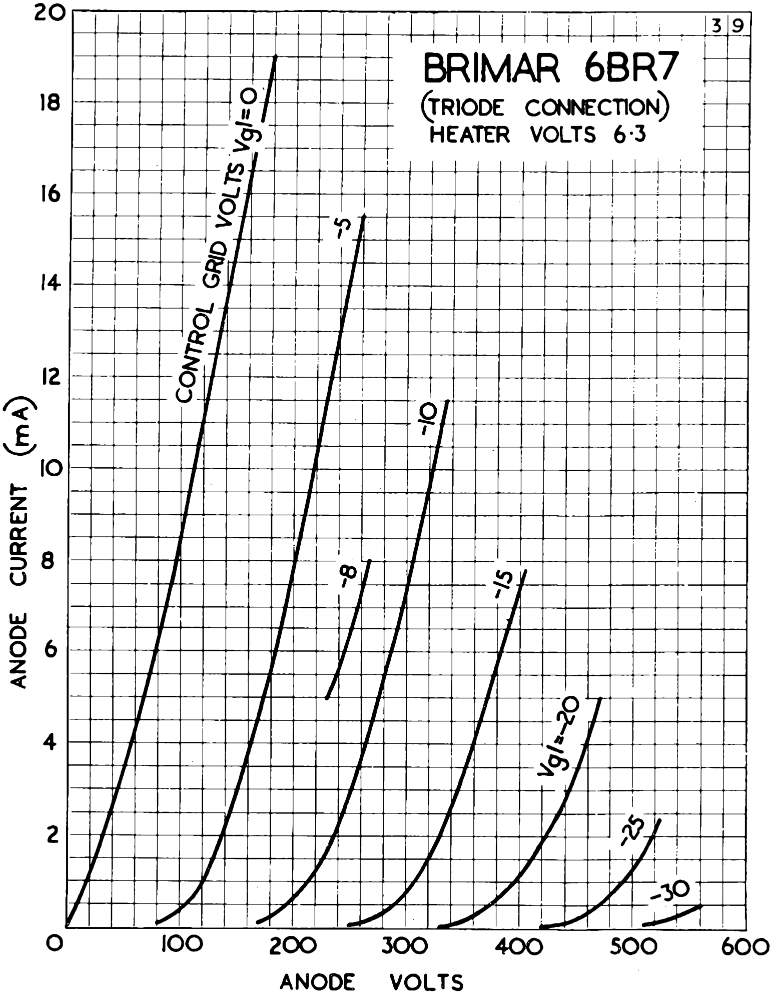
Anode and Screen Supply Voltage	100	200	300	volts
Anode Load Resistor	0.25	0.25	0.25	meg.
Screen Series Resistor	1.0	1.0	1.2	meg.
Cathode Bias Resistor	2,500	1,500	1,200	ohms
Peak Output	35	70	100	volts
Voltage gain	90	120	140	—

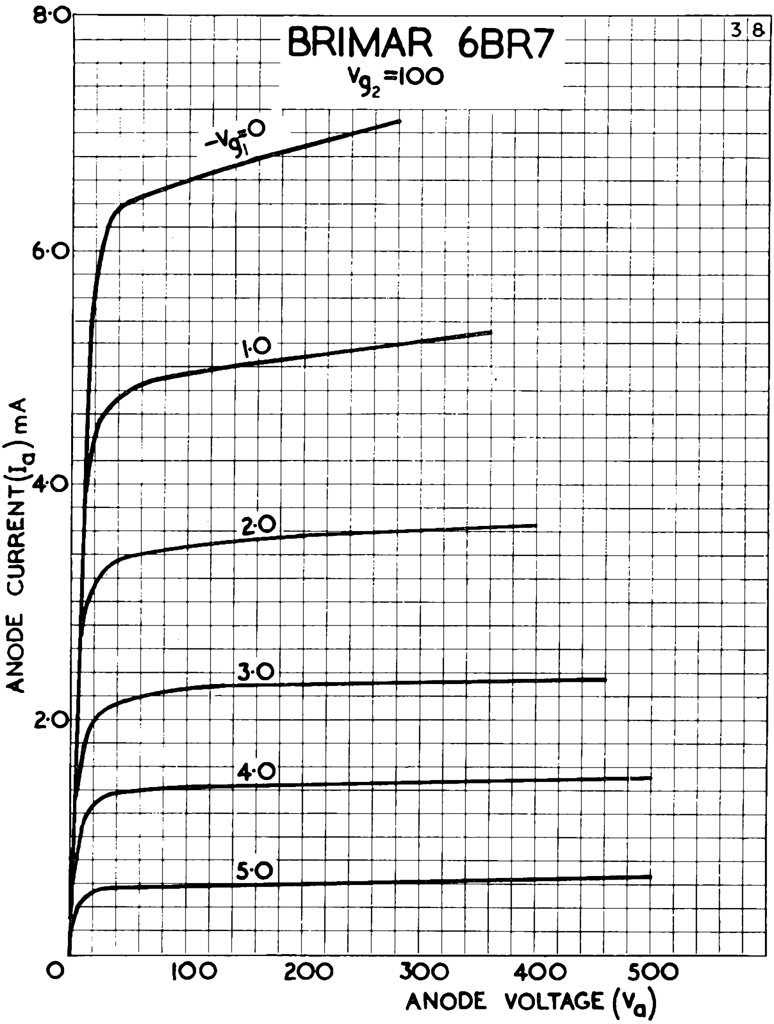
INTER-ELECTRODE CAPACITANCES

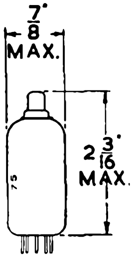
Input	4.0 pF
Output	4.0 pF
Control Grid to Anode	0.01 pF max.

When connected as a triode (g_3 to Cathode, g_2 to Anode), type 6BR7 has similar characteristics to those of type 6C5G.

Type 6BR7 *is a commercial equivalent of the* CV2135.

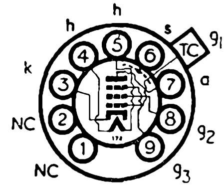

3 9
BRIMAR 6BR7
(TRIODE CONNECTION)
HEATER VOLTS 6·3
CONTROL GRID VOLTS Vg1=0
-5
-8
-10
-15
Vg1=-20
-25
-30
ANODE CURRENT (mA)
0
2
4
6
8
10
12
14
16
18
20
0
100
200
300
400
500
600
ANODE VOLTS


BRIMAR 6BR7
V_{g_2}=100
3 8
$-V_{g_1}$=0
1·0
2·0
3·0
4·0
5·0
8·0
6·0
4·0
2·0
0
100
200
300
400
500
ANODE CURRENT (I_a) mA
ANODE VOLTAGE (V_a)



Industrial Type

TYPE **6BS7** MINIATURE LOW MICROPHONY AMPLIFIER PENTODE



B9A (Noval) Base

The BRIMAR type 6BS7 has been specially designed for use in the early stages of high gain A.F. amplifiers. Its extremely rigid construction ensures very low microphony and its thorough screening, with the added features of a top grid connection remote from heater connections, ensures a low hum level.

Properly used, the BRIMAR 6BS7 will operate satisfactorily at input levels as low as 10μ volts on its grid.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.15 amp.
Anode Voltage	300 volts max.
Anode Dissipation	0.75 watt max.
Screen (g_2) Voltage	125 volts max.
Screen Dissipation	0.3 watt max.

OPERATING CHARACTERISTICS

(g_3 connected to Cathode)

Anode Voltage	100	250	volts
Anode Current	2.0	2.1	mA
Screen Voltage	100	100	volts
Screen Current	0.7	0.6	mA
Control Grid (g_1) Voltage	—3	—3	volts
Anode Impedance	1.5	2.3	meg.
Mutual Conductance	1.1	1.25	mA/V

OPERATION AS RESISTANCE COUPLED AMPLIFIER

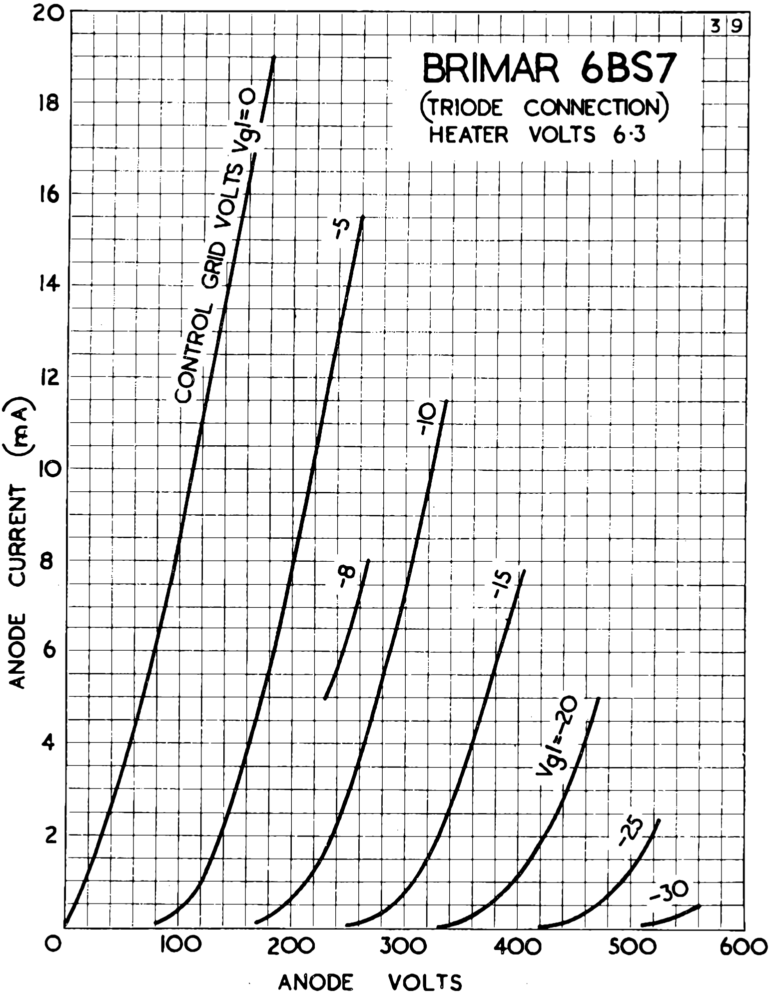
Anode and Screen Supply Voltage	100	200	300	volts
Anode Load Resistor	0.25	0.25	0.25	meg.
Screen Series Resistor	1.0	1.0	1.2	meg.
Cathode Bias Resistor	2,500	1,500	1,200	ohms
Peak Output	35	70	100	volts
Voltage gain	90	120	140	—

INTER-ELECTRODE CAPACITANCES

Input	4.0 pF
Output	4.0 pF
Control Grid to Anode	0.01 pF max.

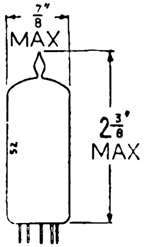
For characteristic curves refer to type 6BR7.

When connected as a triode (g_3 to Cathode, g_2 to Anode) type 6BS7 has similar characteristics to those of type 6C5G.



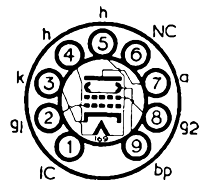
39
BRIMAR 6BS7
(TRIODE CONNECTION)
HEATER VOLTS 6·3
CONTROL GRID VOLTS Vg1=0
-5
-8
-10
-15
Vg1=-20
-25
-30
ANODE CURRENT (mA)
ANODE VOLTS
0
2
4
6
8
10
12
14
16
18
20
100
200
300
400
500
600

Current Equipment Type



B9A (Noval) Base

TYPE 6BW6
MINIATURE
OUTPUT
BEAM TETRODE



The BRIMAR type 6BW6 is a B9A (Noval) based output beam tetrode, the characteristics and ratings of which are identical to those of the 6V6G/GT. It is suitable for R.F. application up to frequencies of the order of 150 Mc/s.

RATINGS

Heater Voltage ...	6.3 volts
Heater Current	0.45 amp.
Anode Voltage ...	315 volts max.
Anode Dissipation	12.0 watts max.
Screen (g_2) Voltage	285 volts max.
Screen Dissipation	2.0 watts max.
Bulb Temperature	250° C. max.
D.C. Cathode Current ...	65 mA. max.

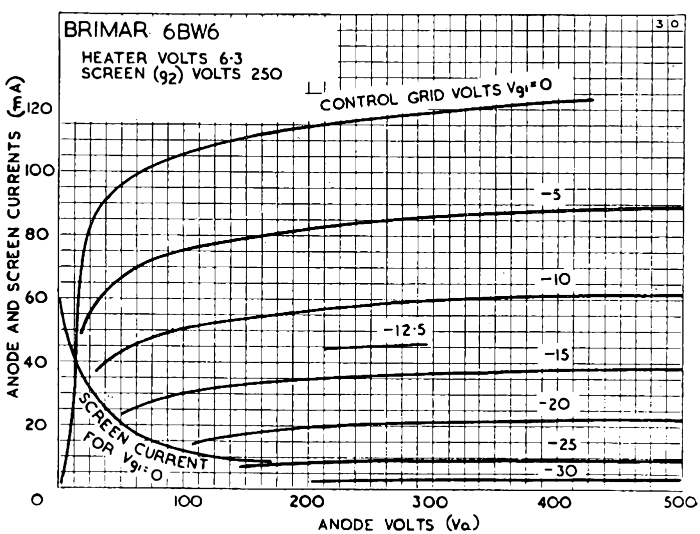
OPERATING CHARACTERISTICS

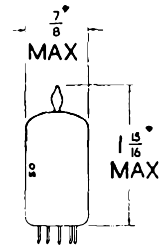
Anode Voltage ...	180	250	315	volts
Anode Current ...	29	45	34	mA
Screen Voltage ...	180	250	225	volts
Screen Current ...	3.0	4.5	2.2	mA
Control Grid (g_1) Voltage	—8.5	—12.5	—13	volts
Cathode Bias Resistor ...	270	250	360	ohms
Anode Impedance	58,000	52,000	77,000	ohms
Mutual Conductance ...	3.7	4.1	3.75	mA/V
Inner Amplification Factor ($\mu g_1, g_2$) ...	—	10	—	
Optimum Load ...	5,500	5,000	8,500	ohms
Power Output ...	2.0	4.5	5.5	watts
Harmonic Distortion ...	8.0	8.0	12	per cent.

INTER-ELECTRODE CAPACITANCES

Input ...	8.5 pF
Output ...	7.5 pF
Grid to Anode ...	0.6 pF

Type 6BW6 *is a commerical equivalent of the* CV2136.

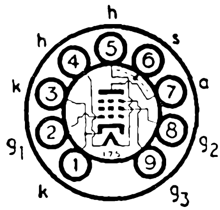




B9A (Noval) Base

Current Equipment Type

TYPE **6BW7**
MINIATURE
HIGH SLOPE
R.F. PENTODE



The BRIMAR 6BW7 is a high slope R.F. pentode designed for use in the R.F. Frequency Changer, I.F. and Video stages of television receivers. The valve features high mutual conductance together with a high R.F. input impedance, achieved by the use of two cathode connections. Type 6BW7 will operate from a 180 or 250 volt H.T. rail, making it suitable for both AC/DC and AC operated receivers.

RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.3 amp.
Anode Voltage ...	275 volts max.
Anode Dissipation ...	2.75 watts max.
Screen (g_2) Voltage ...	275 volts max.
Screen Dissipation ...	1.2 watts max.

OPERATING CONDITIONS

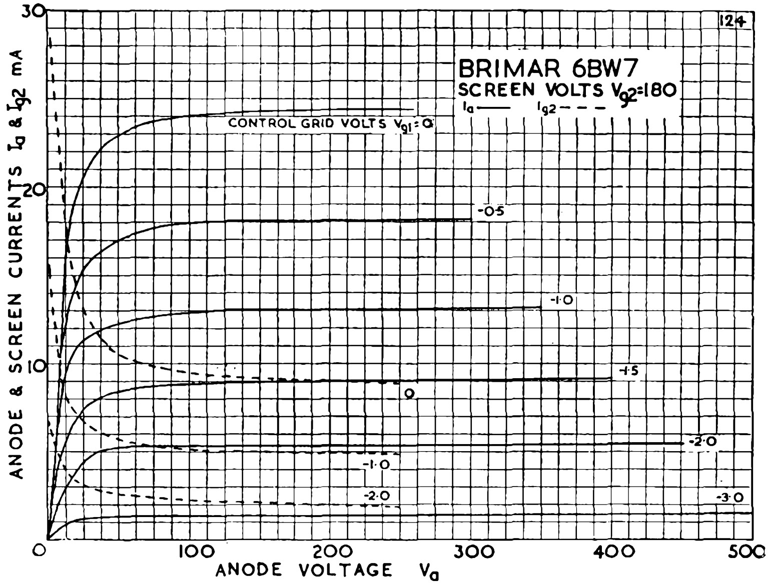
(Suppressor Grid (g_3) connected to Cathode)

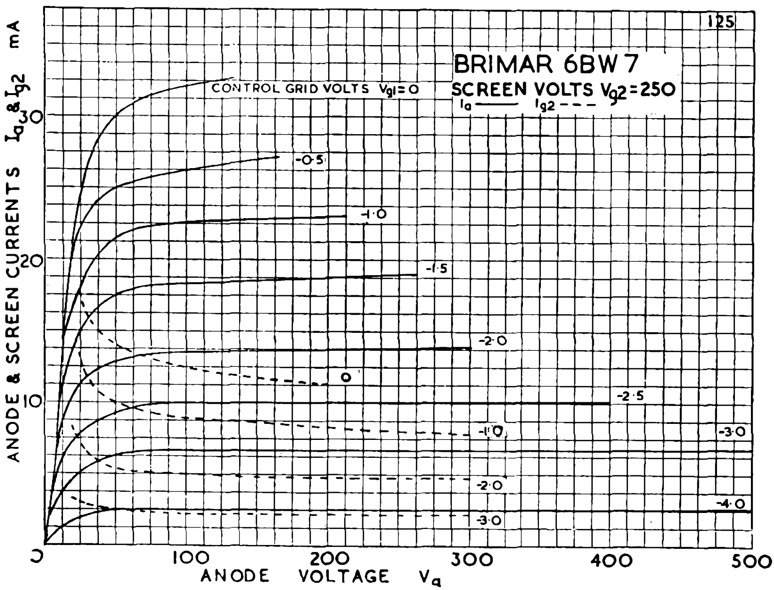
Anode Voltage ...	180	250 volts
Anode Current ...	9.5	9.5 mA
Screen Voltage ...	180	250 volts
Screen Current ...	3.5	3.5 mA
Cathode Bias Resistor ...	100	180 ohms
Mutual Conductance ...	9.3	8.5 mA/V
Anode Impedance ...	0.6	0.75 meg.
Input Impedance at 50 mc/s. ...	14,000	16,000 ohms
Inner Amplification Factor ($\mu_{g1, g2}$) ...	70	70
Control Grid (g_1) Voltage for anode current cut-off ...	—7	—8 volts
Suppressor Grid Voltage for $\frac{1}{10}$ normal anode current ...	—50	—75 volts

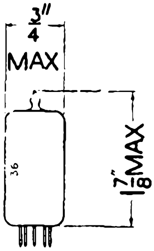
INTER-ELECTRODE CAPACITANCES *

Input ...	9.5 pF
Output ...	3.5 pF.
Control Grid to Anode ...	0.01 pF. max.

* *With no external shield.*


124
BRIMAR 6BW7
SCREEN VOLTS Vg2=180
Ia —— Ig2 - - -
CONTROL GRID VOLTS Vg1=0
-0·5
-1·0
-1·5
-2·0
-3·0
0
-1·0
-2·0
ANODE & SCREEN CURRENTS Ia & Ig2 mA
0
10
20
30
100
200
300
400
500
ANODE VOLTAGE Va

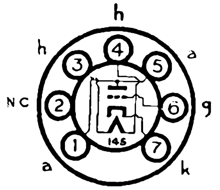

125
BRIMAR 6BW7
SCREEN VOLTS Vg2=250
Ia —— Ig2 - - -
CONTROL GRID VOLTS Vg1=0
-0·5
-1·0
-1·5
-2·0
-2·5
-3·0
-4·0
0
-1·0
-2·0
-3·0
ANODE & SCREEN CURRENTS Ia & Ig2 mA
10
20
30
100
200
300
400
500
ANODE VOLTAGE Va



B7G Base

Current Equipment Type

TYPE 6C4
MINIATURE
H.F. POWER
TRIODE



As oscillator or power amplifier, type 6C4 will operate efficiently at frequencies up to 150 Mc/s.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.15 amp
Anode Voltage	300 volts max.
Anode Current	25 mA max.
Anode Dissipation	3.5 watts max.
Grid Current	8.0 mA max.

OPERATING CHARACTERISTICS

Class A

Anode Voltage	100	250	volts
Anode Current	11.8	10.5	mA
Grid Voltage	0	—8.5	volts
Anode Impedance	6,250	7,700	ohms
Mutual Conductance	3.1	2.2	mA/V
Amplification Factor	19	17	

Class C Telegraphy

Anode Voltage	300 volts
Anode Current	25 mA
Grid Voltage	—27 volts
Grid Current (D.C.)	7.0 mA
Input Power	0.35 watt
Output Power	5.5 watts*

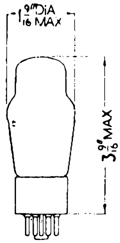
* *Approximately* 2.5 *watts at* 150 *Mc/s.*

INTER-ELECTRODE CAPACITANCES

	with shield	without shield	
Input	1.8	1.8	pF
Output	2.5	1.3	pF
Grid to Anode	1.4	1.6	pF

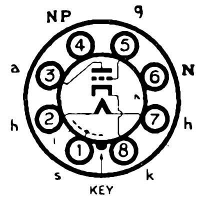
For characteristic curves refer to type 12AU7.

Type 6C4 *is a commercial equivalent of the* CV133.



Replacement Type

TYPE **6C5G** (OCTAL BASE) GENERAL PURPOSE TRIODE



The BRIMAR type 6C5G is a small triode suitable for use as detector, oscillator or L.F. amplifier valve.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation ...	2.5 watts max.

OPERATION AS RESISTANCE COUPLED AMPLIFIER

Anode Supply Voltage ...	90	180	300 volts
Anode Load Resistor ...	0.1	0.1	0.1 meg.
Cathode Bias Resistor ...	8,000	6,500	6,000 ohms
Peak Output ...	22	54	84 volts
Voltage gain ...	11	12	13

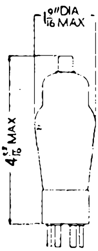
OPERATING CHARACTERISTICS

Anode Voltage	250 volts
Anode Current...	8.0 mA
Control Grid Voltage	—8 volts
Mutual Conductance	2.0 mA/V
Amplification Factor	20

INTER-ELECTRODE CAPACITANCES*

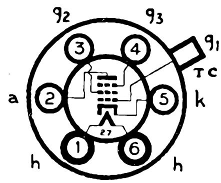
Input (Grid to all other electrodes)	4.4 pF
Output (Anode to all other electrodes)	12.0 pF
Grid to Anode	2.2 pF

* *With Pin 1 (Internal Shield) connected to Cathode.*



Replacement Type

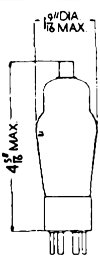
TYPE **6C6** (U.X. BASE) R.F. PENTODE



CHARACTERISTICS

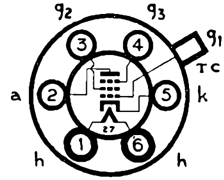
Heater Voltage	6 3 volts	Screen Current	0.5 mA
Heater Current	0.3 amp.	Control Grid (g_1) Voltage ...	-3 volts
Anode Voltage	250 volts	Anode Impedance	1.0 meg.
Anode Current	2.0 mA	Mutual Conductance	1.2 mA
Screen (g_2) Voltage	100 volts	Cut-off Voltage	-7 volts

For further information on characteristics refer to type 6J7G.



Replacement Type

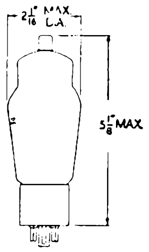
TYPE **6D6** (U.X. BASE) VARI-MU R.F. PENTODE



CHARACTERISTICS

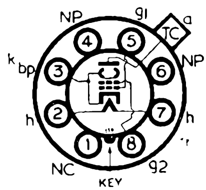
Heater Voltage	6.3 volts	Screen Current	2.0 mA
Heater Current	0.3 amp.	Control Grid (g_1) Voltage ...	-3 volts
Anode Voltage	250 volts	Anode Impedance	0.8 meg.
Anode Current	8.2 mA	Mutual Conductance	1.6 mA/V
Screen (g_2) Voltage	100 volts	Cut-off Voltage	-50 volts

For further information on characteristics refer to type 6U7G



Current Equipment Type

TYPE **6CD6G**
(OCTAL BASE)
LINE TIME BASE
OUTPUT VALVE



The BRIMAR 6CD6G is designed for television line time base output service in applications where the power requirements are greater than can be satisfied by the 6BG6G. Its features include high anode current at low anode voltage, and high ratio of anode to screen current. Type 6CD6G is suitable for scanning wide angle cathode ray tubes up to 21″ in size. When used in conjunction with type 6U4GT, efficient operation may be secured at low H.T. rail voltages.

RATINGS

Heater Voltage	6.3 volts
Heater Current	2.5 amps.
Direct Anode Voltage	700 volts max.
*Peak Positive Anode Pulse Voltage	6,600 volts max.
Anode Dissipation	15 watts max.
Direct Screen (g_2) Voltage	175 volts max.
Screen Dissipation	3 watts max.
Direct Control Grid (g_1) Voltage	–50 volts max.
*Peak Negative Control Grid Voltage	–200 volts max.
Heater to Cathode Potential	250 volts max.
Direct Cathode Current	200 mA max.
Peak Cathode Current	700 mA max.

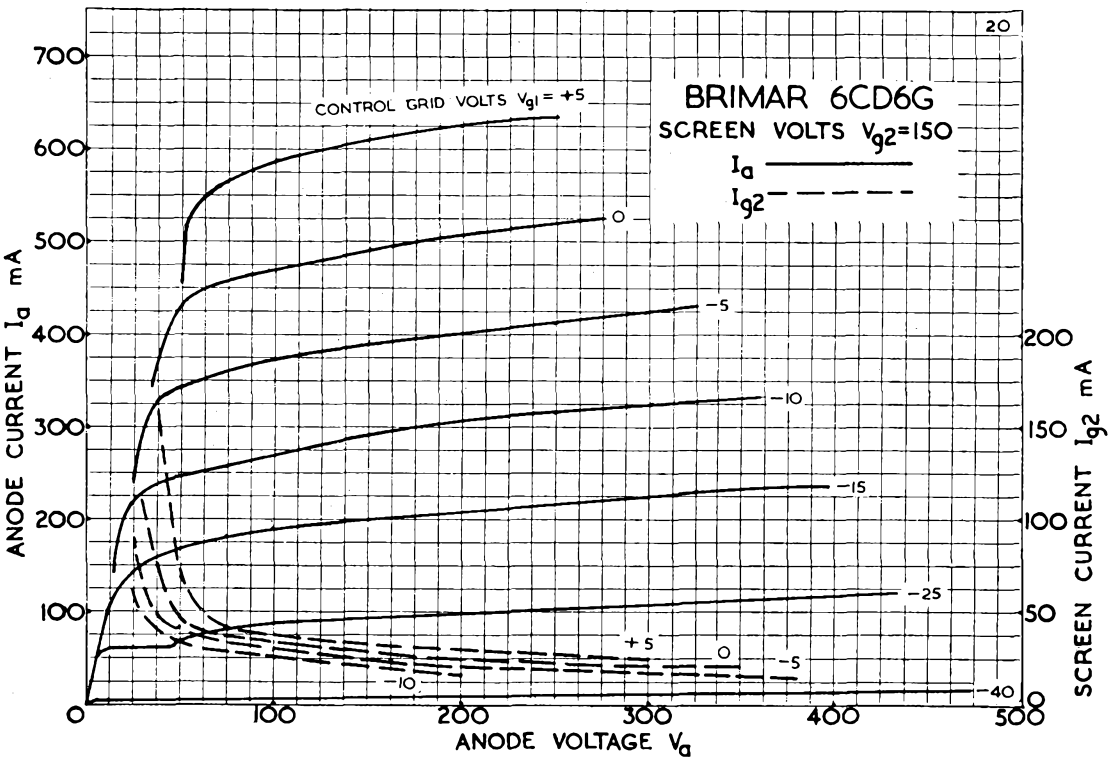
OPERATING CHARACTERISTICS

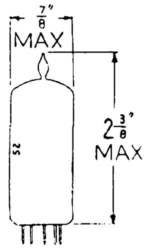
Anode Voltage	200 volts
Anode Current	64 mA
Screen Voltage	150 volts
Screen Current	3 mA
Control Grid Voltage	–30 volts
Mutual Conductance	6.7 mA/V
Inner Amplification Factor (μ_{g_1, g_2})	3.5

INTER-ELECTRODE CAPACITANCES

Input (c_{in})	26 pF
Output (c_{out})	10 pF
Anode to Grid ($c_{g_1, a}$)	1.0 pF

* *The duty cycle must not exceed 15 per cent of the scanning cycle, and its duration must not exceed 15μ seconds.*


BRIMAR 6CD6G
SCREEN VOLTS V_{g2}=150
I_a
I_{g2}
CONTROL GRID VOLTS V_{g1} = +5
0
−5
−10
−15
−25
−40
+5
0
−5
−10
20
ANODE CURRENT I_a mA
700
600
500
400
300
200
100
0
100
200
300
400
500
ANODE VOLTAGE V_a
SCREEN CURRENT I_{g2} mA
200
150
100
50
0



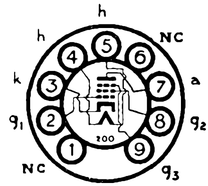
B9A (Noval) Base

Current Equipment Type

TYPE 6CH6

(Previously Coded 7D10)

MINIATURE VIDEO OUTPUT PENTODE



The BRIMAR type 6CH6 is a miniature high slope pentode suitable for video amplification where more power is required than is obtainable from normal R.F. pentodes. Its high anode dissipation and current rating make it suitable for working into loads of low impedance and high self capacity.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.75 amp.
Anode Voltage	275 volts max
Screen (g_2) Voltage	275 volts max.
Anode Dissipation	12 watts max.
Screen Dissipation	2.5 watts max.
D.C. Cathode Current	60 mA max.
Max. Peak Cathode Current (Absolute)	1.5 amps.*
Max. Control Grid Circuit Resistance	0.1 meg.†

** The duration of circuit flow must not exceed 2μ secs. and must not be greater than 5 per cent of the duty cycle.*

† This value may be increased to 220,000 ohms if autobias is employed.

OPERATING CHARACTERISTICS

Anode Voltage	250 volts
Anode Current	40 mA
Screen Voltage	250 volts
Screen Current	6 mA
Control Grid Voltage (V_{g1})	–4.5 volts
Mutual Conductance	11 mA/V
Anode Impedance	50,000 ohms
Inner Amplification Factor ($\mu_{g1,g2}$)	26

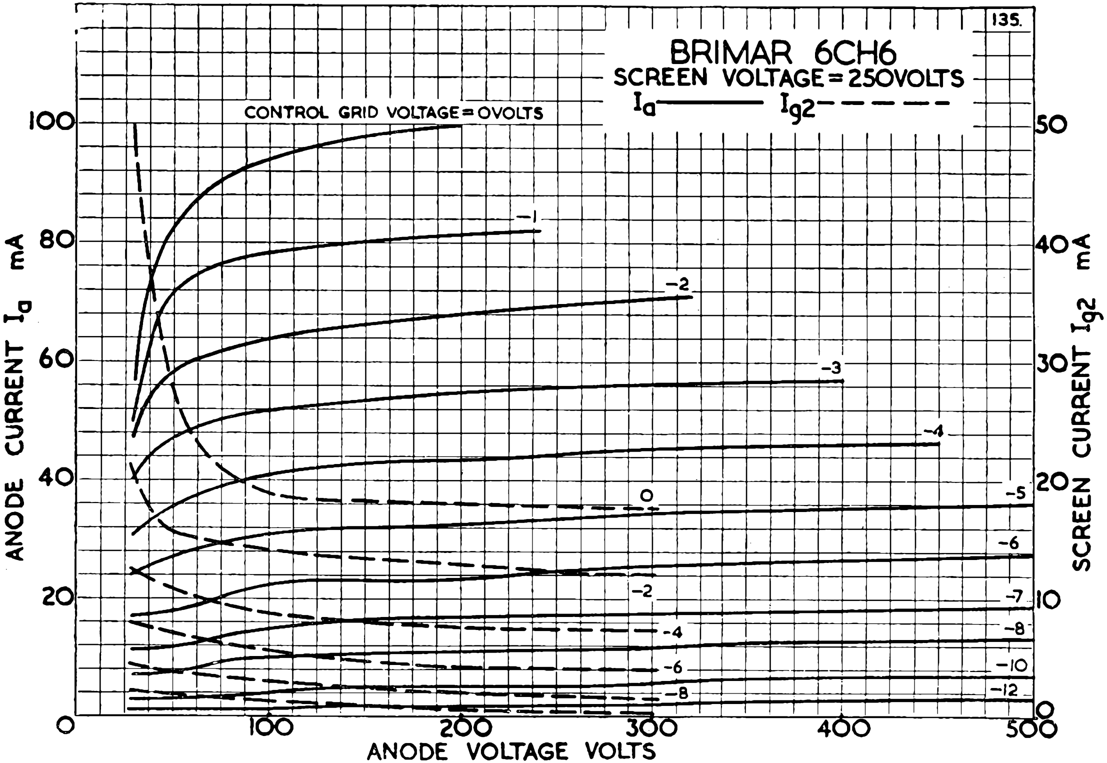
INTER-ELECTRODE CAPACITANCES **

Input (c_{in})	14 pF
Output (c_{out})	5 pF
Grid to Anode ($c_{a,g1}$)	0.25 pF

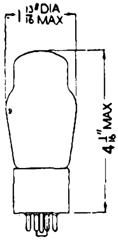
*** No external shield.*

Type 6CH6 is a commercial equivalent of the CV2127.

6CH6


135.
BRIMAR 6CH6
SCREEN VOLTAGE = 250 VOLTS
Ia ——— Ig2 – – – –
CONTROL GRID VOLTAGE = 0 VOLTS
−1
−2
−3
−4
−5
−6
−7
−8
−10
−12
0
−2
−4
−6
−8
ANODE CURRENT Ia mA
SCREEN CURRENT Ig2 mA
ANODE VOLTAGE VOLTS
0
100
200
300
400
500
20
40
60
80
100
10
30
50

BRIMAR

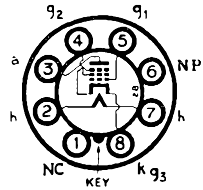


Replacement Type

TYPE 6F6G

(OCTAL BASE)

POWER PENTODE



The BRIMAR type 6F6G is an indirectly heated output pentode suitable for use in A.C. and car radio equipment.

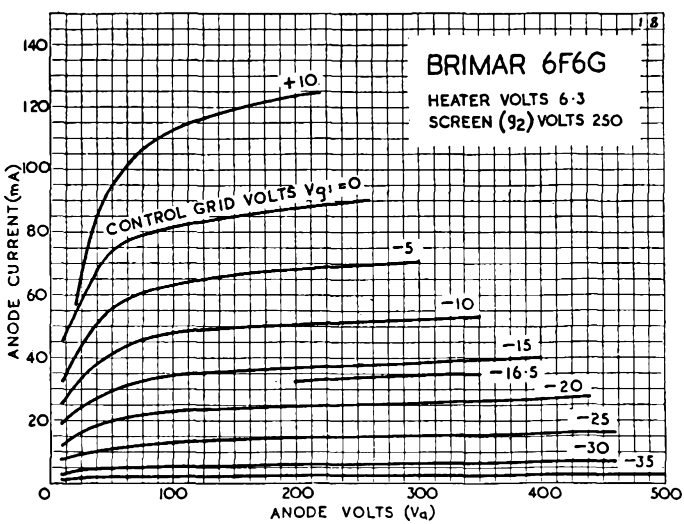
RATINGS

Heater Voltage	6.3 volts
Heater Current	0.7 amp.
Anode Voltage	375 volts max.
Anode Dissipation	11 watts max.
Screen (g_2) Voltage	285 volts max.
Screen Dissipation	3.75 watts max.

OPERATING CHARACTERISTICS CLASS "A"

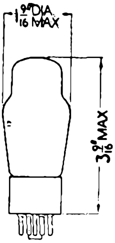
	SINGLE VALVE		PUSH PULL (2 VALVES)	
Anode Voltage	250	285	315	volts
Anode Current	34	38	62	mA
Screen Voltage	250	285	285	volts
Screen Current (Zero Signal)	6.5	7.0	12	mA
Screen Current (Max. Signal)	9.7	12.0	18	mA
Control Grid (g_1) Voltage	−16.5	−20	−24	volts
Cathode Bias Resistor	410	440	320	ohms
Anode Impedance	80,000	78,000	–	ohms
Mutual Conductance	2.50	2.55	–	mA/V
Optimum Load	7,000	7,000	10,000*	ohms
Power Output	3.2	4.5	10.5	watts
Harmonic Distortion	8.0	9.0	3.0	per cent.

* *Anode to Anode Load.*

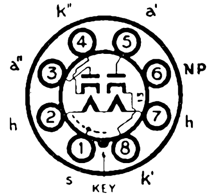


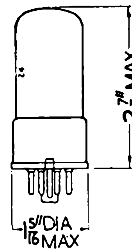
Replacement Types

TYPES 6H6G, 6H6GT (OCTAL BASE)



6H6G.





6H6GT.

DOUBLE DIODES

RATINGS

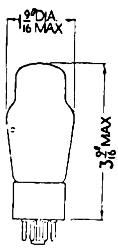
Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Peak Inverse Voltage	420 volts max.
Peak Anode Current (each Anode)	48 mA max.
D C. Heater-Cathode Voltage	330 volts max.

OPERATING AS RECTIFIER

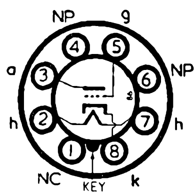
	HALF-WAVE	FULL-WAVE	
R.M.S. Input per Anode	117	117	volts max.
Supply Impedance per Anode	30	15	ohms min.
Rectified Current	8	8	mA max.

Current Equipment Types

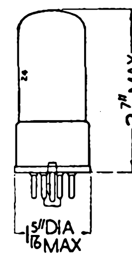
TYPES 6J5G, 6J5GT (OCTAL BASE)



6J5G.



Note.—Type 6J5GT *has Pin* I *connected to metal shell.*



6J5GT.

GENERAL PURPOSE TRIODES

RATINGS

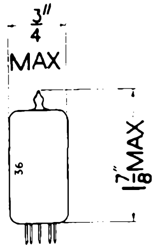
Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	2.5 watts max.
Cathode Current	20 mA max.

OPERATING CHARACTERISTICS

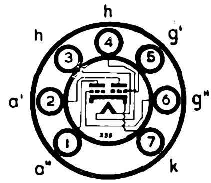
Anode Voltage	100	250	volts
Anode Current	10.6	9.0	mA
Control Grid Voltage	0	–8	volts
Anode Impedance	8,000	7,700	ohms
Mutual Conductance	2.5	2.6	mA/V
Amplification Factor	20	20	

For further characteristics and curves refer to type 6SN7GT.

Current Equipment Type



TYPE **6J6**
DOUBLE TRIODE



The BRIMAR 6J6 is a miniature double triode with a common cathode and may be used as a mixer or R.F. oscillator and in the latter application will produce a power output of 3.5 watts at frequencies up to 50 Mc/s. It is useful as a mixer up to 600 Mc/s.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.45 amps.
Anode Voltage	300 volts max.
Anode Dissipation	1.5 watts max.
Anode Input power as an R.F. Amplifier or Oscillator ...	4.5 watts max.
Anode Current	15 mA max.
Grid Voltage	0 volts max.
Grid Voltage	—40 volts min.
Grid Current	8 mA max.
Grid Circuit Resistance with Cathode Bias (Fixed Bias not recommended)	0.5 Megohms max.
Heater to Cathode Voltage	100 volts max.

OPERATING CHARACTERISTICS

Anode Voltage	100 volts
Cathode Bias Resistor	50 ohms
Anode Current	8.5 mA
Mutual Conductance	5.3 mA/V
Amplification Factor	38
Anode Resistance	7,100 ohms

OPERATION AS A PUSH-PULL R.F. AMPLIFIER OR OSCILLATOR UP TO 50 Mc/s

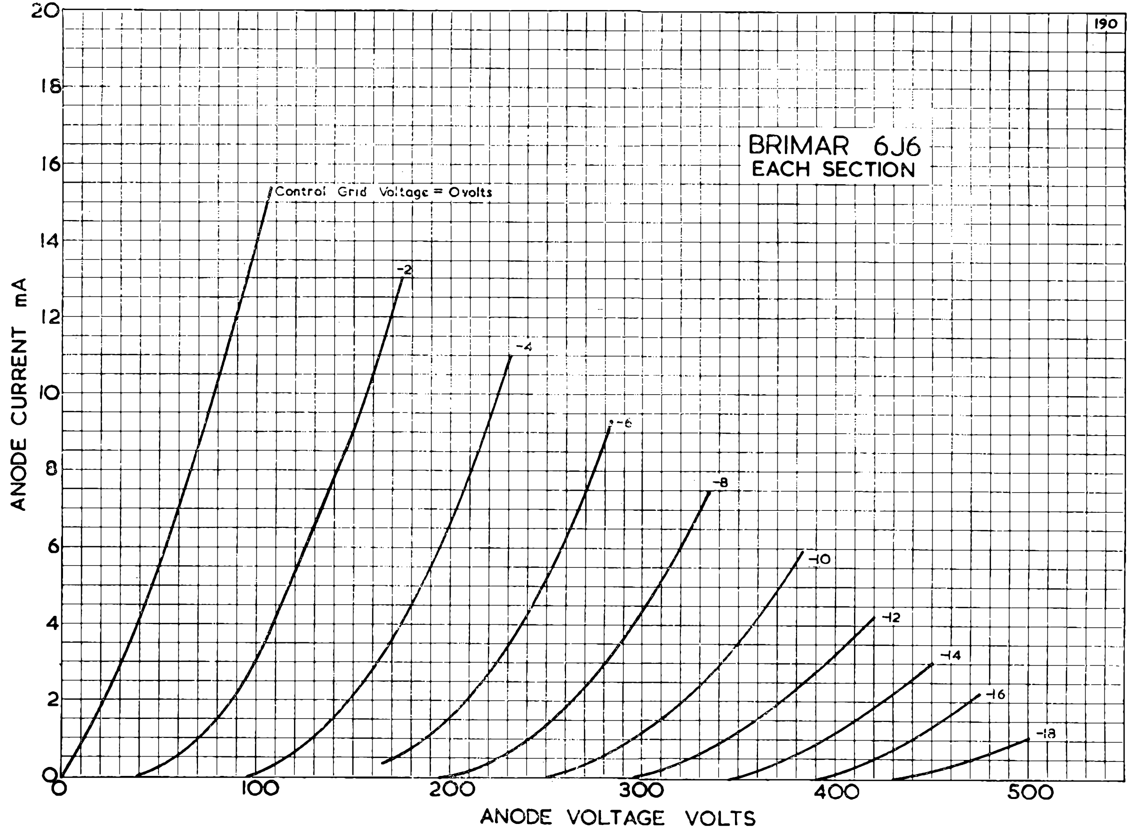
Anode Voltage	150 volts
Grid Voltage *	—10 volts
Anode Current, Total	30 mA
Grid Current, Total	16 mA
Grid Driving Power	0.35 watts approx.
Output Power	3.5 watts

** From fixed bias supply, grid resistor of 625 ohms, or cathode resistor of 220 ohms.*

INTER-ELECTRODE CAPACITANCES *

Grid to Anode	1.6 pF
Grid to Cathode and Heater	2.2 pF
Anode to Cathode and Heater	0.4 pF

** Measured without external shield*

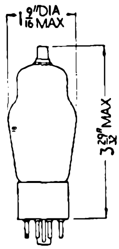


190
BRIMAR 6J6
EACH SECTION
Control Grid Voltage = 0 volts
-2
-4
-6
-8
-10
-12
-14
-16
-18
ANODE CURRENT mA
0
2
4
6
8
10
12
14
16
18
20
ANODE VOLTAGE VOLTS
0
100
200
300
400
500

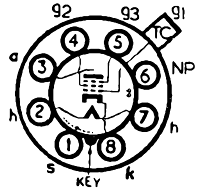
BRIMAR

Replacement Types

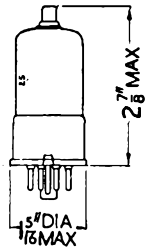
TYPES 6J7G, 6J7GT (OCTAL BASE)



6J7G.



Note.—Type 6J7GT, has Pin 1 connected to metal shell.



6J7GT.

R.F. PENTODES

The BRIMAR types 6J7G, 6J7GT are indirectly heated pentode amplifier valves suitable for use in A.C., A.C./D.C. or car radio equipment. With the exception of their overall dimensions the two types are identical.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	0.75 watts max.
Screen (g_2) Voltage	125 volts max.
Screen Dissipation	0.1 watts max.

OPERATING CHARACTERISTICS [Suppressor Grid (g_3) connected to Cathode]

Anode Voltage	100	250	volts
Anode Current	2.0	2.0	mA
Screen Voltage	100	100	volts
Screen Current	0.5	0.5	mA
Control Grid (g_1) Voltage	−3	−3	volts
Anode Impedance	1.0	1.5	meg.
Mutual Conductance	1.1	1.25	mA/V
Control Grid Bias (For Anode current cut-off)	−7	−7	volts

OPERATION AS RESISTANCE COUPLED AMPLIFIER (g_3 connected to Cathode)

Anode and Screen Supply Voltage	100	200	300	volts
Anode Load Resistor	0.25	0.25	0.25	meg.
Screen Series Resistor	1.0	1.0	1.2	meg.
Cathode Bias Resistor	2,500	1,500	1,200	ohms
Peak Output	35	70	100	volts
Voltage Gain	90	120	14C	

OPERATION AS A TRIODE (g_2 connected to Anode)

For operating characteristics see type 6C5G.

OPERATION AS ANODE BEND DETECTOR (g_3 connected to Cathode)

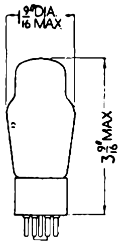
Anode Supply Voltage	100	250	volts
Anode Load Resistor	0.25	0.5	meg.
Screen Series Resistor	2.5	4.7	meg.
Cathode Bias Resistor	10,000	10,000	ohms
R.M.S. Input	1.6	1.4	volts*
Peak Output	17	17	volts*

* *For R.M.S. Input modulated 20 per cent.*

INTER-ELECTRODE CAPACITANCES †

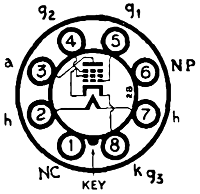
Input	4.6 pF
Output	12 pF
Control Grid to Anode	.007 pF max.

† *With close fitting shield connected to Cathode.*
For characteristic curve refer to type 6BR7



Replacement Type

TYPE 6K6G
(OCTAL BASE)
POWER PENTODE



RATINGS

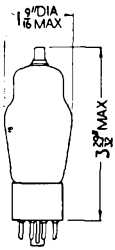
Heater Voltage	6.3 volts
Heater Current	0.4 amp.
Anode Voltage	315 volts max.
Anode Dissipation	8.5 watts max.
Screen (g_2) Voltage	285 volts max.
Screen Dissipation	2.8 watts max.

OPERATING CHARACTERISTICS

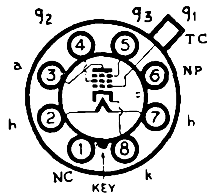
Anode Voltage	100	250	315	volts
Anode Current	9.0	32	25.5	mA
Screen Voltage	100	250	285	volts
Screen Current (Zero Signal)	1.6	5.5	4.0	mA
Screen Current (Max. Signal)	3.0	10	9.0	mA
Control Grid Voltage	–7	–18	–21	volts
Cathode Bias Resistor	600	500	700	ohms
Anode Impedance	100,000	68,000	75,000	ohms
Mutual Conductance	1.5	2.3	2.1	mA/V
Optimum Load	12,000	7,600	9,000	ohms
Power Output	0.35	3.4	4.5	watts
Harmonic Distortion	11	11	15	per cent.

Replacement Types

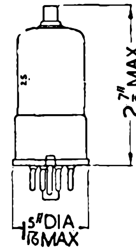
TYPES 6K7G, 6K7GT
(OCTAL BASE)



6K7G.



Note.—Type 6K7GT has Pin 1 connected to metal shell.



6K7GT.

VARI-MU R.F. PENTODES

The BRIMAR types 6K7G, 6K7GT are indirectly heated pentodes of the vari-mu (remote cut-off) type for use in the R.F. or I.F. stages of radio equipment.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	2.75 watts max.
Screen (g_2) Voltage	125 volts max.
Screen Dissipation	0.35 watts max.

OPERATING CHARACTERISTICS
[Suppressor Grid (g_3) connected to Cathode].

Anode Voltage	100	180	250	250	volts
Anode Current	9.5	4.0	7.0	10.5	mA
Screen Voltage	100	75	100	125	volts
Screen Current	2.7	1.0	1.7	2.6	mA
Control Grid (g_1) Voltage ...	–1	–3	–3	–3	volts
Cathode Bias Resistor	–	600	330	220	ohms
Anode Impedance	0.15	1.0	0.8	0.6	meg.
Mutual Conductance	1.65	1.1	1.45	1.65	mA/V
Control Grid Voltage	–38	–32	–42	–52	volts

(For mutual conductance of .002 mA/V)

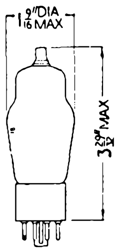
INTER-ELECTRODE CAPACITANCES *

	6K7G	6K7GT	
Input	5	4.6	pF
Output	12	12	pF
Control Grid to Anode	0.007	0.005	pF max.

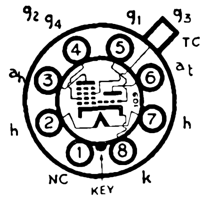
* *With close fitting shield connected to Cathode.*

Replacement Types

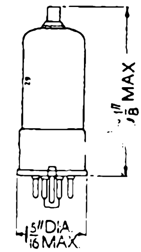
TYPES 6K8G, 6K8GT
(OCTAL BASE)



6K8G.



Note.—Type 6K8GT has Pin 1 connected to metal shell.



6K8GT.

TRIODE-HEXODE FREQUENCY CHANGERS

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Hexode Anode (a_h) Voltage	300 volts max.
Hexode Anode Dissipation	0.75 watts max.
Hexode Screen (g_2, g_4) Voltage	150 volts max.
Hexode Screen Dissipation	0.7 watts max.
Triode Anode (a_t) Voltage	125 volts max.
Triode Anode Dissipation	0.75 watts max.
Total Cathode Current	16 mA max.

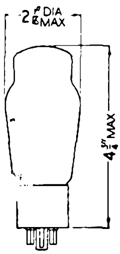
OPERATION AS FREQUENCY CHANGER

Hexode Anode Voltage	100	250	volts
Hexode Anode Current	2.3	2.5	mA
Hexode Screen Voltage	100	100	volts
Hexode Screen Current	6.2	6.0	mA
Hexode Control Grid (g_3) Voltage	–3	-3	volts
Cathode Bias Resistor	220	300	ohms
Hexode Anode Impedance	0.4	0.6	meg.
Triode Anode Supply Voltage	100	250	volts
Triode Anode Voltage	100	100	volts
Triode Anode Resistor	–	40,000	ohms
Triode Anode Current	3.8	3.8	mA
Triode Grid (g_1) Resistor	50,000	50,000	ohms
Triode Grid Current	0.15	0.15	mA
Conversion Conductance	0.33	0.36	mA/V
Hexode Control Grid Voltage (For conversion of 0.002 mA/V)	–30	-30	volts

INTER-ELECTRODE CAPACITANCES *

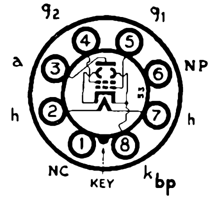
R.F. Input (g_3 to all except a_h)	4.6 pF
I.F. Output (a_h to all except g_3)	4.8 pF
Oscillator Input (g_1 to all except a_t)	6.5 pF
Oscillator Output (a_t to all except g_1)	3.4 pF
Control Grid (g_3) to Oscillator Grid (g_1)	0.2 pF max.
Control Grid (g_3) to Oscillator Anode (a_t)	0.05 pF max.
Control Grid (g_3) to Hexode Anode (a_h)	0.08 pF max.
Oscillator Grid (g_1) to Oscillator Anode (a_t)	1.8 pF

* *With close fitting shield connected to Cathode.*



Current Equipment Type

TYPE 6L6G
(OCTAL BASE)
OUTPUT
BEAM TETRODE



The BRIMAR type 6L6G is an indirectly heated beam power tetrode for use in the output stages of large audio equipment. Owing to the special construction only a small proportion of odd harmonics are produced and in push-pull connection large outputs may be obtained without distortion.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.9 amp.
Anode Voltage	360 volts max.
Anode Dissipation	19 watts max.
Screen (g_2) Voltage	270 volts max.
Screen Dissipation	2.5 watts max.

OPERATING CHARACTERISTICS

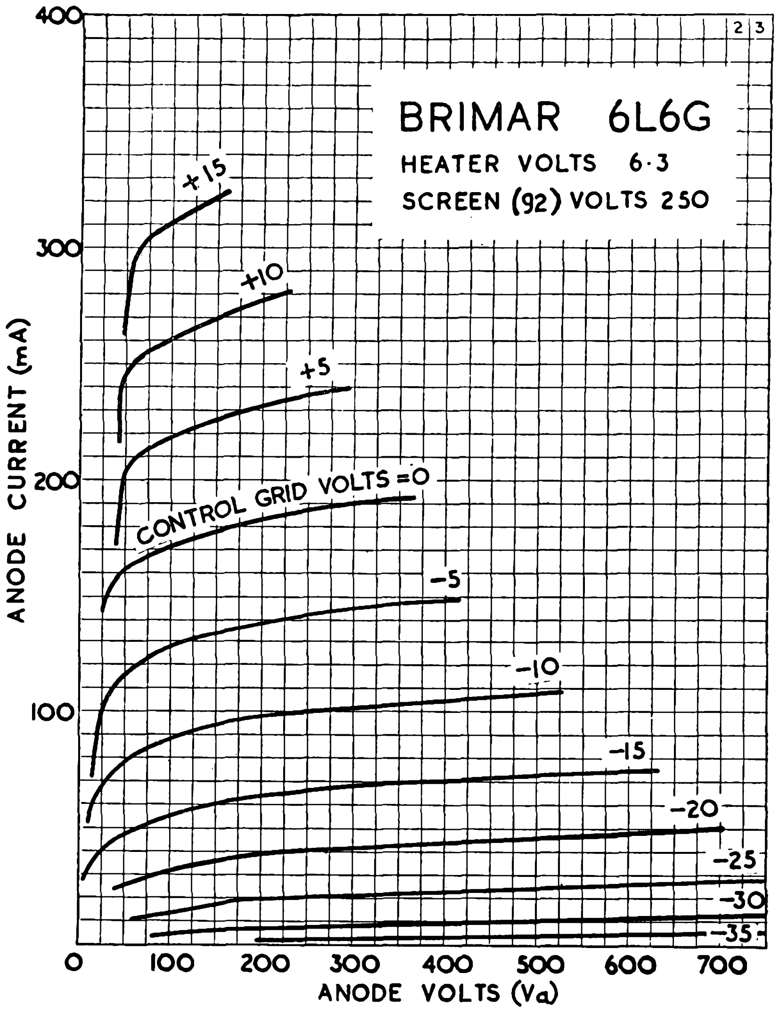
	CLASS A			CLASS AB1	
	Single Valve		Push Pull (2 valves)	Push Pull (2 valves)	
Anode Voltage	250	350	250	360	volts
Anode Current (Zero Signal)	72	54	120	88	mA
Anode Current (Max. Signal)	79	66	140	100	mA
Screen Voltage	250	250	250	270	volts
Screen Current (Zero Signal)	5.0	2.5	10	5	mA
Screen Current (Max. Signal)	7.3	7.0	16	17	mA
Control Grid (g_1) Voltage	–14	–18	–16	–22.5	volts
Cathode Bias Resistor	170	300	125	250	ohms
Anode Impedance	22,500	33,000	25,000	–	ohms
Mutual Conductance	6.0	5.2	5.5	–	mA/V
Optimum Load	2,500	4,200	5,000	9,000	ohms
Power Output	6.5	11	14	24	watts
Harmonic Distortion	10	15	2	4	per cent

OPERATION AS TRIODE (g_2 connected to Anode)
CLASS A. PUSH PULL (2 valves)

Anode Voltage	325 volts max.
Anode Current	80 mA
Cathode Bias Resistor	375 ohms
Optimum Load	8,000 ohms
Power Output	6 watts
Harmonic Distortion	0.6 per cent.

INTER-ELECTRODE CAPACITANCES

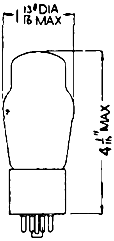
Input	11.5 pF
Output	9.5 pF
Control Grid to Anode	0.9 pF



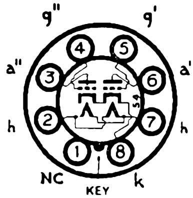
BRIMAR 6L6G
HEATER VOLTS 6·3
SCREEN (g2) VOLTS 250
2|3
ANODE CURRENT (mA)
ANODE VOLTS (Va)
CONTROL GRID VOLTS = 0
+15
+10
+5
-5
-10
-15
-20
-25
-30
-35
400
300
200
100
0
100
200
300
400
500
600
700

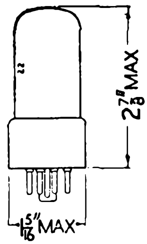
Replacement Types

TYPES 6N7G, 6N7GT



6N7G.





6N7GT.

DOUBLE TRIODES

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.8 amp.
Anode Voltage	300 volts max.
Peak Anode Current (per Anode)	125 mA max.
Anode Dissipation (per Anode)	5.5 watts max.

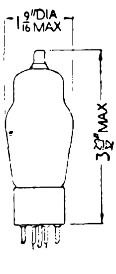
OPERATING CHARACTERISTICS

	Each Section (Class A)	Both Sections (Class B)	
Anode Voltage	250	300	volts
Anode Current (Zero Signal)	3.0	35	mA
Anode Current (Max. Signal)	—	70	mA
Grid Voltage	—5	0	volts
Cathode Bias Resistor	1.000	—	ohms
Anode Impedance	23,000	—	ohms
Mutual Conductance	1 6	—	mA/V
Amplification Factor	35	—	—
Peak Input (Grid—Grid)	—	82	volts
Peak Grid Current (Each Section)	—	22	mA
Optimum Load	30,000	8.0C0	ohms*
Power Output	0.2	10	watts

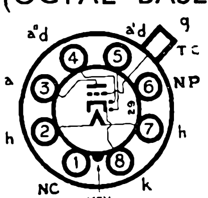
** Anode to Anode load*

Replacement Types

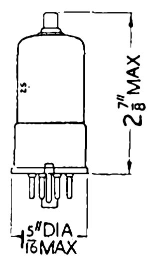
TYPES 6Q7G, 6Q7GT
(OCTAL BASE)



6Q7G.



Note.—Type 6Q7GT *has Pin* I *connected to metal shell.*



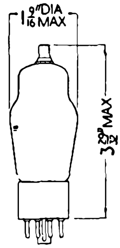
6Q7GT.

DOUBLE DIODE TRIODES

RATINGS

Heater Voltage	6.3 volts	Anode Voltage	300 volts max.
Heater Current	0.3 amp.	Grid Voltage	0 volts min.

For operating characteristics and curves refer to type 6AT6.

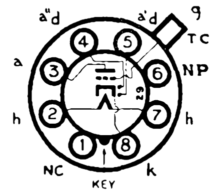


Replacement Type

TYPE **6R7G**

(OCTAL BASE)

DOUBLE DIODE TRIODE



RATINGS

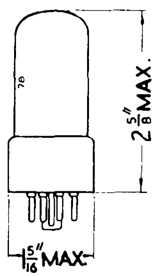
Heater Voltage	6.3 volts	Heater Current	0.3 amp.

OPERATING CHARACTERISTICS

Anode Voltage	250 volts	Anode Impedance ...	8,500 ohms
Anode Current	9.5 mA	Mutual Conductance ...	1.9 mA/V
Control Grid Voltage	—9 volts	Amplification Factor ...	16

OPERATION AS RESISTANCE COUPLED AMPLIFIER

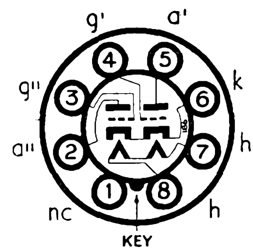
Anode Supply Voltage	250 volts	Peak Output	60 volts
Anode Load Resistor	0.1 meg.	Voltage Gain	10
Cathode Bias Resistor	400 ohms		



Replacement Type

TYPE **6SC7GT**

HIGH-MU DOUBLE TRIODE



CATHODE
(Indirectly Heated)

Heater Voltage	6.3 volts
Heater Current	0.3 amps. (nom.)
Max. Heater-Cathode Potential	250 volts

DIMENSIONS

Max. overall length	$3\frac{3}{16}$ inches
Max. Bulb diameter	$1\frac{5}{16}$ inches
Max. seated height...	$2\frac{5}{8}$ inches

RATINGS

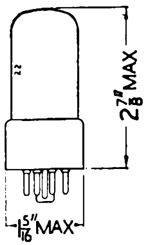
Max. Anode Voltage	250 volts
Max. Anode Dissipation	1.0 watts

TYPICAL OPERATING CONDITIONS (Single Triode)

Anode Voltage	250 volts
Grid Voltage	—2.0 volts
Anode Current	2.0 mA
Anode Impedance	53,000 ohms
Mutual Conductance	1.325 mA/V
Amplification Factor	70

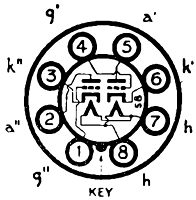
CAPACITANCES

C_{ag}	2 pF
C_{in}	2 pF
C_{out}	3 pF



Replacement Type

TYPE **6SL7GT**
(OCTAL BASE)
HIGH-MU
DOUBLE TRIODE



The BRIMAR type 6SL7GT is an indirectly heated valve comprising two high-mu triodes in one envelope. With the exception of the heaters, the connections to each assembly are brought out to separate base pins. Type 6SL7GT may be used as L.F. amplifier or phase inverter and in certain cases the two units may be connected in cascade to give a very high overall gain.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	250 volts max.
Anode Dissipation (each Anode)	1.0 watts max.

OPERATING CHARACTERISTICS (Each Section)

Anode Voltage	250 volts
Anode Current	2.3 mA
Control Grid Voltage	−2 volts
Anode Impedance	44,000 ohms
Mutual Conductance	1.6 mA/V
Amplification Factor	70

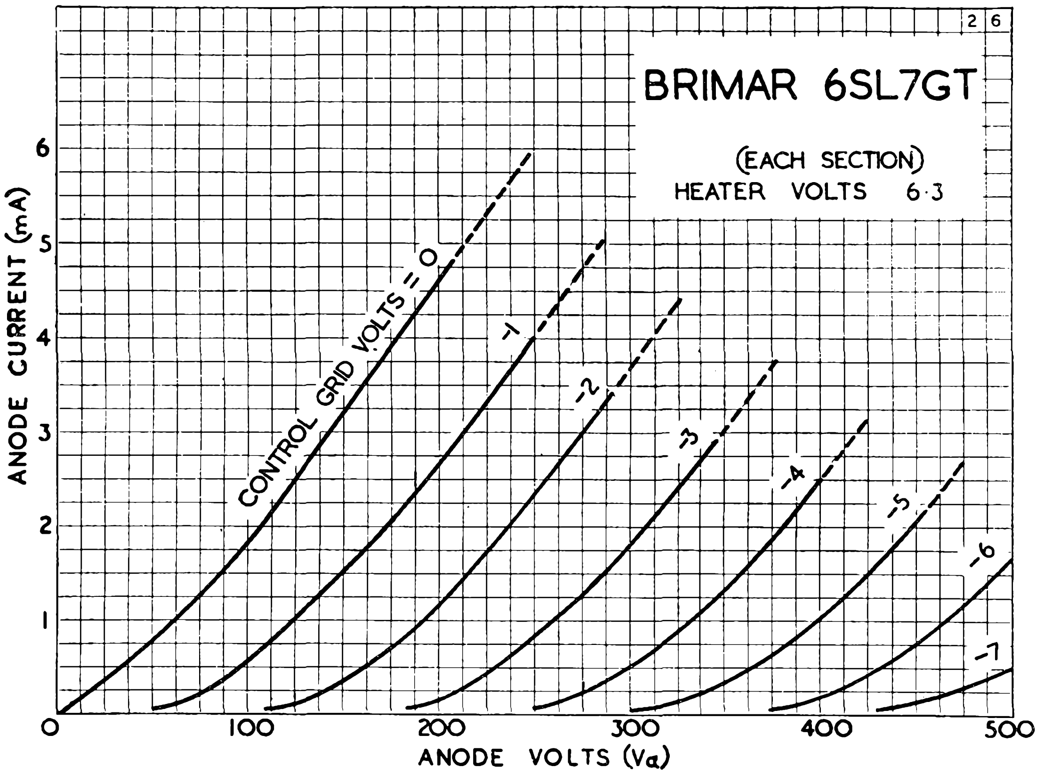
OPERATION AS RESISTANCE COUPLED AMPLIFIER (Each Section)

Anode Supply Voltage	100	250	volts
Anode Load Resistor	0.25	0.25	meg.
Cathode Bias Resistor	4,700	3,300	ohms
Peak Output	21	62	volts
Stage Gain	23	50	

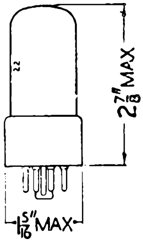
INTER-ELECTRODE CAPACITANCES †

	Section (1)		Section (2)	
Input	2.15		2.15	pF
Output	0.9		0.9	pF
Grid to Anode	3.4		3.5	pF
Anode 1 to Anode 2		1.4		pF
Grid 1 to Grid 2		0.25		pF
Grid 1 to Anode 2		0.45		pF
Grid 2 to Anode 1		0.35		pF

† *With no external shield.*

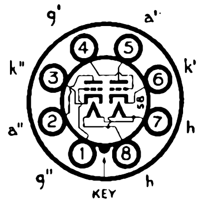


2 6
BRIMAR 6SL7GT
(EACH SECTION)
HEATER VOLTS 6·3
ANODE CURRENT (mA)
ANODE VOLTS (Va)
CONTROL GRID VOLTS = 0
-1
-2
-3
-4
-5
-6
-7
0
1
2
3
4
5
6
0
100
200
300
400
500



Replacement Type

TYPE 6SN7GT
(OCTAL BASE)
LOW-MU DOUBLE TRIODE



The BRIMAR type 6SN7GT is an indirectly heated valve comprising two general purpose triodes in one envelope. With the exception of the heaters, the connections to each assembly are brought out to separate base pins. Type 6SN7GT may be used as oscillator, L.F. amplifier, phase inverter, etc., or the two units may be connected in cascade to give a high overall gain. The operating characteristics of each section are identical to those of type 6J5GT.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.6 amp.
Anode Voltage	300 volts max.
Anode Dissipation (Each Anode)	2.5 watts max.
Average Grid Current	1.0 mA max.

OPERATING CHARACTERISTICS (Each Section)

Anode Voltage	100	250 volts
Anode Current	10.6	9.0 mA
Control Grid Voltage	0	−8 volts
Cathode Bias Resistor	–	1,100 ohms
Anode Impedance	8,000	7,700 ohms
Mutual Conductance	2.5	2.6 mA/V
Amplification Factor	20	20

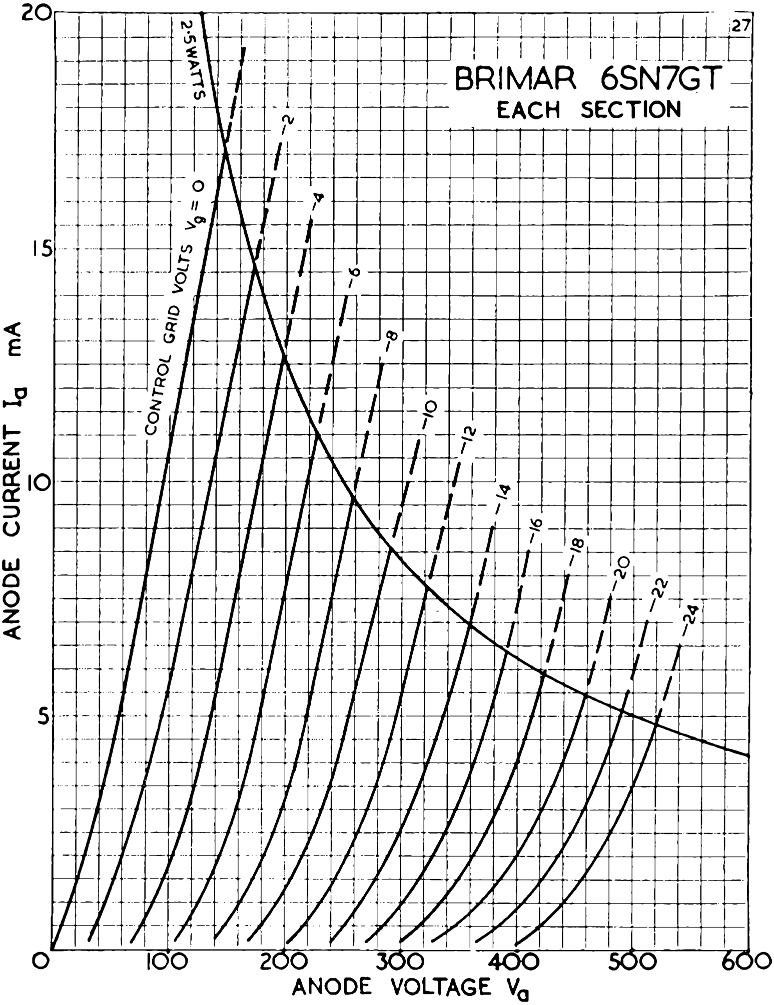
OPERATION AS RESISTANCE COUPLED AMPLIFIER (Each Section)

Anode Supply Voltage	100	200	300 volts
Anode Load Resistor	0.05	0.1	0.25 meg.
Cathode Bias Resistor	2,500	3,300	6,000 ohms
Peak Output	17	38	57 volts
Voltage Gain	13	14	14

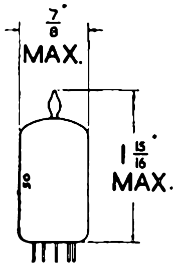
INTER-ELECTRODE CAPACITANCES †

	Section (1)		Section (2)	
Input	2.6		2.6	pF
Output	0.8		0.8	pF
Grid to Anode	4.0		4.1	pF
Anode 1 to Anode 2		0.5		pF
Grid 1 to Grid 2		0.1		pF
Grid 1 to Anode 2		0.2		pF
Grid 2 to Anode 1		0.2		pF

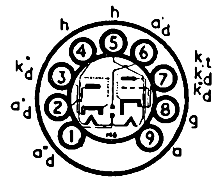
† *With no external shield.*


BRIMAR 6SN7GT
EACH SECTION
27
2·5 WATTS
CONTROL GRID VOLTS $V_g = 0$
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
ANODE CURRENT I_a mA
ANODE VOLTAGE V_a
20
15
10
5
0
100
200
300
400
500
600

Current Equipment Type



TYPE **6T8**
MINIATURE
TRIPLE DIODE
TRIODE



RATINGS

Type 6T8 is particularly suitable for use in discriminator circuits and for delayed A.V.C. applications. For discriminator use Diodes 2 and 3 should be employed.

Heater Voltage	6.3 volts
Heater Current	0.45 amp.
Anode Voltage	300 volts max.
Anode Dissipation	1.0 watt max.
Diode Current	5.0 mA max.

OPERATING CHARACTERISTICS

Anode Voltage	100	250	volts
Anode Current	0.8	1.0	mA
Grid Voltage	—1	—3	volts
Anode Impedance	54,000	58,000	ohms
Mutual Conductance	1.3	1.2	mA/V
Amplification Factor	70	70	

OPERATION AS RESISTANCE COUPLED AMPLIFIER

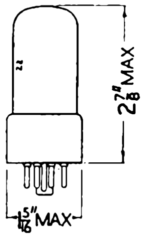
Refer to type 6AT6 for operating details.

INTER-ELECTRODE CAPACITANCES *

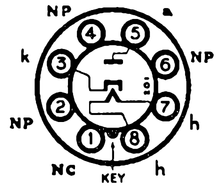
Triode Input	1.6 pF
Triode Output	1.0 pF
Grid to Anode	2.2 pF
Grid to each Diode	0.35 pF max.
Diode (d′ or d‴) Input	3.8 pF
Diode (d″) Input	4.5 pF

* *Measured with no external shield.*

Current Equipment Type



TYPE 6U4GT
(OCTAL BASE)
EFFICIENCY DIODE



The BRIMAR type 6U4GT is an indirectly heated half-wave rectifier designed for efficiency diode service in television receivers. The high working peak heater to cathode potential renders a separate highly insulated heater supply unnecessary when a line output transformer of the " auto " type is used.

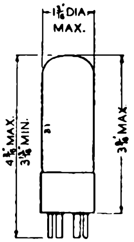
RATINGS
(Absolute Maximum)

Heater Voltage	6.3 volts
Heater Current	1.2 amps.
Peak Anode Current	660 mA max.
Peak Heater Cathode Potential, Heater Positive ...	110 volts abs. max.
Peak Heater Cathode Potential, Heater Negative ...	550 volts abs. max.
*Peak Heater Cathode Potential, Heater Negative ...	3,850 volts abs. max.
*Peak Inverse Voltage	3,850 volts max.
Direct Output Current	138 mA max.
Hot Switching Transient Anode Current for Duration of 0.2 Seconds Max.	3.85 amps. max.

INTER-ELECTRODE CAPACITANCE

Heater to Cathode ($C_{h,\,k}$)	8.5 pF

** For television efficiency diode service, where the duty cycle of the pulse does not exceed 15 per cent of the scanning cycle, and its duration does not exceed 15 micro-seconds.*



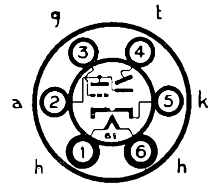
Replacement Type

TYPES 6U5/6G5

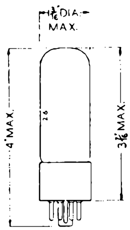
(U.X. BASE)

"MAGIC EYE"

TUNING INDICATOR



For operating characteristics refer to type 6U5G.



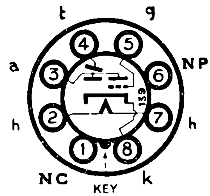
Current Equipment Type

TYPE 6U5G

(OCTAL BASE)

"MAGIC EYE"

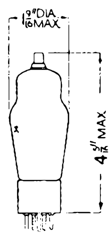
TUNING INDICATOR



OPERATING CHARACTERISTICS

Heater Voltage	6.3 volts			
Heater Current	0.3 amp.			
Anode Supply Voltage		100	200	250 volts
Anode Load Resistor		0.5	1.0	1.0 meg.
Anode Current*		0.2	0.2	0.24 mA
Target Voltage		100	200	250 volts
Target Current*		1	3	4 mA approx.
Grid Voltage†		—8	—18.5	—22 volts

* *For shadow angle of 90° approx., Grid Voltage zero.*
† *For shadow angle of 0°, Anode Current zero.*

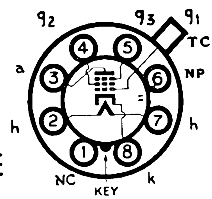


Replacement Type

TYPE 6U7G

(OCTAL BASE)

VARI-MU R.F. PENTODE



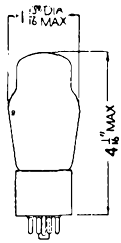
OPERATING CHARACTERISTICS

[Suppressor Grid (g_3) connected to Cathode]

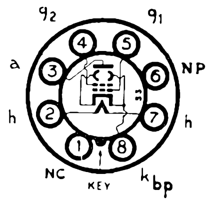
Heater Voltage		6.3 volts
Heater Current		0.3 amp.
Anode Voltage	100	250 volts
Anode Current	8.0	8.2 mA
Screen (g_2) Voltage	100	100 volts
Screen Current	2.2	2.0 mA
Control Grid Voltage	—3	—3 volts
Cathode Bias Resistor	330	330 ohms
Anode Impedance	0.25	0.8 meg.
Mutual Conductance	1.5	1.6 mA/V
Control Grid Bias (For Mutual Conductance of 0.002 mA/V)	—50	—50 volts

Current Equipment Types

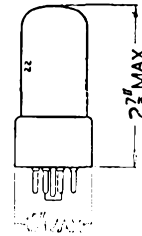
TYPES 6V6G, 6V6GT
(OCTAL BASE)



6V6G.



OUTPUT BEAM TETRODES



6V6GT

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.45 amp.
Anode Voltage	315 volts max.
Anode Dissipation	12 watts max.
Screen (g_2) Voltage	285 volts max.
Screen Dissipation	2.0 watts max.

OPERATING CHARACTERISTICS

	Single Valve Class A		Push Pull Class AB1 (2 valves)	
Anode Voltage	180	250	285	volts
Anode Current (Zero Signal)	29	45	70	mA
Anode Current (Max. Signal)	30	47	92	mA
Screen Voltage	180	250	285	volts
Screen Current (Zero Signal)	3.0	4.5	4.0	mA
Screen Current (Max. Signal)	4.0	7.0	13.5	mA
Control Grid (g_1) Voltage	–8.5	–12.5	–19	volts
Cathode Bias Resistor	250	240	250	ohms
Anode Impedance	58,000	52,000	–	ohms
Mutual Conductance	3.7	4.1	–	mA/V
Optimum Load	5,500	5,000	8,000	ohms
Power Output	2.0	4.5	14	watts
Harmonic Distortion	8	8	3.5	per cent.

OPERATION AS TRIODE (Anode and Screen strapped)
CLASS A. PUSH PULL (2 valves)

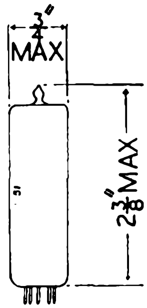
Anode Voltage	250	285	max. volts
Anode Current	90	78	mA
Cathode Bias Resistor	150	240	ohms
Optimum Load	4,000	4,500	ohms
Power Output	1.7	3.1	watts
Harmonic Distortion	0.4	0.5	per cent.

INTER-ELECTRODE CAPACITANCES †

Input	10.5 pF
Output	9.2 pF
Control Grid to Anode	1.2 pF
Heater to Cathode	6.0 pF

For characteristic curves refer overleaf to type 6BW6.

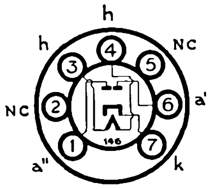
† *With no external shield.*



B7G Base

Current Equipment Type

TYPE 6X4 MINIATURE FULL-WAVE RECTIFIER



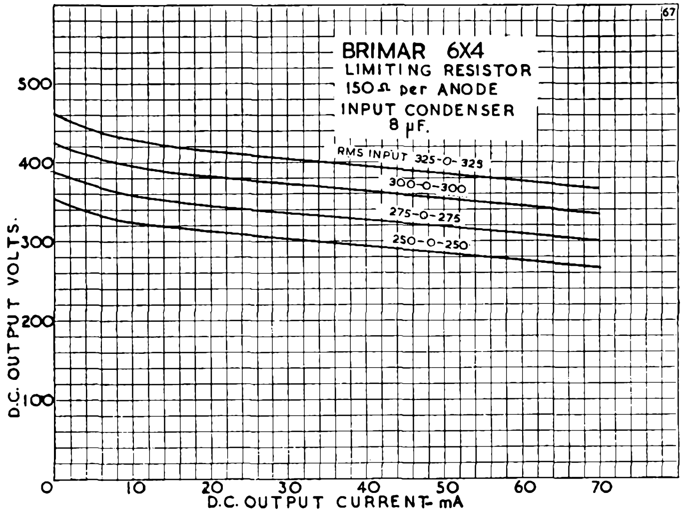
RATINGS

Heater Voltage	6.3 volts
Heater Current	0.6 amp.
Peak Inverse Voltage	1,250 volts max.
Peak Current (each anode)	210 mA max.
Peak Heater-Cathode Potential	450 volts max.

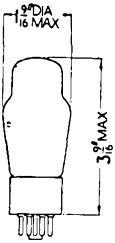
CHARACTERISTICS AS FULL-WAVE RECTIFIER

CONDENSER INPUT

R.M.S. Input per Anode	325 volts max.
Supply Impedance per Anode	150 ohms min.
Rectified Current	70 mA max.



Type 6X4 is a commercial equivalent of the CV493.

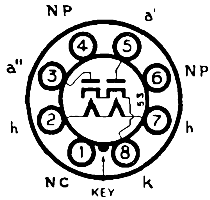


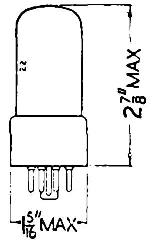
6X5G.

Replacement Types

TYPES 6X5G, 6X5GT

(OCTAL BASE)





6X5GT.

FULL-WAVE RECTIFIERS

The BRIMAR types 6X5G, 6X5GT are indirectly heated full-wave rectifiers for use in equipment where the current drain does not exceed 70 mA.

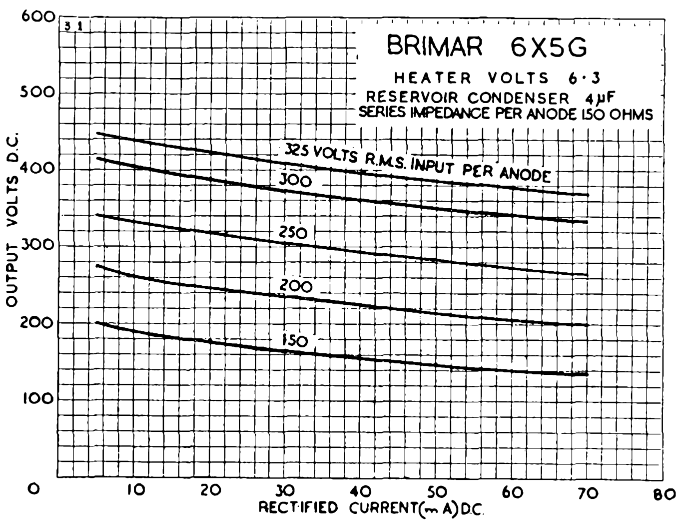
RATINGS

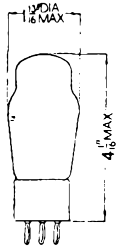
Heater Voltage ...	6.3 volts
Heater Current ...	0.6 amp.
Peak Inverse Voltage ...	1,250 volts max.
Peak Current (Each Anode) ...	210 mA max.
Heater Cathode Potential ...	450 volts max.

CHARACTERISTICS AS FULL-WAVE RECTIFIER

CONDENSER INPUT

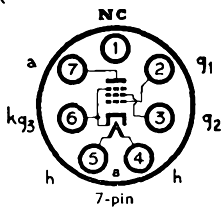
R.M.S. Input per Anode ...	325 volts max.
Supply Impedance per Anode ...	150 ohms min.
Rectified Current ...	70 mA max.
Reservoir Condenser ...	32 μF max.

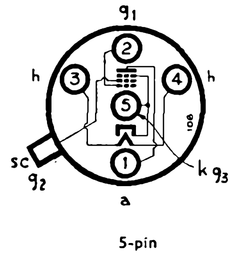




Replacement Type

TYPE **7A2**
(ENGLISH BASE)



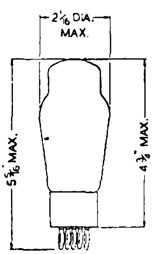


OUTPUT PENTODE

CHARACTERISTICS

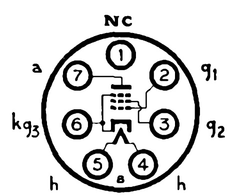
Heater Voltage	4.0 volts	Grid (g_1) Voltage	–16.5 volts
Heater Current	1.2 amp.	Cathode Bias Resistor ...	410 ohms
Anode Voltage	250 volts	Anode Impedance	80,000 ohms
Anode Current	34 mA	Mutual Conductance ...	2.35 mA/V
Screen (g_2) Voltage	250 volt	Optimum Load	7,000 ohms
Screen Current	6.5 mA	Power Output	3.5 watts

For characteristic curves refer to type 6F6G.



Replacement Type

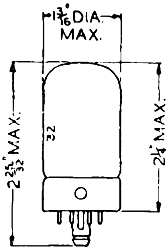
TYPE **7A3**
(ENGLISH BASE)
HIGH SLOPE
POWER PENTODE



CHARACTERISTICS

Heater Voltage	4.0 volts	Grid (g_1) Voltage	-6 volts
Heater Current	2.0 amp.	Cathode Bias Resistor ...	150 ohms
Anode Voltage	250 volts	Anode Impedance	60,000 ohms
Anode Current	32 mA	Mutual Conductance ...	10 mA/V
Screen (g_2) Voltage	250 volts	Optimum Load	8,500 ohms
Screen Current	6.0 mA	Power Output	3.75 watts

For characteristic curves refer to type 6AG6G.

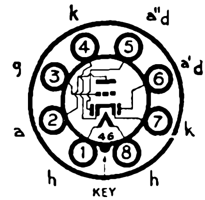


Replacement Type

TYPE 7B6

(LOCTAL BASE)

DOUBLE DIODE TRIODE



RATINGS

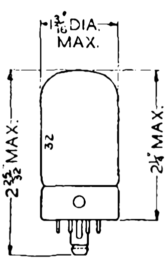
Heater Voltage	6.3 volts	Anode Voltage	300 volts max.
Heater Current	0.3 amp.	Diode Current	1.0 mA max.

OPERATING CHARACTERISTICS

Anode Voltage ...	100	250 volts	Anode Impedance ...	110,000	91,000 ohms
Anode Current ...	0.4	0.9 mA	Mutual Conductance	0.9	1.1 mA/V
Grid Voltage	—1.0	—2.0 volts	Amplification Factor	100	100

OPERATION AS RESISTANCE CAPACITY COUPLED AMPLIFIER

Anode Supply Voltage	100	250	250	volts
Anode Load Resistor	0.47	0.27	0.27	meg.
Grid Resistor	1.0	1.0	10.0	meg.
Cathode Bias Resistor	8,200	3,300	0	ohms
Succeeding Grid Resistor	0.47	0.47	0.47	meg.
Peak Output	8.0	44	44	volts
Stage Gain	48	59	56	
Harmonic Distortion	4	4	5	per cent.

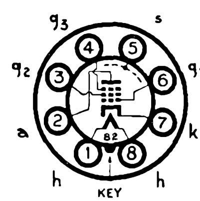


Replacement Type

TYPE 7B7

(LOCTAL BASE)

VARI-MU R.F. PENTODE



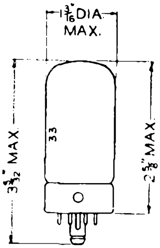
RATINGS

Heater Voltage	6.3 volts	Anode Dissipation ...	2.25 watts max.
Heater Current	0.15 amp.	Screen (g_2) Voltage ...	100 volts max.
Anode Voltage	300 volts max.	Screen Dissipation ...	0.25 watts max.

OPERATING CHARACTERISTICS

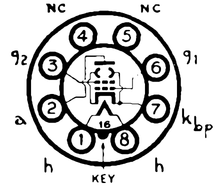
Anode Voltage	100	250	volts
Anode Current	8.2	8.5	mA
Screen Voltage	100	100	volts
Screen Current	1.8	1.7	mA
Control Grid (g_1) Voltage	—3	—3	volts
Cathode Bias Resistor	300	300	ohms
Anode Impedance	0.3	0.75	meg.
Mutual Conductance	1.65	1.75	mA/V
*Control Grid Voltage	—40	—40	volts

*For Mutual conductance of 0.01 mA/V.



Replacement Type

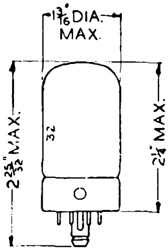
TYPE 7C5
(LOCTAL BASE)
OUTPUT BEAM TETRODE



RATINGS

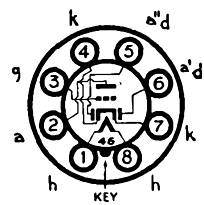
Heater Voltage ...	6.3 volts
Heater Current ...	0.45 amp.

For operating characteristics and curves refer to type 6BW6.



Replacement Type

TYPE 7C6
(LOCTAL BASE)
DOUBLE DIODE TRIODE



RATINGS

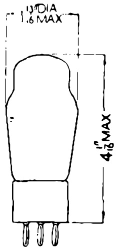
Heater Voltage	6.3 volts	Anode Voltage	300 volts max.
Heater Current	0.15 amp.	Diode Current	1.0 mA max.

OPERATING CHARACTERISTICS

Anode Voltage ...	100	250	volts	Anode Impedance ...	0.1	0.1	meg.
Anode Current ...	1.0	1.3	mA	Mutual Conductance	0.85	1.0	mA/V
Grid Voltage ...	0	—1.0	volts	Amplification Factor	85	100	

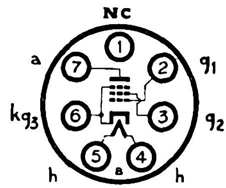
OPERATION AS RESISTANCE CAPACITY COUPLED AMPLIFIER

Anode Supply Voltage ...	100	250	250	volts
Anode Load Resistor...	0.47	0.27	0.27	meg.
Grid Resistor ...	1.0	1.0	10.0	meg.
Cathode Bias Resistor ...	10,000	3,300	0	ohms
Succeeding Grid Resistor ...	0.47	0.47	0.47	meg.
Peak Output Voltage...	8.5	40	39	volts
Stage Gain ...	43	53	57	
Harmonic Distortion ...	5.0	4.8	5.0	per cent.



Replacement Type

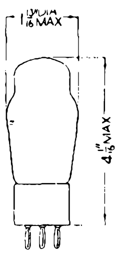
TYPE **7D3**
(ENGLISH BASE)
POWER PENTODE



CHARACTERISTICS

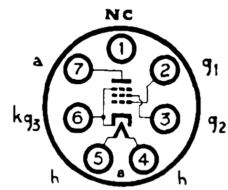
Heater Voltage ... ... 40 volts Heater Current ... ... 0.20 amp.

For further information refer to type 25A6G.



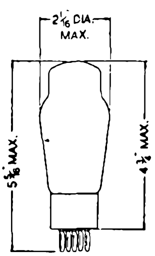
Replacement Type

TYPE **7D5**
(ENGLISH BASE)
POWER PENTODE



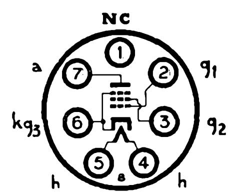
Heater Voltage ... ... 13.0 volts Heater Current ... ... 0.315 amp.

Characteristics as type 6F6G.



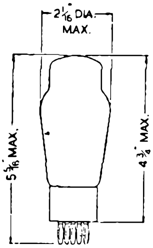
Replacement Type

TYPE **7D6**
(ENGLISH BASE)
HIGH SLOPE
POWER PENTODE



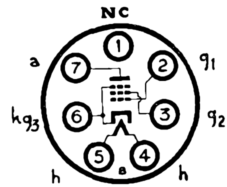
Heater Voltage ... ... 40 volts Heater Current ... ... 0.?0 amp

Characteristics as type 6AG6G.



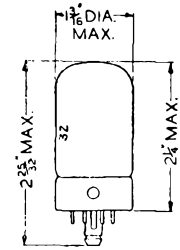
Replacement Type

TYPE **7D8**
(ENGLISH BASE)
HIGH SLOPE
POWER PENTODE



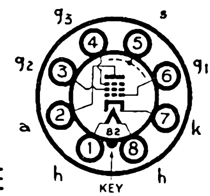
Heater Voltage ...	13.0 volts
Heater Current ...	0.65 amp.

Characteristics as type 6AG6G.



Replacement Type

TYPE **7H7**
(LOCTAL BASE)
HIGH SLOPE
VARI-MU R.F. PENTODE



RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.3 amp.
Anode Voltage ...	300 volts max.
Anode Dissipation ...	2.5 watts
Screen (g_2) Voltage ...	150 volts max.
Screen Dissipation ...	0.5 watts

OPERATING CHARACTERISTICS

[Suppressor Grid (g_3) connected to Cathode]

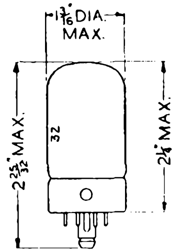
Anode Voltage ...	100	250	250	volts
Anode Current ...	8.2	9.5	9.5	mA
Screen Voltage ...	100	150	250*	volts
Screen Current ...	3.3	3.5	3.5	mA
Control Grid (g_1) Voltage ...	—1	—2.5	—2.5	volts
Cathode Bias Resistor ...	80	200	200	ohms
Anode Impedance ...	0.25	0.8	0.8	meg.
Mutual Conductance ...	4.8	4.2	4.2	mA/V
Control Grid Voltage ...	—12	—19	—30	volts
(For Mutual Conductance of 0.035 mA/V)				

* *Via series screen resistor of 30,000 ohms.*

INTER-ELECTRODE CAPACITANCES†

Input (Control Grid to all except Anode) ...	8.0 pF
Output (Anode to all except Control Grid) ...	7.0 pF
Control Grid to Anode ...	0.007 pF max.

† *With close fitting external shield connected to Cathode.*



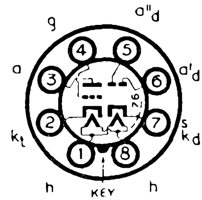
OBSOLETE—FOR REFERENCE ONLY

TYPE 7K7

(LOCTAL BASE)

DOUBLE DIODE TRIODE

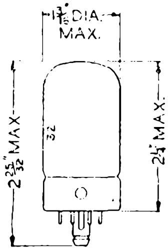
(SEPARATE TRIODE CATHODE)



CHARACTERISTICS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.

For further characteristics and curves refer to type 6SL7GT.



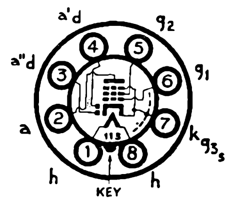
Replacement Type

TYPE 7R7

(LOCTAL BASE)

DOUBLE DIODE

R.F. PENTODE



The BRIMAR type 7R7 is a multiple valve of "all glass" construction designed for simultaneous operation as detector and I.F. or L.F. amplifier in radio receivers. The pentode section has semi-vari-mu characteristics and A.V.C. may be applied.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Dissipation	2.0 watts max.
Screen (g_2) Voltage	100 volts max.
Screen Dissipation	0.25 watt max.

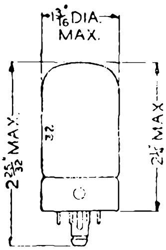
OPERATING CHARACTERISTICS

Anode Voltage	100	250	volts
Anode Current	5.5	6.2	mA
Screen Voltage	100	100	volts
Screen Current	2.2	1.6	mA
Control Grid (g_1) Voltage	−1.0	−1.0	volt
Cathode Bias Resistor	150	150	ohms
Anode Impedance	0.35	1.0	meg.
Mutual Conductance	3.0	3.2	mA/V
Control Grid Voltage ... ... (For Anode current cut-off)	−16	−20	volts

INTER-ELECTRODE CAPACITANCES †

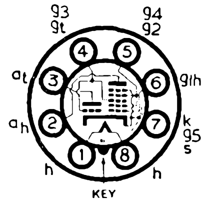
Input (Control Grid to all except Anode)	5.6 pF
Output (Anode to all except Control Grid)	5.3 pF
Control Grid to Anode	0.004 pF max.

† *With close fitting external shield connected to Cathode.*



Replacement Type

TYPE 7S7
(LOCTAL BASE)
TRIODE-HEPTODE
FREQUENCY CHANGER



The BRIMAR type 7S7 is an indirectly heated triode-heptode of the "all glass" construction, fitted with a lock-in type base. Type 7S7 features high conversion, together with high anode impedance and will operate efficiently at frequencies up to 100 Mc/s.

RATINGS

Heater Voltage ...	6.3	volts
Heater Current ...	0.3	amp.
Heptode Anode Voltage ...	300	volts max.
Heptode Screen (g_2, g_4) Voltage ...	100	volts max.
Triode Anode Supply Voltage ...	300	volts max.
Total Cathode Current ...	14	mA max.

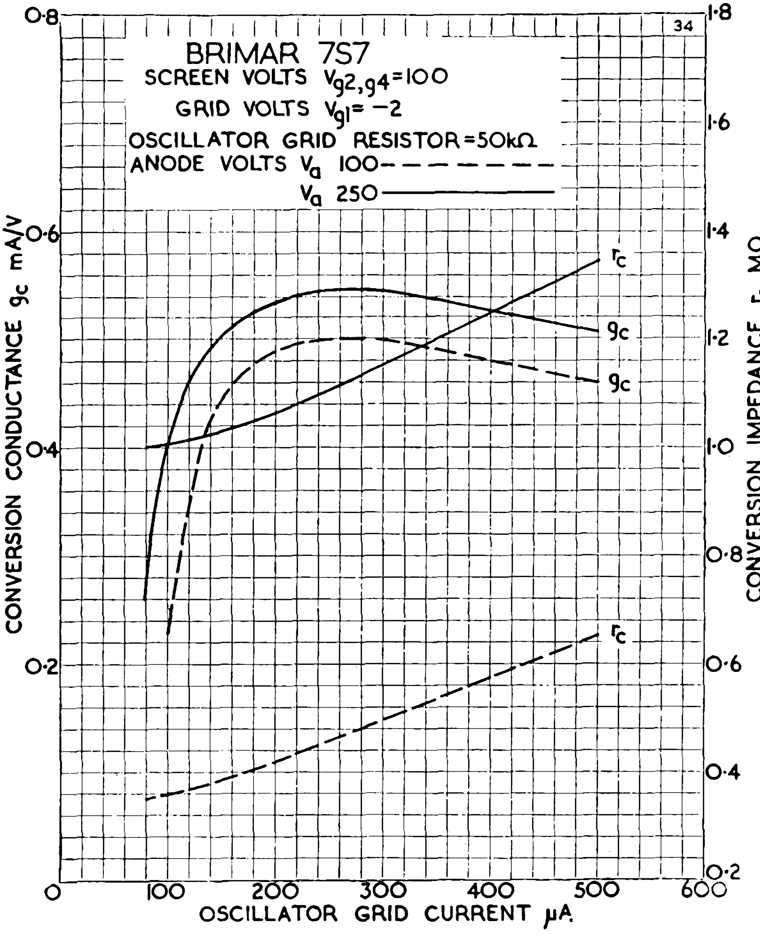
OPERATING CHARACTERISTICS

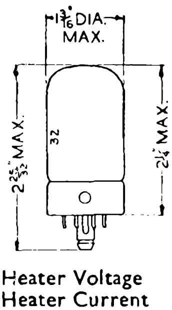
Heptode Anode Voltage ...	100	250	volts
Heptode Anode Current...	1.9	1.8	mA
Heptode Screen Voltage ...	100	100	volts
Heptode Screen Current ...	3.0	3.0	mA
Heptode Control Grid (g_1) Voltage ...	–2	–2	volts
Cathode Bias Resistor ...	250	200	ohms
Heptode Anode Impedance ...	0.5	1.25	meg.
Triode Anode Supply Voltage ...	100	250	volts
Triode Anode Resistor ...	–	20,000	ohms
Triode Anode Voltage ...	100	150	volts
Triode Anode Current ...	3.0	5.0	mA
Triode Grid Current ...	0.3	0.4	mA
Triode Grid Resistor ...	50,000	50,000	ohms
Conversion Conductance ...	0.5	0.53	mA/V
Heptode Control Grid Voltage ... (For Conversion Conductance of 0.005 mA/V)	–21	–21	volts

INTER-ELECTRODE CAPACITANCES *

R.F. Input (g_1 to all except a_h) ...	5.0	pF
I.F. Output (a_h to all except g_1) ...	8.0	pF
Oscillator Input (g_t to all except a_t) ...	7.0	pF
Oscillator Output (a_t to all except g_t) ...	3.5	pF
Control Grid (g_1) to Heptode Anode (a_h) ...	0.03	pF max.
Oscillator Grid (g_t) to Oscillator Anode (a_t) ...	1.0	pF

* *With close fitting shield connected to Cathode.*



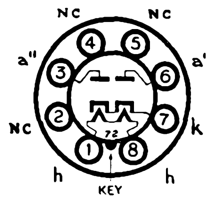


Replacement Type

TYPE 7Y4

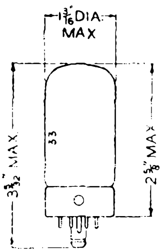
(LOCTAL BASE)

FULL-WAVE RECTIFIER



Heater Voltage	... ...	6.3 volts
Heater Current	... ...	0.5 amp.

Other characteristics as type 6X4.

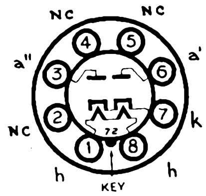


Replacement Type

TYPE **7Z4**

(LOCTAL BASE)

FULL-WAVE RECTIFIER



The BRIMAR type 7Z4 is an indirectly heated full-wave rectifier for use in A.C. and car radio equipment.

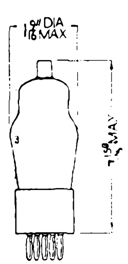
RATINGS

Heater Voltage	6.3 volts
Heater Current...	0.9 amp.
Peak Inverse Voltage	1,250 volts max.
Peak Current (Each Anode)	300 mA max.
Heater-Cathode Potential	450 volts max.

CHARACTERISTICS AS FULL-WAVE RECTIFIER

CONDENSER INPUT

R.M.S. Input per Anode	325 volts max.
Supply Impedance per Anode...	75 ohms min.
Rectified Current	100 mA max.
Reservoir Condenser	32μF max.

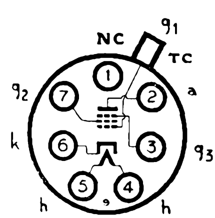


Replacement Type

TYPE **8D2**

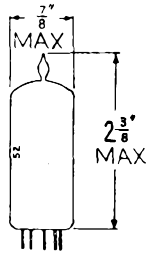
(ENGLISH BASE)

R.F. PENTODE



Heater Voltage	13.0 volts
Heater Current...	0.2 amp.

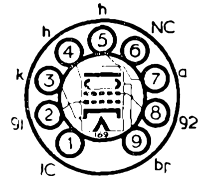
Other characteristics as type 6J7G.



B9A (Noval) Base

Current Equipment Type

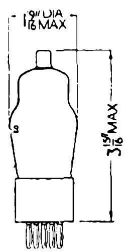
TYPE **9BW6**
MINIATURE
OUTPUT
BEAM TETRODE



CHARACTERISTICS

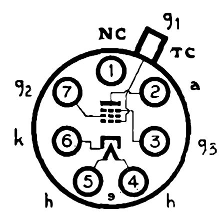
Heater Voltage	9 volts (Nominal)
Heater Current	0.3 amps.

For further information on characteristics and curves refer to type 6BW6.



Replacement Type

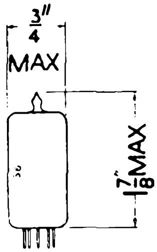
TYPE **9D2**
(ENGLISH BASE)
VARI-MU
R.F. PENTODE



CHARACTERISTICS

Heater Voltage	13.0 volts	Control Grid (g_1) Voltage	−3 volts
Heater Current	0.2 amp.	Cathode Bias Resistor	220 ohms
Anode Voltage	250 volts	Anode Impedance	0.6 meg.
Anode Current	10.5 mA	Mutual Conductance	1.65 mA/V
Screen (g_2) Voltage	125 volts	Control Grid Voltage	−52 volts
Screen Current	2.6 mA	(For Mutual Conductance of 0.002 mA/V.)	

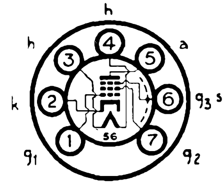
For further information refer to type 6K7G.



Current Equipment Type

TYPE **9D6**

MINIATURE VARI-MU R.F. PENTODE



The BRIMAR type 9D6 is an indirectly heated vari-mu R.F. pentode of "all glass" construction, fitted with a miniature type base. Owing to its relatively high slope and small physical size, type 9D6 is particularly suitable for use in the R.F. and I.F. stages of compact radio equipment.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.2 amp.
Anode Voltage	250 volts max.
Anode Dissipation	2.5 watts max.
Screen (g_2) Voltage	250 volts max.
Screen Dissipation	0.6 watts max.

OPERATING CHARACTERISTICS

[Suppressor Grid (g_3) connected to Cathode]

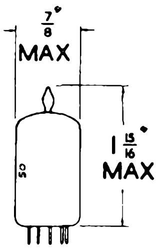
Anode Voltage	250	250	volts
Anode Current	8.0	8.0	mA
Screen Voltage	150	200	volts
Screen Current	2.0	2.1	mA
Control Grid (g_1) Voltage	—0.65	—2.5	volts
Cathode Bias Resistor	65	250	ohms
Anode Impedance	1.0	1.0	meg.
Mutual Conductance	2.5	2.5	mA/V
Inner Amplification Factor (μg_1-g_2)	—	30	
Control Grid Voltage (For Mutual Conductance of 0 005 mA/V)	—15	—28	volts

INTER-ELECTRODE CAPACITANCES

Input	4.5 pF
Output	7.0 pF
Control Grid to Anode	0.004 pF

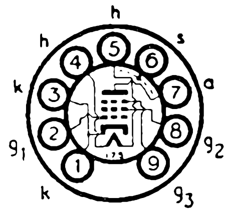
**With close fitting shield connected to Cathode.*

Type 9D6 is a commercial equivalent of the CV131



Current Equipment Type

TYPE 9D7 MINIATURE HIGH SLOPE VARI-MU PENTODE



The BRIMAR 9D7 is a high slope R.F. pentode with a vari-mu characteristic for use in the I.F. stages of television and F.M. receivers using automatic gain control. It is suitable for use with both A.C. and A.C./D.C. operated receivers.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	275 volts max.
Anode Voltage ($I_a = 0$)	500 volts max.
Anode Dissipation	2.75 watts max.
Screen Voltage	275 volts max.
Screen Voltage ($I_{g2} = 0$)	500 volts max.
Screen Dissipation	1.2 watts max.
Cathode Current	30 mA max.
Heater-Cathode Voltage	250 volts max.

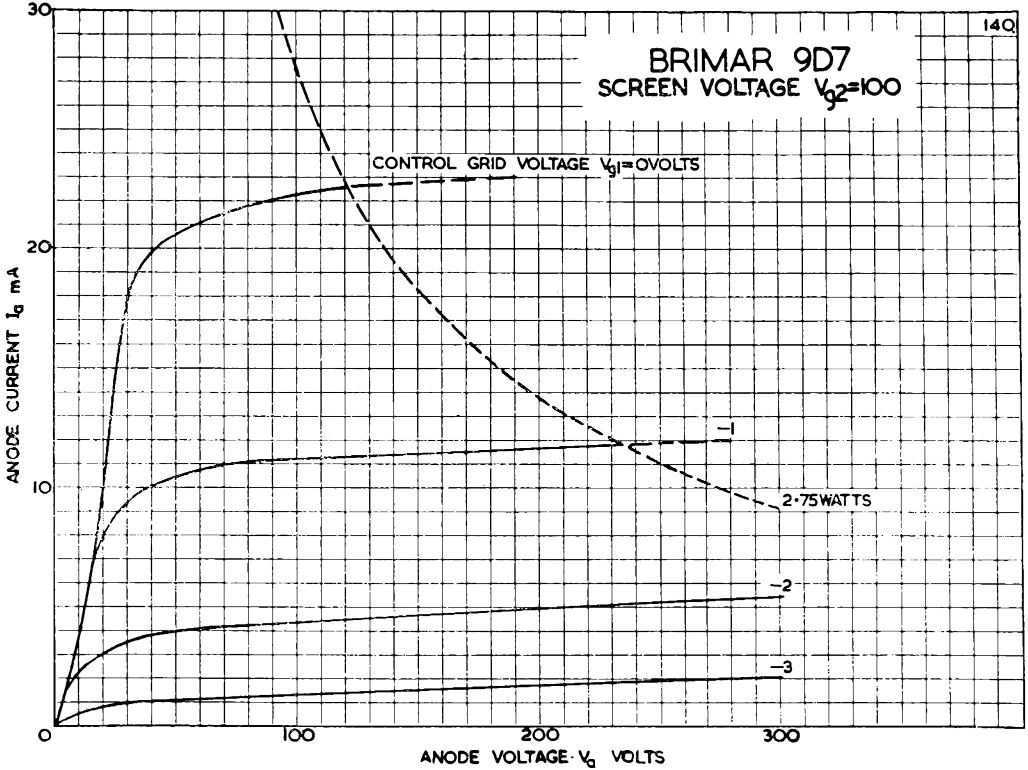
OPERATING CHARACTERISTICS

Anode Voltage	250 volts
Screen Voltage	100 volts
Cathode Bias Resistor	100 ohms
Anode Current	10 mA
Screen Current	3.3 mA
Mutual Conductance	8.4 mA/V
Anode Impedance	750 kilohms
Inner Amplification Factor (μg_1-g_2)	35
Mutual Conductance at $V_{g1} = -20V$	7 μA/V

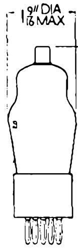
INTER-ELECTRODE CAPACITANCES *

Input	9.0 pF
Output	3.0 pF
Grid to Anode	0.01 pF max.

* *With no external shield.*

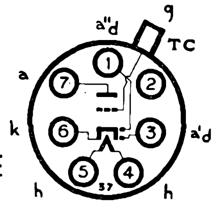

140
BRIMAR 9D7
SCREEN VOLTAGE Vg2=100
CONTROL GRID VOLTAGE Vg1=0VOLTS
-1
-2
-3
2·75WATTS
ANODE CURRENT Ia mA
ANODE VOLTAGE Va VOLTS
30
20
10
0
100
200
300

9D7



Replacement Type

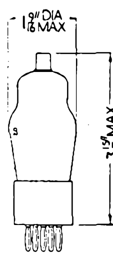
TYPE 11D3
(ENGLISH BASE)
DOUBLE DIODE TRIODE



CHARACTERISTICS

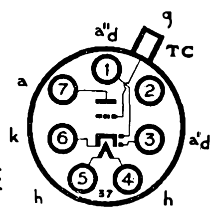
Heater Voltage	13.0 volts
Heater Current	0.2 amp.

Other characteristics as type 75.



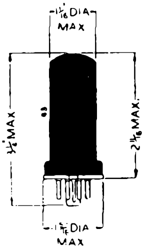
Replacement Type

TYPE 11D5
(ENGLISH BASE)
DOUBLE DIODE TRIODE



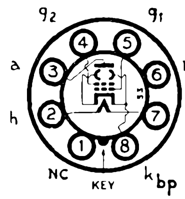
CHARACTERISTICS

Heater Voltage	13.0 volts
Heater Current	0.15 amp.
Anode Voltage	250 volts
Anode Current	3.8 mA
Grid Voltage	–3 volts
Cathode Bias Resistor	750 ohms
Anode Impedance	26,700 ohms
Mutual Conductance	1.5 mA/V
Amplification Factor	40



Replacement Type

TYPE 12A6
(OCTAL BASE)
OUTPUT BEAM
TETRODE



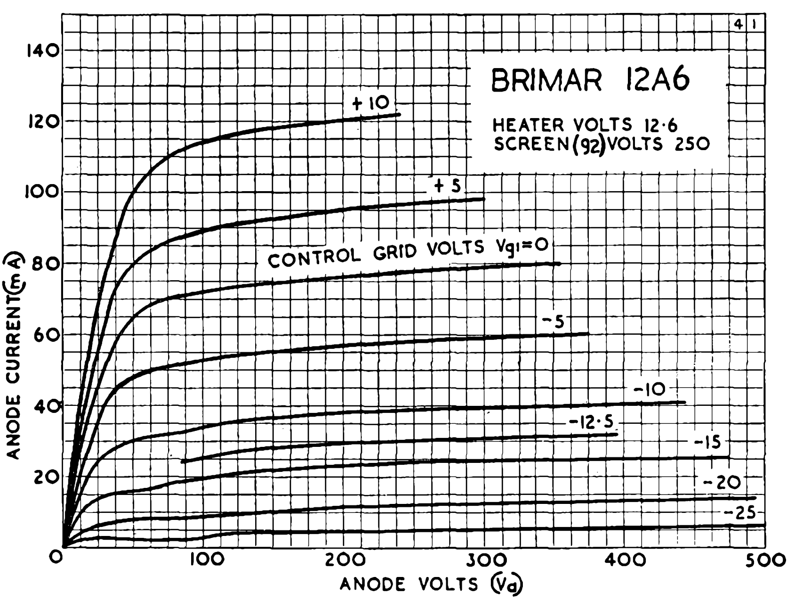
The BRIMAR type 12A6 is an indirectly heated output beam tetrode of high efficiency for use in car radio or A.C./D.C. receivers, where the supply exceeds 110 volts.

RATINGS

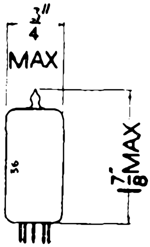
Heater Voltage	12.6 volts	Anode Dissipation	7.5 watts max.
Heater Current	0.15 amp.	Screen (g_2) Voltage	250 volts max.
Anode Voltage	250 volts max.	Screen Dissipation	1.5 watts max.

OPERATING CHARACTERISTICS (CLASS "A")

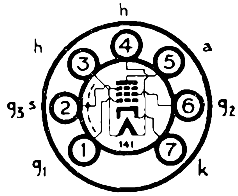
Anode Voltage	180	250	volts	Anode Impedance	92,000	70,000	ohms
Anode Current	21	30	mA	Mutual Conductance	2.7	3.0	mA/V
Screen Voltage	180	250	volts	Optimum Load ...	8,000	7,500	ohms
Screen Current	2.6	3.5	mA	Power Output ..	1.6	3.4	watts
Control Grid (g_1) Voltage	−8.5	−12.5	volts	Harmonic Distortion	7	7	per cent.
Cathode Bias Resistor ...	350	350	ohms				



Current Equipment Type



TYPE **12AC6**
MINIATURE
VARI-MU
PENTODE



The BRIMAR 12AC6 is a vari-mu pentode for use in car radio receivers for operation direct from the 12-volt battery without the use of a vibrator H.T. system. It is designed to operate over the range of voltage variation normally encountered with car batteries.

RATINGS

Heater Voltage	12.6 volts
Heater Current	0.15 amp.
Anode Voltage	30 volts max.
Screen Voltage	30 volts max.
Grid 1 Circuit Resistance	2.2 MΩ max.
Cathode Current	20 mA max.
Heater-Cathode Voltage	$\pm$30 volts max.

OPERATING CHARACTERISTICS *

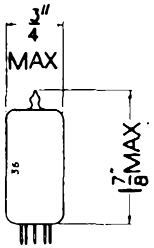
Anode Voltage	12.6 volts
Screen Voltage	12.6 volts
Control Grid Voltage	0 volts
Anode Current	550 μA
Screen Current	200 μA
Mutual Conductance	730 μA/V
Anode Impedance	0.5 MΩ
Grid 1 Voltage for $g_m = 10\mu A/V$ ($V_{g3} = 0$)	—5.2 volts approx.
Grid 3 Voltage for $g_m = 10\mu A/V$ ($V_{g1} = 0$, $R_{g1} = 2.2M\Omega$) ...	—3.7 volts approx.

* g_3 connected to cathode.

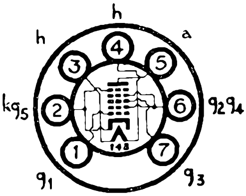
INTER-ELECTRODE CAPACITANCES

	With external screen	Without external screen
Input	4.3	4.3 pF
Output	5.0	5.0 pF
Anode to Grid	0.004	0.005 pF

Current Equipment Type



TYPE 12AD6 MINIATURE HEPTODE FREQUENCY CHANGER



The BRIMAR 12AD6 is a miniature frequency changer for use in car radio receivers to operate directly from the 12-volt battery without the use of a vibrator H.T. system. It is designed to operate over the range of voltage variations normally encountered with car batteries.

RATINGS

Heater Voltage	12.6 volts
Heater Current	0.15 amp.
Anode Voltage	30 volts max.
Screen Grid (g_2, g_4) Voltage	30 volts max.
Screen Grid Supply Voltage	30 volts max.
Negative Control Grid (g_3) Voltage	—30 volts max.
Positive Control Grid Voltage	0 volts max.
Control Grid Circuit Resistance	10 megohms max.
Cathode Current	20 mA max.
Heater-Cathode Voltage	$\pm$30 volts max.

STATIC CHARACTERISTICS—OSCILLATOR SECTION

Measured with grids 2 and 4 connected to anode

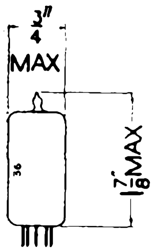
Anode, g_2 and g_4 Voltage	12.6 volts
Control Grid (g_3) Voltage	0 volts
Oscillator Grid (g_1) Voltage	0 volts
Mutual Conductance (g_1 to g_2+g_4+a)	3.8 mA/V
Amplification Factor (g_1 to g_2+g_4+a)	9
Cathode Current	5 mA
Control Grid Voltage for $I_k = 10\mu A$	—4 volts

OPERATING CHARACTERISTICS AS A SELF EXCITED MIXER

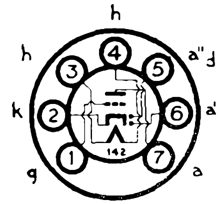
Anode Voltage	12.6 volts
Screen Grid (g_2, g_4) Voltage	12.6 volts
Control Grid (g_3) Voltage	0 volts
Control Grid Resistance	2.2 megohms
Oscillator Grid (g_1) Resistance	33 kilohms
Oscillatory Voltage on Oscillator Grid	1.6 volts r.m.s.
Oscillator Grid Current	50 μA
Anode Current	450 μA
Screen Grid Current	1.5 mA
Cathode Current	2 mA
Conversion Conductance	260 μA/V
Control Grid Voltage for $g_c = 5\mu A/V$	—2.2 volts approx.
Control Grid Voltage for $g_c = 20\mu A/V$	—1.8 volts approx.

INTER-ELECTRODE CAPACITANCES

	With external screen	Without external screen
Control Grid to Anode (g_2 to a)	0.25	0.30 pF max.
Control Grid to Oscillator Grid (g_3 to g_1)	0.15	0.15 pF max.
R.F. Input (g_3 to all)	8.0	8.0 pF
Oscillator Input (g_1 to all)	5.5	5.5 pF
Mixer Output (a to all)	13.0	8.0 pF
Oscillator Grid to Cathode (g_1 to $k+g_5$)	3.0	3.0 pF
Oscillator Output (k to all except g_1)	20.0	15.0 pF
Oscillator Grid to Anode (g_1 to a)	0.05	0.1 pF



TYPE 12AE6
MINIATURE DOUBLE DIODE TRIODE



The BRIMAR 12AE6 is a double diode triode for use in detector, A.V.C. and A.F. amplifier circuits of car radio receivers and is intended to operate directly from the 12-volt battery without the use of a vibrator H.T. system. It is designed to operate over the range of voltage variations normally encountered with car batteries.

RATINGS

Heater Voltage	12.6 volts
Heater Current	0.15 amp,
Anode Voltage	30 volts max.
Grid Circuit Resistance	10 MΩ max.
Cathode Current	20 mA max.
Diode Current (Average)	1 mA max.
Heater-Cathode Voltage	$\pm$30 volts max.

OPERATING CHARACTERISTICS

Anode Voltage	12.6 volts
Grid Voltage	0 volts
Anode Current	750 μA
Mutual Conductance	1 mA/V
Anode Impedance	15 kilohms
Amplification factor	15

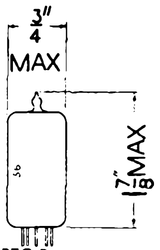
OPERATION AS AN R.C. COUPLED AMPLIFIER

Anode Supply Voltage	14.4 volts
Grid Voltage	0 volts
Anode Load Resistor	470 KΩ
Grid Resistor	2.2 MΩ
Input Grid Coupling Capacitor	.01 μF
Grid Resistor of following Stage	2.2 MΩ
Signal Source Impedance	1,000 Ω max.
Voltage Gain	10

INTER-ELECTRODE CAPACITANCES *

Input	1.8 pF
Output	1.1 pF
Anode to Grid	2.0 pF
Diode Anode to Diode Anode	0.9 pF

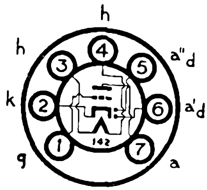
* *Measured without external screen.*



B7G Base

Current Equipment Type

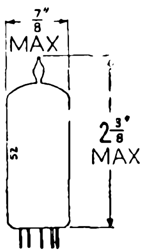
TYPE 12AT6 MINIATURE DOUBLE DIODE TRIODE



RATINGS

Heater Voltage ... ... 12.6 volts Heater Current ... ... 0.15 amp.

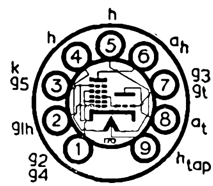
For further information and characteristic curves refer to type 6AT6.



B9A (Noval) Base

Current Equipment Type

TYPE 12AH8 MINIATURE TRIODE-HEPTODE FREQUENCY CHANGER



The Brimar 12AH8 is a triode-heptode frequency changer on the Noval (B9A) base, featuring high conversion conductance, conversion impedance and oscillator mutual conductance. The centre tapped heater permits operation from either 6.3 or 12.6 volts, enabling the same valve to be used in both A.C. and A.C./D.C. equipment.

RATINGS

Heater Voltage ...	6.3	or	12.6 volts
Heater Current ...	0.3	or	0.15 amp.
Heptode Anode Voltage			300 volts max.
Heptode Screen (g_2, g_4) Voltage			125 volts max.
Triode Anode Voltage ...			150 volts max.
Total Cathode Current			17.5 mA max.

OPERATING CHARACTERISTICS

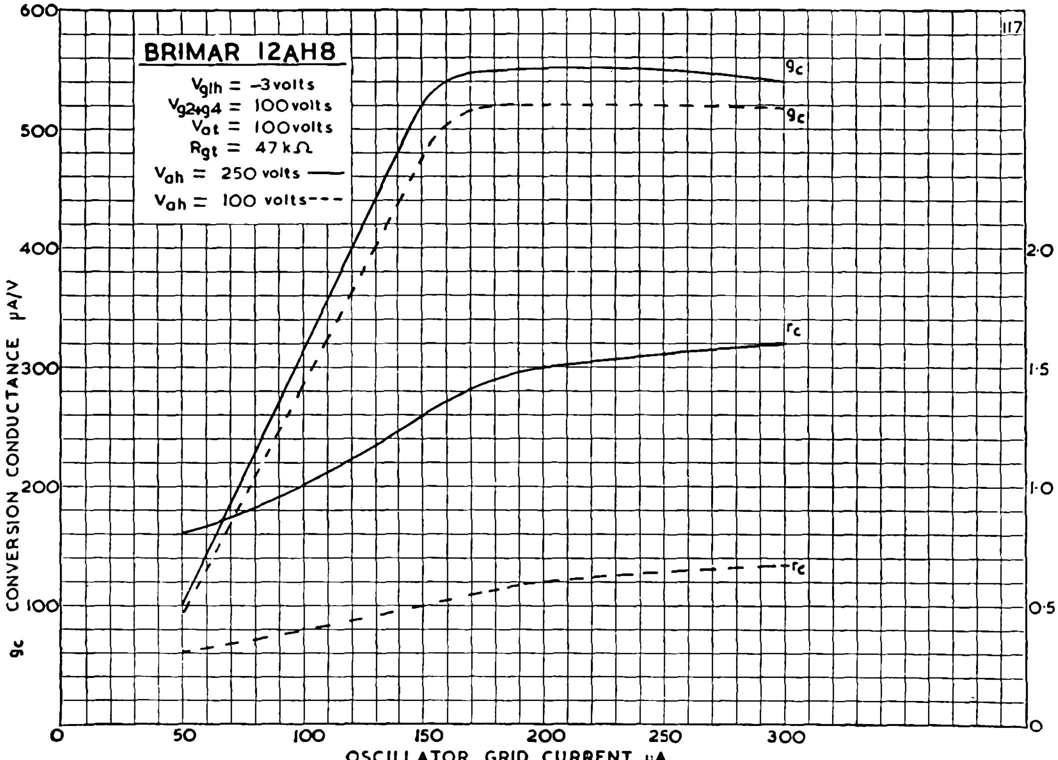
Heptode Anode Voltage	100	250 volts
Heptode Anode Current	2.5	2.6 mA
Heptode Screen Voltage	100	100 volts
Heptode Screen Current	4.5	4.4 mA
Signal Grid (g_1) Voltage	—3	—3 volts
Cathode Bias Resistor ...	220	220 ohms
Heptode Anode Impedance	0.6	1.5 meg.
Triode Anode Supply Voltage	100	250 volts
Triode Anode Resistor	0	27,000 ohms
Triode Anode Voltage ...	100	100 volts
Triode Anode Current	5.7	5.7 mA
Triode Grid Current ...	0.2	0.2 mA
Triode Grid Resistor ...	47	47 kilohms
Conversion Conductance	0.52	0.55 mA/V.
Conversion Conductance for Vg_1—22 volts ...	0.005	0.005 mA/V.
Equivalent Noise Resistance ...	100,000	100,000 ohms approx.
*Triode Mutual Conductance	3.5	3.5 mA/V.
*Triode Amplication Factor ...	17	17

* Taken at V_{at} = 100 v. V_{gt} — 0 v.

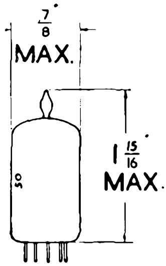
INTER-ELECTRODE CAPACITANCES

(with external close fitting shield)

R.F. Input (g_1h-all)	5.0 pF
I.F. Output (a_h-all)	8.0 pF
Triode Input ...	7.0 pF
Triode Output ...	2.5 pF
Heptode Grid to Heptode Anode (g_1h-a_h) ...	0.025 pF
Troide Grid to Triode Anode (g_t-a_t)	1.2 pF

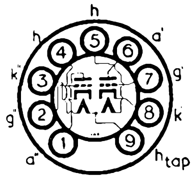


BRIMAR 12AH8
V_{g1h} = −3 volts
V_{g2+g4} = 100 volts
V_{at} = 100 volts
R_{gt} = 47 kΩ
V_{ah} = 250 volts
V_{ah} = 100 volts
117
g_c
g_c
r_c
r_c
g_c CONVERSION CONDUCTANCE µA/V
r_c CONVERSION IMPEDANCE MΩ
OSCILLATOR GRID CURRENT µA
0
50
100
150
200
250
300
400
500
600
0.5
1.0
1.5
2.0



Current Equipment Type

TYPE 12AT7
MINIATURE
HIGH SLOPE
DOUBLE TRIODE



B9A (Noval) Base

The separate cathode connections and tapped heater features enable the 12AT7 to be used in a variety of applications. As a frequency changer it will operate at frequencies up to 500 Mc/s.

RATINGS

Heater Voltage	6.3 or 12.6 volts	
Heater Current	0.3 or 0.15 amp.	
Anode Voltage...	300 volts max.	
Anode Dissipation (each section)	2.5 watts max.	
D.C. Cathode Current (each section)	20 mA. max.	
Anode Voltage (zero Anode Current)	550 volts max.	

OPERATING CHARACTERISTICS

(Each Section, Class A)

Anode Voltage	100	180	250	volts
Anode Current	3.7	11.0	10.0	mA
Grid Voltage	−1	−1	−2	volts
Anode Impedance	13,500	9,400	10,000	ohms
Mutual Conductance	4.0	6.6	5.5	mA/V
Amplification Factor	54	62	55	
Grid Voltage (for Anode Current cut-off)	−6	−8	−12	volts

OPERATION AS FREQUENCY CHANGER

OSCILLATOR SECTION

Anode Supply Voltage	250 volts
Anode Decoupling Resistor	1,000 ohms
Grid Resistor	10,000 ohms

MIXER SECTION

Anode Supply Voltage	250 volts
Anode Decoupling Resistor	1,000 ohms
Cathode Bias Resistor	680 ohms
* Conversion Conductance	2.5 mA/V
† Heterodyne Voltage	(See note)

** Exact value depends on circuit constants and input impedance considerations.*

† Heterodyne voltage should be just less than that required to cause grid current in the mixer section.

INTER-ELECTRODE CAPACITANCES *

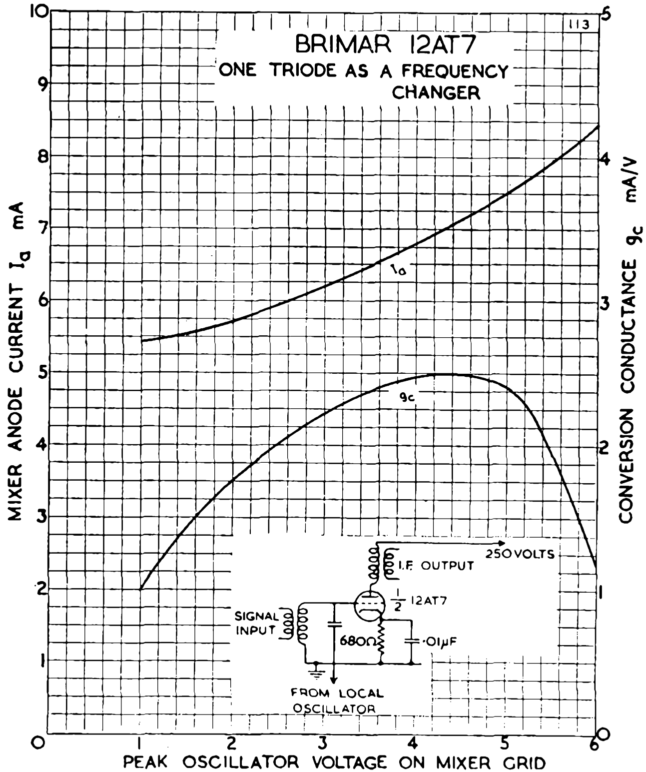
Grid to Grid	0.005 pF max.
Anode to Anode	0.4 pF max.

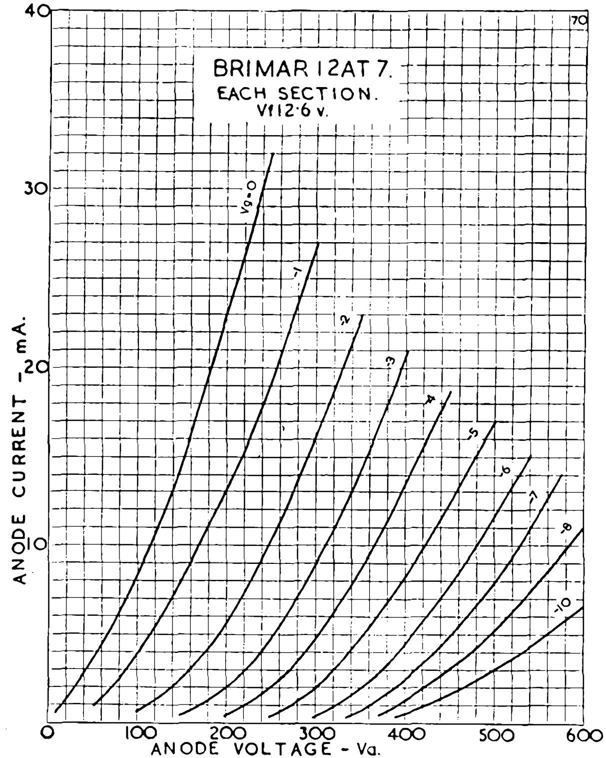
EACH SECTION

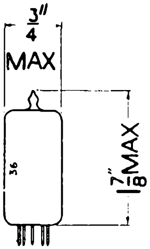
Input	2.5 pF
Output	0.4 pF
Grid to Anode	1.5 pF
Cathode to Heater	2.5 pF

**Measured with no external shield.*

Type 12AT7 is a commercial equivalent of the CV455.


BRIMAR 12AT7
ONE TRIODE AS A FREQUENCY CHANGER
113
MIXER ANODE CURRENT I_a mA
CONVERSION CONDUCTANCE g_c mA/V
PEAK OSCILLATOR VOLTAGE ON MIXER GRID
I_a
g_c
250 VOLTS
I.F. OUTPUT
$\frac{1}{2}$ 12AT7
SIGNAL INPUT
680Ω
·01μF
FROM LOCAL OSCILLATOR


BRIMAR 12AT7.
EACH SECTION.
Vf 12·6 v.
70
ANODE CURRENT - mA.
ANODE VOLTAGE - Va.
Vg-0
-1
-2
-3
-4
-5
-6
-7
-8
-10

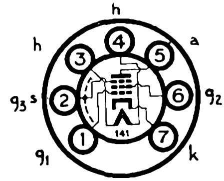


Current Equipment Type

TYPE 12AU6

HIGH SLOPE

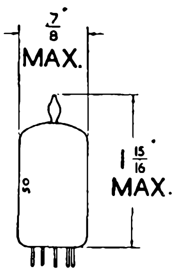
R.F. PENTODE



RATINGS

Heater Voltage	12.6 volts
Heater Current	0.15 amp.

For further information and characteristics refer to type 6AU6.



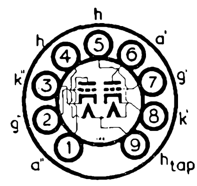
Current Equipment Type

TYPE 12AU7

MINIATURE

DOUBLE TRIODE

(LOW-MU)



B9A (Noval) Base

RATINGS

Heater Voltage	6.3	or	12.6	volts
Heater Current...	0.3		0.15	amp.
Anode Voltage	300			volts max.
Anode Dissipation (per section)	2.75			watts max.
Cathode Current (per section)	20			mA max.
Anode Voltage (zero Anode Current) ...	550			volts max.

OPERATING CHARACTERISTICS

Anode Voltage	100	250	volts
Anode Current	11.8	10.5	mA
Grid Voltage	0	—8.5	volts
Anode Impedance	6,250	7,700	ohms
Mutual Conductance	3.1	2.2	mA/V
Amplification Factor	19	17	

OPERATION AS RESISTANCE COUPLED AMPLIFIER

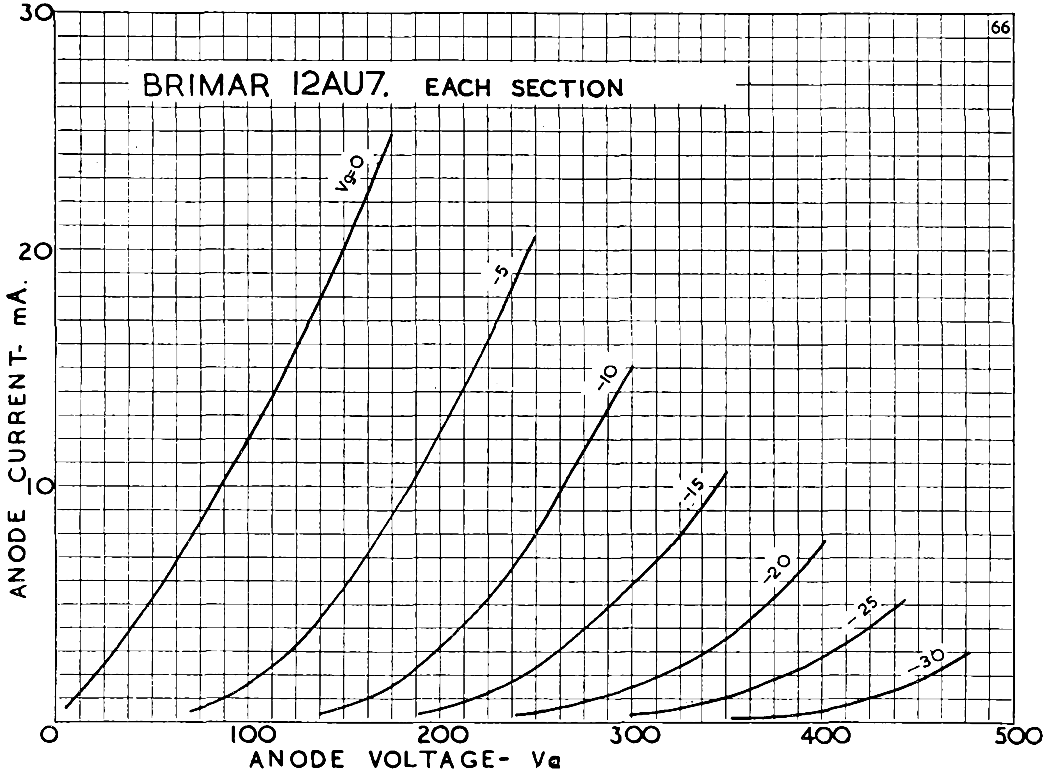
Anode Supply Voltage	100	250	volts
Anode Load Resistor	0.1	0.1	meg.
Cathode Bias Resistor	4,000	3,000	ohms
Peak Output	17	50	volts
Stage Gain	11	12	

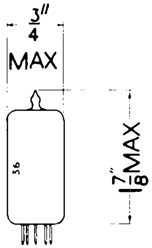
INTER-ELECTRODE CAPACITANCES *

	Section 1	Section 2	
Input	1.6	1.6	pF
Output	0.5	0.35	pF
Grid to Anode	1.5	1.5	pF

* *With no external shield.*

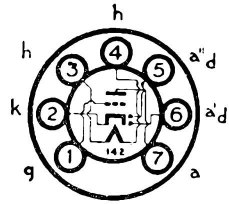
Type 12AU7 is a commercial equivalent of the CV491.


BRIMAR 12AU7. EACH SECTION
66
Vg=0
-5
-10
-15
-20
-25
-30
ANODE CURRENT- mA.
0
10
20
30
0
100
200
300
400
500
ANODE VOLTAGE- Va



Current Equipment Type

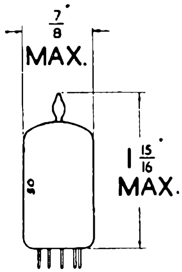
TYPE **12AV6**
DOUBLE DIODE TRIODE



RATINGS

Heater Voltage ... ... 12.6 volts   Heater Current... ... 0.15 amps.

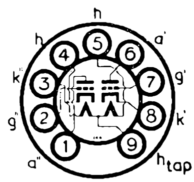
For further information, see type 6AV6.



B9A (Noval) Base

Current Equipment Type

TYPE **12AX7**
MINIATURE DOUBLE TRIODE (HIGH-MU)



RATINGS

Heater Voltage	6.3	or 12.6	volts
Heater Current	0.3	or 0.15	amp.
Anode Voltage		300	volts max.
Anode Dissipation		1.0	watts max.
Anode Voltage (Zero Anode Current)		550	volts max.

OPERATING CHARACTERISTICS (Each Section)

Anode Voltage	100	250	volts
Anode Current	0.5	1.2	mA
Grid Voltage	—1	—2	volts
Anode Impedance	80,000	62,500	ohms
Mutual Conductance	1.25	1.6	mA/V
Amplification Factor	100	100	

OPERATION AS RESISTANCE COUPLED AMPLIFIER

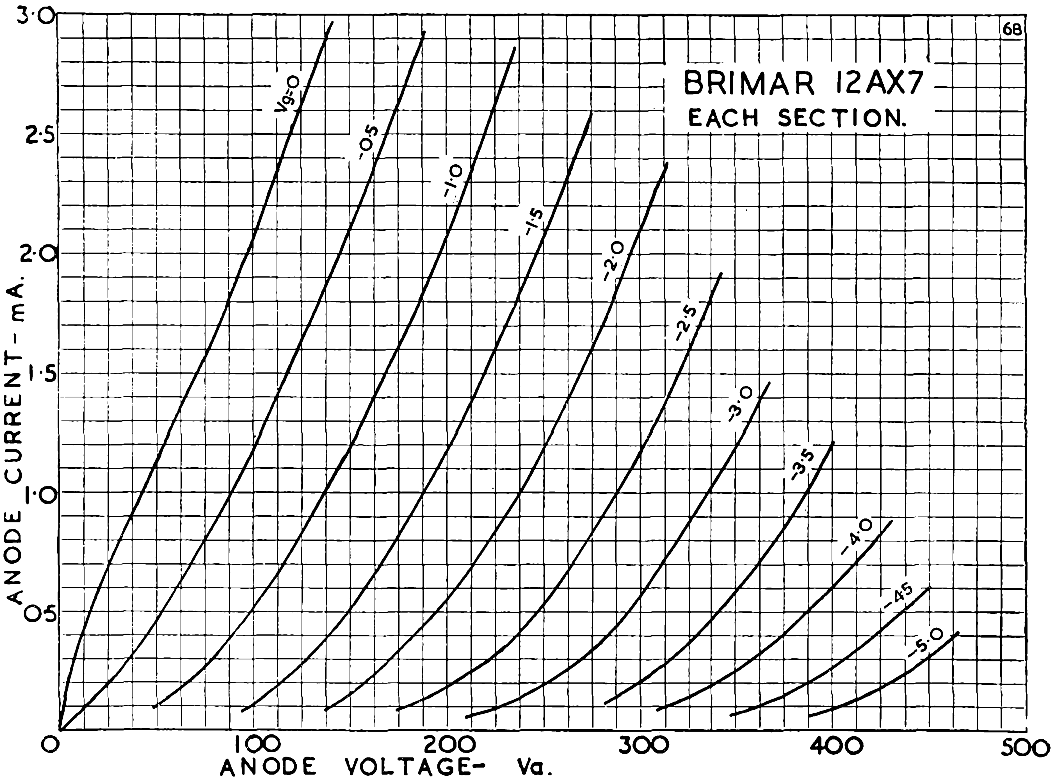
Anode Supply Voltage	100	250	volts
Anode Load Resistor	0.25	0.25	meg.
Cathode Bias Resistor	6,500	3,000	ohms
Peak Output	10	50	volts
Stage gain	45	60	

INTER-ELECTRODE CAPACITANCES *

	Section 1	Section 2	
Input	1.6	1.6	pF
Output	0.46	0.34	pF
Grid to Anode	1.7	1.7	pF

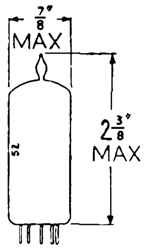
* *With no external shield.*

Type 12AX7 *is a commercial equivalent of the* CV492.


BRIMAR 12AX7
EACH SECTION.
68
ANODE CURRENT - mA.
3·0
2·5
2·0
1·5
1·0
0·5
0
100
200
300
400
500
ANODE VOLTAGE - Va.
Vg=0
-0·5
-1·0
-1·5
-2·0
-2·5
-3·0
-3·5
-4·0
-4·5
-5·0

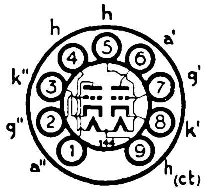
BRIMAR

Current Equipment Type



B9A (Noval) Base

TYPE 12BH7
MINIATURE
DOUBLE TRIODE
(LOW-MU)



The BRIMAR type 12BH7 is a double triode with two independent low impedance units. It is designed particularly for television application, where one valve is suitable for use as frame oscillator and output stages for wide angle deflection cathode ray tubes.

RATINGS

Heater Voltage	6.3 } or	12.6 volts
Heater Current	0.6 } or	0.3 amp.
Direct Anode Voltage as Frame Scan Output Valve		500 volts max.
Direct Anode Voltage as Class A Amplifier		300 volts max.
Anode Dissipation, each section		3.5 watts max.
Cathode Current, each section		20 mA max.
*Peak Positive Pulse Anode Voltage		1,500 volts max.
*Peak Negative Pulse Grid Voltage		220 volts max.
Peak Cathode Current, each section		70 mA max.

OPERATING CHARACTERISTICS

(As Class A Amplifier, each section)

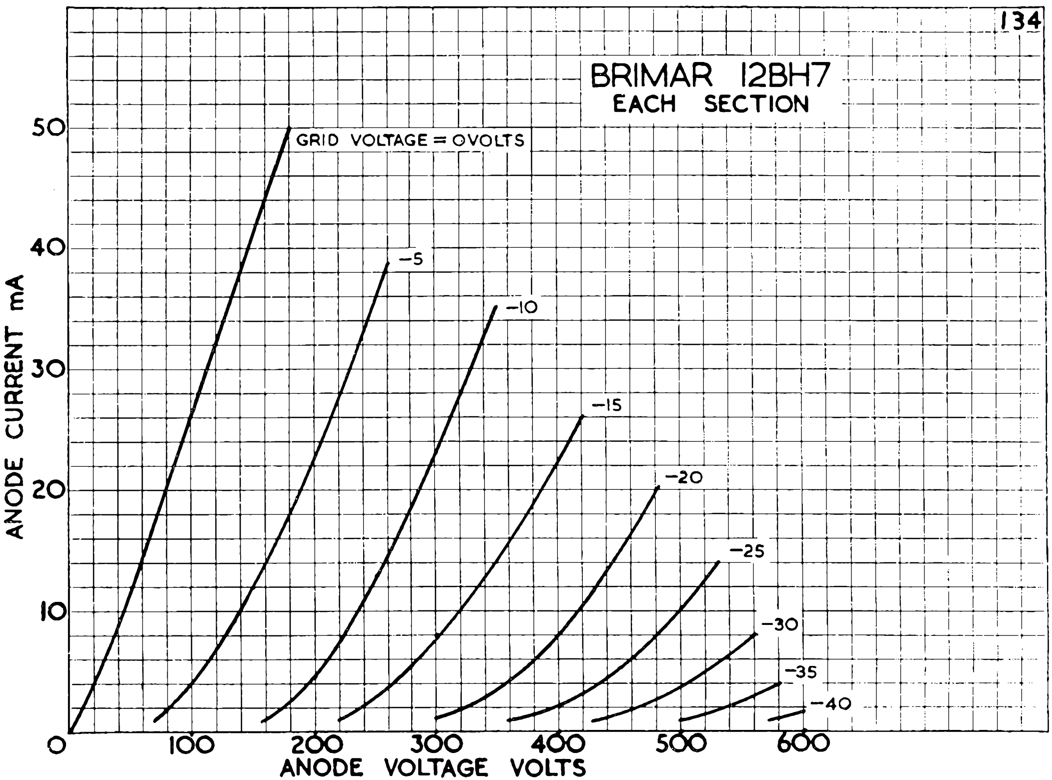
Anode Voltage	85	250	volts
Anode Current	20	11.5	mA
Grid Voltage	0	—10.5	volts
Mutual Conductance	6.2	3.1	mA/V
Amplification Factor	21	17	
Anode Impedance	3,400	5,500	ohms
Grid Voltage for Cut-off	—8	—20	volts

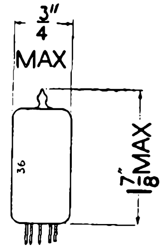
INTER-ELECTRODE CAPACITANCES †

Anode 1 to Anode 2 ($c_{a', a''}$)	0.9 pF
Each Section :	
Input (c_{in})	3.0 pF
Output (c_{out})	0.8 pF
Grid to Anode ($c_{g, a}$)	2.4 pF

* *The duty cycle must not exceed* 15 *per cent of the scanning cycle, and its duration must* not exceed 3 *milli-seconds. Ratings are absolute values.*

† *No external shield.*

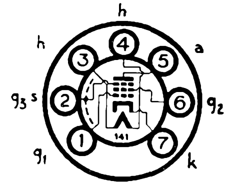

134
BRIMAR 12BH7
EACH SECTION
GRID VOLTAGE = 0 VOLTS
−5
−10
−15
−20
−25
−30
−35
−40
ANODE CURRENT mA
0
10
20
30
40
50
100
200
300
400
500
600
ANODE VOLTAGE VOLTS



B7G Base

Current Equipment Type

TYPE 12BA6
MINIATURE
HIGH SLOPE
VARI-MU
R.F. PENTODE

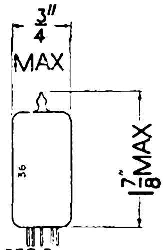


RATINGS

Heater Voltage ... ... 12.6 volts Heater Current ... ... 0.15 amp

Type 12BA6 is a commercial equivalent to CV1928

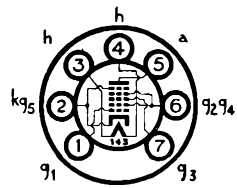
For further information and characteristic curves refer to type 6BA6.



B7G Base

Current Equipment Type

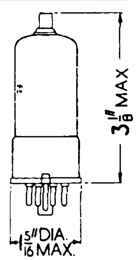
TYPE 12BE6
MINIATURE
HEPTODE
FREQUENCY
CHANGER



RATINGS

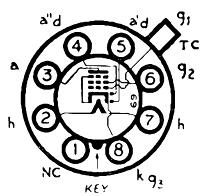
Heater Voltage ... ... 12.6 volts Heater Current ... ... 0.15 amp.

For further information and characteristic curves refer to type 6BE6.



Replacement Type

TYPE 12C8GT
(OCTAL BASE)
DOUBLE DIODE
AMPLIFIER PENTODE

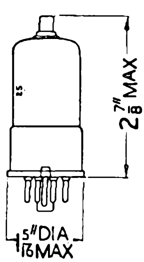


Note.—Pin 1 connected to metal shell.

RATINGS

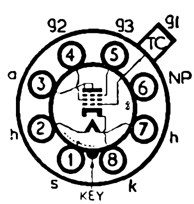
Heater Voltage ... ... 12.6 volts Heater Current ... ... 0.15 amp

For further information and characteristic curves refer to type 6B8GT.



Replacement Type

TYPE 12J7GT
(OCTAL BASE)
R.F. PENTODE

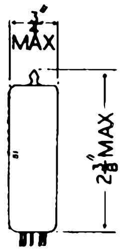


Note.—Pin 1 connected to metal shell.

RATINGS

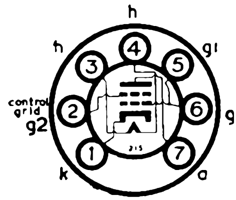
Heater Voltage ... ... 12.6 volts Heater Current ... ... 0.15 amp.

For further information refer to type 6J7GT.



Current Equipment Type

TYPE **12K5** MINIATURE OUTPUT TETRODE



The BRIMAR 12K5 is a miniature tetrode with a space charge grid, g_1, the control grid being g_2. The valve is intended for use as a driver stage in A.F. applications in car radio receivers and will operate directly from the 12-volt battery without the use of vibrator H.T. system. It is designed to operate over the range of voltage variation normally encountered with car batteries.

RATINGS

Heater Voltage	12.6 volts
Heater Current	0.45 amp.
Anode Voltage	30 volts max.
Control Grid (g_2) Voltage	—20 volts max.
Control Grid Circuit Resistance	2.2 megohms max.
Space Charge Grid (g_1) Voltage	16 volts abs. max.
Space Charge Grid Supply Voltage	30 volts max.
Heater-Cathode Voltage	$\pm$30 volts max.

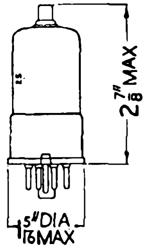
OPERATING CHARACTERISTICS

Anode Voltage	12.6 volts
Space Charge Grid Voltage	12.6 volts
Control Grid Voltage	—2 volts
Anode Current	8 mA
Space Charge Grid Current	85 mA
Mutual Conductance (g_2 to a)	7 mA/V
Anode Impedance	800 ohms
Amplification Factor	5.6

TYPICAL OPERATION AS A DRIVER STAGE

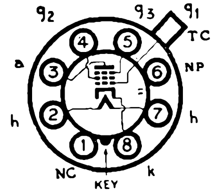
Anode Voltage	12.6 volts
Space Charge Grid Voltage	12.6 volts
Control Grid Resistor *	2.2 megohms
Input Coupling Capacitor	0.1 μF
Signal Source Impedance	100 KΩ
Optimum Load	800 ohms
Anode Current, no signal	35 mA
Anode Current, maximum signal	8 mA
Power Output	35 mW
Distortion	10 per cent.

* Bias is provided by grid current rectification.



Replacement Type

TYPE 12K7GT
(OCTAL BASE)
VARI-MU
R.F. PENTODE

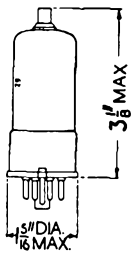


Note.—Pin 1 connected to metal shell.

RATINGS

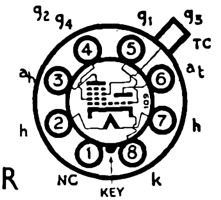
Heater Voltage ... ... **12.6 volts** **Heater Current** ... ... **0.15 amp.**

For further information and characteristic curves refer to type 6K7GT.



Replacement Type

TYPE 12K8GT
(OCTAL BASE)
TRIODE-HEXODE
FREQUENCY CHANGER

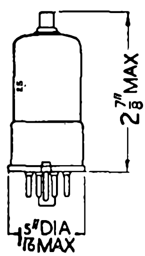


Note.—Pin 1 connected to metal shell.

RATINGS

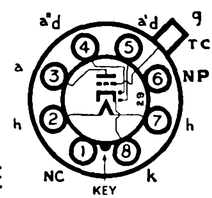
Heater Voltage ... ... **12.6 volts** **Heater Current** ... ... **0.15 amp.**

For further information and characteristic curves refer to type 6K8GT.



Replacement Type

TYPE 12Q7GT
(OCTAL BASE)
DOUBLE DIODE TRIODE

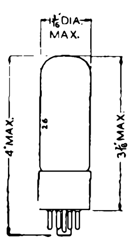


Note.—Pin 1 connected to metal shell.

RATINGS

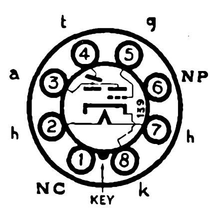
Heater Voltage ... ... **12.6 volts** **Heater Current** ... ... **0.15 amp.**

For further information and characteristic curves refer to type 6Q7GT.



Current Equipment Type

TYPE 12U5G
(OCTAL BASE)
"MAGIC EYE"
TUNING INDICATOR

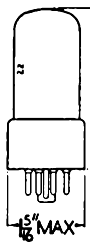


RATINGS

Heater Voltage ... ... **12.6 volts** **Heater Current** ... ... **0.15 amp.**

For further information refer to type 6U5G.

Industrial Type



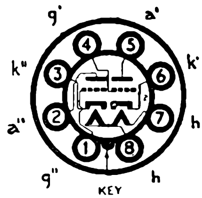
TYPE 13D1

(Previously Coded 25SN7GT)

(OCTAL BASE)

DOUBLE TRIODE

(SEPARATE CATHODES)



CHARACTERISTICS

BRIMAR type 13D1 has been specially designed for use in aircraft and Industrial equipment where reliability is of importance. It supersedes type 25SN7GT and is a direct replacement for it. Except for the heater rating the characteristics are nominally the same as for the type 6SN7GT.

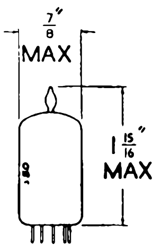
Heater Voltage ...	25	volts		
Heater Current ...	0.15	amp.		
Anode Voltage ...	100		250	volts
Anode Current ...	10.6		9.0	mA
Grid Voltage ...	0		-8	volts
Cathode Bias Resistor ...	-		1,100	ohms
Anode Impedance ...	8,000		7,700	ohms
Mutual Conductance ...	2.5		2.6	mA/V
Amplification Factor ...	20		20	

For further information and characteristic curves refer to type 6SN7GT.

TYPE 13D2

Characteristics precisely similar to type 6SN7GT.

Industrial Type

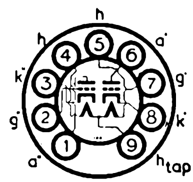


TYPE 13D3

MINIATURE

DOUBLE TRIODE

(MEDIUM MU)



B9A (Noval) Base

BRIMAR type 13D3 is an indirectly heated double triode, particularly suitable as a D.C. amplifier and low noise amplifier.

RATINGS

Heater Voltage ...	...6.3 } or { 12.6 volts
Heater Current ...	...0.6 } or { 0.3 amp.
Anode Voltage ...	300 volts max.
Anode Dissipation (each Section) ...	5.0 watts max.
Anode Voltage (Zero Anode Current) ...	550 volts max.

OPERATING CHARACTERISTICS

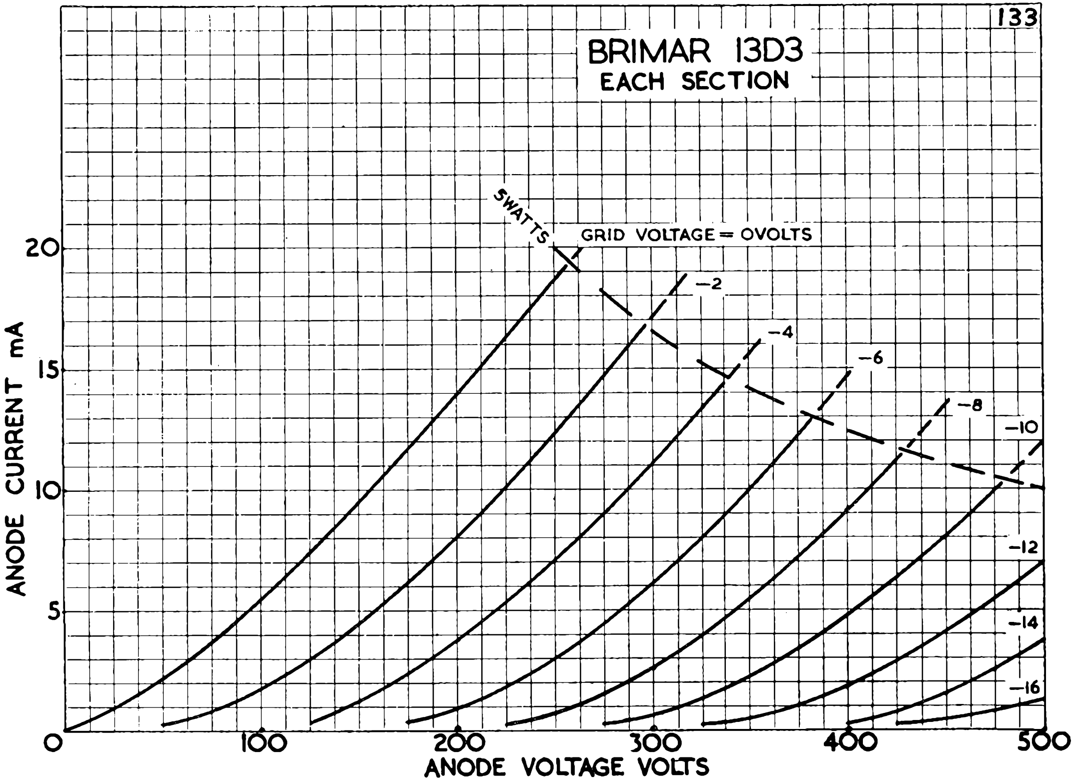
Anode Voltage ...	250 volts
Anode Current ...	6.0 mA.
Grid Voltage ...	—4.6 volts
Anode Impedance ...	14,000 ohms
Mutual Conductance ...	2.3 mA/V
Amplification Factor ...	32

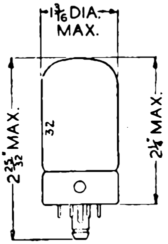
INTER-ELECTRODE CAPACITANCES *

	Section 1	*Section 2*
Input ...	2.3	2.3 pF
Output ...	0.95	0.85 pF
Grid to Anode ...	2.1	2.1 pF
Anode to Anode ...	1.0 pF	

* *With no external shield.*

Type 13D3 *is a commercial equivalent to* CV2212.

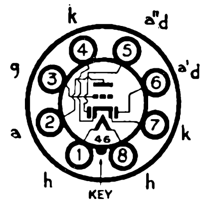

133
BRIMAR 13D3
EACH SECTION
5 WATTS
GRID VOLTAGE = 0 VOLTS
−2
−4
−6
−8
−10
−12
−14
−16
ANODE CURRENT mA
0
5
10
15
20
100
200
300
400
500
ANODE VOLTAGE VOLTS



Replacement Type

TYPE **14B6**

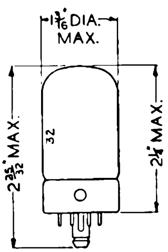
(LOCTAL BASE)
DOUBLE DIODE
TRIODE



RATINGS

Heater Voltage ... ... 12.6 volts   Heater Current ... ... 0.15 amp.

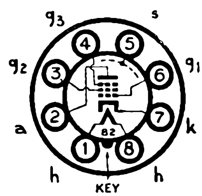
For further information refer to type 7B6.



Replacement Type

TYPE **14H7**

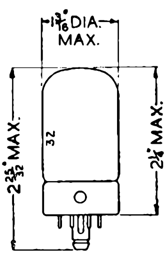
(LOCTAL BASE)
HIGH SLOPE
VARI-MU PENTODE



RATINGS

Heater Voltage ... ... 12.6 volts   Heater Current ... ... 0.15 amp.

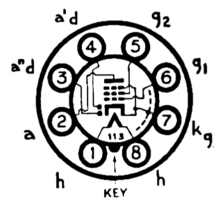
For further information refer to type 7H7.



Replacement Type

TYPE **14R7**

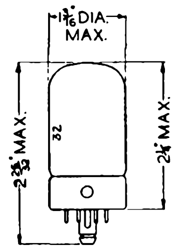
(LOCTAL BASE)
DOUBLE DIODE
R.F. PENTODE



RATINGS

Heater Voltage ... ... 12.6 volts   Heater Current ... ... 0.15 amp.

For further information refer to type 7R7.



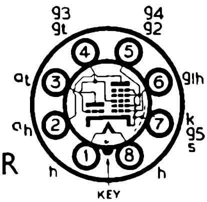
Replacement Type

TYPE **14S7**

(LOCTAL BASE)

TRIODE-HEPTODE

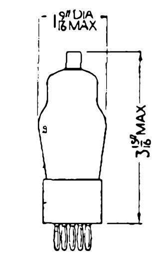
FREQUENCY CHANGER



RATINGS

Heater Voltage ... ... 12.6 volts Heater Current ... ... 0.15 amp.

For further information refer to type 7S7.

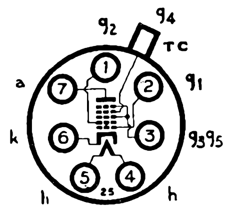


Replacement Types

TYPES **15A2, 15D1, 15D2**

(ENGLISH BASE)

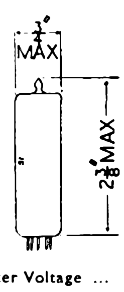
HEPTODE FREQUENCY CHANGERS



CHARACTERISTICS

	15A2	**15D1**	**15D2**	
Heater Voltage	4.0	13.0	13.0	volts
Heater Current	0.65	0.2	0.15	amp.

Characteristics as type 6A8G.



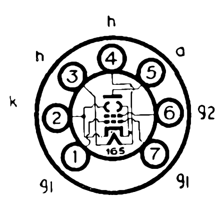
Current Equipment Type

TYPE **19AQ5**

MINIATURE

OUTPUT BEAM

TETRODE

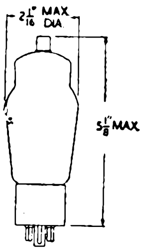


RATINGS

Heater Voltage ... ... 19 volts Heater Current ... ... 0.15 amp.

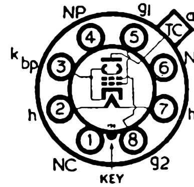
For further information refer to type 6AQ5.

19BG6G
19T8
20D2
20D3
(see **12AH8**)
21A6
(see type **PL81**)



Replacement Type

TYPE 19BG6G
(OCTAL BASE)
LINE TIME BASE OUTPUT VALVE

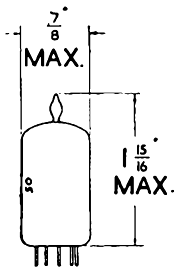


BRIMAR type 19BG6G is designed for use in the output stages of line time base generators in A.C./D.C. type Television receivers. The valve may be used in conjunction with BRIMAR type R12 rectifier to provide E.H.T. from line fly-back pulses.

RATINGS

Heater Voltage	19 volts	Heater Current	0.3 amp.

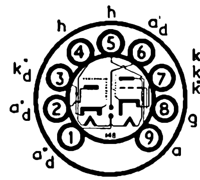
For further information and characteristic curves refer to type 6BG6G.



B9A (Noval) Base

Current Equipment Type

TYPE 19T8
MINIATURE
TRIPLE DIODE TRIODE



RATINGS

Heater Voltage	19 volts	Anode Dissipation ...	1.0 watt max.
Heater Current	0.15 amp.	Diode Current	5.0 mA max.
Anode Voltage	300 volts max.		

OPERATING CHARACTERISTICS

Anode Voltage ...	100	250	volts	Anode Impedance	54,000	58,000	ohms
Anode Current ...	0.8	1.0	mA	Mutual Conductance	1.3	1.2	mA/V
Grid Voltage ...	—1	—3	volts	Amplification Factor	70	70	

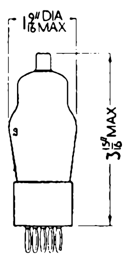
OPERATION AS RESISTANCE COUPLED AMPLIFIER

Refer to type 6AT6 for operating details.

INTER-ELECTRODE CAPACITANCES*

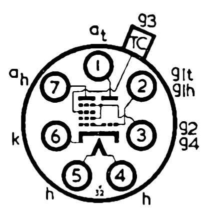
Triode Input	1.6 pF	Grid to each Diode ...	0.35 pF max.
Triode Output	1.0 pF	Diode (d' or d''') Input ...	3.8 pF
Grid to Anode	2.2 pF	Diode (d'') Input ...	4.5 pF

* *Measured with no external shield.*



Replacement Type

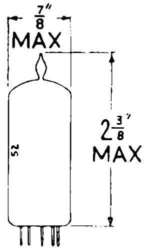
TYPE 20D2
(ENGLISH BASE)
TRIODE-HEXODE FREQUENCY CHANGER



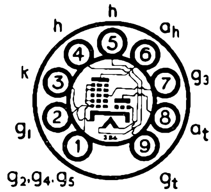
Heater Voltage	13.0 volts	Heater Current	0.15 amp.

Characteristics as type 6K8G.

Current Equipment Type



TYPE **20D4**
TRIODE-HEPTODE FREQUENCY CHANGER



The BRIMAR 20D4 is a triode-heptode frequency changer on the Noval (B9A) base, featuring very high conversion conductance.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amps.
Heptode Anode Voltage	300 volts max.
Heptode Screen Voltage	125 volts max.
Triode Anode Voltage	150 volts max.
Total Cathode Current	17.5 mA max.

OPERATING CHARACTERISTICS

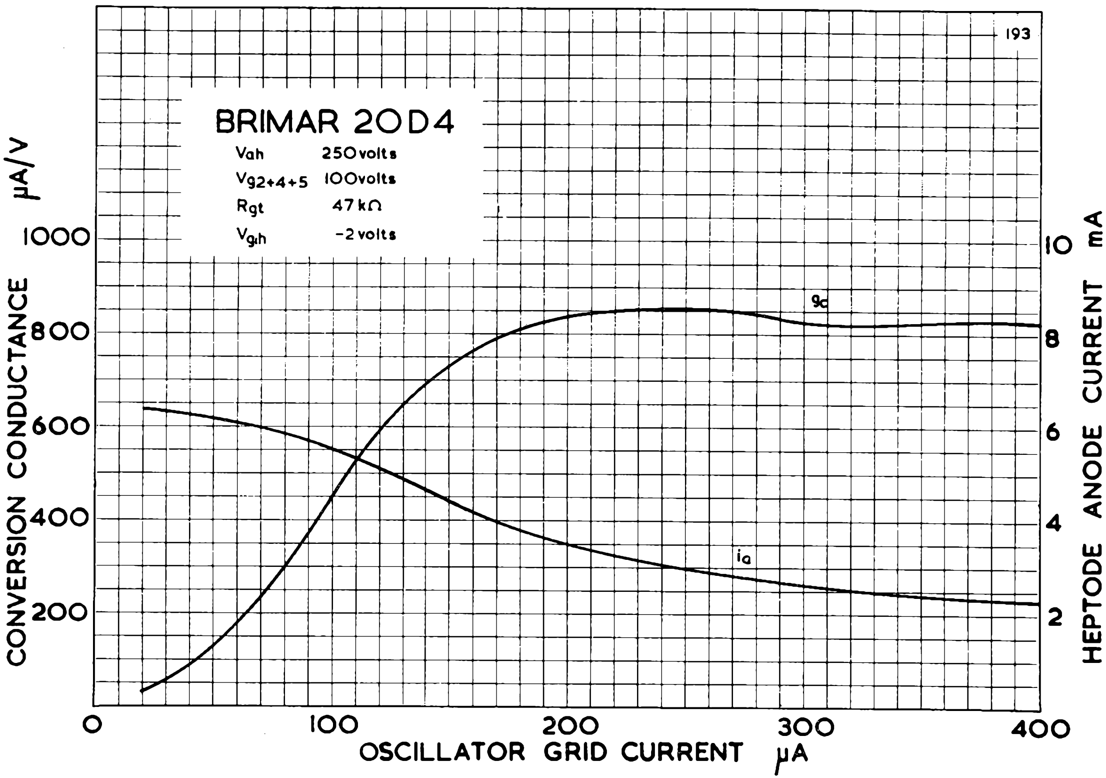
Heptode Anode Voltage	250 volts
Heptode Screen Voltage	100 volts
Heptode Control Grid (g_1) Voltage	—2 volts
Heptode Injection Grid (g_3) Voltage	0 volts
Anode Current	7.0 mA
Screen Grid Current	2.3 mA
Mutual Conductance (g_1-a)	2.8 mA/V
Anode Impedance	0.9 Megohms
Control Grid Voltage for gm/100	—20 volts
Triode Anode Voltage	100 volts
Triode Grid Voltage	0 volts
Anode Current	15 mA
Mutual Conductance	3.5 mA/V
Amplification Factor	16

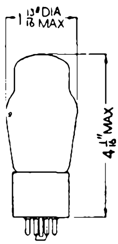
OPERATION AS A FREQUENCY CHANGER

Heptode Anode Voltage	250 volts
Heptode Screen Voltage	100 volts
Heptode Control Grid Voltage	—2 volts
Triode Grid Resistor (g_t connected to g_3)	50 kilohms
Triode Grid Current	250 μA
Conversion Conductance	850 μA/V
Heptode Anode Current...	3.0 mA
Heptode Screen Current	3.6 mA

INTER-ELECTRODE CAPACITANCES

R.F. Input (g_{1h}-all)	4.5 pF
I.F. Output (a_h-all)	8.2 pF
Triode Input	2.1 pF
Triode Output	0.87 pF
Heptode Grid to Heptode Anode	0.034 pF


BRIMAR 20D4
Vah 250 volts
Vg2+4+5 100 volts
Rgt 47 kΩ
Vg1h -2 volts
193
gc
ia
CONVERSION CONDUCTANCE µA/V
1000
800
600
400
200
HEPTODE ANODE CURRENT mA
10
8
6
4
2
0
100
200
300
400
OSCILLATOR GRID CURRENT µA

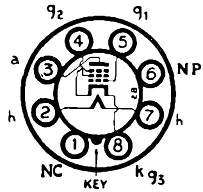


Replacement Type

TYPE **25A6G**

(OCTAL BASE)

POWER PENTODE



The BRIMAR type 25A6G is an indirectly heated power pentode for use in A.C./D.C. equipment where the operating voltages are low.

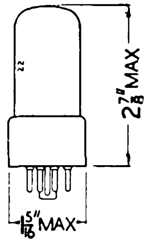
RATINGS

Heater Voltage	25.0 volts
Heater Current	0.3 amp.
Anode Voltage	160 volts max.
Anode Dissipation	5.3 watts max.
Screen (g_2) Voltage	135 volts max.
Screen Dissipation	1.9 watts max.

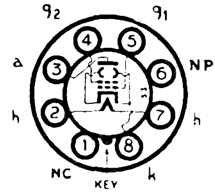
OPERATING CHARACTERISTICS (CLASS "A")

Anode Voltage	95	135	160	volts
Anode Current	20	37	33	mA
Screen Voltage	95	135	120	volts
Screen Current (Zero Signal)	4.0	8.0	6.5	mA
Screen Current (Max. Signal)	8	14	12	mA
Control Grid (g_1) Voltage	—15	—20	—18	volts
Cathode Bias Resistor	625	440	440	ohms
Anode Impedance	45,000	35,000	42,000	ohms
Mutual Conductance	2.0	2.45	2.4	mA/V
Optimum Load	4,500	4,000	5,000	ohms
Power Output	0.9	2.0	2.2	watts
Harmonic Distortion	11	9	10	per cent.

Current Equipment Type



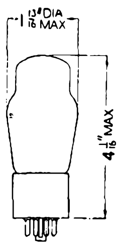
TYPE 25L6GT
25L6GTY*
(OCTAL BASE)
OUTPUT BEAM TETRODE



CHARACTERISTICS

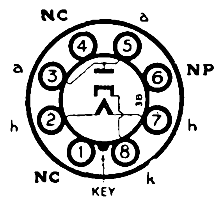
Heater Voltage	25		volts	Control Grid (g_1) Voltage	-7.5	-8	volts
Heater Current	0.3		amp.	Cathode Bias Resistor ...	150	160	ohms
Anode Voltage	110	200	volts	Anode Impedance ...	10,000	30,000	ohms
Anode Current	49	50	mA	Mutual Conductance ...	9.0	9.5	mA/V
Screen Voltage	110	110	volts	Optimum Load	1,500	3,000	ohms
Screen Current (Zero Signal)	4.0	2.0	mA	Power Output	2.1	4.3	watts
Screen Current (Max. Signal)	9	7	mA	Harmonic Distortion ...	11	10	per cent.
D.C. Cathode Current (max.)		125	mA				

* *Ruggedised Version*



Replacement Type

TYPE 25Z4G
(OCTAL BASE)
HALF-WAVE RECTIFIER



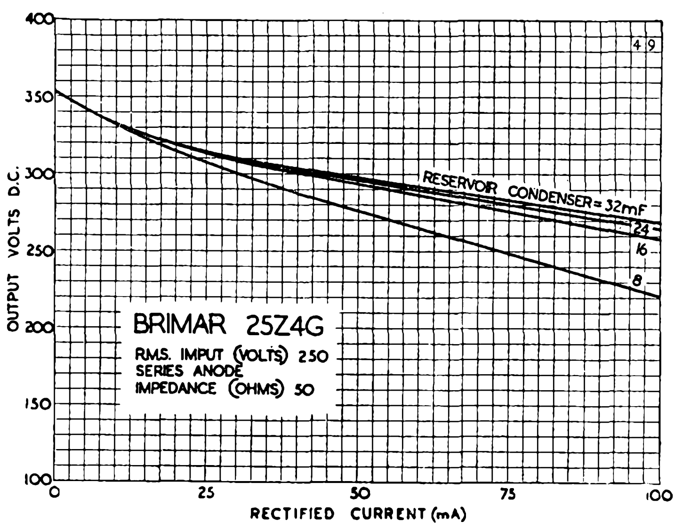
The BRIMAR type 25Z4G is an indirectly heated half-wave rectifier for use in A.C./D.C. equipment. It is designed to replace type 25Z6G where this valve is used in half-wave application.

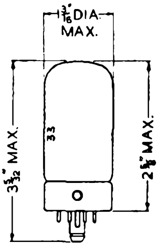
RATINGS

Heater Voltage ...	25 volts
Heater Current ...	0.30 amp.
Peak Inverse Voltage ...	700 volts max.
Peak Anode Current ...	450 mA max.
Heater-Cathode Potential ...	350 volts max.

CHARACTERISTICS AS HALF-WAVE RECTIFIER

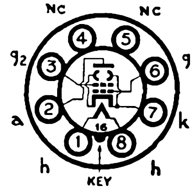
R.M.S. Input ...	117	250	volts max.
Supply Impedance ...	0	50	ohms min.
Rectified Current ...	100	100	mA max.





Replacement Type

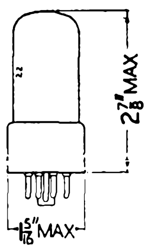
TYPE 35A5 (LOCTAL BASE) OUTPUT BEAM TETRODE



RATINGS

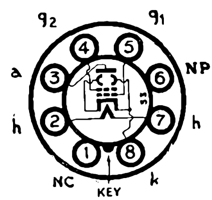
Heater Voltage	35 volts
Heater Current	0.15 amp.
Anode Voltage	200 volts max
Anode Dissipation	8.5 watts max.
Screen (g_2) Voltage	110 volts max.
Screen Dissipation	1.0 watts max.

For further information and characteristic curves refer to type 35L6GT.



Replacement Type

TYPE 35L6GT (OCTAL BASE) OUTPUT BEAM TETRODE



The BRIMAR type 35L6GT is an indirectly heated beam tetrode for use in the output stages of A.C./D.C. equipments where the operating voltages are low.

RATINGS

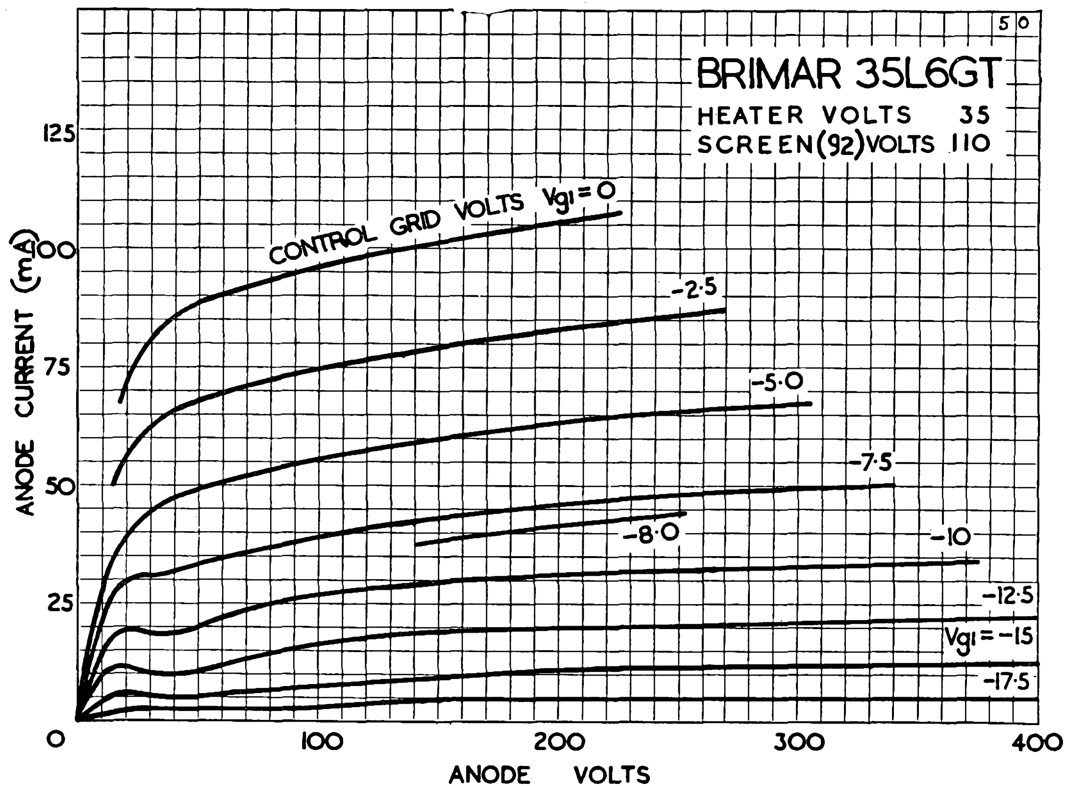
Heater Voltage	35 volts
Heater Current	0.15 amp.
Anode Voltage	200 volts max.
Anode Dissipation	8.5 watts max.
Screen (g_2) Voltage	110 volts max.
Screen Dissipation	1.0 watt max.

OPERATING CHARACTERISTICS

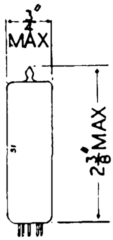
Anode Voltage	110	200	volts
Anode Current	40	41	mA
Screen Voltage	110	110	volts
Screen Current (Zero Signal)	3.0	2.0	mA
Screen Current (Max. Signal)	7	7	mA
Control Grid (g_1) Voltage	—7.5	—8	volts
Cathode Bias Resistor	170	185	ohms
Anode Impedance	14.000	40,000	ohms
Mutual Conductance	5.8	5.9	mA/V
Optimum Load	2,500	4,500	ohms
Power Output	1.5	3.3	watts
Harmonic Distortion	10	10	per cent

INTER-ELECTRODE CAPACITANCES

Input	13.2 pF
Output	8.25 pF
Control Grid to Anode	0.95 pF

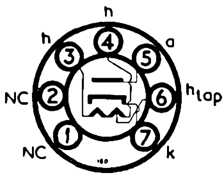

50
BRIMAR 35L6GT
HEATER VOLTS 35
SCREEN(g2)VOLTS 110
CONTROL GRID VOLTS Vg1 = 0
-2·5
-5·0
-7·5
-8·0
-10
-12·5
Vg1 = -15
-17·5
125
100
75
50
25
0
100
200
300
400
ANODE CURRENT (mA)
ANODE VOLTS

Current Equipment Type



B7G Base

TYPE 35W4
MINIATURE HALF-WAVE RECTIFIER



The BRIMAR type 35W4 is an indirectly heated half-wave rectifier for use in compact A.C./D.C. equipment.

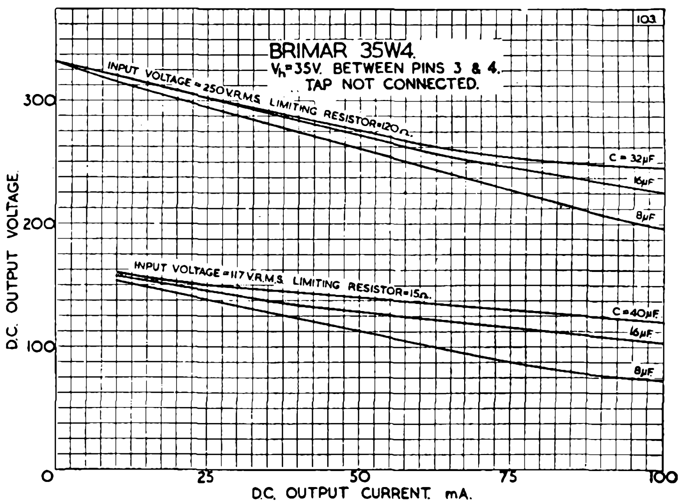
RATINGS

Heater Voltage	35 volts
Heater Current	0.15 amp.
Peak Inverse Voltage	700 volts max.
Peak Anode Current	600 mA max.
Heater-Cathode Potential (D.C.)	350 volts max.

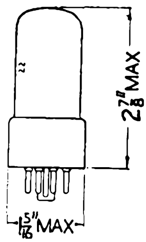
CHARACTERISTICS AS HALF-WAVE RECTIFIER

R.M.S. Input	117	240 volts max.
Supply Impedance	15	120 ohms min.
Rectified Current	100	100 mA max.
Reservoir Condenser	40	40 μF max.

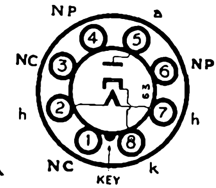
NOTE.—Ratings above 117 volts R.M.S. may not be applicable to valves type 35W4 made by other manufacturers.



Replacement Type



TYPE 35Z4GT
(OCTAL BASE)
HALF-WAVE RECTIFIER



The BRIMAR type 35Z4GT is an indirectly heated half-wave rectifier for use in A.C./D.C. equipment where low heater current drain is of importance.

RATINGS

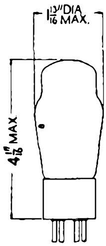
Heater Voltage	35 volts
Heater Current	0.15 amp.
Peak Inverse Voltage	700 volts max.
Peak Anode Current	600 mA max.
Heater-Cathode Potential	350 volts max.

CHARACTERISTICS AS HALF-WAVE RECTIFIER

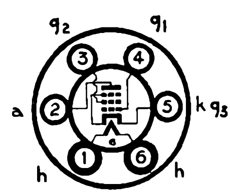
R.M.S. Input	117	250 volts max.
Supply Impedance	15	100 ohms min.
Rectified Current	100	100 mA max.
Reservoir Condenser	40	40 μF max.

Operational Curves for type 35W4 *may be used for the type* 35Z4GT.

Replacement Types



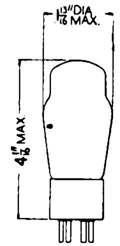
TYPES 42, 42E
(U.X. BASE)
POWER PENTODES



RATINGS

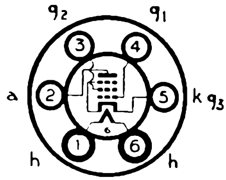
Heater Voltage	6.3 volts
Heater Current	0.7 amp.

For further information and characteristic curves refer to type 6F6G.



Replacement Types

TYPES 43, 43E
(U.X. BASE)
POWER PENTODES

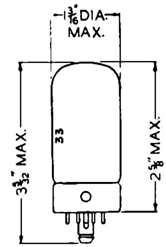


CHARACTERISTICS

Heater Voltage		25 volts
Heater Current		0.3 amp.
Anode Voltage ...	135	160 volts
Anode Current ...	37	33 mA
Screen (g_2) Voltage	135	120 volts
Screen Current ...	8.0	6.5 mA
Control Grid (g_1) Voltage	—20	—18 volts

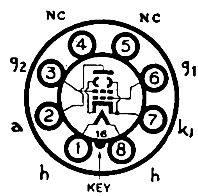
Cathode Bias Resistor	440	440 ohms
Anode Impedance ...	35,000	42,000 ohms
Mutual Conductance	2.45	2.40 mA/V
Optimum Load ...	4,000	5,000 ohms
Power Output ...	2.0	2.2 watts
Harmonic Distortion	9	10 per cent.

For further information and characteristic curves refer to type 25A6G.



Replacement Type

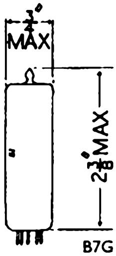
TYPE 50A5
(LOCTAL BASE)
OUTPUT BEAM
TETRODE



CHARACTERISTICS

Heater Voltage		50 volts
Heater Current		0.15 amp.
Anode Voltage	100	200 volts
Anode Current	49	50 mA
Screen (g_2) Voltage	110	110 volts
Screen Current	4.0	1.5 mA
Control Grid (g_1) Voltage	—7.5	—8.0 volts
Cathode Bias Resistor	150	160 ohms
Anode Impedance	13,000	35,000 ohms
Mutual Conductance	8.0	8.25 mA/V
Optimum Load	2,000	3,000 ohms
Power Output	2.1	4.3 watts
Harmonic Distortion	10	10 per cent.

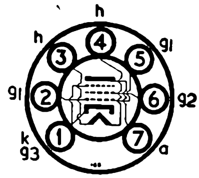
The characteristic curves of the 50A5 *are similar to those of type* 50L6GT.



B7G Base

Current Equipment Type

TYPE 50C5
MINIATURE OUTPUT BEAM TETRODE



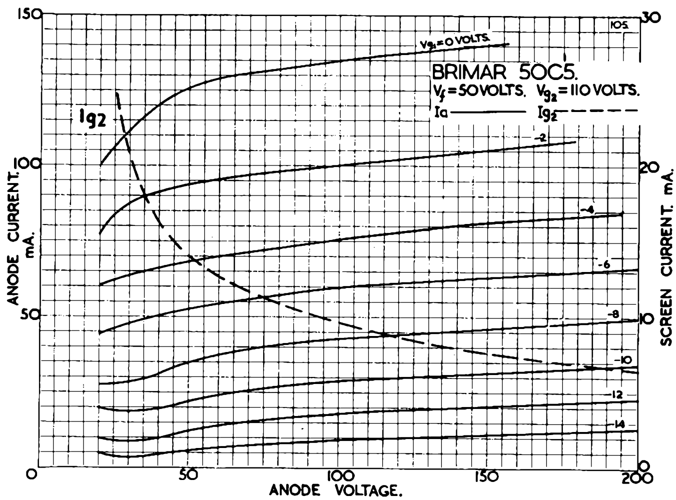
Type 50C5 is particularly suitable for operation in compact 110 Volt A.C./D.C. equipment.

RATINGS

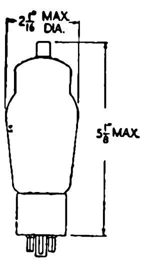
Heater Voltage	50 volts	Screen (g_2) Voltage	117 volts max.
Heater Current	0.15 amp.	Screen Dissipation	1.25 watts max.
Anode Voltage	135 volts max.	Heater-Cathode Potential ...	250 volts max.
Anode Dissipation	5.5 watts max.		

OPERATING CHARACTERISTICS

Anode Voltage	110 volts	Anode Impedance	10,000 ohms
Anode Current	49 mA	Mutual Conductance	7.5 mA/V
Screen Voltage	110 volts	Optimum Load	2,500 ohms
Screen Current	4 mA	Power Output	1.9 watts
Control Grid (g_1) Voltage ...	−7.5 volts	Harmonic Distortion	9 per cent.
Cathode Bias Resistor ...	140 ohms		

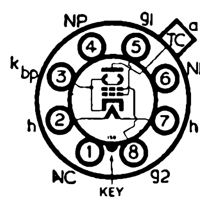


Type 50C5 is a commercial equivalent of the CV1959.



Current Equipment Type

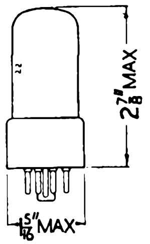
TYPE 50CD6G
(OCTAL BASE) LINE TIME BASE OUTPUT VALVE



RATINGS

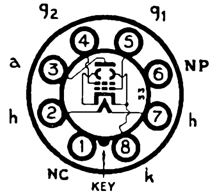
Heater Voltage	50 volts	Heater Current...	0.3 amp.

For further information and characteristic curves refer to type 6CD6G.



Replacement Type

TYPE 50L6GT (OCTAL BASE) OUTPUT BEAM TETRODE

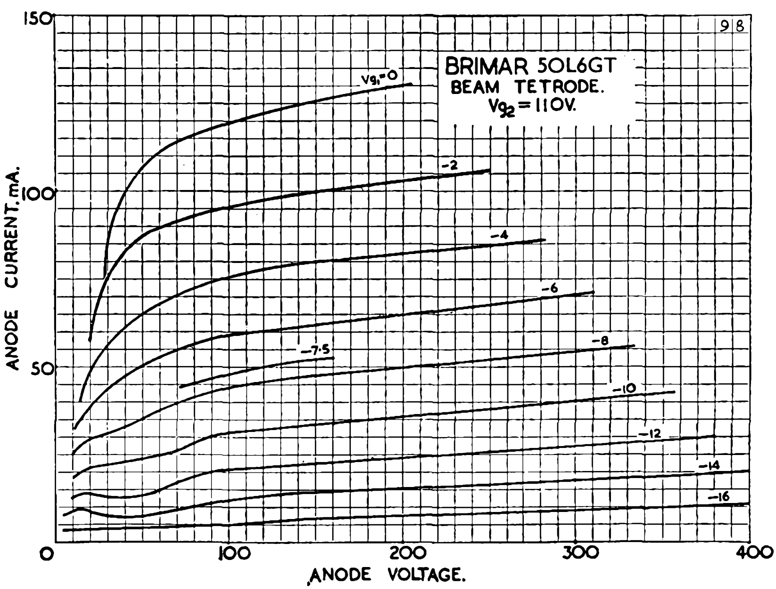


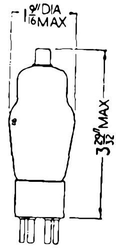
RATINGS

Heater Voltage ...	50 volts	Anode Dissipation ...	10 watts max.
Heater Current ...	0.15 amp.	Screen (g_2) Voltage...	117 volts max.
Anode Voltage ...	200 volts max.	Screen Dissipation ...	1.25 watts max.

OPERATING CHARACTERISTICS

Anode Voltage	110	200	volts
Anode Current	49	50	mA
Screen Voltage	110	110	volts
Screen Current (Zero Signal)	4.0	2.0	mA
Screen Current (Max. Signal)	11.0	7.0	mA
Control Grid (g_1) Voltage	—7.5	—8.0	volts
Cathode Bias Resistor	150	160	ohms
Anode Impedance	13,000	30,000	ohms
Mutual Conductance	9.0	9.5	mA/V
Optimum Load	2,000	3,000	ohms
Power Output	2.1	4.3	watts
Harmonic Distortion	11	10	percent.



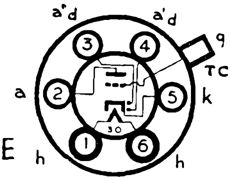


Replacement Type

TYPE **75**

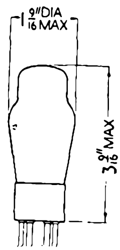
(U.X. BASE)

DOUBLE DIODE TRIODE



CHARACTERISTICS

Heater Voltage	6.3 volts	Grid Voltage	−2 volts
Heater Current	0.3 amp.	Anode Impedance	91,000 ohms
Anode Voltage	250 volts	Mutual Conductance ...	1.1 mA/V
Anode Current	0.9 mA	Amplification Factor	100

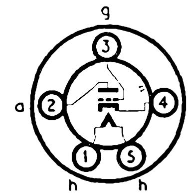


Replacement Type

TYPE **76**

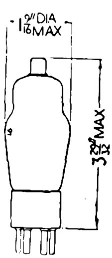
(U.X. BASE)

GENERAL PURPOSE TRIODE



CHARACTERISTICS

Heater Voltage ...		6.3 volts	
Heater Current ...		0.3 amp.	
Anode Voltage ...	100	250	volts
Anode Current ...	2.5	5.0	mA
Grid Voltage ...	−5	−13.5	volts
Anode Impedance ...	12,000	9,500	ohms
Mutual Conductance ...	1.15	1.45	mA/V
Amplification Factor ...	14	14	
Grid to Anode Capacitance ...		2.2	pF
Grid to Cathode Capacitance ...		3.4	pF
Anode to Cathode Capacitance ...		5.5	pF

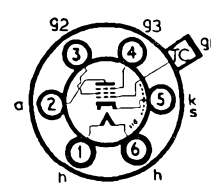


Replacement Types

TYPES **77, 77E**

(U.X. BASE)

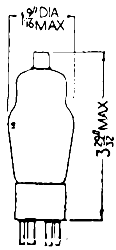
R.F. PENTODES



CHARACTERISTICS

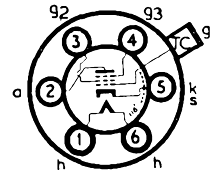
Heater Voltage	6.3 volts	Control Grid (g_1) Voltage ...	−3 volts
Heater Current	0.3 amp.	Suppressor (g_3) Voltage ...	0 volts
Anode Voltage	250 volts	Anode Impedance	1.5 meg.
Anode Current	2.3 mA	Mutual Conductance ...	1.2 mA/V
Screen (g_2) Voltage	100 volts	Control Grid Voltage ...	−7.5 volts
Screen Current	0.5 mA	(For Anode Current cut-off)	

For further information refer to type 6J7G.



Replacement Types

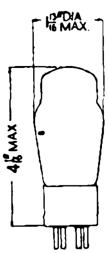
TYPES **78, 78E**
(U.X. BASE)
VARI-MU
R.F. PENTODES



CHARACTERISTICS

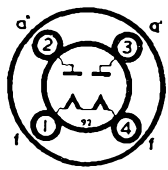
Heater Voltage	6.3 volts	Control Grid (g_1) Voltage ...	–3 volts
Heater Current	0.3 amp.	Cathode Bias Resistor ...	330 ohms
Anode Voltage	250 volts	Anode Impedance	0.8 meg.
Anode Current	7.0 mA	Mutual Conductance ...	1.45 mA/V
Screen (g_2) Voltage	100 volts	Control Grid Voltage ...	–42 volts
Screen Current	1.7 mA	(For Mutual Conductance of 0.002 mA/V)	

For further information and characteristic curves refer to type 6K7G.



Replacement Type

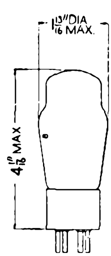
TYPE **80**
(U.X. BASE)
FULL-WAVE
RECTIFIER



CHARACTERISTICS

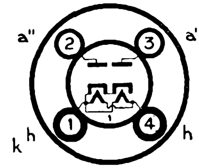
Filament Voltage ... ... 5.0 volts
Filament Current ... ... 2.0 amp.

For further information and characteristic curves refer to type 5Y3GT.



Replacement Type

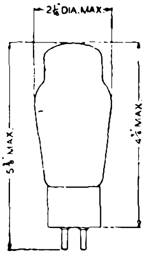
TYPE **80s**
(U.X. BASE)
FULL-WAVE RECTIFIER



CHARACTERISTICS

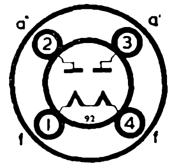
Heater Voltage ... ... 5.0 volts
Heater Current ... ... 2.0 amp.
R.M.S. Input per Anode ... ... 350 volts max.
Rectified Current ... ... 125 mA max.

For further information and characteristic curves refer to type 5Z4G.



Industrial Type

TYPE **83**
(U.X. BASE)
FULL-WAVE RECTIFIER
(MERCURY VAPOUR)



RATINGS

Filament Voltage	5.0 volts
Filament Current	3.0 amp.
Peak Inverse Voltage	1,550 volts max.
Peak Current per Anode	1.0 amp. max.
Condensed Mercury Temperature	20-60°C.

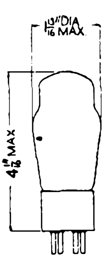
OPERATION AS FULL-WAVE RECTIFIER

CONDENSER INPUT

R.M.S. Input per Anode	450 volts max.
Supply Impedance per Anode	50 ohms min.
Rectified Current	225 mA max.

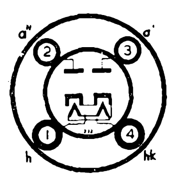
CHOKE INPUT

R.M.S. Input per Anode	550 volts max.
Input Choke Inductance	3 Henries min.
Rectified Current	225 mA max.



Replacement Type

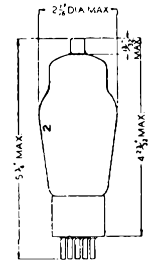
TYPE **83V**
(U.X. BASE)
FULL-WAVE
RECTIFIER



CHARACTERISTICS

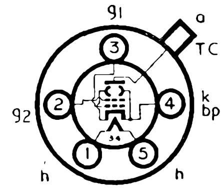
Heater Voltage	5.0 volts
Heater Current	2.0 amp.

For further information and characteristic curves refer to type 5V4G.



Industrial Type

TYPE 807
(U.X. BASE)
OUTPUT BEAM
TETRODE



The BRIMAR type 807 is an indirectly heated beam tetrode for use in the output stages of large audio equipment. The valve is fitted with a low-loss base and may be used as R.F. amplifier or frequency multiplier in transmitters. Above 60 Mc/s the ratings must be reduced and at 120 Mc/s the ratings must not exceed 50 per cent. of the maximum.

RATINGS

Heater Voltage	6.3 volts	
Heater Current	0.9 amp.	
Anode Voltage	600 volts	Absolute Maximum
Anode Dissipation	25 watts	Absolute Maximum
Screen (g_2) Voltage	300 volts	Absolute Maximum
Screen Dissipation	3.5 watts	Absolute Maximum

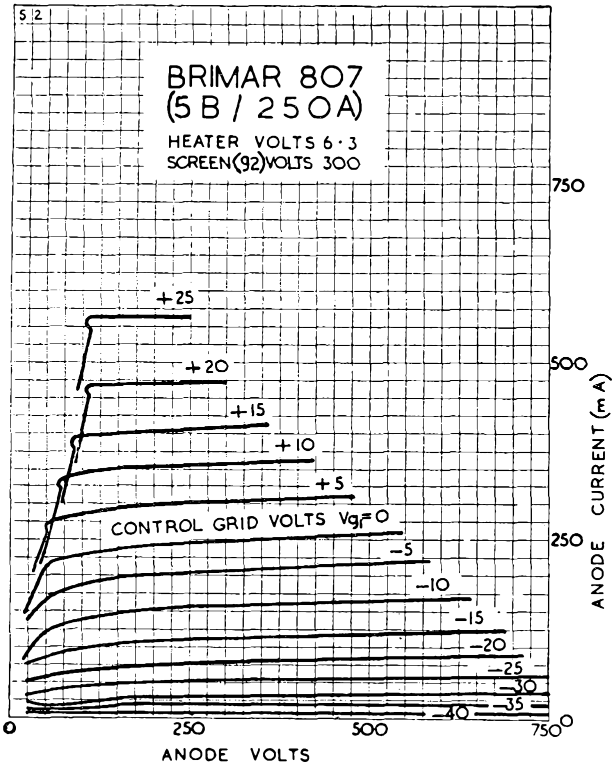
OPERATING CHARACTERISTICS (CLASS "A")

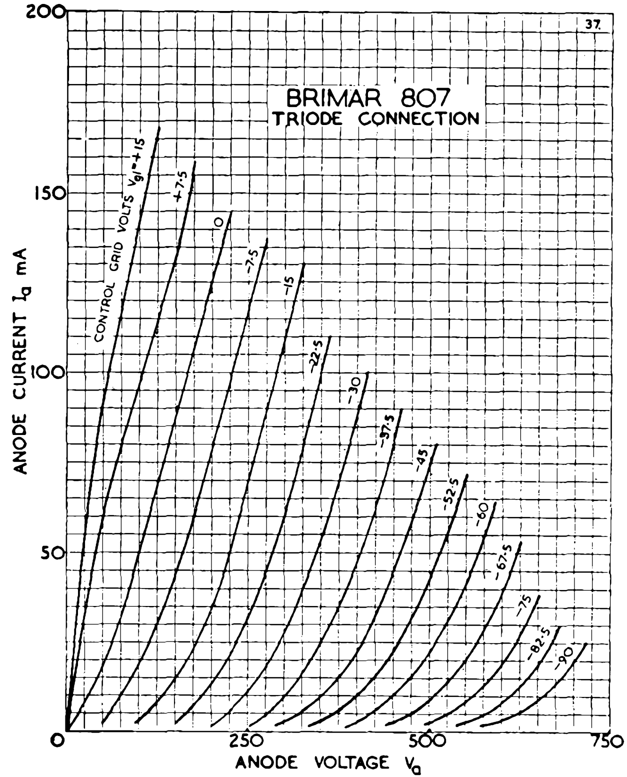
Anode Voltage	300	500	volts
Anode Current	83	50	mA
Screen Voltage	250	200	volts
Screen Current	8.0	1.6	mA
Control Grid (g_1) Voltage	–12.5	–14.5	volts
Cathode Bias Resistor	140	280	ohms
Anode Impedance	24,000	39,000	ohms
Mutual Conductance	6.5	5.7	mA/V
Optimum Load	3,000	6,000	ohms
Power Output	6.4	11.5	watts
Harmonic Distortion	6	12	per cent.

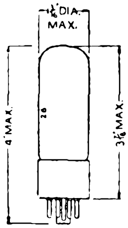
OPERATION AS PUSH-PULL AMPLIFIER (2 VALVES)

	Class AB1		Class AB2*	
Anode Voltage	500	600	600	volts
Anode Current (Zero Signal)	100	80	60	mA
Anode Current (Max. Signal)	119	150	200	mA
Screen Voltage	300	300	300	volts
Screen Current (Zero Signal)	2.5	1.5	1.5	mA
Screen Current (Max. Signal)	16.5	17.5	21	mA
Control Grid Voltage	–	–27.5	–30	volts
Cathode Bias Resistor	270	–	–	ohms
Peak Input (Grid to Grid)	72	59	78	volts
Optimum Load (Anode to Anode) ...	9,000	10,000	6,400	ohms
Power Output	32.5	47.5	80	watts
Harmonic Distortion	2.7	2.2	3.5	per cent.

* *To obtain the maximum output at low distortion, the Anode and Screen supply voltages must not vary more than 5 per cent. nor the grid bias 3 per cent. between no signal and full signal conditions.*

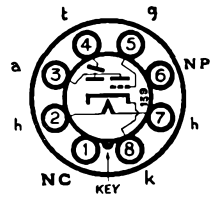

S 2
BRIMAR 807
(5B / 250A)
HEATER VOLTS 6·3
SCREEN (g2) VOLTS 300
+25
+20
+15
+10
+5
CONTROL GRID VOLTS Vg1=0
−5
−10
−15
−20
−25
−30
−35
−40
0
250
500
750
ANODE VOLTS
ANODE CURRENT (mA)


37
BRIMAR 807
TRIODE CONNECTION
CONTROL GRID VOLTS Vg1=+15
+7·5
0
−7·5
−15
−22·5
−30
−37·5
−45
−52·5
−60
−67·5
−75
−82·5
−90
0
50
100
150
200
250
500
750
ANODE CURRENT Ia mA
ANODE VOLTAGE Va



Replacement Type

TYPE 1629
(OCTAL BASE)
" MAGIC EYE "
TUNING INDICATOR

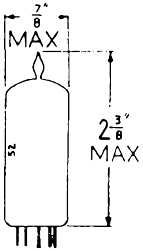


CHARACTERISTICS

Heater Voltage	12.6 volts			
Heater Current	0.15 amp.			
Anode Supply Voltage	100	200	250	volts
Anode Load Resistor	0.5	1.0	1.0	meg.
Anode Current *	0.2	0.2	0.24	mA
Target Voltage	100	200	250	volts
Target Current *	1	3	4	mA
Grid Voltage	—3.3	—6.5	—8	volts

(For 0° shadow angle.)

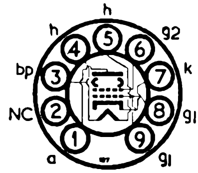
* *For 90° shadow angle, grid voltage zero.*



B9A (Noval) Base

Industrial Type

TYPE 5763
MINIATURE
V.H.F. BEAM POWER
AMPLIFIER



The BRIMAR type 5763, owing to its small size and comparatively high ratings is very suitable for use in portable V.H.F. equipment. Sufficient ventilation must be provided to ensure that the bulb temperature never exceeds 250°C.

RATINGS

Heater Voltage	6.0 volts	
Heater Current	0.75 amp.	
Anode Voltage	300 volts	Absolute Maximum
Anode Dissipation	12 watts	Absolute Maximum
Screen (g_2) Voltage	250 volts	Absolute Maximum
Screen Dissipation	2.0 watts	Absolute Maximum
Control Grid (g_1) Current	5.0 mA D.C.	Absolute Maximum
Bulb Temperature	250° C.	Absolute Maximum
Heater to Cathode Potential	100 volts max.	Absolute Maximum
D.C. Cathode Current	65 mA max.	

Frequency for above Ratings 175 Mc/s max.

INTER-ELECTRODE CAPACITANCES (No External Shield)

Input	9.5 pF
Output	4.5 pF
Control Grid to Anode	0.3 pF max.

OPERATION AS CLASS "A" AMPLIFIER

Anode Voltage	250 volts	Control Grid Voltage	−7.25 volts
Anode Current	45 mA	Anode Impedance	27,000 ohms
Screen Voltage	250 volts	Mutual Conductance	7.0 mA/V
Screen Current	4.7 mA	Amp. Factor (μg_1-g_2)	16

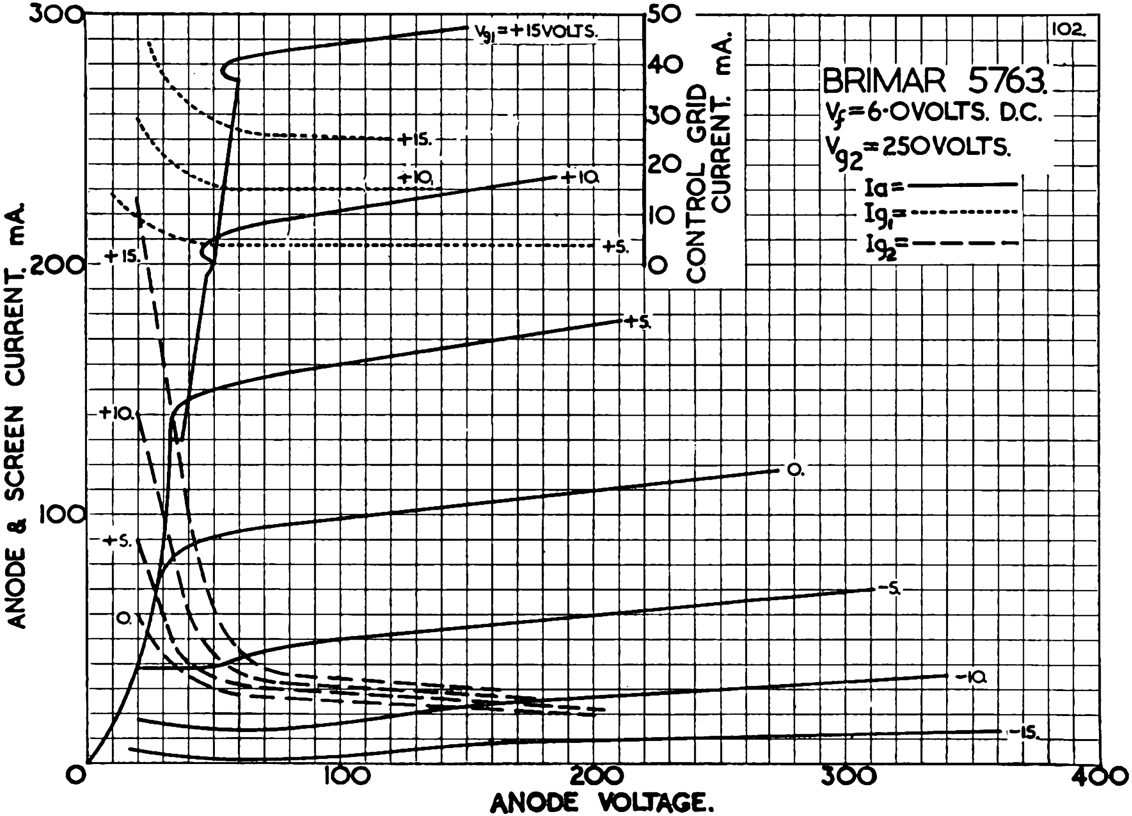
OPERATION AS OSCILLATOR OR POWER AMPLIFIER (CLASS "C" TELEGRAPHY) AT 50 Mc/s

Anode Voltage	300 volts
Anode Current	50 mA
Screen Voltage	250 volts
Screen Current	5.0 mA
Control Grid Voltage	−60 volts
Control Grid Resistor	22,000 ohms
Control Grid Current	3 mA
Peak R.F. Grid Voltage	80 volts
Input Driving Power	0.35 watts
Output Power	8.0 watts

OPERATION AS FREQUENCY MULTIPLIER

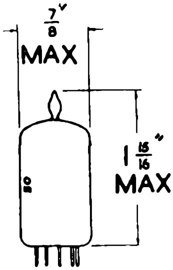
	Doubler to 175 Mc/s	*Tripler to 175 Mc/s*	
Anode Voltage	300	300	volts
Anode Current	40	35	mA
Screen Supply Voltage	300	300	volts
Series Screen Resistor	12,500	12,500	ohms
Screen Current	4.0	5.0	mA
Control Grid Voltage	−75	−100	volts
Control Grid Resistor	75,000	100,000	ohms
Peak R.F. Grid Voltage	95	120	volts
Control Grid Current	1.0	1.0	mA
Input Driving Power	0.6	0.6	watts
Output Power	3.6	2.8	watts

Type 5763 is a commercial equivalent of the CV2129.

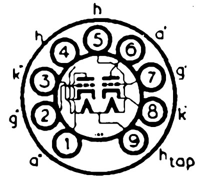

BRIMAR 5763.
V_f=6·0VOLTS. D.C.
V_{g2}=250VOLTS.
Ia=
Ig_1=
Ig_2=
102.
ANODE & SCREEN CURRENT. mA.
CONTROL GRID CURRENT. mA.
ANODE VOLTAGE.
V_{g1}=+15VOLTS.
+15.
+10.
+5.
0.
-5.
-10.
-15.
0
100
200
300
400
10
20
30
40
50

5965

Industrial Type



TYPE 5965
MINIATURE
DOUBLE TRIODE



The BRIMAR 5965 is a Trustworthy miniature double triode designed for use in high-speed digital computors. Each triode section features a high zero-bias anode current, a sharp cut-off characteristic, and a separate cathode connection. In addition, the balance of the cut-off characteristic between the two sections is controlled. The heater-cathode construction is designed for dependable service under conditions of intermittent operation. When used in " on-off " control applications, the 5965 will maintain its emission capabilities after long periods of operation under cut-off conditions.

RATINGS

Heater Voltage (A.C. or D.C.) ...	6.3 } or { 12.6 volts
Heater Current ...	0.45 } or { 0.225 amp.
Anode Voltage ...	300 volts max.
Positive D.C. Grid Voltage ...	0 volts max.
Anode Dissipation ...	2.2 watts max.
Cathode Current ...	15 mA max.
Heater Cathode Voltage ...	90 volts max.
Grid Circuit Resistance—With Fixed Bias ...	0.1 megohm max.
With Cathode Bias ...	0.5 megohm max.

OPERATING CHARACTERISTICS (Each Section)

Anode Voltage ...	150 volts
Cathode Bias Resistor ...	220 ohms
Amplification Factor ...	47
Anode Resistance, approximate ...	7,250 ohms
Mutual Conductance ...	6.5 mA/V
Anode Current ...	8.2 mA

TYPICAL OPERATION (Computor Service, Each Section)

	On Condition	Off Condition	
Anode Supply Voltage ...	150	150	volts
Anode Load Resistor ...	7,200	7,200	ohms
Grid Voltage ...	0†	—	volts
Anode Current, approximate ...	10.5	—	mA
Grid Voltage for $I_a = 150\mu A$ approx.‡ ...	—	—5.5	volts

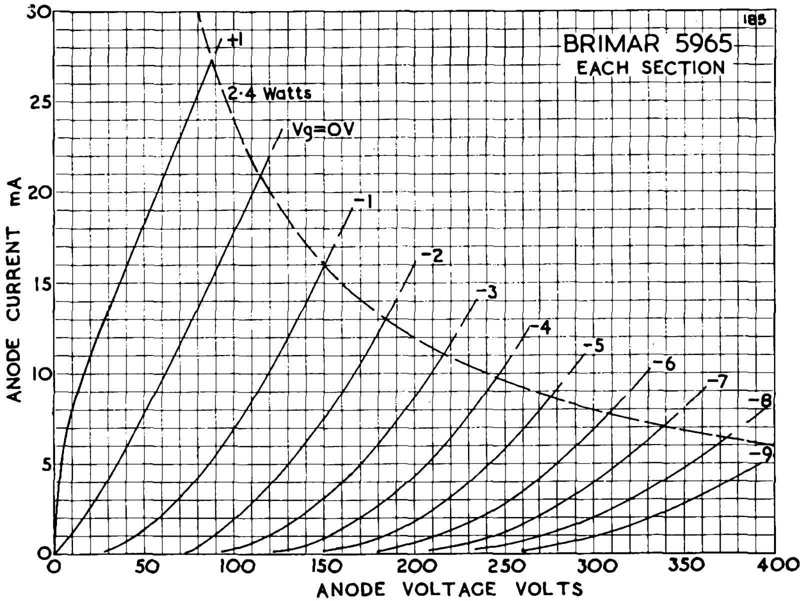
DIRECT INTER-ELECTRODE CAPACITANCES *

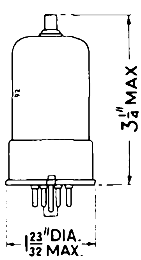
Grid to Anode (Each Section) ...	3.0 pF
Input (Each Section) ...	3.8 pF
Output (Section 1) ...	0.5 pF
Output (Section 2) ...	0.38 pF
Anode to Anode ...	0.5 pF

* *Without external shield.*

† *Approximate value of grid voltage with grid current adjusted for approximately 140μA.*

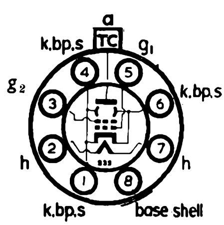
‡ *The grid voltage required to produce 150μA in one section normally will not differ by more than 1·5 volts from the grid voltage required to produce 150μA in the other section with an anode supply voltage of 150 volts and an anode load resistor of 7,200 ohms.*





Industrial Type

TYPE 6146
R.F.
POWER AMPLIFIER



The BRIMAR 6146 is an octal based beam tetrode for use as an R.F. power amplifier up to 175 Mc/s or as an A.F. power amplifier or modulator.

RATINGS (Absolute Maximum)

Heater Voltage	6.3 volts
Heater Current	1.25 amps.
Anode Voltage	600 volts max.
Anode Dissipation	20 watts max.
Screen Voltage	250 volts max.
Screen Dissipation	3 watts max.
Control Grid Voltage	—150 volts max.
Control Grid Current	3.5 mA max.
Control Grid Circuit Resistance—Fixed Bias	100 kilohms
Cathode Bias ...	500 kilohms
R.F. Amplifier or Oscillator ...	30 kilohms
Peak Heater to Cathode Voltage	135 volts max.
Bulb Temperature	220° C. max.

OPERATING CHARACTERISTICS

Anode Voltage	200 volts
Screen Voltage	200 volts
Anode Current	100 mA
Control Grid Voltage for Ia = 100mA	—29.5 volts approx.
Mutual Conductance	7 mA/V
Inner Amplification Factor (μg_1-g_2)	4.5

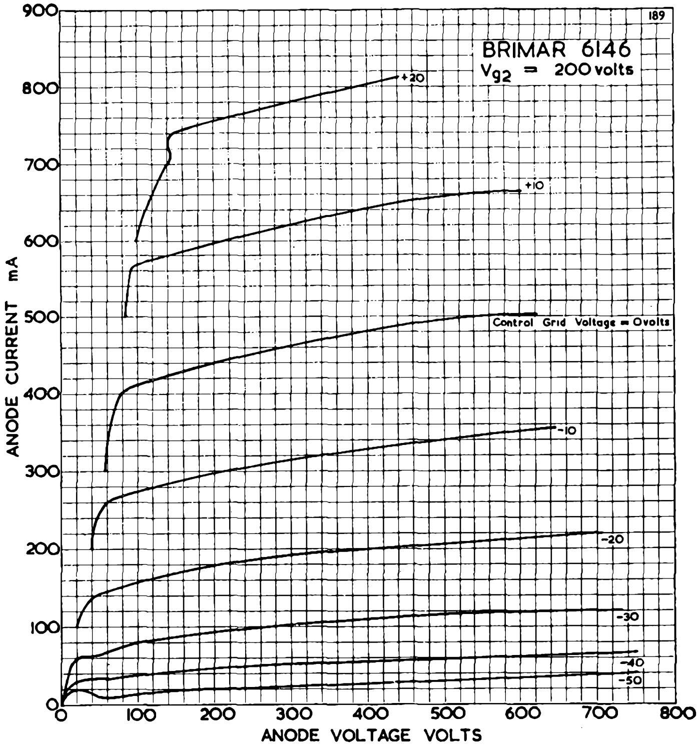
OPERATION AS A POWER AMPLIFIER (CLASS C TELEGRAPHY)

Operating Frequency	60	175	Mc/s
Anode Voltage	600	320	volts
Screen Voltage	150 *	180 †	volts
Control Grid Voltage	– 58‡	—51 §	volts
Peak R.F. Drive Voltage	73	64	volts
Anode Current	112	140	mA
Screen Current	9	10	mA
Control Grid Current	2.8	2.0	mA
Drive Power	0.2	3	watts
Power Output	52	25	watts

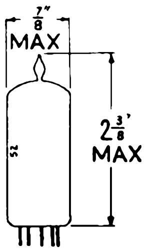
** Grid No. 2 voltage must not exceed 400 volts under key up conditions.*
† Derived from the 320 volt supply through a series resistor of 15.5 kilohms.
‡ Derived from a grid resistor of 20 kilohms or a cathode resistor of 470 ohms.
§ Derived from a grid resistor of 27 kilohms or a cathode resistor of 330 ohms.

INTER-ELECTRODE CAPACITANCES

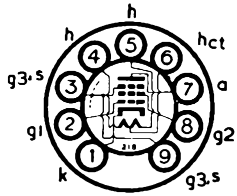
Input	13.5 pF
Output	9 pF
Control Grid to Anode	0.22 pF max.



Current Equipment Type



TYPE 6870 TRUSTWORTHY R.F. AND VIDEO PENTODE



The BRIMAR 6870 is a Trustworthy high slope pentode for use as a small transmitting valve or as a video valve giving a larger output with low anode loads than an ordinary R.F. amplifying pentode.

RATINGS

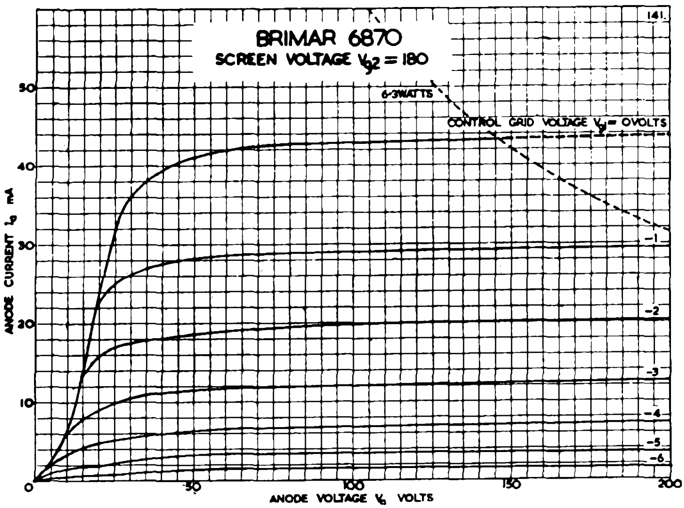
Heater Voltage	6.3 or 12.6 volts
Heater Current	0.6 or 0.3 amp.
Anode Voltage	300 volts max.
Anode Voltage ($I_a = 0$)	500 volts max.
Anode Dissipation	6.3 watts max.
Screen Voltage	250 volts max.
Screen Voltage ($I_{g2} = 0$)	500 volts max.
Screen Dissipation	2.0 watts max.
Control Grid Current (D.C.)	3 mA max.
Control Grid Circuit Resistance—Fixed bias	0.1 MΩ max.
Auto bias	0.5 MΩ max.
Cathode Current	50 mA max.
Frequency of Operation	150 Mc/s. max.
Shock (Intermittent Service)	550 g
Vibration (Continuous Service)	2.5 g

OPERATING CHARACTERISTICS (CLASS A)

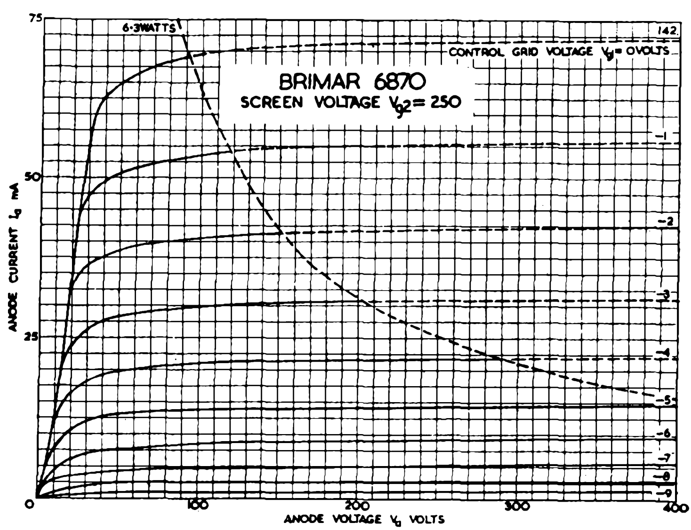
Anode Voltage	180	250	volts
Screen Voltage	180	250	volts
Autobias Resistor	56	120	Ω
Anode Current	25	25	mA
Screen Current	3.5	3.5	mA
Mutual Conductance	9.0	8.5	mA/V
Anode Impedance	170	230	kΩ
Inner Amplification Factor (μg_1—g_2)	35	35	
Control Grid Voltage for $I_a = 100\mu A$	—9	—13.5	V

INTER-ELECTRODE CAPACITANCES

Input	8.5 pF
Output	7.0 pF
Control Grid to Anode	0.025 pF max.

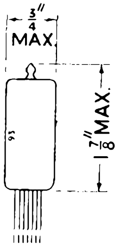


BRIMAR 6870
SCREEN VOLTAGE V_{g2} = 180
141
6·3WATTS
CONTROL GRID VOLTAGE V_{g1} = 0VOLTS
-1
-2
-3
-4
-5
-6
ANODE CURRENT I_a mA
50
40
30
20
10
0
50
100
150
200
ANODE VOLTAGE V_a VOLTS

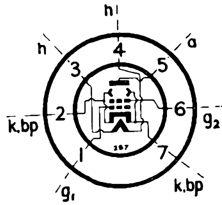


6·3WATTS
142
CONTROL GRID VOLTAGE V_{g1} = 0VOLTS
BRIMAR 6870
SCREEN VOLTAGE V_{g2} = 250
-1
-2
-3
-4
-5
-6
-7
-8
-9
ANODE CURRENT I_a mA
75
50
25
0
100
200
300
400
ANODE VOLTAGE V_a VOLTS

Industrial Type



TYPE F/7001
BEAM TETRODE



The BRIMAR F/7001 is a miniature beam tetrode intended primarily for use as an R.F. amplifier up to 50 Mc/s in mobile equipment. It is a Trustworthy valve and has been designed for use under adverse conditions of vibration and shock.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.45 amps
Anode Voltage	250 volts abs. max.
Anode Voltage (Ia = 0)	550 volts abs. max.
Anode Dissipation	5.5 watts abs. max.
Screen Voltage	250 volts abs. max.
Screen Voltage (I_{g2} = 0)	550 volts abs. max.
Screen Dissipation	1.1 watts abs. max.
Grid-Cathode Circuit Resistance—Fixed bias	100 kilohms max.
Cathode bias	500 kilohms max.
Cathode Current	55 mA abs. max.
Heater to Cathode Voltage	175 volts abs. max.
Bulb Temperature	210° C. abs. max.
Shock (short duration)	500 g abs. max.
Continuous Vibration	2.5 g abs. max.
Operating Frequency	50 Mc/s max.

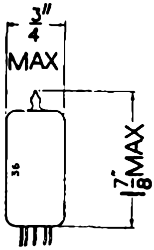
OPERATING CHARACTERISTICS

Anode Voltage	120 volts
Screen Voltage	120 volts
Control Grid Voltage	0 volts
Cathode Bias Resistor	250 ohms
Anode Current	35 mA
Screen Current	4 mA
Mutual Conductance	4.8 mA/V
Anode Impedance	15 kilohms
Inner Amplification Factor ($\mu g_1 g_2$)	5.5 approx.

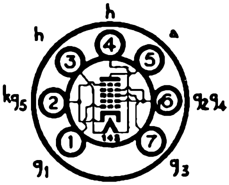
INTER-ELECTRODE CAPACITANCES

Input	7.0 pF
Output	8.75 pF
Grid to Anode	0.1 pF max.

Industrial Type



TYPE 7032
GATING HEPTODE



The BRIMAR 7032 is a miniature heptode with short grid base characteristics on grid 1 and grid 3. It is of Trustworthy construction and is intended for use in computers as a gating valve or in similar applications. The cathode has been designed to give good life and reliability when used for long periods under cut-off conditions.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amps.
Anode Voltage	300 volts max.
Anode Dissipation	1 watt max.
Screen Voltage	100 volts max.
Screen Voltage ($Ig_2 = 0$)	300 volts max.
Screen Dissipation	1.2 watts max.
Grid 3 Voltage	0 volts max.
Grid 3 Voltage	—50 volts min.
Cathode Current	14 mA max.
Heater to Cathode Voltage	100 volts max.
Shock (Intermittent Service)	500 g.
Vibration (Continuous Service)	2½ g.

OPERATING CHARACTERISTICS

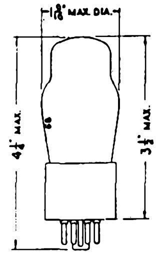
Anode Voltage	250	250	250	volts
Screen Voltage	100	100	100	volts
Grid 1 Voltage	—8	—2	—2	volts
Grid 3 Voltage	0	13	0	volts
Anode Current	0.01	0.05	4.5	mA
Screen Current	0.04	11.3	7.2	mA
Mutual Conductance, Grid 1 to Anode	—	—	1.8	mA/V
Mutual Conductance, Grid 3 to Anode	—	—	0.5	mA/V
Amplification Factor, Grid 1 to Grid 2	—	—	22	

INTER-ELECTRODE CAPACITANCES *

Grid 3 to Anode	0.35 pF max.
Anode to All	13.5 pF
Grid 3 to All	7.5 pF
Grid 1 to Grid 3	0.15 pF max.

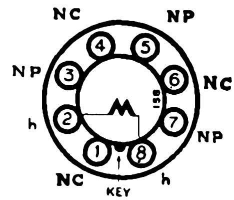
* *Measured with external shield.*

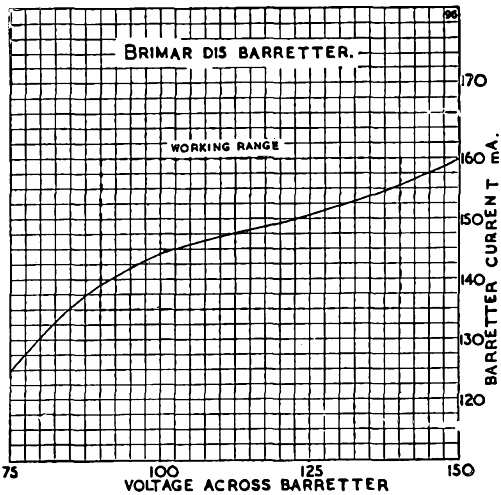
BRIMAR



Replacement Type

TYPE **D15**
(OCTAL BASE)
CURRENT
STABILISER

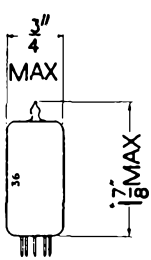




BRIMAR type D15 is a barretter suitable for use with the 0.15 amp. series of valves.

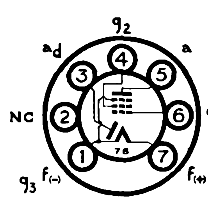
CHARACTERISTICS

Operating Current	0.15 amp.
Voltage Range	90-140 volts



Current Equipment Type

TYPE **DAF96**
MINIATURE BATTERY
DIODE PENTODE



RATINGS

Filament Voltage	1.4 volts
Filament Current	0.025 amp.
Anode Voltage	90 volts max.
Screen (g_2) Voltage	90 volts max.
Cathode Current	0.25 mA max.

DAF96
DF96

CHARACTERISTICS

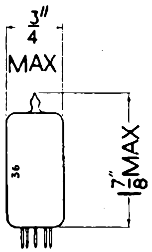
Anode Voltage	67.5 volts
Screen Voltage	67.5 volts
Control Grid Voltage	—1.5 volts
Anode Current	170 μA
Screen Current	55 μA
Mutual Conductance	170 μA/V

RESISTANCE CAPACITY COUPLED OPERATION

Anode and Screen Supply Voltage	85	64	volts
Anode Load Resistor	1	1	MΩ
Screen Series Resistor	2.7	2.7	MΩ
Control Grid Resistor	10	10	MΩ
Peak Output	7	7	volts Pk
Voltage Gain	60	52	

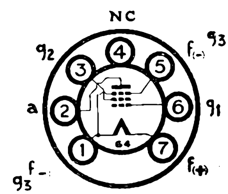
INTER-ELECTRODE CAPACITANCES (with no external Shield)

Input	1.8 pF
Output	2.7 pF
Control Grid to Anode	0.3 pF max.
Diode to all other Electrodes	1.1 pF



Current Equipment Type

TYPE **DF96**
MINIATURE BATTERY
VARI-MU PENTODE



RATINGS

Filament Voltage	1.4 volts
Filament Current	0.025 amp
Anode Voltage	120 volts max
Screen (g_2) Voltage	90 volts max.
Cathode Current	2.2 mA max

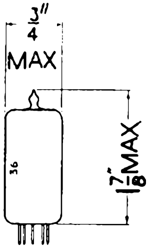
CHARACTERISTICS

Anode Voltage	64	85	volts
Screen Series Resistor	0	39	kΩ
Control Grid Voltage	0	0	volts
Anode Current	1.65	1.65	mA
Screen Current	0.55	0.55	mA
Mutual Conductance	0.85	0.85	mA/V
Anode Impedance	0.7	1.0	MΩ
Inner μ ($\mu_{g_1-g_2}$)	18	18	
Control Grid Bias for g_m = 0.01 mA/V	—4.1	—5.5	volts

INTER-ELECTRODE CAPACITANCES

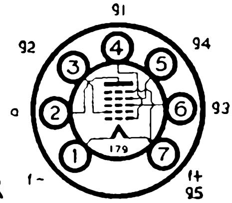
Input	3.3 pF
Output	7.8 pF
Control Grid to Anode	0.01 pF max.

BRIMAR



Current Equipment Type

TYPE **DK96**
MINIATURE BATTERY HEPTODE FREQUENCY CHANGER



RATINGS

Filament Voltage	1.4 volts
Filament Current	0.025 amp.
Anode Voltage	90 volts max.
Screen (g_4) Voltage	90 volts max.
Oscillator Anode (g_2) Voltage	60 volts max.
Cathode Current	2.6 mA max.

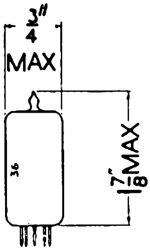
CHARACTERISTICS

Anode Voltage	64	85	volts
Screen (g_4) Series Resistor	0	120	kΩ
Anode Current	0.55	0.6	mA
Screen (g_4) Current	0.12	0.14	mA
Oscillator Anode (g_2) Voltage	35	35	volts
Oscillator Anode Current	1.6	1.5	mA
Oscillator Grid Resistor	27	27	kΩ
Oscillator Grid Current	85	85	μA
Conversion Conductance	275	300	μA/V
Anode Impedance	0.75	0.8	MΩ
Control Grid Bias for $\frac{g_c}{100}$	—4.5	—6.5	volts

INTER-ELECTRODE CAPACITANCES

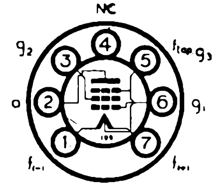
Oscillator Grid (g_1) to all	3.9	pF
Oscillator Anode (g_2) to all	4.8	pF
R.F. Input (g_3) to all	7.4	pF
I.F. Output (a) to all	8.1	pF
Oscillator Grid (g_1) to Anode	0.11	pF max.
Oscillator Anode (g_2) to Anode	0.3	pF max.
Control Grid (g_3) to Anode	0.36	pF max.
Oscillator Grid (g_1) to Osc. Anode (g_2)	3	pF
Oscillator Grid (g_1) to Control Grid (g_3)	0.2	pF max.
Oscillator Anode (g_2) to Control Grid (g_3)	1.6	pF

DL96 EABC80/ 6AK8



Current Equipment Type

TYPE **DL96**
MINIATURE BATTERY OUTPUT PENTODE



RATINGS

Filament Voltage ...	1.4	or 2.8 volts	Anode Voltage	90 volts max.
Filament Current ...	0.05	or 0.025 mA	Screen Voltage	90 volts max.
Cathode Current ...	6	4.5 mA		

CHARACTERISTICS
(Filament parallel-connected)

Anode Voltage	64	85 volts	Screen Current ...	0.65	0.9 mA
Screen Voltage ...	64	85 volts	Mutual Conductance	1.3	1.4 mA/V
Control Grid Voltage ...	—3.3	—5.2 volts	Anode Impedance	170	150 kΩ
Anode Current	3.5	5 mA	Inner μ (μg_1-g_2)	7	7

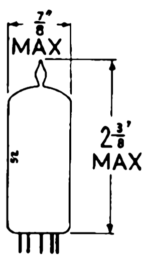
OPERATING CHARACTERISTICS

	Parallel Filament		*Series Filament
Anode Voltage	64	85	90 volts
Screen Voltage	64	85	90 volts
Control Grid Voltage	—3.3	—5.2	—6.3 volts
Anode Current	3.5	5	3.7 mA
Screen Current	0.65	0.9	0.7 mA
Anode Load Impedance	15	13	20 kΩ
Power Output (D_{tot} = 10%)	100	200	150 mW

* *Under these conditions a 680 Ω resistor should be connected between f^- and f_{tap}.*

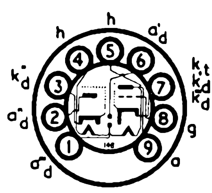
INTER-ELECTRODE CAPACITANCES

Input	4.9 pF	Control Grid to Anode ...	0.4 pF max.
Output	4.4 pF		



Current Equipment Type

TYPE **EABC80/6AK8**
TRIPLE DIODE TRIODE



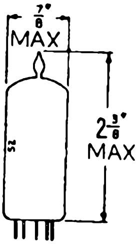
The type EABC80 is primarily intended for use as the demodulator/1st A.F. Amplifier in A.M./F.M Receivers, one diode having a separate cathode, Diodes 2 and 3 should be used for discriminator circuits, Diode 1 for A.M. demodulator and A.G.C. circuits.

RATINGS

Heater Voltage	6.3 volts	Diode 1 Current	1 mA max.
Heater Current	0.45 amp.	Diode 2 Current	10 mA max.
		Diode 3 Current	10 mA max.

For characteristics of Triode Section refer to type 6AT6.

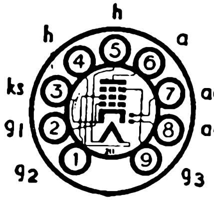
BRIMAR



Replacement Type

TYPE **EBF80/6N8**

DOUBLE DIODE
VARI-MU PENTODE



RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Anode Voltage ($I_a = 0$)	500 volts max.
Screen Voltage	300 volts max.
Screen Voltage ($I_{g2} = 0$)	500 volts max.
Anode Dissipation	1.5 watts max.
Screen Dissipation	0.3 watts max.
Cathode Current	10 mA max.
Heater-Cathode Voltage	100 volts max.
Diode Current	0.8 mA max.

OPERATING CHARACTERISTICS (PENTODE SECTION)

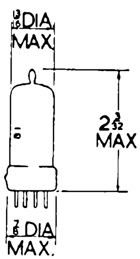
Anode Voltage	250 volts
Screen Voltage	85 volts
Control Grid Voltage	—2 volts
Anode Current	5 mA
Screen Current	1.75 mA
Mutual Conductance	2.2 mA/V
Anode Impedance	1.5 MΩ
Inner Amplification Factor (μ_{g1-g2})	18

OPERATION AS RESISTANCE COUPLED A.F. AMPLIFIER

Anode and Screen Supply Voltage	250	250	250	250 volts
Anode Resistor	220	100	220	100kΩ
Screen Series Resistor	680	270	680	270kΩ
Control Grid Resistor	1	1	10	10MΩ
Control Grid Resistor (following stage)	680	330	680	330kΩ
Cathode Bias Resistor	1200	560	0	0Ω
Stage Gain	150	100	185	125

INTER-ELECTRODE CAPACITANCES

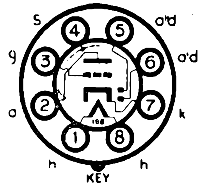
Pentode Section:	
Input	4.2 pF
Output	4.9 pF
Grid to Anode	0.0025 pF max.
Diode Section:	
Diode 1 Anode to Cathode	2.2 pF
Diode 2 Anode to Cathode	2.35 pF
Diode 1 Anode to Pentode Control Grid	0.0008 pF max.
Diode 2 Anode to Pentode Control Grid	0.001 pF max.



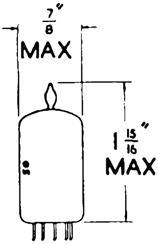
Replacement Type

TYPE **EBC41**

DOUBLE DIODE TRIODE

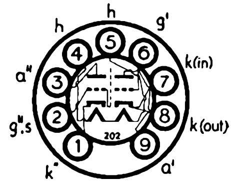


Heater Voltage	6.3 volts
Heater Current	0.23 amp.
Anode Voltage	250 volts
Grid Voltage	—3 volts
Anode Current	1 mA
Amplification Factor	70
Mutual Conductance	1.3 mA/V
Anode Impedance	54 kΩ



Current Equipment Type

TYPE **ECC84**
MINIATURE
HIGH SLOPE
DOUBLE TRIODE



The BRIMAR ECC84 consists of two separate high slope triode units designed for use in VHF cascode amplifiers. Normally, triode 1 is operated as a grounded cathode stage directly coupled to triode 2 which is connected as a grounded grid stage. This gives a low noise input amplifier for use in television receivers for Band III. The shield connected to the grid of triode 2 keeps coupling between the two units to a minimum.

Heater Voltage	6.3 volts
Heater Current	0.335 amp.

RATINGS

Anode Voltage ($I_a = 0$)	550 volts max.
Anode Voltage	180 volts max.
Anode Dissipation (either triode separately)	2.0 watts max.
Total Anode Dissipation (both triodes operating)	2.5 watts max.
Negative Grid Voltage	—50 volts max.
Grid Resistance Triode 1	500 k ohms max.
Grid Resistance Triode 2 (with autobias)	20 k ohms max.
Grid Resistance Triode 2 (with other forms of bias) ...	100 k ohms max.
Cathode Current (each triode)	18 mA max.
Heater-Cathode 1 potential	90 volts max.
Heater-Cathode 2 potential (heater positive)	90 volts max.
Heater-Cathode 2 potential (heater negative) *	250 volts max.
Resistor between Heater and Cathode	20 k ohms max.

** Maximum D.C. component 180 volts.*

OPERATING CHARACTERISTICS

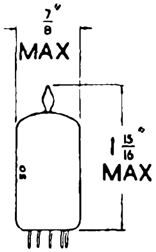
Anode Voltage	90 volts
Grid Voltage	—1.5 volts
Anode Current	12 mA
Mutual Conductance	6.0 mA/V
Amplification Factor	24
Anode Impedance	4,000 ohms
Input Impedance of Triode 1 at 200 Mc/s:	
Separate Cathodes	4,000 ohms
Strapped Cathodes	2,000 ohms

INTER-ELECTRODE CAPACITANCES *

$C_{a'-g'}$	1.1 pF	$C_{a''-k''}$	0.16 pF
C_{in}'	2.3 pF	$C_{k''-g''+h}$	4.9 pF
C_{out}'	0.5 pF	$C_{h-k''}$	2.8 pF
$C_{g'-h}$	0.25 pF max.	$C_{g'-a''}$	0.006 pF max.
$C_{a''-g''}$	2.3 pF	$C_{a'-a''}$	0.035 pF
$C_{a-g''+h}$	2.5 pF	$C_{a'-k'+h+g''}$ ...	1.2 pF

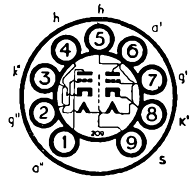
** Measured without external shield.*

BRIMAR



Current Equipment Type

TYPE ECC85
MINIATURE
HIGH SLOPE
DOUBLE TRIODE



BRIMAR type ECC85 is a Noval based double triode intended primarily as an R.F. amplifier and frequency changer in F.M. receivers.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.435 amp.
Anode Voltage ($I_a = 0$)	550 volts abs. max.
Anode Voltage	300 volts abs. max.
Anode Dissipation	2.5 watts abs. max.
Anode Dissipation ($p_a' + p_a''$)	4.5 watts abs. max.
Cathode Current	15 mA abs. max.
Grid Voltage	—100 volts abs. max.
Grid Resistance	1 MΩ abs. max.
Heater-Cathode Voltage	90 volts abs. max.
Heater-Cathode Resistance	22 kΩ abs. max.

OPERATING CHARACTERISTICS AS R.F. AMPLIFIER

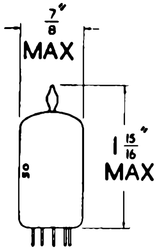
Anode Supply Voltage	250 volts
Anode Resistor	1.8 kΩ
Anode Voltage	230 volts
Grid Voltage	—2 volts
Bias Resistor	200 Ω
Anode Current	10 mA
Mutual Conductance	6 mA/V
Anode Impedance	9.7 kΩ
Input Impedance at 100 Mc/s	6 kΩ
Equivalent Noise Resistance	500 Ω

OPERATING CONDITIONS AS SELF-OSCILLATING MIXER

Anode Supply Voltage	250 volts
Anode Resistor	12 kΩ
Grid Resistor	1 MΩ
Oscillatory Voltage	3 volts r.m.s.
Anode Current	5.2 mA
Conversion Conductance	2.3 mA/V
Anode Impedance	22 kΩ
Input Impedance at 100 Mc/s	15 kΩ

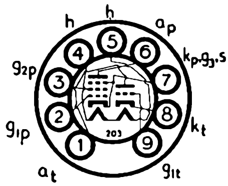
INTER-ELECTRODE CAPACITANCES

Anode to Grid (each section)	1.5 pF
Anode to Cathode (each section)	0.18 pF
Anode to Anode	0.04 pF max.
Grid to Grid	0.003 pF max.
Input (each section)	3 pF
Output (each section)	1.2 pF
Output (with external shield)	1.9 pF



Current Equipment Type

TYPE ECF82/6U8
MINIATURE
TRIODE PENTODE
FREQUENCY CHANGER



The BRIMAR ECF82/6U8 is a triode-pentode frequency changer featuring a high slope triode and a high input impedance pentode of high slope suitable for use in television receivers for Band III. The high input impedance at 200 Mc/s permits a sensibly constant conversion gain to be obtained over Bands I and III. The low value of C_{ag} for the pentode and $C_{ap,\ at}$ facilitate the reduction of oscillator radiation. The use of low oscillator grid current to obtain the required heterodyne voltage reduces the frequency drift of the oscillator to a minimum.

Heater Current ...	0.45 amp.
Heater Voltage ...	6.3 volts (nom.)

RATINGS

	Triode	Pentode
Heater—Cathode Potential (cathode positive)		220 volts max.
Heater—Cathode Potential (cathode negative)		90 volts max.
Anode Voltage ($I_a = 0$)	550	550 volts max.
Anode Voltage ...	300	300 volts max.
Screen (g_2) Voltage	—	300 volts max.
Anode Dissipation	2.7	2.8 watts max.
Screen Dissipation	—	0.5 watts max.
Positive D.C. Grid No. 1 Voltage	0	0 volts max.
Cathode Current	20	20 mA max.
Grid Resistance	1	3 megohm max.

CHARACTERISTICS

	Triode	Pentode
Anode Voltage ...	150	250 volts
Screen Voltage ...	—	110 volts
Cathode Bias Resistor ...	56	68 ohms
Anode Current ...	18	10 mA
Screen Current ...	—	3.5 mA
Mutual Conductance	8.5	5.2 mA/V
Anode Impedance (approx.)	5	400 k ohms
Amplification Factor	40	—
Grid No. 1 Voltage (for $I_a = 10\mu A$) ...	—12	—10 volts

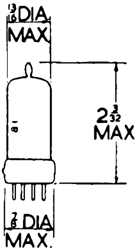
TYPICAL OPERATION AS MIXER

	Triode		Pentode
Anode Voltage ...	100	170	170 volts
Screen Voltage ...	—	110	170 volts
Cathode Bias Resistor ...	0	0	680 ohms
Grid Leak Resistor	27	270	100 k ohms
Anode Current ...	7.0	5.5	6.6 mA
Screen Current	—	2.0	2.5 mA
Heterodyne Voltage	—	3.0	5.0 volts/peak
Conversion Conductance	—	1.6	1.65 mA/V

INTER-ELECTRODE CAPACITANCES *

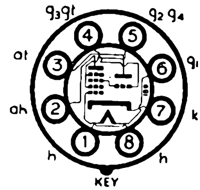
Pentode Grid No. 1 to Pentode Anode	0.006 pF
Pentode Input ...	5.0 pF
Pentode Output	3.5 pF
Triode Grid to Triode Anode ...	1.8 pF
Triode Grid to Cathode	2.5 pF
Triode Anode to Cathode	1.0 pF
Cathode to Heater (either section) approx.	3.0 pF

* *Measured with external shield.*

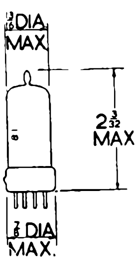


Replacement Type

TYPE **ECH42**
TRIODE HEXODE
FREQUENCY CHANGER

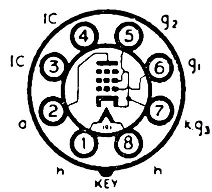


Heater Voltage	6.3 volts
Heater Current	0.23 amp.
Hexode Anode Voltage	250 volts
Hexode Screen Voltage	85 volts
Hexode Grid Voltage	—2 volts
Hexode Anode Current	3 mA
Hexode Screen Current	3 mA
Triode Anode Supply Voltage	250 volts
Triode Anode Resistor	33 kΩ
Triode Grid Resistor	47 kΩ
Triode Grid Current	200 μA
Conversion Conductance	750 μA/V

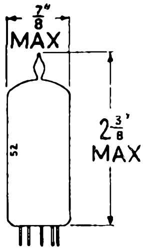


Replacement Type

TYPE **EF41**
VARI-MU
R.F. PENTODE

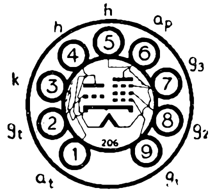


Heater Voltage	6.3 volts
Heater Current	0.2 amp.
Anode Voltage	250 volts
Screen Resistor	90 kΩ
Grid Voltage	—2.5 volts
Anode Current	6 mA
Screen Current	1.7 mA
Anode Impedance	1 MΩ
Mutual Conductance	2.2 mA/V
Grid Voltage for $\frac{g_m}{100}$	—39 volts



Replacement Type

TYPE **ECL80/6AB8**
MINIATURE
TRIODE PENTODE



The BRIMAR ECL80/6AB8 is a triode pentode with a common cathode designed for use in the frame time base circuits of television receivers. The triode may be used as frame blocking oscillator and the pentode in the frame output stage. The triode may also be used as a line time base generator or an A.F. voltage amplifier and the pentode as a sync. separator or an audio output valve. It is suitable for use in A.C. or A.C./D.C. receivers.

RATINGS

Heater Voltage	6.3 volts	Heater Current	0.3 amp
Heater Cathode potential	150 volts max.	Heater-Cathode resistor	20 k ohms max.

	Triode	*Pentode*
Anode Voltage ($I_a = 0$) ...	550	550 volts max.
Anode Voltage (Peak)	—	1,200 volts max.
Anode Voltage ...	200	400 volts max.
Screen Voltage ($I_{g_2} = 0$)	—	550 volts max.
Screen Voltage ...	—	250 volts max.
Anode Dissipation	1.0	3.5 watts max.
Screen Dissipation	—	1.2 watts max.
Cathode Current	8	25 mA max.
Peak Cathode Current*	200	350 mA max.
Grid Resistor ($I_{kp} = 12$ mA) (Frame output stage) ...	3.0	2.2 MΩ max.
($I_{kp} = 20$ mA) (Audio output stage) ...	—	1.0 MΩ max.

* *Maximum pulse duration of 10% of one cycle, with a maximum of 2m. secs.*

CHARACTERISTICS

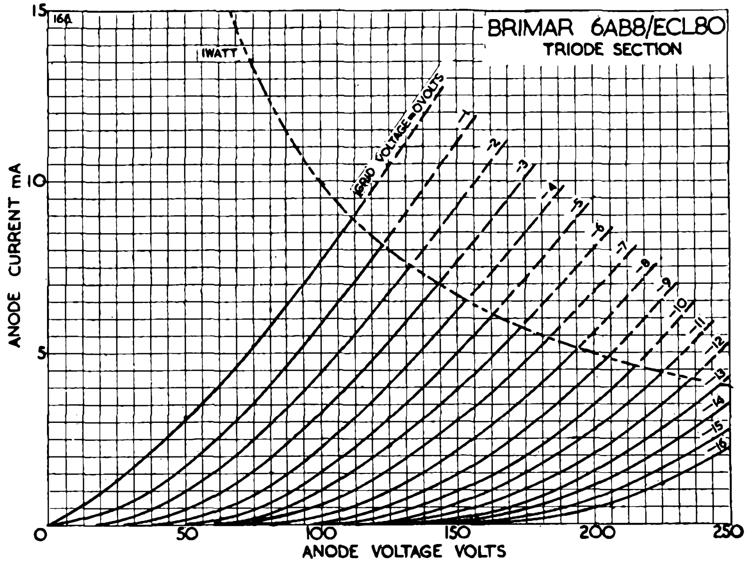
	Triode	*Pentode*	
Anode Voltage ...	100	170	200 volts
Suppressor Voltage	0	0	0 volts
Screen Voltage	—	170	200 volts
Grid Voltage ...	—2.3	—6.7	—8.0 volts
Anode Current ...	4.0	15.0	17.5 mA
Screen Current	—	2.8	3.3 mA
Mutual Conductance	1.4	3.2	3.3 mA/V
Anode Impedance	12.5	150	150 kilohms
Amplification Factor	17.5	—	—
Inner Amplification Factor	—	14	14

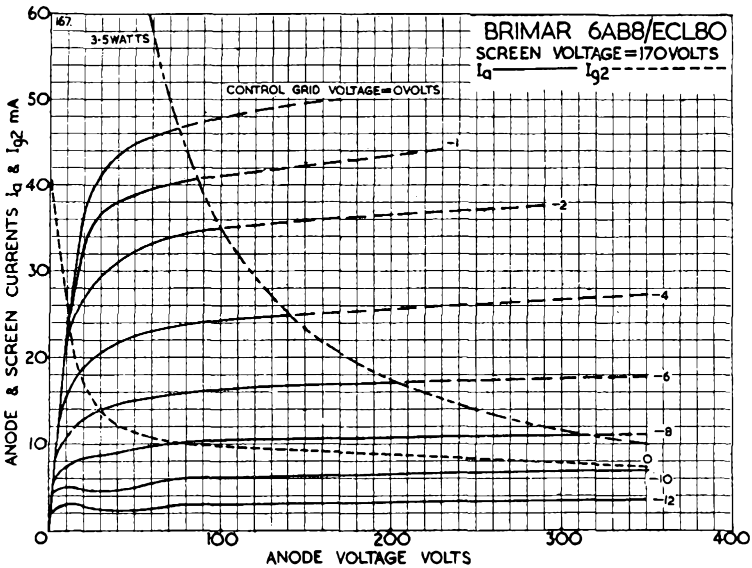
INTER-ELECTRODE CAPACITANCES*

Triode Grid to Pentode Anode	0.12 pF max.
Triode Anode to Pentode Anode	1.2 pF max.
Triode Grid to Pentode Grid 1	0.2 pF max.
Triode Anode to Pentode Grid 1	0.2 pF max.
Heater to Cathode	3.7 pF max.
Pentode Input ...	4.5 pF
Pentode Output	5.0 pF
Triode Grid to Cathode	2.0 pF
Triode Anode to Cathode	0.3 pF

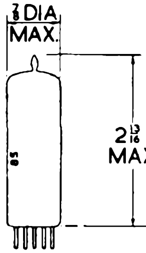
	Triode	*Pentode*
Anode to Grid ...	0.9	0.2 pF max.
Grid No. 1 to Heater ...	0.05	0.25 pF

* *Measured without external shield.*


BRIMAR 6AB8/ECL80
TRIODE SECTION
166
1 WATT
GRID VOLTAGE=0 VOLTS
ANODE CURRENT mA
ANODE VOLTAGE VOLTS

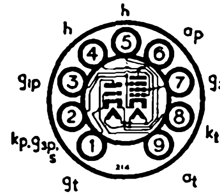

BRIMAR 6AB8/ECL80
SCREEN VOLTAGE=170 VOLTS
Ia ——— Ig2 - - - -
167
3·5 WATTS
CONTROL GRID VOLTAGE=0 VOLTS
ANODE & SCREEN CURRENTS Ia & Ig2 mA
ANODE VOLTAGE VOLTS

ECL82
PCL82



Current Equipment Types

TYPES ECL82/ PCL82



The BRIMAR ECL82 and PCL82 are noval triode-pentodes for use in frame time-base circuits and as sound amplifiers and output valves.

RATINGS

	ECL82	PCL82			ECL82	PCL82	
Heater Voltage ...	6.3	16.0	volts	Heater Current ...	0.78	0.3	amps.

	ECL82 Triode	ECL82 Pentode	PCL82 Triode	PCL82 Pentode	
Anode Voltage ($I_a = 0$)	550	900	550	900	volts max.
Anode Voltage	300	600	250	600	volts max.
Anode Peak Voltage, Positive †	600	2,500	600	2,500	volts max.
Negative	600	500	600	500	volts max.
Anode Dissipation ($V_a <$ 250 volts) ...	1	7	1	7	watts max.
Anode Dissipation ($V_a >$ 250 volts) ...	1	5	—	—	watts max.
Screen Voltage ($I_{g_2} = 0$)	—	550	—	550	volts max.
Screen Voltage	—	300	—	250	volts max.
Screen Dissipation	—	1.8	—	1.8	watts max.
Screen Dissipation (at full drive)	—	3.2	—	3.2	watts max.
Cathode Current	15	50	15	50	mA max.
Peak Cathode Current † *	250	—	250	—	mA max.
Control Grid Resistance, Fixed Bias ...	1	1	1	1	MΩ max.
Cathode Bias ...	3	2	3	2	MΩ max.

† Maximum duration 4% of a cycle, with a maximum duration of 800 micro seconds.
* Under frame blocking oscillator conditions.

CHARACTERISTICS

ECL82 and PCL82

	Triode	Pentode			Triode	Pentode	
Anode Voltage ...	100	170	volts	Screen Current ...	—	8	mA.
Screen Voltage ...	—	170	volts	Mutual Conductance	2.5	7.5	mA/V.
Grid Voltage	0	—11.5	volts	Anode Impedance	27	16	kilohms.
Anode Current ...	3.5	41	mA.	Amplification Factor	70	10	(g_1-g_2)

OPERATING CONDITIONS

Pentode section as an audio output stage

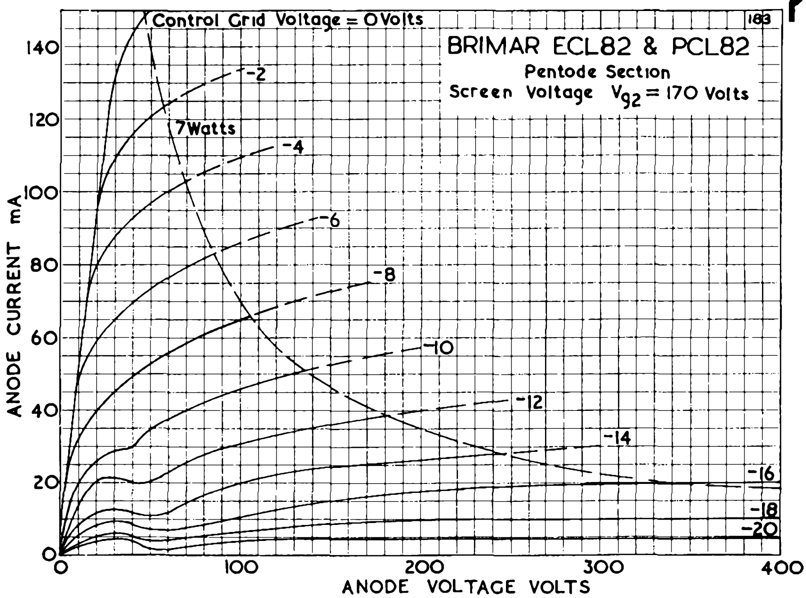
Anode and Screen Voltage	170	200	volts
Grid Voltage	—11.5	—16	volts
Anode Current ...	41	35	mA.

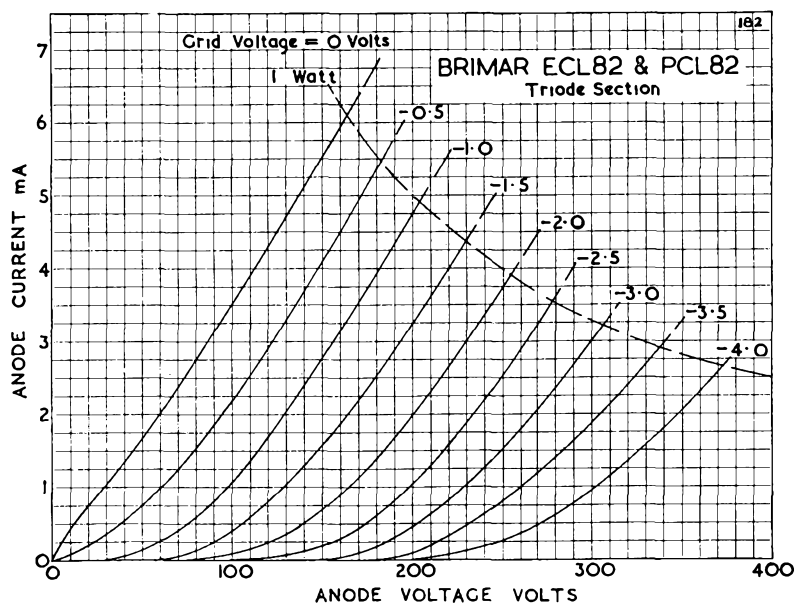
Triode section as an A.F. amplifier

Anode Supply Voltage	170	200	volts
Anode Resistor ...	220	220	kilohms
Cathode Bias Resistor	2.7	2.2	kilohms
Optimum Load ...	4	5.6	kilohms
Power Output	3.3	3.5	watts
Distortion ...	10	10	per cent.
Maximum Output	25	26	V.r.m.s.
Gain	51	52	
Following Grid Resistor ...		700	kilohms

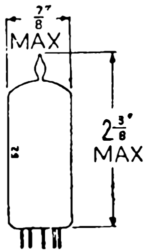
INTER-ELECTRODE CAPACITANCES

	ECL82	PCL82			ECL82	PCL82	
Triode Input ...	2.7	2.7	pF	Pentode Anode to Pentode Grid ...	0.3	0.3	pF
Triode Output ...	4	4	pF	Pentode Grid to Heater	0.3	0.3	pF
Triode Anode to Triode Grid... ...	4	4	pF	Triode Anode to Pentode Grid ...	0.02	0.02	pF
Triode Grid to Heater	0.1	0.025	pF	Triode Grid to Pentode Anode	0.02	0.02	pF
Pentode Input ...	9.3	9.0	pF	Triode Grid to Pentode Grid ...	0.025	0.025	pF
Pentode Output ...	8	8	pF	Triode Anode to Pentode Anode...	0.25	0.25	pF max.


183
BRIMAR ECL82 & PCL82
Pentode Section
Screen Voltage V_{g2} = 170 Volts
Control Grid Voltage = 0 Volts
7 Watts
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
ANODE CURRENT mA
0
20
40
60
80
100
120
140
ANODE VOLTAGE VOLTS
0
100
200
300
400

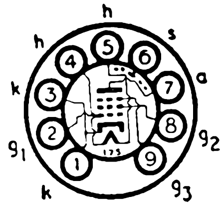

182
BRIMAR ECL82 & PCL82
Triode Section
Grid Voltage = 0 Volts
1 Watt
-0·5
-1·0
-1·5
-2·0
-2·5
-3·0
-3·5
-4·0
ANODE CURRENT mA
0
1
2
3
4
5
6
7
ANODE VOLTAGE VOLTS
0
100
200
300
400

EF80/6BX6



Replacement Type

TYPE **EF80/6BX6**
HIGH SLOPE
R.F. PENTODE



RATINGS

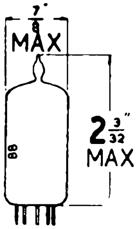
Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Anode Voltage	300 volts max.
Screen Voltage	300 volts max.
Anode Dissipation	2.5 watts max.
Screen Dissipation	0.7 watts max.

OPERATING CHARACTERISTICS

Anode Voltage	170	200	250 volts
Anode Current	10	10	10 mA
Screen Voltage	170	200	250 volts
Screen Current	2.5	2.6	2.8 mA
Mutual Conductance	7.4	7.1	6.8 mA/V
Anode Impedance	0.5	0.55	0.65 MΩ
Input Impedance at 50 Mc/s.	10	12	15 kΩ

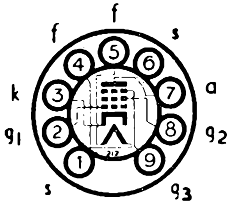
INTER-ELECTRODE CAPACITANCES

Input	7.5 pF
Output	3.3 pF
Control Grid to Anode	0.007 pF max.



Replacement Type

TYPE **EF89/6DA6**
HIGH SLOPE VARI-MU
R.F. PENTODE



The Brimar EF89 is a high slope R.F. Pentode particularly suitable for use in F.M. receivers.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.2 amp.
Anode Voltage	300 volts max.
Anode Voltage ($I_a=0$)	500 volts max.
Anode Dissipation	2.25 watts max.
Screen Voltage	300 volts max.
Screen Voltage ($I_{g2}=0$)	500 volts max.
Screen Dissipation	0.45 watts max.
Cathode Current	16.5 mA max.

OPERATING CHARACTERISTICS

With Cathode Bias

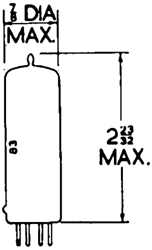
Anode Voltage	200		250		volts
Screen Series Resistor	24		51		kΩ
Cathode Bias Resistor	130		160		ohms
Grid Voltage	—1.95	—20	—1.95	—20	volts
Anode Current	11.1		9		mA
Screen Current	3.8		3		mA
Mutual Conductance	3.85	0.16	3.5	0.24	mA/V
Anode Impedance	0.6		1.0		MΩ

With Grid Leak Bias

Anode Voltage	200		250		volts
Screen Series Resistor	33		62		kΩ
Cathode Bias Resistor	0		0		ohms
Control Grid Voltage	0	—20	0	—20	volts
Anode Current	11.25		9		mA
Screen Current	3.9		2.9		mA
Mutual Conductance	5.15	0.15	4.7	0.22	mA/V
Anode Impedance	0.55		0.82		MΩ

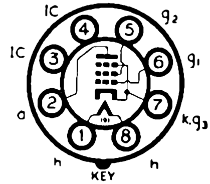
INTER-ELECTRODE CAPACITANCES

Input	5.5 pF
Output	5.1 pF
Control Grid to Anode	0.002 pF max.



Replacement Type

TYPE **EL41**
POWER PENTODE



Heater Voltage	6.3 volts	Anode Current	36 mA
Heater Current	0.7 amp.	Screen Current	5.2 mA
Anode Voltage	250 volts	Mutual Conductance ...	10 mA/V
Screen Voltage	250 volts	Anode Load Impedance ...	7,000 Ω
Grid Voltage	—7 volts	Power Output (D_{tot} = 10%)	4.2 watts

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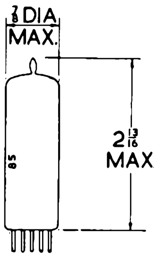
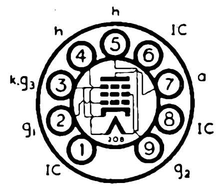


Current Equipment Type

TYPE **EL84**
MINIATURE OUTPUT PENTODE



RATINGS

Heater Voltage ...	... 6.3 volts	Screen (g_2) Voltage	... 300 volts max.
Heater Current ...	... 0.76 amp.	Screen Dissipation (zero signal)	... 2 watts max.
Anode Voltage ...	... 300 volts max.	Screen Dissipation (max. signal)	... 4 watts max.
Anode Dissipation	... 12 watts max.	Cathode Current	... 65 mA max.

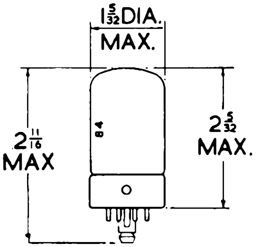
OPERATING CHARACTERISTICS

	Single Valve	Push Pull Class AB1
Anode Voltage	250	300 volts
Screen Voltage	250	300 volts
Control Grid Voltage	—7.3	— volts
Cathode Resistor	—	130 Ω
Anode Current	48	72 mA
Screen Current	5.5	8 mA
Mutual Conductance	11	— mA/V
Optimum Load	5.2	8.0 kΩ
Power Output (D_{tot} = 10%)	5.7 watts	17 watts

INTER-ELECTRODE CAPACITANCES *

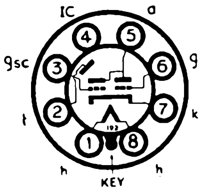
Input	11 pF	Control Grid to Anode ...	0.5 pF max.
Output	6 pF	Control Grid to Heater ...	0.25 pF max.

**With no external shield*



Replacement Type

TYPE **EM71**
TUNING
INDICATOR



Heater Voltage	6.3 volts		Anode Current (max. shadow)...	0.5 mA
Heater Current	0.3 amp.		Target Voltage	250 volts
Anode Supply Voltage ...	250 volts		Target Current (max. shadow)...	2.5 mA
Anode Load Resistor ...	0.5 MΩ		Grid Voltage (zero shadow) ...	—20 volts

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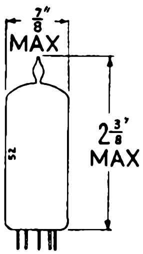
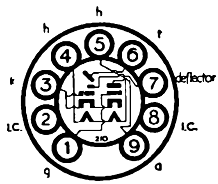
Current Equipment Type



TYPE **EM85**
MINIATURE
" MAGIC EYE "
TUNING INDICATOR



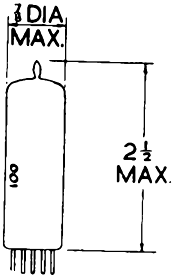
BRIMAR type EM85 is a Noval based " Magic Eye " with the screen viewed through the side of the bulb. The display is green with a dark fan-shaped area in the centre.

OPERATING CHARACTERISTICS

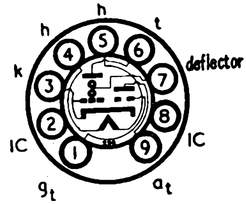
Heater Voltage ... ... 6.3 volts Heater Current ... ... 0.3 amp.

Anode Supply Voltage	200		250		volts
Target Voltage	200		250		volts
Anode Load Resistor	470		470		kΩ
Grid Voltage	0	—14	0	—18	volts
Anode Current	0.4	0.10	0.5	0.12	mA
Target Current	1.4		2.1		mA
Shadow Angle	100°	0°	100°	0°	

Current Equipment Type



TYPE **EM840**
MINIATURE TUNING INDICATOR



The BRIMAR EM840 is a noval based tuning indicator with the luminous target deposited on the glass itself in the form of a vertical strip. Each end of this strip is luminous and on the application of a control voltage, the luminous areas extend inwards to the centre from the ends.

RATINGS

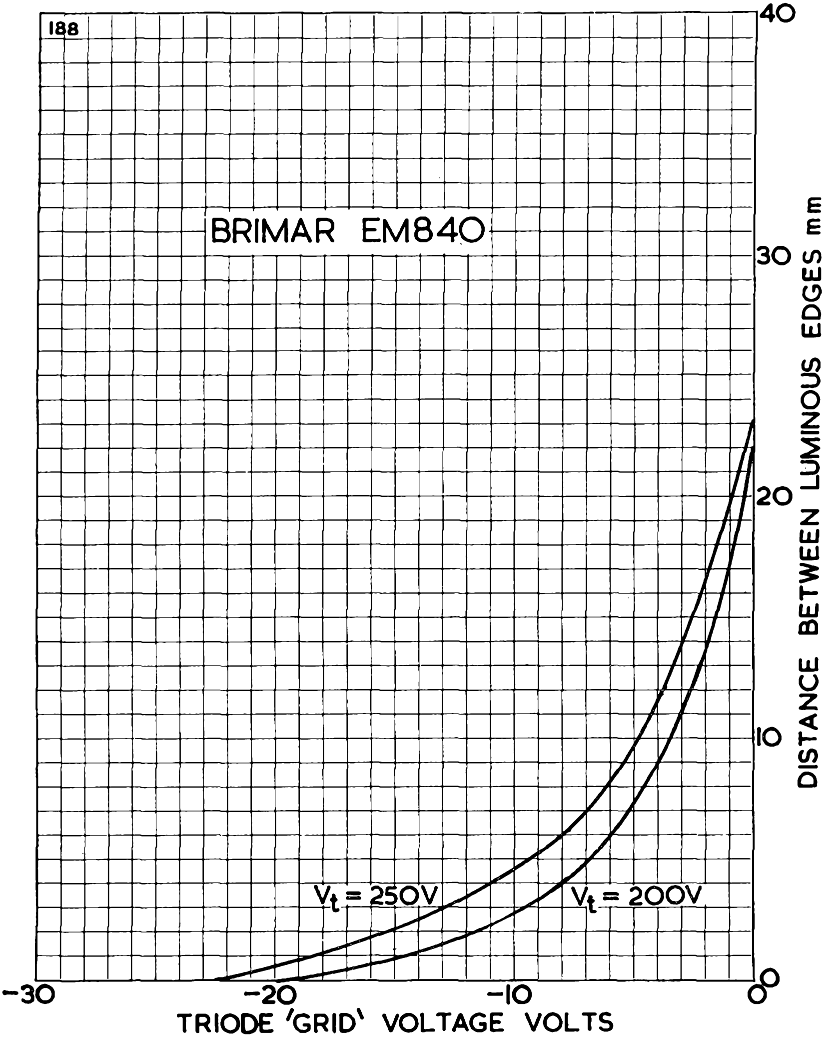
Heater Voltage	6.3 volts
Heater Current	0.25 amp.
Anode Voltage	300 volts max.
Anode Supply Voltage	550 volts max.
Anode Dissipation	0.5 watt max.
Target Voltage	300 volts max.
Target Voltage	150 volts min.
Target Supply Voltage	550 volts max.
Cathode Current	3.0 mA max.
Heater-Cathode Voltage	100 volts max.
Triode Grid Resistance	3.0 megohms max.
Bulb temperature of luminous area	150° C. max.

OPERATING CHARACTERISTICS

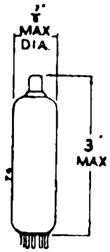
Target Voltage	250 volts	
Anode Supply Voltage	250 volts	
Anode Resistor	470 kΩ	
Triode Grid Voltage	0	—22 volts
Anode Current	0.45	0 mA
Target Current	0.7	1 mA
Length of Shadow	$\frac{13}{16}$	0 inch

NOTE. The deflectors should be connected to the triode anode for normal use.

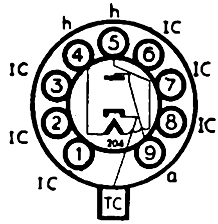
The indicator has a vari-μ characteristic and is, therefore, sensitive to weak signals, a change in shadow length of approximately $\frac{1}{4}$ inch long is produced by changing the control voltage from 0 to —2 volts.


188
BRIMAR EM840
Vt = 250V
Vt = 200V
40
30
20
10
0
DISTANCE BETWEEN LUMINOUS EDGES mm
-30
-20
-10
0
TRIODE 'GRID' VOLTAGE VOLTS

Current Equipment Type



TYPE **EY83**
MINIATURE
BOOSTER DIODE



B9A (Noval) Base

The BRIMAR EY83 is an indirectly heated booster diode designed for operation in A.C./D.C. television receivers. The high working peak heater to cathode potential renders the use of a separate, highly insulated heater winding unnecessary.

Heater Current ... ... 1.0 amp.
Heater Voltage ... ... 6.3 volts nom.

RATINGS

Peak Anode Current ... ... 450 mA max.
Mean Anode Current ... ... 150 mA max.
Heater-Cathode potential during flyback (heater negative with respect to cathode) † ... ... 5,000 volts max.
Peak Inverse Voltage † ... ... 5,000 volts max.

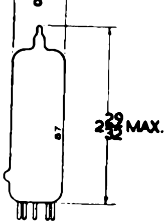
† Maximum pulse duration 15% of one cycle, with a maximum of 15 μ secs.

INTER-ELECTRODE CAPACITANCES*

Anode to Cathode ... ... 6.2 pF
Heater to Cathode ... ... 2.1 pF

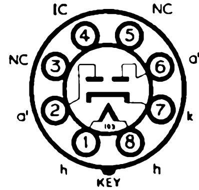
** Measured with no external shield.*

Refer to Type PY83 for characteristic curve.



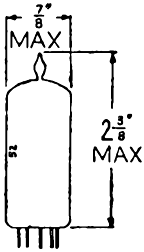
Replacement Type

TYPE **EZ40**
FULL WAVE
RECTIFIER

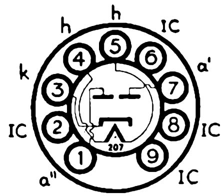


Heater Voltage ...	... **6.3 volts**	**Output Current**	**90 mA max.**
Heater Current ...	... **0.6 amp.**	**Reservoir Capacitance** ...	**50 μF max.**
Anode Voltage R.M.S.	... **2×350 volts max.**	**Limiting Resistance per Anode**	**300 Ω min.**

Current Equipment Type



TYPE **EZ80/6V4**
MINIATURE FULL-WAVE RECTIFIER



Heater Voltage	6.3 volts
Heater Current	0.6 amp.

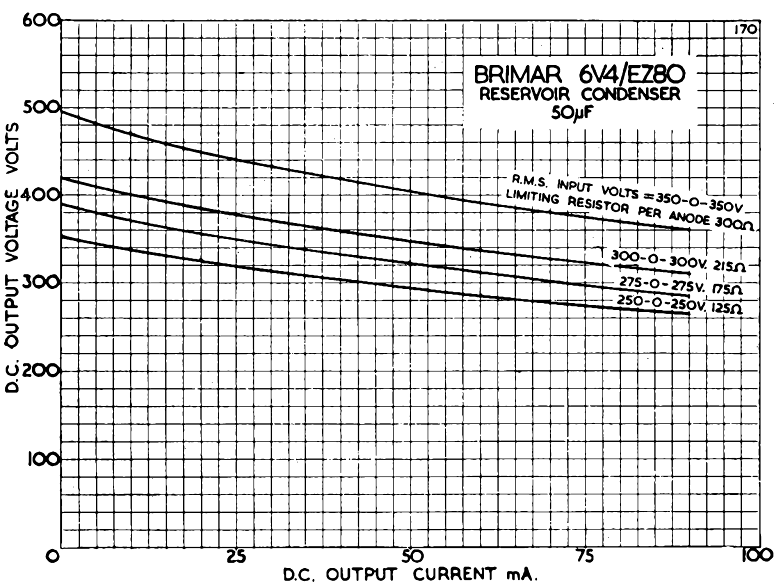
RATINGS

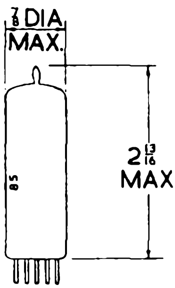
Peak Inverse Voltage	980 volts max.
Peak Current (each anode)	270 mA max.
Hot Switching Transient Anode Current	900 mA max.
Peak Heater-Cathode potential	500 volts max.

CHARACTERISTICS AS FULL-WAVE RECTIFIER

CONDENSER INPUT

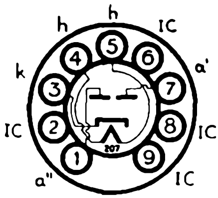
R.M.S. Input per Anode	250	275	300	350 volts
Supply Impedance per Anode ...	125	175	215	300 ohms min.
Reservoir Condenser	50	50	50	50 μF max.
Rectified Current	90	90	90	90 mA max.





Current Equipment Type

TYPE **EZ81**
MINIATURE FULL-WAVE RECTIFIER



The BRIMAR EZ81 is a miniature noval-based full wave rectifier for use in radio receivers and amplifiers using a common heater supply.

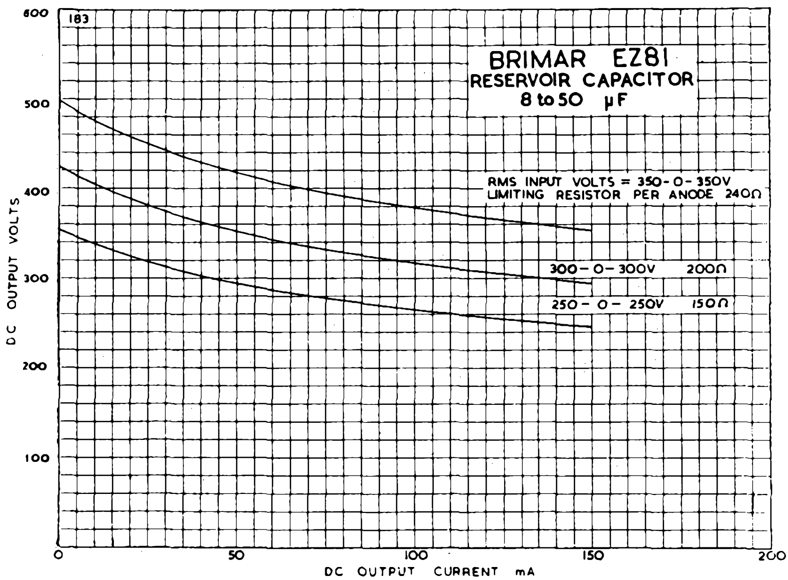
RATINGS

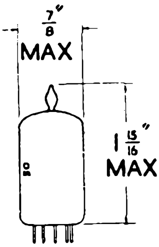
Heater Voltage ...	6.3 volts
Heater Current ...	1.0 amp.
Peak Inverse Voltage ...	1,000 volts max.
R.M.S. Input Voltage per anode ...	350 volts max.
Peak Anode Current ...	450 mA max.
Mean Anode Current ...	150 mA max.
Peak Heater-Cathode Potential ...	500 volts max.
Reservoir Capacitor ...	50 μF max.

OPERATING CHARACTERISTICS AS A FULL WAVE RECTIFIER

CONDENSER INPUT FILTER

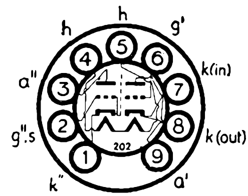
R.M.S. Input Voltage per Anode ...	250	300	350	volts
Supply Impedance per Anode ...	150	200	240	ohms min.
Reservoir Capacitor ...	50	50	50	μF
Rectified Current ...	150	150	150	mA max.
Output Voltage ...	240	295	350	volts





Current Equipment Type

TYPE **PCC84/7AN7**
MINIATURE
HIGH SLOPE
DOUBLE TRIODE

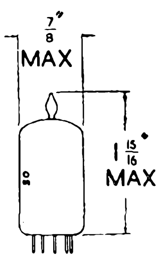


The BRIMAR PCC84/7AN7 consists of two separate high slope triode units designed for use in VHF cascode amplifiers. Normally, triode 1 is operated as a grounded cathode stage directly coupled to triode 2 which is connected as a grounded grid stage. This gives a low noise input amplifier for use in television receivers for Band III. The shield connected to the grid of triode 2 keeps coupling between the two units to a minimum.

RATINGS

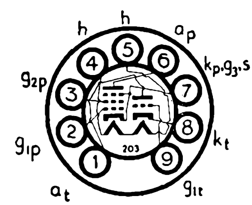
Heater Current	0.3 amp.
Heater Voltage	7.0 volts (nom.)

For further information and characteristics refer to type ECC84



Current Equipment Type

TYPE **PCF82/9U8**
MINIATURE
TRIODE-PENTODE
FREQUENCY CHANGER



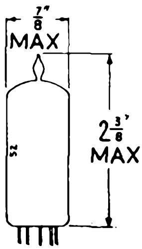
The BRIMAR PCF82/9U8 is a triode-pentode frequency changer featuring a high slope triode and a high input impedance pentode of high slope suitable for use in television receivers for Band III. The high input impedance at 200 Mc/s permits a sensibly constant conversion gain to be obtained over Bands I and III. The low value of C_{ag} for the pentode and C_{ap-at} facilitate the reduction of oscillator radiation. The use of low oscillator grid current to obtain the required heterodyne voltage reduces the frequency drift of the oscillator to a minimum.

RATINGS

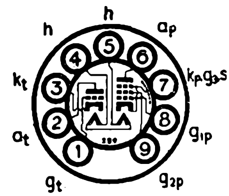
Heater Current	0.3 amp.
Heater Voltage	9.5 volts (nom.)

For further information and characteristics refer to type ECF82/6U8

Current Equipment Type



TYPE **PCL84**
VIDEO
TRIODE PENTODE



The BRIMAR PCL84 consists of a medium-high-μ triode and a high slope pentode in a miniature envelope on a noval base. The pentode section is intended for use as a video amplifier and will provide a larger current swing than high slope R.F. pentodes which have been used hitherto. The other section is a general purpose triode for use as a cathode follower, oscillator, etc.

RATINGS

	Pentode		*Triode*	
Heater Voltage	15		15	volts max.
Heater Current	0.3		0.3	amps.
Anode Voltage	250		250†	volts max.
Anode Voltage ($I_a = 0$)	550		550	volts max.
Anode Dissipation	4		1	watts max.
Screen Voltage	250			volts max.
Screen Voltage ($I_{g2} = 0$)	550			volts max.
Screen Dissipation	1.7			watts max.
Control Grid Circuit Resistance, Fixed Bias	1		1	megohm
Control Grid Circuit Resistance, Auto Bias	2		3	megohms
Cathode Current	40		12	mA
Heater-Cathode Voltage, Cathode Negative	200		150	volts max.
Heater-Cathode Voltage, Cathode Positive	200	250 d.c.	†150 a.c.	volts max.
Heater-Cathode Circuit Resistance ...	20		20	kilohms

†Peak Voltage 400 volts.

OPERATING CHARACTERISTICS

Pentode

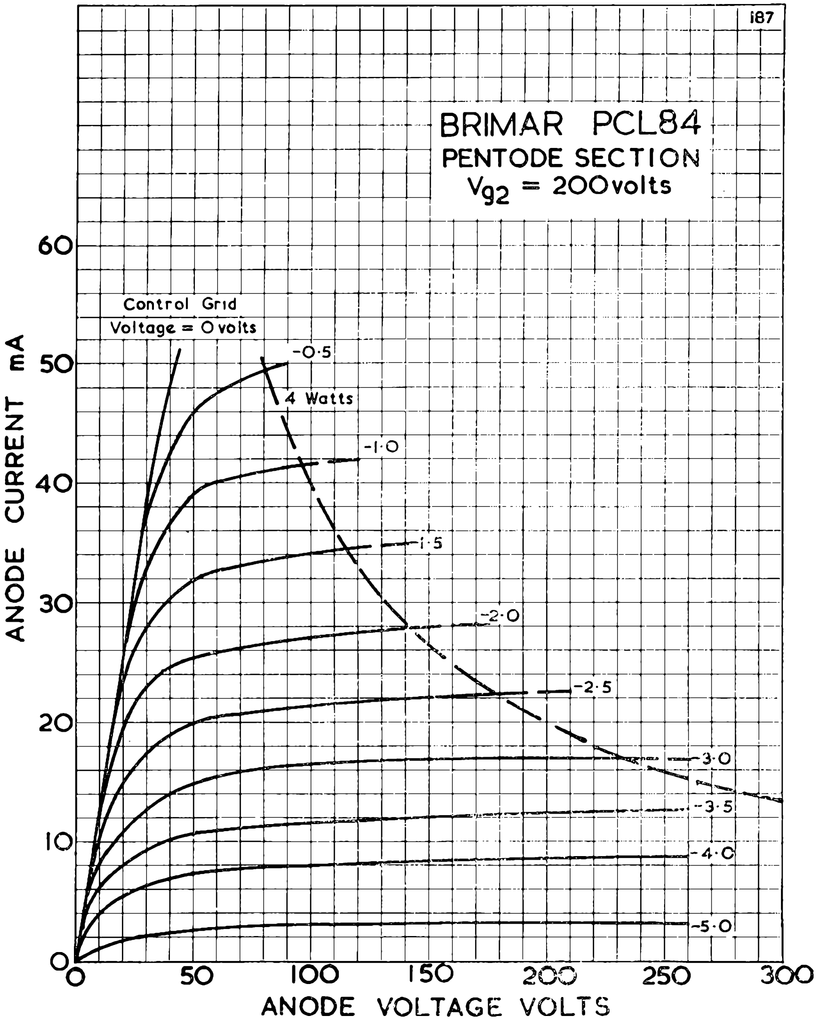
Anode Voltage	170	200	220	volts
Screen Voltage	170	200	220	volts
Grid Voltage	—2.1	—2.9	—3.4	volts
Anode Current	18	18	18	mA
Screen Current	3.1	3.1	3.1	mA
Mutual Conductance	11	10.4	10.0	mA/V
Anode Resistance	100	130	150	kilohms approx.
Inner-μ (μ_{g-g_2})	36	36	36	

Triode

Anode Voltage	200 volts
Grid Voltage	—1.7 volts
Anode Current	3 mA
Mutual Conductance	4 mA/V
Amplification Factor	65

INTER-ELECTRODE CAPACITANCES

Pentode Input	9 pF
Pentode Output	4.5 pF
Pentode Grid to Anode	0.1 pF max.
Triode Anode to Pentode Grid	0.01 pF max.
Triode Input	4 pF
Triode Output	2.5 pF
Triode Grid to Anode	2.7 pF
Triode Grid to Heater	0.1 min., 0.15 max.
Triode Grid to Pentode Grid	0.01 pF max.



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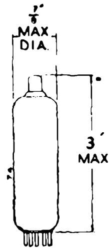
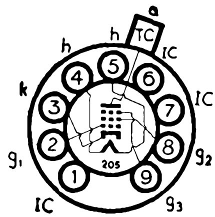
BRIMAR PCL84
PENTODE SECTION
V_{g2} = 200 volts
Control Grid
Voltage = 0 volts
-0·5
4 Watts
-1·0
-1·5
-2·0
-2·5
-3·0
-3·5
-4·0
-5·0
ANODE CURRENT mA
0
10
20
30
40
50
60
0
50
100
150
200
250
300
ANODE VOLTAGE VOLTS



Replacement Type

TYPE **PL81/21A6**
MINIATURE
LINE TIME BASE
OUTPUT VALVE



The BRIMAR PL81/21A6 is designed for operation as the line time-base output valve in A.C./D.C. television receivers. Used in conjunction with a booster diode it is suitable for the scanning of wide angle (70°) cathode ray tubes from low H.T. rail voltages.

RATINGS

Heater Current ...	0.3 amp.
Heater Voltage ...	21.5 volts (nom.)
Anode Voltage ($I_a = 0$ mA) ...	550 volts max.
Anode Voltage ...	250 volts max.
Peak Positive Anode Pulse Voltage * ...	7,000 volts max.
Screen Supply Voltage ...	550 volts max.
Screen Voltage ...	250 volts max.
Anode Dissipation ...	8.0 watts max.
Screen Dissipation † ...	4.5 watts max.
Anode + Screen Dissipation ...	10.0 watts max.
Cathode Current ...	180 mA max.
Grid Resistor ** ...	500 k ohms max.
Heater-Cathode potential ...	200 volts max.
Heater-Cathode resistor ...	20 k ohms max.

* *Maximum pulse duration 15% of one cycle, with maximum of 18 µsecs.*

† *The screen dissipation may rise to a maximum of 6 watts during the period between the commencement of screen current flow and the instant when the anode current attains one half of its normal value.*

** *In line output service this may be increased to 3.3 MΩ max.*

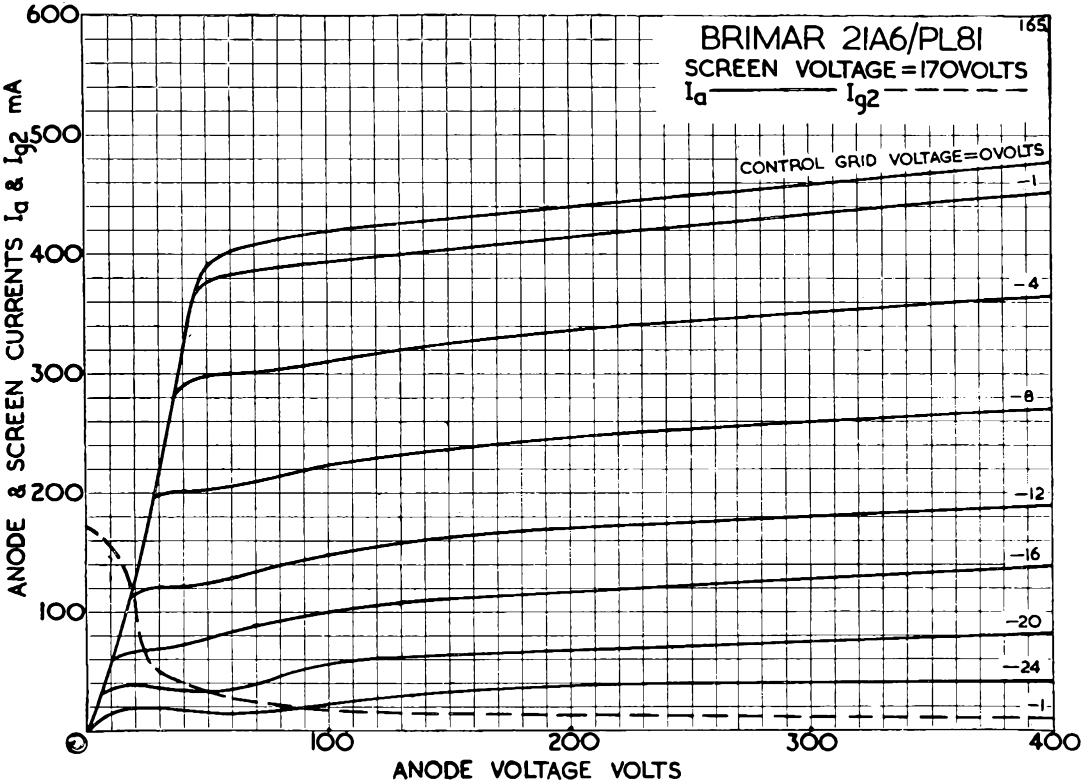
CHARACTERISTICS

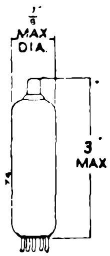
Anode Voltage ...	170	200 volts
Suppressor (g_3) Voltage ...	0	0 volts
Screen (g_2) Voltage ...	170	200 volts
Anode Current ...	45	40 mA
Screen Current ...	3.0	2.8 mA
Control Grid Voltage ...	—22	—28 volts
Mutual Conductance ...	6.2	6.0 mA/V
Anode Impedance ...	10,000	11,000 ohms
Inner Amplification Factor ...	5.5	5.5

INTER-ELECTRODE CAPACITANCES *

Input ...	14.7 pF
Output ...	6.0 pF
Anode to Grid 1 ...	0.8 pF max.
Grid 1 to Heater ...	0.2 pF max.
Anode to Cathode ...	0.1 pF max.

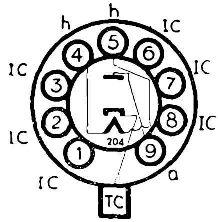
* *Measured with no external shield.*


BRIMAR 21A6/PL81
SCREEN VOLTAGE = 170 VOLTS
I_a ——— I_{g2} – – –
CONTROL GRID VOLTAGE = 0 VOLTS
165
−1
−4
−8
−12
−16
−20
−24
−1
ANODE & SCREEN CURRENTS I_a & I_{g2} mA
600
500
400
300
200
100
0
100
200
300
400
ANODE VOLTAGE VOLTS



Replacement Type

TYPE PY81/17Z3
MINIATURE
BOOSTER DIODE



The BRIMAR PY81/17Z3 is an indirectly heated booster diode designed for operation in A.C./D.C. television receivers. The high working peak heater to cathode potential renders the use of a separate, highly insulated heater winding unnecessary.

Heater Current	0.3 amp.
Heater Voltage	17.0 volts max.

RATINGS

Peak Anode Current †	450 mA max.
Mean Anode Current	150 mA max.
Heater-Cathode potential (with respect to cathode) :	
Heater Negative during forward stroke *	800 volts max.
Heater Negative during flyback †	4,500 volts max.
Heater-Anode potential during flyback (heater positive) † ...	3,000 volts max.
Peak Inverse Voltage †	4,500 volts max.

† Maximum pulse duration 15% of one cycle with a maximum of 15 µsecs.
** This voltage may be made up of a maximum voltage of 220 volts R.M.S. at the mains supply frequency and a D.C. component of not more than 600 volts.*

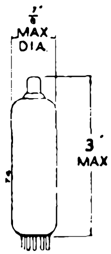
INTER-ELECTRODE CAPACITANCES *

Anode to Cathode	6.4 pF
Heater to Cathode	3.6 pF

** Measured with no external shield.*

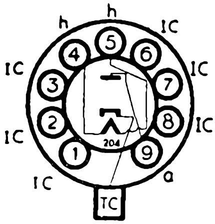
Note.—The heating time of this valve is approximately twice that of other valves normally used in the series heater chain of television receivers and precautions may be necessary to ensure that the screen dissipation of the line output valve is not exceeded during the warm-up period.

Current Equipment Type



B9A (Noval) Base

TYPE **PY83**
MINIATURE
BOOSTER DIODE



The BRIMAR PY83 is an indirectly heated booster diode designed for operation in A.C./D.C. television receivers. The high working peak heater to cathode potential renders the use of a separate, highly insulated heater winding unnecessary.

Heater Current	0.3 amp.
Heater Voltage	20.0 volts nom.

RATINGS

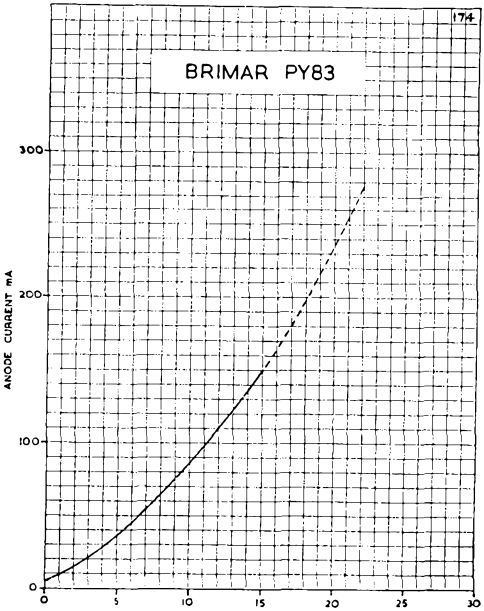
Peak Anode Current	500 mA max.
Mean Anode Current	175 mA max.
Heater-Cathode potential during flyback (heater negative with respect to cathode) †	5,000 volts max.
Peak Inverse Voltage †	5,000 volts max.

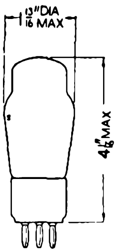
† *Maximum pulse duration 15% of one cycle with a maximum of 15 μsecs.*

INTER-ELECTRODE CAPACITANCES *

Anode to Cathode	6.2 pF
Heater to Cathode	2.1 pF

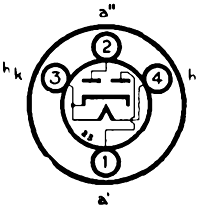
* *Measured with no external shield.*





Replacement Type

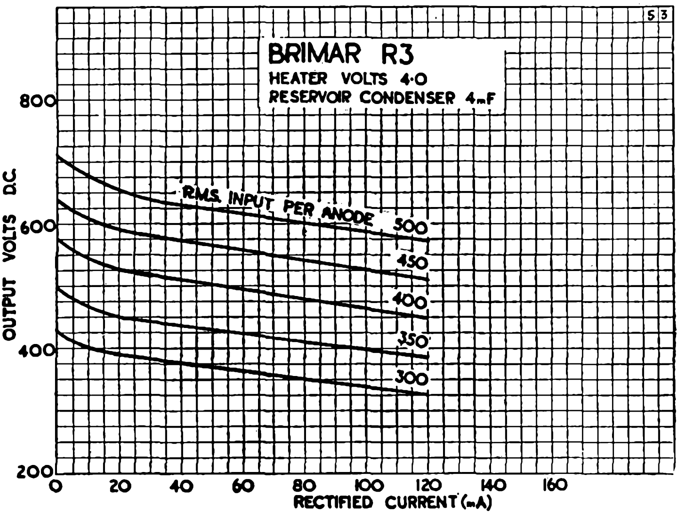
TYPES **R2, R3**
(ENGLISH BASE)
FULL-WAVE
RECTIFIERS

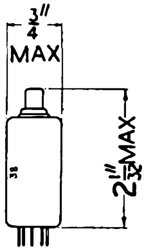


CHARACTERISTICS

	Type R2	Type R3	
Heater Voltage	4.0	4.0	volts
Heater Current	2.5	2.5	amp.
R.M.S. Input per Anode	350	500	volts
Rectified Current	120	120	mA

For characteristic curves of type R2, *refer to type* R3 *up to* 350 *volts R.M.S. input.*



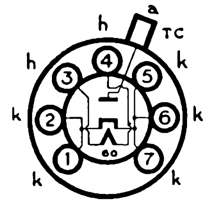


B7G Base

Current Equipment Type

TYPE R10

MINIATURE HIGH VOLTAGE RECTIFIER



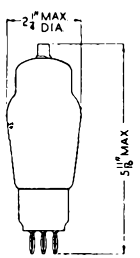
The BRIMAR type R10 is an indirectly heated half-wave rectifier of the "all glass" construction, fitted with a miniature type base. It is particularly suitable for use in portable oscilloscopes.

RATINGS

Heater Voltage	4.0 volts
Heater Current	0.5 amp.
Peak Inverse Voltage (No Load)	15.5 kV max.
Peak Inverse Voltage (Full Load)	12.5 kV max.
Peak Anode Current	40 mA max.
Supply Frequency	100 kc/s max.
Absolute Max. Heater Cathode potential	10 volts

CHARACTERISTICS AS HALF-WAVE RECTIFIER

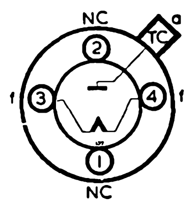
R.M.S. Input (DELAYED SWITCHING)	5.5 kV max.
R.M.S. Input (SIMULTANEOUS SWITCHING)	3.5 kV max.
Series Anode Impedance	62,000 ohms min.
Rectified Current	5.0 mA max.



Replacement Type

TYPE R11

(ENGLISH BASE) HIGH VOLTAGE RECTIFIER

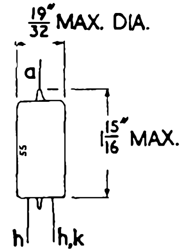


RATINGS

Heater Voltage	4.0 volts
Heater Current	1.1 amp.
Peak Inverse Voltage (No Load)	14 kV max.
Peak Inverse Voltage (Full Load)	12.5 kV max.
Peak Anode Current	350 mA max.
Supply Frequency	60 cps. max.

CHARACTERISTICS AS HALF-WAVE RECTIFIER

R.M.S. Input	5.0 kV max.
Series Anode Impedance	4,000 ohms min.
Rectified Current	50 mA max.
Reservoir Condenser	1.0 μF max.



Current Equipment Type

TYPE **R12**
(WIRE ENDED)
HIGH VOLTAGE
RECTIFIER

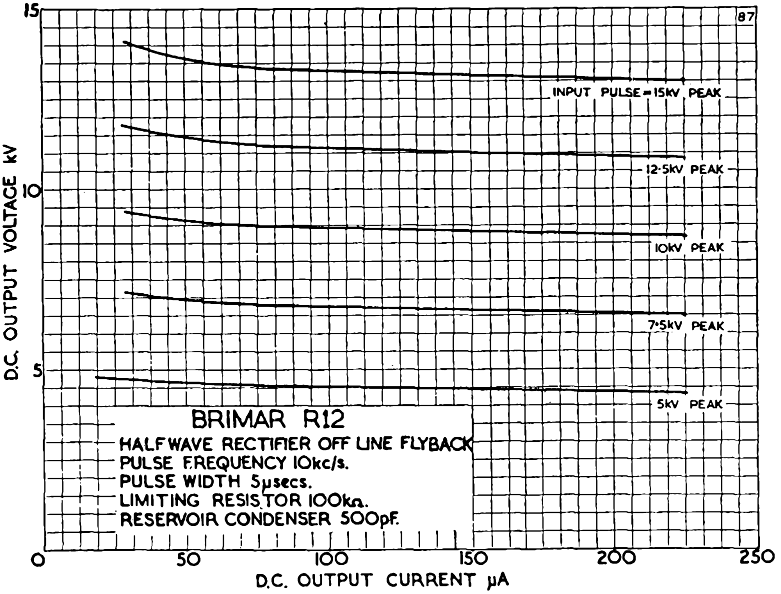
BRIMAR type R12 is an indirectly heated half-wave rectifier designed for use in the E.H.T. supply of television receivers. The low heater consumption permits operation from line fly-back pulses whilst the absence of base enables the valve to be wired in close proximity to the line output transformer.

RATINGS

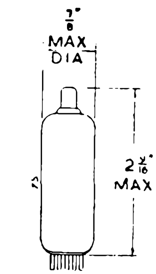
Heater Voltage	6.3 volts ± 10 per cent
Heater Current	0.09 amp.

	Sinusoidal * Input	Pulse Input	
Peak Inverse Voltage	17	17	kV max.
Rectified Current	0.5	0.1	mA max.
Series Anode Impedance	0.1	0.1	meg. min
Reservoir Condenser	5/f *	0.1	µF max.

**Maximum operating frequency 500 Kc/s.*
f measured in cycles per second.

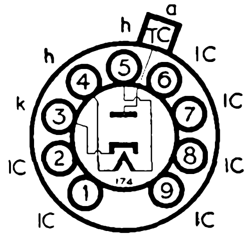


Type R12 is a commercial equivalent of the CV426.



Industrial Type

TYPE R17 HALF-WAVE RECTIFIER



B9A (Noval) Base

The BRIMAR type R17 is an indirectly heated miniature half-wave rectifier for use in compact equipment. A pair operated in a full wave circuit give a better performance than a single 5V4G, and have the added advantage of separate heater and cathode connections.

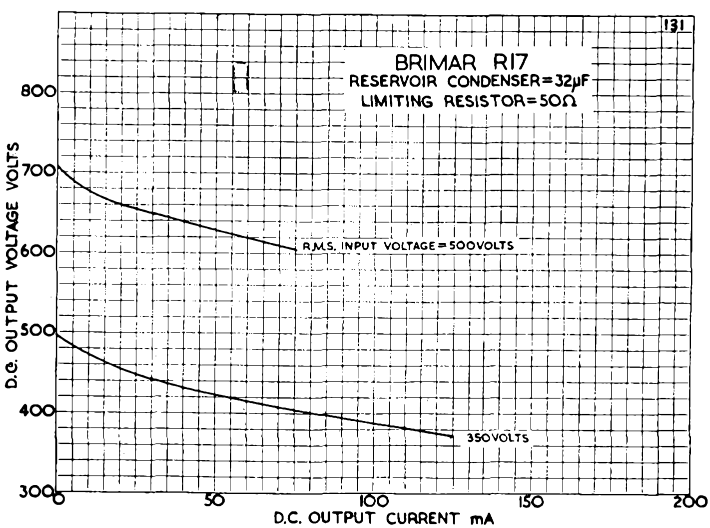
RATINGS

Heater Voltage	6.3 volts
Heater Current	0.8 amp.
Peak Anode Current	750 mA max.
Peak Inverse Voltage	1,450 volts max.
Peak Heater to Cathode Voltage	700 volts max.

TYPICAL OPERATION AS A HALF-WAVE RECTIFIER

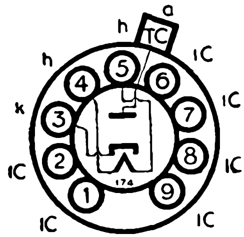
R.M.S. Input Voltage	350	500 volts
Supply Impedance	50	50 ohms min.
Reservoir Condenser	32	32 μF max.
Direct output current	125	75 mA max.

Type R17 *is a commercial equivalent to the* CV2218.



Industrial Type

TYPE R18 (MINIATURE) HALF-WAVE RECTIFIER



B9A (Noval) Base.

The BRIMAR type R18 is an indirectly heated miniature half-wave rectifier with high peak ratings of cathode current and of inverse and heater to cathode voltages.

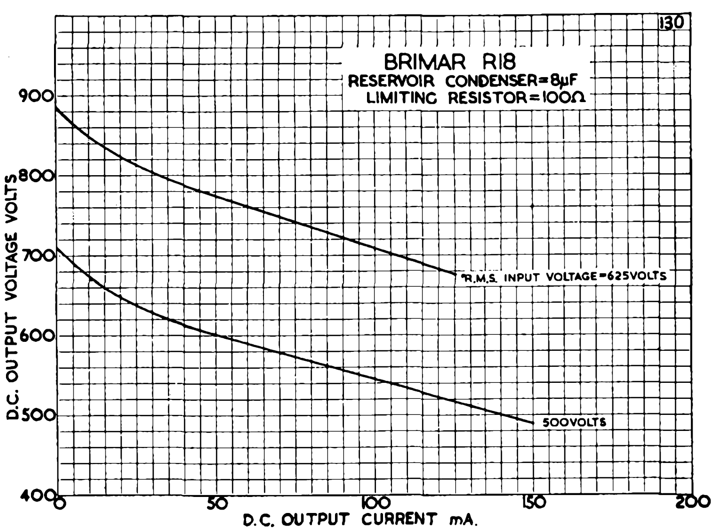
RATINGS

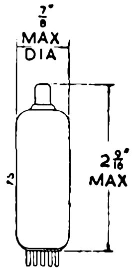
Heater Voltage	6.3 volts
Heater Current	1.1 amps.
Peak Anode Current	900 mA max.
Peak Inverse Voltage	1,800 volts max.
Peak Heater to Cathode Voltage	900 volts max.
D.C. Output Current	150 mA max.

TYPICAL OPERATION AS A HALF-WAVE RECTIFIER

R.M.S. Input Voltage	500	652 volts
Supply Impedance	200	160 ohms min.
Reservoir Condenser	8	8 μF max.
Direct Output Current	150	125 mA max.

Type R18 *is a commercial equivalent of the* CV2235.

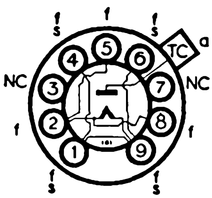




B9A (Noval) Base.

Current Equipment Type

TYPE **R19/1X2B**
MINIATURE HIGH VOLTAGE RECTIFIER



THE BRIMAR R19/1X2B is a noval based E.H.T. rectifier for use in Television Receivers. It may be used as a replacement for the American 1X2A, although its ratings are higher than those of the latter type.

RATINGS

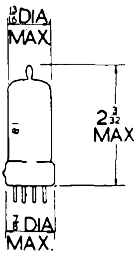
Filament Voltage	1.25 volts
Filament Current	0.2 amp.
Peak Inverse Voltage	25 kV max.
Peak Anode Current	12 mA max.
D.C. Anode Current	2 mA max.

INTER-ELECTRODE CAPACITANCES

Anode to Filament	1.0 pF approx.

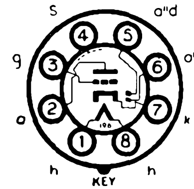
Note.—Precautions must be taken to prevent corona discharge from the connections to this valve by ensuring that no sharp points or bends occur in the wiring and adequate spacing must be left between the valve and surrounding components.

Pins 3 and 7 may be used as anchor points for filament dropping resistors and high voltage filter resistor, or may be connected to the filament. No low potential circuits should be connected to any base pins.

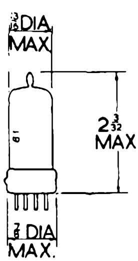


Replacement Type

TYPE **UBC41**
DOUBLE DIODE
TRIODE

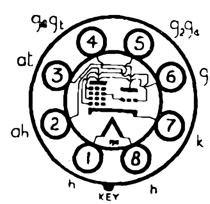


Heater Voltage	14.0 volts
Heater Current	0.1 amp.
Anode Voltage	170 volts
Grid Voltage	—1.6 volts
Anode Current	1.5 mA
Amplification Factor	70
Mutual Conductance	1.65 mA/V
Anode Impedance	42 kΩ

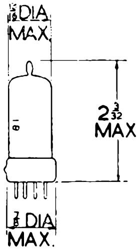


Replacement Type

TYPE **UCH42**
TRIODE HEXODE
FREQUENCY CHANGER

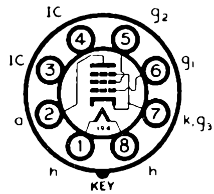


Heater Voltage	14.0 volts
Heater Current	0.1 amp.
Hexode Anode Voltage	200 volts
Hexode Screen Voltage	85 volts
Hexode Grid Voltage	—2 volts
Hexode Anode Current	3 mA
Hexode Screen Current	3 mA
Triode Anode Supply Voltage	200 volts
Triode Anode Resistor	22 kΩ
Triode Grid Resistor	47 kΩ
Triode Grid Current	200 μA
Conversion Conductance	750 μA/V



Replacement Type

TYPE **UF41**
VARI-MU
R.F. PENTODE



Heater Voltage ...	12.6 volts	Anode Current ...	7.2 mA
Heater Current ...	0.1 amp.	Screen Current ...	2.1 mA
Anode Voltage ...	200 volts	Anode Impedance ...	1 MΩ
Screen Resistor ...	40 kΩ	Mutual Conductance	2.3 mA/V
Grid Voltage	—3 volts	Grid Voltage for $\frac{g_m}{100}$	— 34 volts

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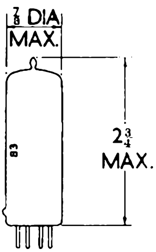
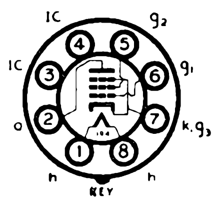


Replacement Type

TYPE **UL41**
POWER PENTODE



Heater Voltage ...	45 volts	Anode Current ...	45 mA
Heater Current ...	0.1 amp.	Screen Current ...	8.5 mA
Anode Voltage ...	200 volts	Mutual Conductance	8.2 mA/V
Screen Voltage ...	200 volts	Anode Load Impedance	4,300 Ω
Grid Voltage	—14.2 volts	Power Output (D_{tot}=10%) ...	4.2 watts

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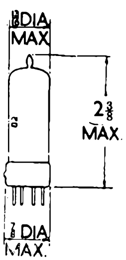
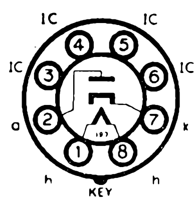


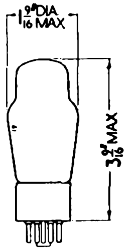
Replacement Type

TYPE **UY41**
HALF-WAVE
RECTIFIER



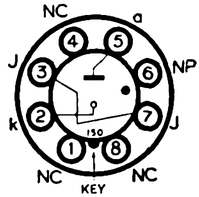
Heater Voltage ...	31.0 volts	Output Current ...	100 mA max.
Heater Current ...	0.1 amp.	Reservoir Capacitance	50 μF max.
Anode Voltage R.M.S.	250 volts max.	Limiting Resistance	210 Ω min.

VR75/30
VR105/30
VR150/30



Industrial Types

TYPE **VR75/30**
TYPE **VR105/30**
TYPE **VR150/30**
(OCTAL BASE)
VOLTAGE REGULATORS



CHARACTERISTICS

TYPE VR75/30

Minimum Starting Voltage	100 volts
Nominal Operating Voltage	75 volts
Minimum Operating Current	5 mA
Maximum Operating Current	40 mA
Maximum Peak Current	100 mA
Regulation (minimum to maximum currents)	6.5 volts

TYPE VR105/30

Minimum Starting Voltage	135 volts
Nominal Operating Voltage	105 volts
Minimum Operating Current	5 mA
Maximum Operating Current	40 mA
Maximum Peak Current	100 mA
Regulation (minimum to maximum currents)	4 volts

TYPE VR150/30

Minimum Starting Voltage	180 volts
Nominal Operating Voltage	150 volts
Minimum Operating Current	5 mA
Maximum Operating Current	40 mA
Maximum Peak Current	100 mA
Regulation (minimum to maximum currents)	5.5 volts

The series resistor fitted between regulator valve and supply voltage must be such that under no-load conditions the current rating of the valve is not exceeded.

Note : Type VR75/30 is exactly equivalent to type OA3
Type VR105/30 is exactly equivalent to type OC3
Type VR150/30 is exactly equivalent to type OD3

BRIMAR "T" VALVES

WHAT are they?
WHAT do they offer?

The BRIMAR "T" Range of special quality valves was specifically designed to operate reliably and efficiently under exceptional conditions of vibration and shock.

Communications and Industrial Equipment Manufacturers are appreciating more than ever that costly delays and shutdowns due to the failure or frequent overhaul of electronic equipment, can be safeguarded against, by building greater reliability and greater life expectancy into such equipments, by the use of "T" Valves.

These valves offer low initial failure, low heater breakdown, low microphony and noise, low level of short life failures and low losses from glass failures.

This has been achieved by the use of completely new mechanical designs of metal piece parts, the re-design of mica slots and holes which hold electrodes into position and improved matching of micas and glass dimensions. Other contributing factors are the use of improved materials and the strictest control over their quality. Also improved manufacturing methods and control techniques.

Stringent tests are observed throughout manufacture far exceeding normal convention. These include glass strain test, base strain, vibration noise, resonance search, vibration fatigue, shock, heater cycling, stability and life tests.

Flying Lead Versions—The design of Special Quality Valves ensures that if they are correctly used within the published ratings they will have a very low failure rate. There is, therefore, a good cause for wiring in Valves in the same manner as other circuit components and most Types are readily available. Flying Lead types assembled on moulded bases, suitable for chassis mounting can also be offered.

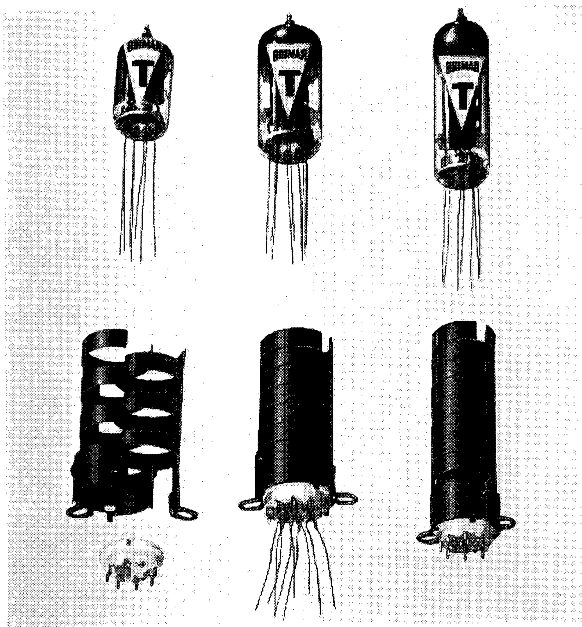
There are four types:—

(*a*) Type FF unscreened on P.T.F.E. base.

(*b*) Type XF unscreened on Nylon loaded P.F. base.

(*c*) Type SF screened on P.T.F.E. base.

(*d*) Type SX screened on Nylon loaded P.F. base.



The use of close fitting blackened metal cans, improves cooling and disperses hot spots on the valve, and the resultant reduction in bulb temperature can improve life by four to five times.

Examples of such units are shown in the accompanying illustration.

More detailed information on these valves for chassis mounting can be obtained from the Publicity Department, Standard Telephones & Cables Limited, Footscray, Kent. Ask for the Trustworthy Flying Lead Assemblies Leaflet.

BRIMAR "T" VALVES—
Pinned Types

Brimar "T" Valve Type	C.V. No.	Commercial Type with Similar Character-istics	Base	Application	** BRIEF CHARACTERISTICS									
					Heater		Anode Voltage Normal	Screen Voltage Normal	Grid Voltage Normal	Amplifi-cation Factor	Mutual Conductance mA/V	Optimum Load Ohms	Auto Bias Resistor Ohms	Power Output Watts
					Volts	Amps.								
5654	CV4010	6AK5	B7G	R.F. Pentode	6·3	0·175	180	120	—	—	5·1	—	180	—
5726	CV4007	6AL5	B7G	Double Diode	6·3	0·3	Max. A.C. Voltage per anode 150 R.M.S. Max. D.C. Output 9 mA.							
5749	CV4009	6BA6	B7G	Vari-Mu F.R. Pentode	6·3	0·3	250	100	−1/−21	—	4·4	—	68	—
5750	CV4012	6BE6	B7G	Heptode F.C.	6·3	0·3	250	100	−1·5/−30	—	475†	—	—	—
5965	—	—	—	Double Triode	6·3	0·45	300	—	—	47	6·5	—	—	—
6057	CV4004	12AX7	B9A	Double Triode	6·3 *	0·3 *	250	—	−2·0	100	1·6	—	1650	—
6058	CV4025	6AL5	B7G	Double	6·3	0·3	Max. A.C. Voltage per Anode 150 R.M.S. Max. D.C. Output 9 mA.							
6059	CV4005	6BR7	B9A	Low Noise A.F. Pentode	6·3	0·15	250	100	−3	—	1·25	—	1200	—
6060	CV4024	12AT7	B9A	Double Triode	6·3 *	0·3 *	250	—	−2·0	55	5·5	—	200	—
6061	CV4043	6BW6	B9A	Output Beam Tetrode	6·3	0·45	250	250	−12·5	—	4·1	5000	250	4·5
6062	CV4039	5763	B9A	V.H.F. Amplifier	6·0	0·75	250	250	−7·25	—	7·0	—	—	—
6063	CV4005	6X4	B7G	A.C. Rectifier	6·3	0·6	Max. A.C. Voltage per Anode 325 R.M.S. Max. D.C. Output 70 mA.							
6064	CV4014	6AM6	B7G	R.F. Pentode	6·3	0·3	250	250	−2·0	—	7·5	—	160	—
6065	CV4015	9D6	B7G	Vari-Mu R.F. Pentode	6·3	0·2	250	200	−2·5/−28	—	2·5	—	250	—
6067	CV4003	12AU7	B9A	Double Triode	6·3 *	0·3 *	250	—	−8·5	17	2·2	—	800	—
6132	CV4055	6CH6	B9A	Video Output Pentode	6·3	0·75	250	250	−4·5	—	11·0	—	—	—
6158	CV4068	13D3	B9A	Double Triode	6·3 (12·6)	0·6 (0·3)	250	—	−4·6	32	2·3	—	—	—
6516	CV4063	6AM5	B7G	Power Pentode	6·3	0·2	250	250	−13·5	—	2·6	16000	680	1·4
6870	—	—	B9A	R.F. and Video Pentode	6·3 (12·6)	0·6 (0·3)	250	250	—	—	8·5	—	120	—
G/6C4	—	6C4	B7G	R.F. Power Triode	6·3	0·15	250	—	−8·5	17	2·2	—	—	5·5‡
G/6L6GA	—	6L6GA	Oct.	Output Beam Tetrode	6·3	0·9	250	250	−14	—	6·0	2500	170	6·5
G/25L6GT	—	25L6GT	Oct.	Output Beam Tetrode	25·0	0·3	110	110	−7·5	—	9·0	1500	150	2·1
G/50C5	—	50C5	B7G	Output Beam Tetrode	50·0	0·15	110	110	−7·5	—	7·5	2500	140	1·9

* Alternative Filament Connections 12·6 Volts, 0·15 Amp. † Conversion conductance in Michromhos ‡ As Class C.R.F. Amplifier

** For greater detail refer to Commercial type with similar characteristics

BRIMAR "T" VALVES—Flying Lead Types

Normal flying lead types		Flying lead types in close fitting cans		Flying lead types on button base (No can)	
"T" Code	C.V. No.	Nylon loaded P.F. Bases	P.T.F.E. Bases	Nylon loaded P.F. Bases	P.T.F.E. Bases
F/5654	CV4050	SX/5654	SF/5654	XF/5654	FF/5654
F/5726	CV4049	SX/5726	SF/5726	XF/5726	FF/5726
F/5750	CV4037	SX/5750	SF/5750	XF/5750	FF/5750
F/6057	CV4035	SX/6057	SF/6057	XF/6057	FF/6057
F/6060	CV4033	SX/6060	SF/6060	XF/6060	FF/6060
F/6061	CV4045	SX/6061	SF/6061	XF/6061	FF/6061
F/6063	CV4001	SX/6063	SF/6063	XF/6063	FF/6063
F/6064	CV4002	SX/6064	SF/6064	XF/6064	FF/6064
F/6067	CV4034	SX/6067	SF/6067	XF/6067	FF/6067
F/6132	CV4056	SX/6132	SF/6132	XF/6132	FF/6132
F/6158	CV4069	SX/6158	SF/6158	XF/6158	FF/6158

Special Valves

The STC special valves cover a very wide range from small sub-miniature cold cathode types to large 150 kilowatt water-cooled transmitting valves.

The following pages describe the salient features of a few valves from the range, in general covering those types which have an application in the electronic instrument field.

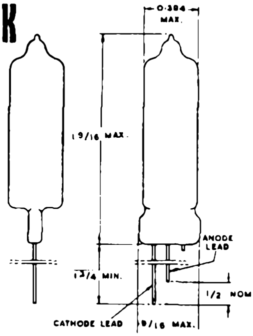
Full technical data is available on all STC Special Valves from the address given below, from whom a brochure listing all the valves, in tabulated form, can be obtained.

A Summary of C.V. Nos. relating to STC types is included at the end of this section (page 230).

Standard Telephones and Cables Limited

SPECIAL VALVES SALES DEPARTMENT

CONNAUGHT HOUSE, ALDWYCH
LONDON, W.C.2
Telephone : Holborn 8765

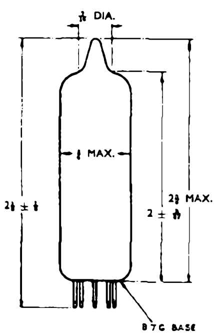


TYPE **G50/1G** COLD CATHODE VOLTAGE STABILISER

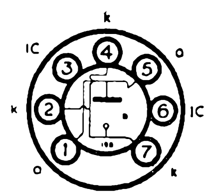
The G50/1G is a gas-filled stabiliser for very low current values. It has been developed for use as a constant voltage coupling element in D.C. amplifiers, voltage limiters, etc.

CHARACTERISTICS

Maximum striking voltage	90	V
Maximum maintaining voltage	60	V
Nominal maintaining voltage	50	V
D.C. operating current, continuous	0·1 to 0·5	mA
Regulation (0·1 to 0·5 mA)	5	V



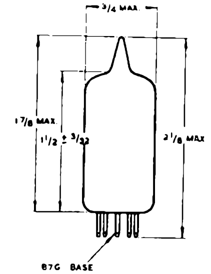
TYPE **G55/1K** MINIATURE COLD CATHODE VOLTAGE STABILISER



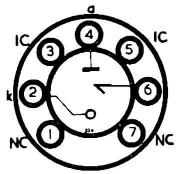
The G55/1K is a miniature cold-cathode, gas-filled, voltage-stabiliser for use in industrial and radio equipment where a stable source of voltage is required. The noteworthy feature of this valve is the relatively low maintaining voltage of 55 volts.

CHARACTERISTICS

Maximum striking voltage	90	V
Stabilising voltage	55	V
D.C. operating current	2 to 30	mA
Maximum peak current (10 seconds max.)	75	mA
Nominal regulation 2 to 30 mA	3	V
Maximum regulation 2 to 30 mA	5	V
Ambient temperature range	—55 to +90	°C



TYPE **G400/1K**
HIGH VOLTAGE COLD CATHODE VOLTAGE STABILISER

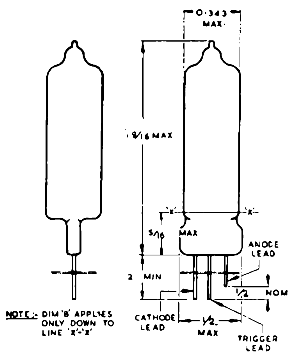


The G400/1K is a miniature low current, high voltage gas-filled stabiliser specially developed for use where a high degree of stability is required.

CHARACTERISTICS

Maximum striking voltage	400	V
Nominal striking voltage	373	V
Stabilising voltage	304 ± 6	V
Cathode current range	2 to 4	mA
Regulation, 2 to 4 mA	1.2	V
Voltage stability (over 200 hrs.)	± 1	V

NOTE.—In use, pins numbers 4 and 6 must be directly connected together in the external circuit.



TYPE **G1/236G**
SUB MINIATURE COLD CATHODE GAS-FILLED TRIODE

The G1/236G is a three electrode, gas-filled cold cathode triode. It has been designed primarily for "storage" purposes in telephone circuits but has applications in the field of electronic counting.

D.C. CHARACTERISTICS

Minimum main gap breakdown voltage	235	V
Nominal main gap maintaining voltage	70	V
Maximum control gap breakdown voltage	85	V
Nominal control gap maintaining voltage	57	V
Maximum cathode current	1.5	mA
Minimum cathode current	0.5	mA
Recommended anode voltage	180	V
Maximum trigger resistance	1.0	MΩ

DYNAMIC CHARACTERISTICS

Transfer

A typical measure of transfer sensitivity is the following:—

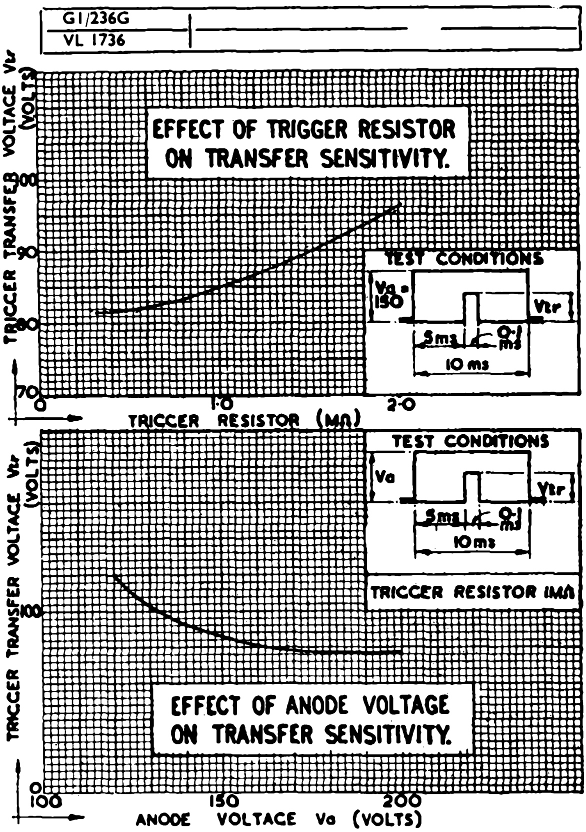
Maximum trigger voltage required for main gap breakdown, in the form of a 100 micro-second pulse at V_a 150 volts and R_t 1 megohm * ... ... 95 V

* The megohm referred to takes a spread of $\pm$ 10% into account. This makes 1·1 megohm an absolute maximum.

DE-IONISATION

A typical measure of de-ionisation is the following:—

After extinguishing, from a conducting condition limited by 100 kΩ, by pulsing the anode to cathode potential with a square pulse of one milli-second duration, the maximum value of re-applied anode voltage that will not cause the valve to restrike is 200 V.

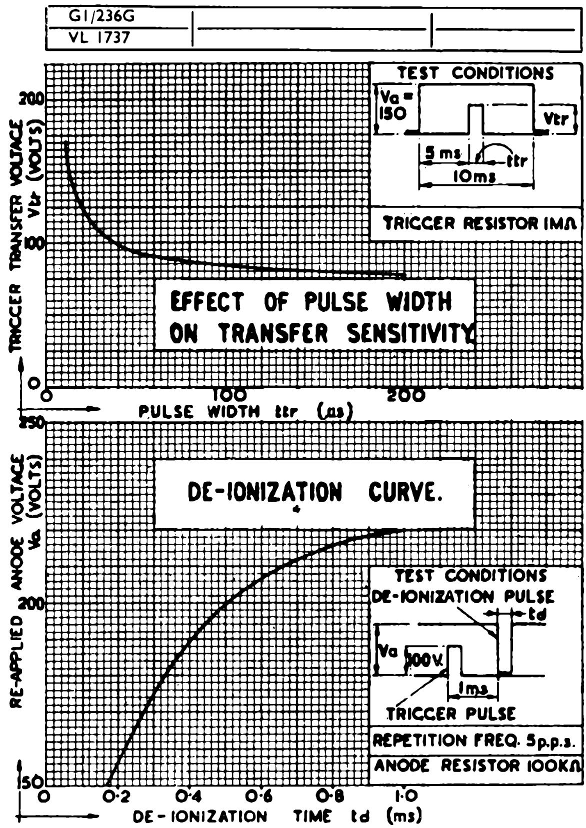


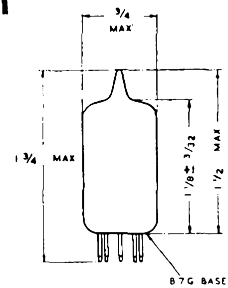
GENERAL NOTES

Anode voltages between 150 and 200 volts and a minimum trigger pulse voltage of 95 volts are required to give satisfactory dynamic operation.

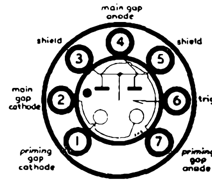
If a circuit is used which takes the trigger negative with respect to the cathode at any time, then the ratio of mean cathode current to mean trigger current, when negative, must not be less than 6 to 1. This ratio is a limitation to the value of trigger resistance which should be determined for each such application. If a metal clip is used for anchoring the valve, it should be electrically connected to the trigger.

These valves are light sensitive during operation and should not be exposed to direct sunlight. On the other hand a small measure of light is necessary to ensure satisfactory dynamic operation. If it is desired to use them in a totally enclosed space a small light source should be provided.





TYPE G1/371K HIGH SPEED PRIMED-TRIGGER COLD-CATHODE TUBE



The G1/371K is a high-speed primed-trigger tube developed for use with the G10/241E Unidirectional Cold-Cathode Gas Filled Decade Counter for which a single cathode trigger tube is required as a coupling element between tubes. Its speed and general characteristics, however, make it a useful general component. It also has features which make it specially suitable for use in circuits where a high input impedance is required.

MAIN ELECTRODE CHARACTERISTICS

Maximum pulse current output	15	mA
Maximum D.C. current output	10	mA
Minimum D.C. current output	2	mA
Anode supply voltage range	270 to 360	V
Main gap maintaining voltage	175 to 185	V
Maximum cathode voltage output	140	V
Shield voltage applied through 50 kΩ	150	V
Trigger Bias (for V_a up to 325 V)	0 to 165	V
Trigger Bias (for V_a up to 360 V)	60 to 165	V
††Trigger breakdown potential on application of a 25 micro-second square pulse based on maximum bias	12 to 26	V
*De-ionisation Time (max.)	30	μ sec
†Transfer Time (nom.)	0.5	μ sec

DIRECT INTERELECTRODE CAPACITANCES

Trigger to cathode	3.0	pF
Trigger to all other electrodes	5.0	pF

PRIMING GAP CHARACTERISTICS

Priming gap current	0.2 to 0.5	mA
Anode feed resistance	390	kΩ
Cathode resistance to earth or main gap cathode potential	56	kΩ

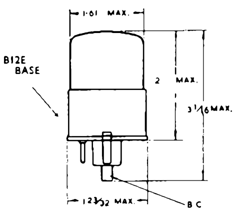
The priming gap cathode must not be more than 140 volts negative to the main cathode at any time.

* De-ionisation time to be short enough to permit a re-application of the nominal working voltage (90 per cent of maximum, i.e. 325 volts) 30 micro-seconds after the extinguishing of a D.C. discharge of maximum rated current by means of a rectangular pulse applied to the anode. The base of the extinguishing pulse shall be 20 volts below the V_m of the main gap, all other electrodes may be at potentials within their working range.

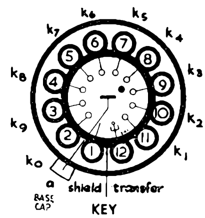
† This is the time interval between current flowing in the trigger cathode circuit as the result of applying a trigger pulse, and conduction starting in the main anode-cathode gap.

†† For pulse widths of less than 25 μ sec, the triggering pulse ← amplitude is an inverse function of the pulse width.

For details of circuitry, apply to Standard Telephones & Cables Ltd., Special Valve Sales, Connaught House, Aldwych, London, W.C.2.



TYPE G10/241E
UNIDIRECTIONAL COLD-CATHODE GAS-FILLED DECADE COUNTER



The G10/241E is a single-ended cold-cathode unidirectional gas-filled counter and distributor tube. It has ten cathodes which are used to indicate the number of the count, either visually at low speeds or by means of the voltage developed across the cathode load at high speeds. It is capable of counting pulses at repetition speeds from approximately 0 up to 20 kc/s.

Each cathode provides a voltage output that is sufficient either to operate a coupling tube to the next counter stage or a registering circuit. The tube has been designed so that it is possible to view the discharge directly at low speeds, and so obtain a direct indication of the count. To this end the holes in the anode through which the glow is visible have been numbered.

D.C. CHARACTERISTICS (Nominal)

Anode-cathode breakdown voltage	280	V
Anode-transfer electrode breakdown voltage	280	V
Anode-cathode maintaining voltage (approx.)	180	V
Cathode current	3.7	mA

A special socket has been designed for use with this valve (McMurdo type X12E).

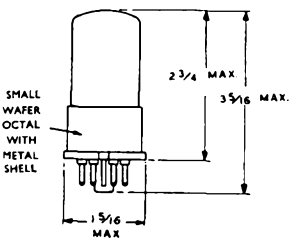
continued overleaf

TYPICAL OPERATING CONDITIONS

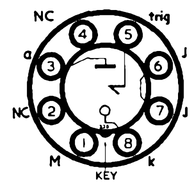
(For pulse repetition frequencies up to 5 kc/s.)

H.T. supply voltage (stabilised)	315 to 345	V
Transfer electrode bias (nominal)	75	V
Shield bias (nominal)	90	V
Anode load	24 $\pm$2%	kΩ
Cathode load	15 $\pm$ 5%	kΩ
Cathode load capacitor	0.005 $\pm$ 20%	μF
Transfer pulse amplitude	120 $\pm$ 15	V
(Measured at the input capacitor with G10/241E in circuit.)		
Transfer pulse width	16 $\pm$ 4	μs
Cathode pulse output (min.)	40	V

For full technical details for this valve, apply Standard Telephones & Cables Ltd., Special Valve Sales, Connaught House, Aldwych, London, W.C.2.



TYPE **G150/2D** COLD CATHODE GAS-FILLED TRIODE



The G150/2D is a cold cathode, three-electrode, gas-filled triode. It has an activated cathode giving a low maintaining voltage, together with a good life performance.

CHARACTERISTICS

Minimum control gap breakdown voltage		60	V
Maximum control gap breakdown voltage		80	V
Nominal control gap maintaining voltage	At 20 mA Cathode Current ...	60	V
Maximum control gap maintaining voltage	At 20 mA Cathode Current ...	70	V
Minimum main gap breakdown voltage		150	V
Minimum main gap maintaining voltage	At 20 mA Cathode Current ...	60	V
Maximum main gap maintaining voltage	At 20 mA Cathode Current ...	77	V
Recommended value of operating current for relay operation		20	mA
Recommended value of operating current for counter applications		2	mA

MAXIMUM RATINGS

Maximum peak cathode current	50	mA
Maximum average cathode current	30	mA

DYNAMIC CHARACTERISTICS

Transfer

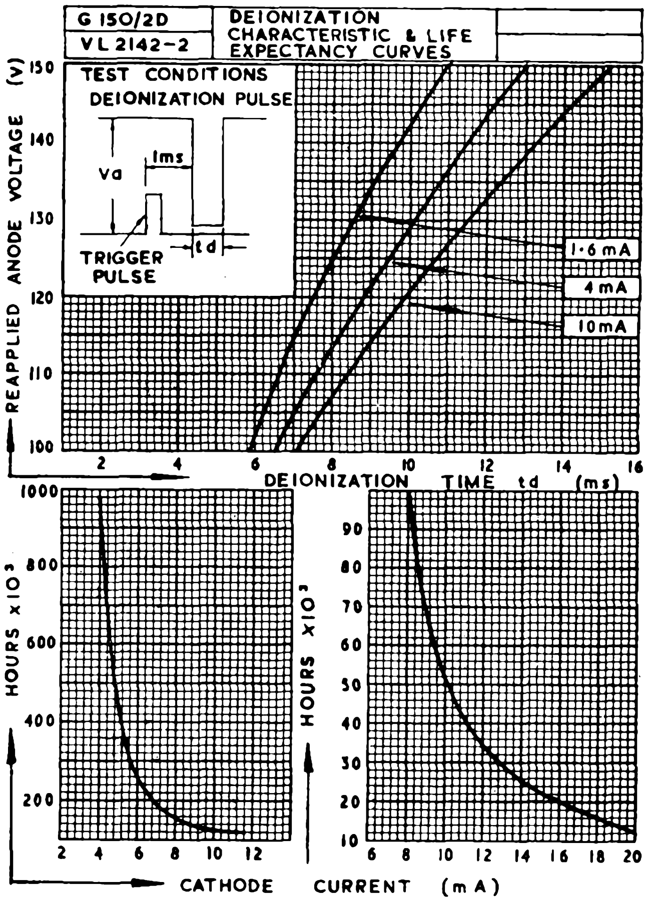
For general dynamic behaviour, see curves at the end of this data.

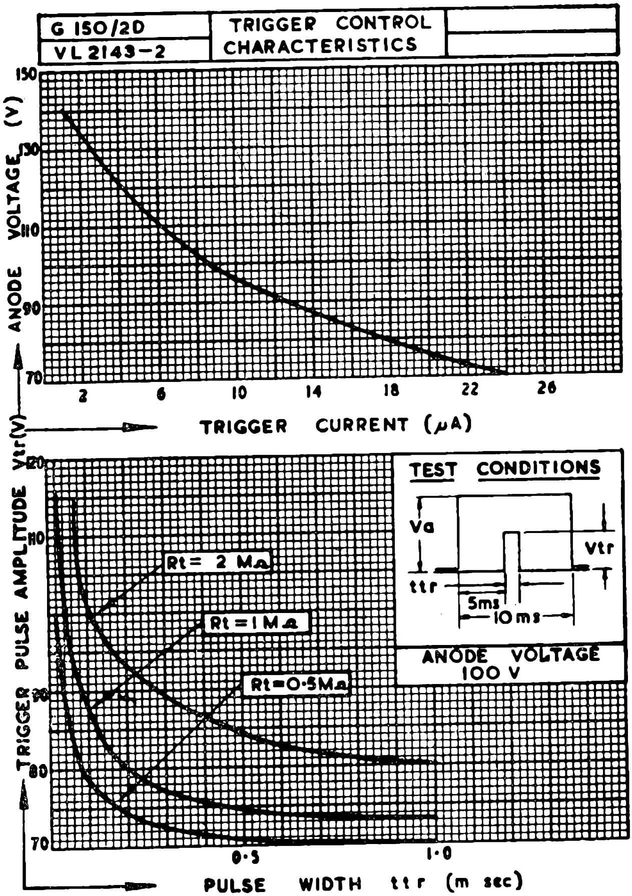
De-ionisation

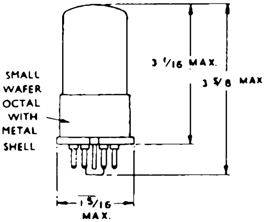
It should be noted that the curves shown refer to most unfavourable conditions. If the negative going pulse went to approximately 45 volts, instead of to zero, the de-ionisation time would be improved by as much as a factor of three.

APPLICATION NOTE

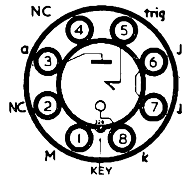
The life expectancy of these valves is a function of cathode current. Curves showing typical figures of life versus D.C. cathode current are included in this data.




G 150/2D
VL 2143-2
TRIGGER CONTROL CHARACTERISTICS
ANODE VOLTAGE (V)
150
130
110
90
70
2
6
10
14
18
22
26
TRIGGER CURRENT (μA)
TRIGGER PULSE AMPLITUDE Vtr(V)
120
110
90
80
70
Rt= 2 MΩ
Rt = 1 MΩ
Rt=0·5MΩ
TEST CONDITIONS
Va
Vtr
ttr
5ms
10 ms
ANODE VOLTAGE 100 V
0·5
1·0
PULSE WIDTH ttr (m sec)



TYPE **G240/2D** COLD-CATHODE GAS-FILLED TRIODE



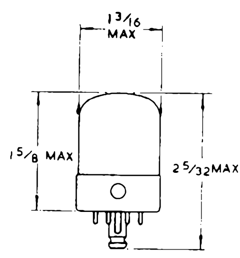
The G240/2D is a cold-cathode, three electrode, gas-filled triode. It has been developed for use in applications where a higher power is needed in the anode circuit than is obtainable with the G150/2D type.
It is characterised by its long life cathode and non-interchangeability of trigger and cathode electrodes.

CHARACTERISTICS

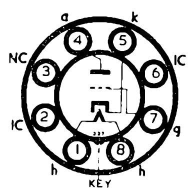
Nominal control gap breakdown voltage	...	75	V
Maximum control gap breakdown voltage	...	90	V
Nominal control gap maintaining voltage	At 20 mA Cathode Current	65	V
Maximum control gap maintaining voltage	At 20 mA Cathode Current	75	V
Minimum main gap breakdown voltage	...	230	V
Nominal main gap maintaining voltage	At 20 mA Cathode Current	90	V
Maximum main gap maintaining voltage	At 20 mA Cathode Current	110	V
Maximum transfer current at R_t 10 MΩ and V_a 200 V	...	15	μA
Optimum operating current	...	20	mA
Nominal main gap deionisation time	...	8	msec

MAXIMUM RATINGS

Maximum peak cathode current ...	50	mA
Maximum direct cathode current ...	30	mA



TYPE **3A/167M** COAXIAL REPEATER TRIODE



The 3A/167M is an indirectly heated triode of very high mutual conductance which has been developed for use in the output stages of wide band amplifiers, and for cascode low-noise amplifiers.
It is electrically equivalent to the U.S.A. type 437A.

CATHODE

Indirectly heated, oxide-coated.

Heater voltage ...	6.3	V
Heater current ...	0.45	A

Continued overleaf

3A/167M

CHARACTERISTICS

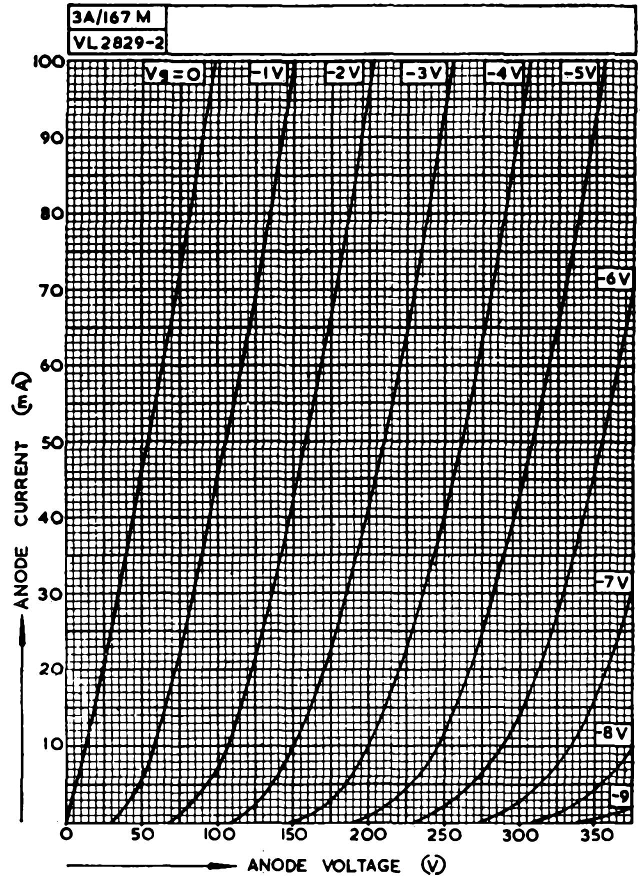
Mutual conductance	measured at $V_a = 150$ V $I_a = 40$ mA	47	mA/V
Impedance ...		1,000	Ω

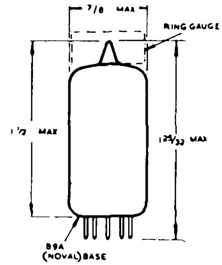
DIRECT INTERELECTRODE CAPACITANCES

Grid to cathode	11	pF
Anode to cathode	2.5	pF
Anode to grid	4	pF

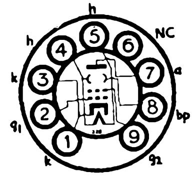
MAXIMUM RATINGS

Maximum direct anode voltage	350	V
Maximum direct anode current	45	mA
Maximum direct anode dissipation	7	W





TYPE 5A/170K BEAM TETRODE WIDE-BAND AMPLIFIER



The 5A/170K is an indirectly-heated beam tetrode developed for general-purpose wide-band applications. It has a high mutual conductance, and a high ratio of mutual conductance to capacitance.

CATHODE

Indirectly heated, oxide-coated.

Heater voltage	6.3	V
Nominal current	0.3	A

CHARACTERISTICS

Mutual conductance	Measured at V_a 180 V : V_{g2} 150 V, I_a 13 mA, I_{g2} 3 mA approx.	16.5	mA/V
Screen grid μ ...		50	

DIRECT INTERELECTRODE CAPACITANCES

(Measured with external shield in accordance with RMA-NEMA standard method.)

Input	7.9 ± 0.6	pF
Increase in C_{in} when hot	3	pF
Output	2.9 ± 0.4	pF
Anode to grid (max.)	0.03	pF
Heater to cathode	5	pF

MAXIMUM RATINGS

Maximum anode supply voltage ($I_a = 0$)	400	V
Maximum direct anode voltage	210	V
Maximum direct anode dissipation	3.3	W
Maximum screen supply voltage ($I_{g2} = 0$)	400	V
Maximum direct screen voltage	175	V
Maximum direct screen dissipation	0.9	W
Maximum grid voltage	0	V
Maximum direct cathode current	25	mA

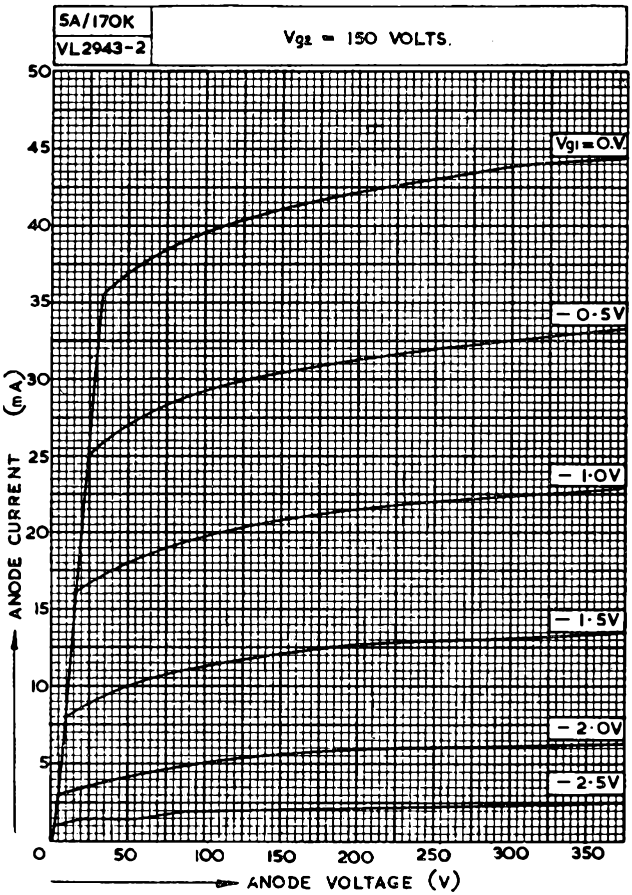
Continued overleaf

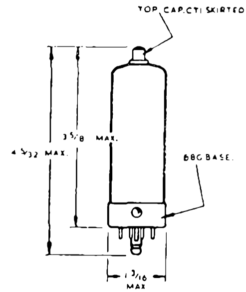
TYPICAL OPERATING CONDITIONS

*Direct anode voltage	180	V
Direct anode current	13	mA
*Direct screen voltage	150	V
Direct screen current	3	mA
†Direct grid supply voltage	+9	V
†Cathode resistor	630	Ω

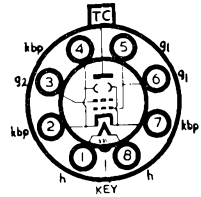
* Referred to cathode.

† It is recommended that the required grid bias be obtained in this manner. The actual voltage between grid and cathode is equal to the difference between the grid supply voltage and the voltage developed across the cathode resistor when cathode current is flowing.





TYPE 5B/254M BEAM-POWER AMPLIFIER



This valve is an indirectly heated, beam-power tetrode electrically similar to the 807 type, and of reliable construction.

CATHODE

Indirectly-heated, oxide coated.

Heater Voltage	6.3 V
Nominal current	0.9 A

CHARACTERISTICS

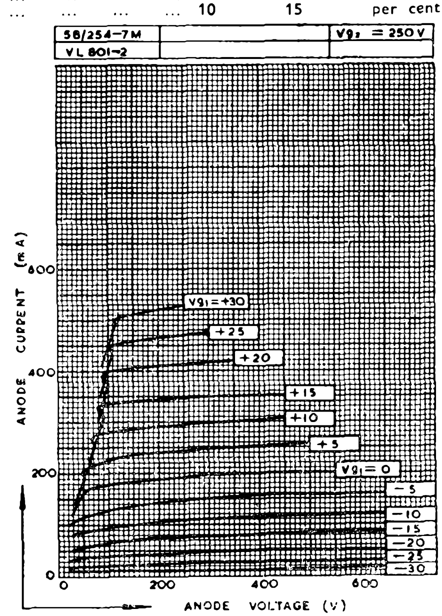
Mutual Conductance	Measured at V_a 300 V: V_{g2} 250 V: I_a 72 mA	6 mA/V
Screen grid μ		9

OPERATING CHARACTERISTICS

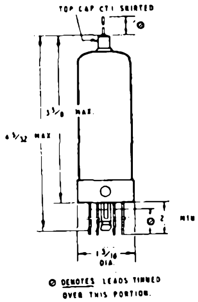
	CLASS A Single Valve		
Anode Voltage	250	350	volts
Anode Current (Zero Signal)	72	54	mA
Anode Current (Max. Signal)	79	66	mA
Screen Voltage	250	250	volts
Screen Current (Zero Signal)	5.0	2.5	mA
Screen Current (Max. Signal)	7.3	7.0	mA
Control Grid (g_1) Voltage	—14	—18	volts
Cathode Bias Resistor	170	300	ohms
Anode Impedance	22,500	33,000	ohms
Mutual Conductance	6.0	5.2	mA/V
Optimum Load	2,500	4,200	ohms
Power Output	6.5	11	watts
Harmonic Distortion	10	15	per cent

VENTILATION

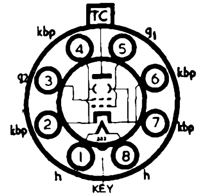
As this valve runs very hot in operation the equipment should be designed so that adequate ventilation is afforded to ensure a safe bulb temperature under all conditions of operation.



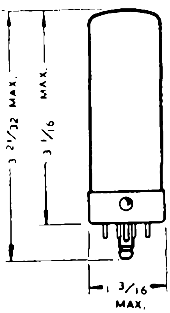
5B/254G
5B/255M
5B/257M
5B/258M



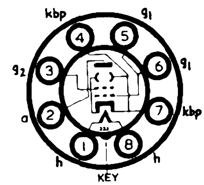
TYPE 5B/254G BEAM-POWER AMPLIFIER



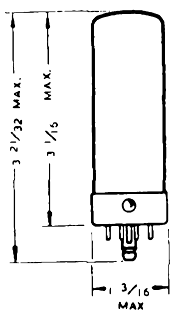
5B/254G is identical to the 5B/254M but has flexible leads for wiring directly into the circuit.



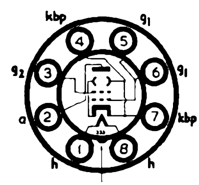
TYPE 5B/255M BEAM-POWER AMPLIFIER



Characteristics identical to 5B/254M

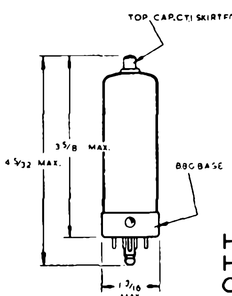


TYPE 5B/257M BEAM-POWER AMPLIFIER



Heater Voltage	... ...	12	V
Heater Current	... ...	0.47	A

Other characteristics identical to 5B/254M.

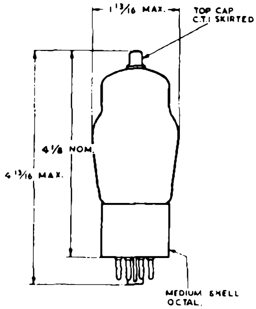


TYPE 5B/258M BEAM-POWER AMPLIFIER

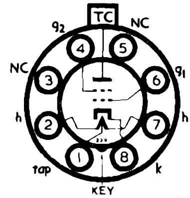
Heater Voltage	... ...	19	V
Heater Current	... ...	0.3	A

Other characteristics identical to 5B/254M.

For full technical details on any of the above valves, apply to Standard Telephones & Cables Ltd., Connaught House, Aldwych, London, W.C.2.



TYPE 3D21A
BEAM TETRODE



The SV-3D21A has been developed primarily for use as a blocking oscillator and pulse modulator. It is also suitable for use as a deflection amplifier, regulator or series valve in high voltage power supplies.
It is directly equivalent to the U.S.A. 3D21A type.

CATHODE

Indirectly-heated, oxide-coated.
Centre tapped heater. The two heater sections may be connected either in series or in parallel.

Heater voltage	6.3 or 12.6	V
Nominal current	1.7 or 0.85	A
Minimum cathode heating time	30	secs

CHARACTERISTICS

Mutual Conductance $\left\{\begin{array}{l}\text{Measured at } V_a \text{ 600 V}\\ V_{g_2} \text{ 300 V : } V_{g_1} \text{—30 V}\end{array}\right\}$	5.5	mA/V

DIRECT INTERELECTRODE CAPACITANCES

Input	19	pF
Output	10	pF
Anode to Grid	1	pF

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Pulse Operation

Maximum Ratings

† *Maximum direct anode supply voltage	3.5	kV
Maximum direct anode dissipation	15	W
Maximum peak anode voltage, including transient ...	5	kV
†Maximum direct screen supply voltage	850	V
Maximum direct screen dissipation	3	W
Maximum negative grid voltage including transient ...	—500	V
Maximum positive peak grid voltage	220	V
Maximum grid dissipation	0.5	W
Maximum heater cathode voltage	150	V
‡Maximum pulse length	10	μsec

Continued overleaf

Typical Operating Conditions

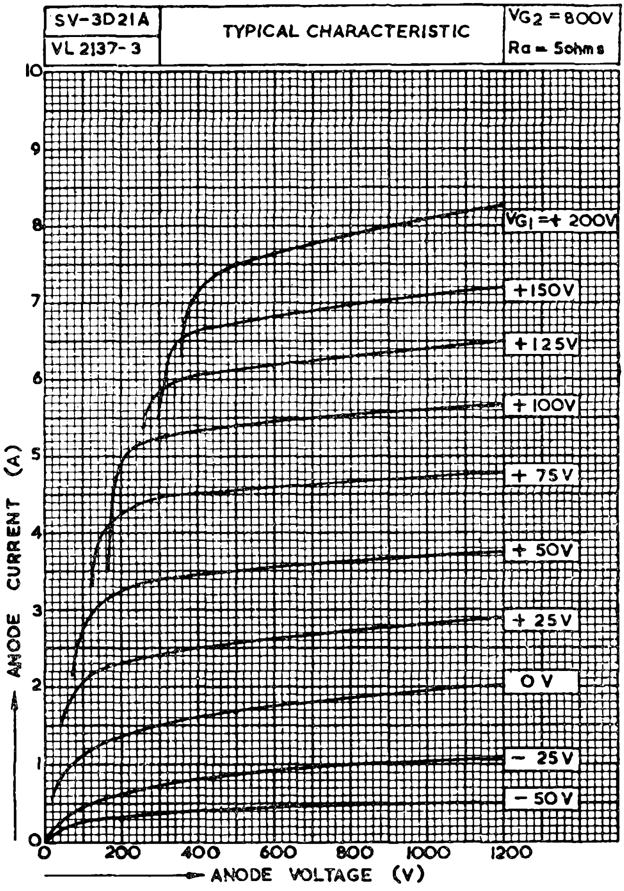
Direct anode voltage	1.5	2.5	3.5	kV
Direct screen voltage	800	800	800	V
Direct grid voltage	—150	—150	—150	V
Peak pulse grid voltage	300	300	300	V
Load resistor	160	305	450	Ω
Power output, peak, approx.	7	14	21	kW

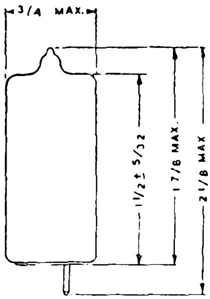
* With a screen voltage not exceeding 400 volts D.C. and when no instantaneous anode voltage due to transient is present (essentially resistive anode load), a maximum anode voltage of 4,500 volts D.C. may be used.

† Series resistance must be inserted in the power supply to limit the D.C. short circuit current to less than 0.5 ampere.

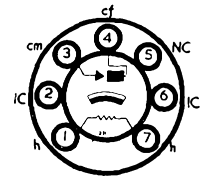
‡ Total pulse length in any 240 micro-second period must not exceed 12 micro-seconds.

For full technical details, apply to Standard Telephones & Cables Ltd., Special Valve Sales, Connaught House, Aldwych, London, W.C.2.





TYPE VLS631 THERMAL DELAY SWITCH



This miniature thermal delay switch has been designed to provide delay between the application of heater voltage and anode voltage in indirectly heated valves and mercury vapour rectifiers.

HEATER

Heater voltage	6.3	V
Nominal current	0.5	A

DELAY TIME AT 20° C.

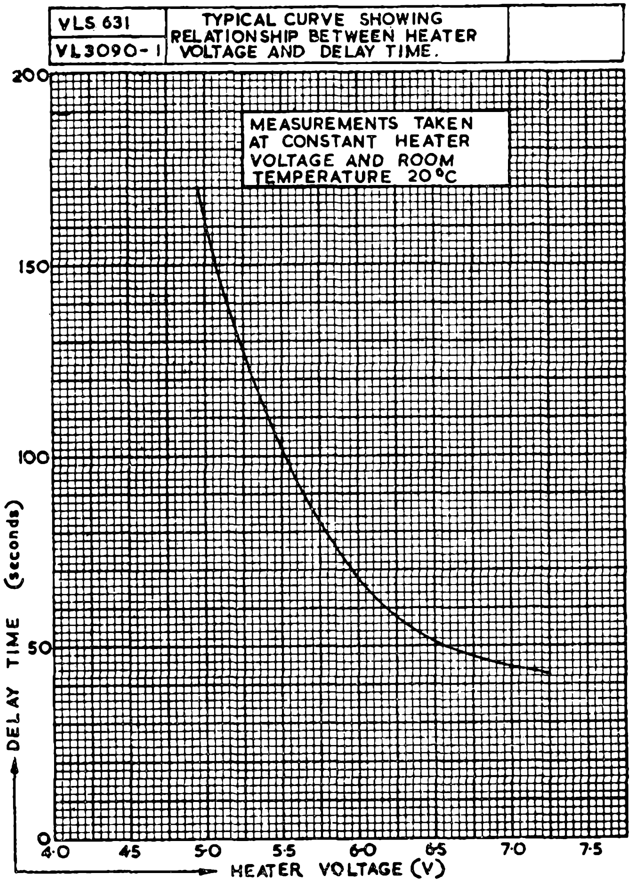
Minimum delay	44	sec
Maximum delay	66	sec

MAXIMUM RATINGS

Maximum open circuit D.C. voltage between contacts ...	220	V
Maximum contact current on make	1.0	A
Maximum surge current on make	5.0	A
Maximum current on break at 50 V D.C.	100	mA

NOTE.—A recommended method of operation is to arrange for the delay switch to operate a mechanical relay fitted with a " hold-on " coil. By this means large powers can be handled and it can be so arranged that as the contacts close the heater supply of the switch is removed. This will ensure the full delay time in the event of a shut down.

Delay switches may be connected in series to obtain multiples of the quoted delay time.

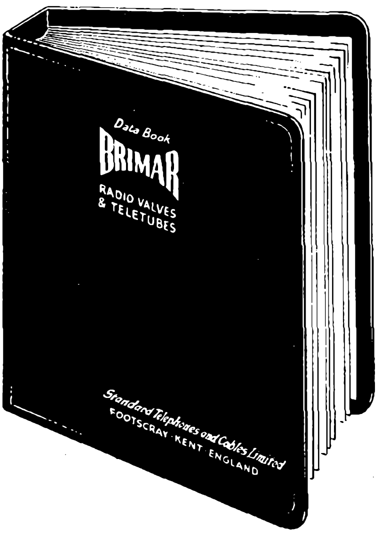


C.V. LIST OF S.T.C. SPECIAL VALVES							
S.T.C.	**C.V. No.**	**S.T.C.**	**C.V. No.**	**C.V. No.**	**S.T.C.**	**C.V. No.**	**S.T.C.**
G50/1G	2208	**5B/254M**	428	391	**5B/255M**	2220	**5B/257M**
G400/1K	2194	**255M**	391	413	**G150/2D**	2223	**G10/241E**
G1/236G	3524	**257M**	2220	428	**5B/254M**	2224	**G1/371K**
G1/371K	2224	**258M**	2347	2174	**G150/2D**	2347	**5B/258M**
G10/241E	2223	**3D21A**	2659	2194	**G400/1K**	2659	**3D21A**
G150/2D	413	**VLS631 ***	Z530333	2208	**G50/1G**	3524	**G1/236G**
G240/2D	2174						

* Formerly CV342.

BRIMAR

APPLICATION REPORT SERVICE



Stiff, Leatherette loose-leaf ring binder with gold-blocked lettering. Size 9″ x 8″

The above Service was inaugurated to provide engineers, engaged in the electronic and allied industries, with more complete information on Brimar Valves.

Application Reports are supplied in loose-leaf binders and in addition to the usual technical information, contain measured performance data in typical circuits, together with comprehensive curves of the various valve parameters.

Since the inception of this service in March 1952, more than 30 Current Equipment Types have been provided, and as new types appear, they are covered by data sheets while Application Reports are being prepared. In this way subscribers are kept automatically up-to-date with the latest technical advances made by Brimar.

It is usual for new subscribers to obtain back numbers of these reports by paying a reduced subscription of 10/- per year for the first 5 years and the current subscription of £1. Additional copies of individual Reports can be obtained for 2/6 or 5/- depending upon the type.

A list of the Reports issued to date is given below:—

6AK6	**6BR7**	**6U4GT**	**35W4**	**EM840**
6AM6	**6BS7**	**6X4**	**50C5**	**EZ80/6V4**
6AT6	**6BW6, 9BW6**	**12AH8**	**807**	**R17**
6AV6	**6BW7**	**12AT7**	**5763**	**R18**
6AU6	**6CD6G**	**12AU7**	**C14BM**	**TS1/2/3**
6BA6	**6CH6**	**12AX7**	**ECF82/PCF82**	**CV List**
6BE6	**6T8**	**13D3**	**EL84/6BQ5**	

TELETUBE SECTION

TELETUBE RATINGS

Heater Voltages and Currents

The heater voltage of tubes intended for use with their heaters run in parallel with other heaters should be maintained within ± 7 per cent of the rated value. Due allowance should be made for any voltage drop in the supply leads to the tube socket and heater voltages should always be checked at the socket with the tube inserted.

The heater current of tubes intended for use with their heaters run in series with other heaters should be maintained within ± 5 per cent of the rated value.

Heater-Cathode Insulation

The heater to cathode potential should not be allowed to exceed the rated value for the tube, but when cathode modulation of the tube is used and its heater is not supplied from an isolated source, this rating may be exceeded for a short period, as is indicated in the tube data, while the receiver is warming up. In the case in which an isolated heater transformer winding is used, a resistance of the order of 100 kΩ should be connected between heater and cathode.

Grid

Normally the impedance between grid and cathode should not exceed 1 megohm.

Final Anode Voltage

Aluminised tubes have a minimum anode voltage below which low brightness and patchy pictures may be experienced. Maximum voltages should not be exceeded or the tube life will be impaired. Minimum and maximum voltages are stated for each type. Operation below the recommended anode voltage will result in a larger spot size and reduced peak brightness. Attempts to achieve the brightness obtainable at higher voltages by increasing the beam current may lead to defocusing of the highlights and short life.

X-Ray Warning

No harmful X-ray radiation is produced by any tube listed in this manual when operated at its maximum recommended final anode voltage provided this is not greater than 16 kV. At voltages above 16 kV shields may be needed to protect against possible injury from prolonged exposure at close range.

Focus

The optimum field and position of the focus coil or magnet is indicated in the tube data. Some means of adjustment of the position of the focus assembly relative to the axis of the tube neck should be provided to cover variations between tubes, between focus components or in the E.H.T. voltage used. The spot size is reduced as the focusing field approaches the screen, so that the siting of the field close to the gun is not recommended.

With tubes using electrostatic focus, care should be taken that the shift magnets used are not mounted so far back that they interfere with the passage of the electron beam through the gun and cause darkening or shading of the raster. With normal scanning coils the position of the shift magnets is immediately behind the scanning coils.

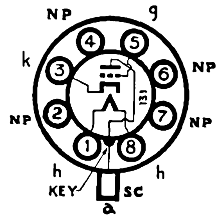
Ion Trap

Where an ion trap is used the ion trap magnet should be adjusted to give the brightest picture. Failure to do so may shorten the life of the tube.

Replacement Types

TYPES C9A, C12A

(BRITISH OCTAL BASE)
MAGNETIC TELETUBES



RATINGS

Heater Voltage	2.0 volts
Heater Current	1.4 amp.
Anode Voltage...	6.0 kV max.
Beam Current	0.15 mA max.

CHARACTERISTICS

	Type C9A	Type C12A	
Anode Voltage...	5,000	5,500	volts
Grid Voltage (For Beam Current cut-off)	—30	—35	volts
Average Peak to Peak Modulation (For maximum Beam Current) ...	23	25	volts
Focusing Requirements	700	700	amp. turns
Scanning Coil Sensitivity approx. (For coil length of 1.75 ins.)	4	4	amp. turns per cm.

INTER-ELECTRODE CAPACITANCES

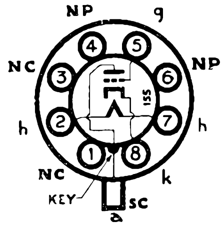
Grid to all other Electrodes... ...	5	5	pF approx
Cathode to all other Electrodes ...	5	5	pF approx.

DIMENSIONS OF TYPES C9A AND C12A

	C9A	C12A
Maximum overall length	374	465 mm.
Maximum overall diameter	228	312 mm.
Maximum neck diameter	35	35 mm.

Replacement Type

TYPE **C9B**
(OCTAL BASE)
MAGNETIC TELETUBE
ALUMINIZED SCREEN



RATINGS

Heater Voltage	2.0 volts
Heater Current...	2.5 amps.
Anode Voltage	8 kV max.
Anode Voltage	6 kV min.
Beam Current	0.15 mA max.
Peak Heater to Cathode Potential	150 volts max.
Peak Heater to Cathode Potential*	250 volts max.

* *Heater Negative with respect to Cathode and only during warm-up period of 15 secs. maximum duration.*

CHARACTERISTICS

Anode Voltage	7,000
Grid Voltage (for beam cut-off)	–40 to –100 volts
Peak to Peak Modulation (for max. beam current) ...	35 volts
Focusing Requirements (for coil with ¼″ gap)	750 amp. turns
Scanning Sensitivity (for coil of mean length 1¾″) ...	5.0 amp. turns/cm.
Distance from centre of focus coil to grid aperture ...	1¾ inches

INTER-ELECTRODE CAPACITANCES

Grid to all	9.0 pF
Cathode to all	7.0 pF
Anode to external coating	1,500 pF min.

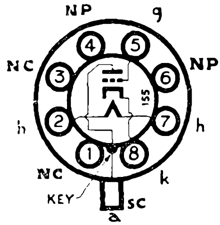
DIMENSIONS

Overall Length	415 mm. ± 7 mm.
Overall Diameter	230 mm. + 0, —4 mm.
Neck Diameter	35 mm. + 0, —1 mm.

Replacement Types

TYPES C12B, C12D

INTERNATIONAL (OCTAL BASE) MAGNETIC TELETUBE ALUMINIZED SCREEN



RATINGS

	C12B		C12D
Heater Voltage		2.0 volts	
Heater Current		2.5 amps.	
Anode Voltage	12 kV max.		7 kV max.
Anode Voltage	8.5 kV min.		5 kV min.
Beam Current		.15 mA max.	
Peak Heater to Cathode potential		150 volts max.	
Peak Heater to Cathode potential*		250 volts max.	

** Heater negative with respect to cathode and only during warm-up period of 15 secs. maximum duration.*

CHARACTERISTICS

	C12B	C12D
Anode Voltage	10 kV	6 kV
Grid Voltage (for beam cut-off)...	—60 to —140 volts	—40 to — 100 volts
Peak to Peak Modulation (for max. beam current)	30 volts	
Focusing Requirements (coil with ¼″ gap)	750 amp. turns	600 amp. turns
Scanning Sensitivity (coil of mean length 1¾″)	5 amp. turns/cm.	3.5 amp. turns/cm.
Distance from Centre of Focus coil to grid aperture	1¾ inches	

INTER-ELECTRODE CAPACITANCES

Grid to all ... ... 9.0 pF Cathode to all ... ... 7.0 pF

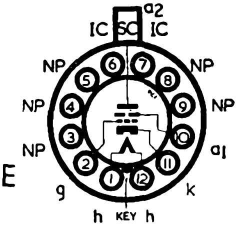
DIMENSIONS

Overall length	502 mm. ± 3 mm.
Overall diameter	303 mm. min., 306.5 mm. max.
Neck diameter	35 mm. + 0, —1 mm.

Replacement Type

TYPE C12FM

B12A (DUODECAL) BASE



MAGNETIC TELETUBE WITH TETRODE GUN, ION TRAP AND EXTERNAL CONDUCTIVE COATING

RATINGS

*Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Final Anode Voltage (V_{a2})	9 kV max.
First Anode Voltage (V_{a1})	350 volts max.
Beam Current	175 μA max.
Peak Heater to Cathode Potential	150 volts max.
†Peak Heater to Cathode Potential	250 volts max.

OPERATING CHARACTERISTICS

Final Anode Voltage	7 kV
First Anode Voltage	200 volts
Grid Voltage (V_{g1}) for Cut-off	—40 volts
Peak to Peak Modulation for Maximum Beam Current	25 volts
Focusing Coil requirements with ¼ inch Gap	600 amp. turns approx.
Distance from Modulator Grid Aperture to Centre of Focus Coil Gap	2 inches approx.
Scanning Power for Coil of Mean Length 1¾ inches	4 amp. turns per cm. approx.

INTER-ELECTRODE CAPACITANCES

Grid to All (c_{g-all})	7.0 pF
Cathode to All (c_{k-all})	5.0 pF
Anode to External Coating (c_{a-M})	2,000 pF

* *Under series operated conditions the maximum heater voltage must not exceed 7.5 volts RMS. This may be ensured by the use of a suitable Brimistor to reduce the switching surge.*

† *Heater Negative with respect to Cathode and only during warm-up period of 15 secs. maximum duration.*

ADJUSTMENT OF ION-TRAP MAGNET

(A suitable magnet is the IT6 from Messrs. Elac Ltd.)

The magnet should be located on the neck with the arrow pointing towards the screen and along the line marked on the neck. With an unmodulated raster the magnet should be slid up the neck to give the brightest picture. It may be necessary to re-adjust the focus during this operation and after doing so the magnet setting should again be adjusted for optimum brightness. It is important to set the ion-trap magnet correctly, as incorrect positioning may lead to premature failure of the tube.

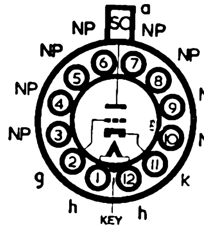
DIMENSIONS

Overall Length	460 mm. ± 5 mm.
Overall Diameter	370 mm. + 1, —7 mm.
Neck Diameter	33 mm. to 35.5 mm.

Replacement Type

TYPE C14BM

B12A (DUODECAL) BASE



RECTANGULAR WIDE ANGLE DEFLECTION TELETUBE WITH ALUMINIZED SCREEN AND EXTERNAL CONDUCTIVE COATING

RATINGS

Heater Voltage	6.3 volts
Heater Current...	0.6 amps.
Anode Voltage	14 kV max.
Anode Voltage	10 kV min.
Beam Current	250 μA max.
Grid Voltage	—2 volts min.
Diagonal Deflection Angle	70 degrees approx.
Peak Heater to Cathode Potential	150 volts max.
Peak Heater to Cathode Potential*	410 volts max

OPERATING CHARACTERISTICS

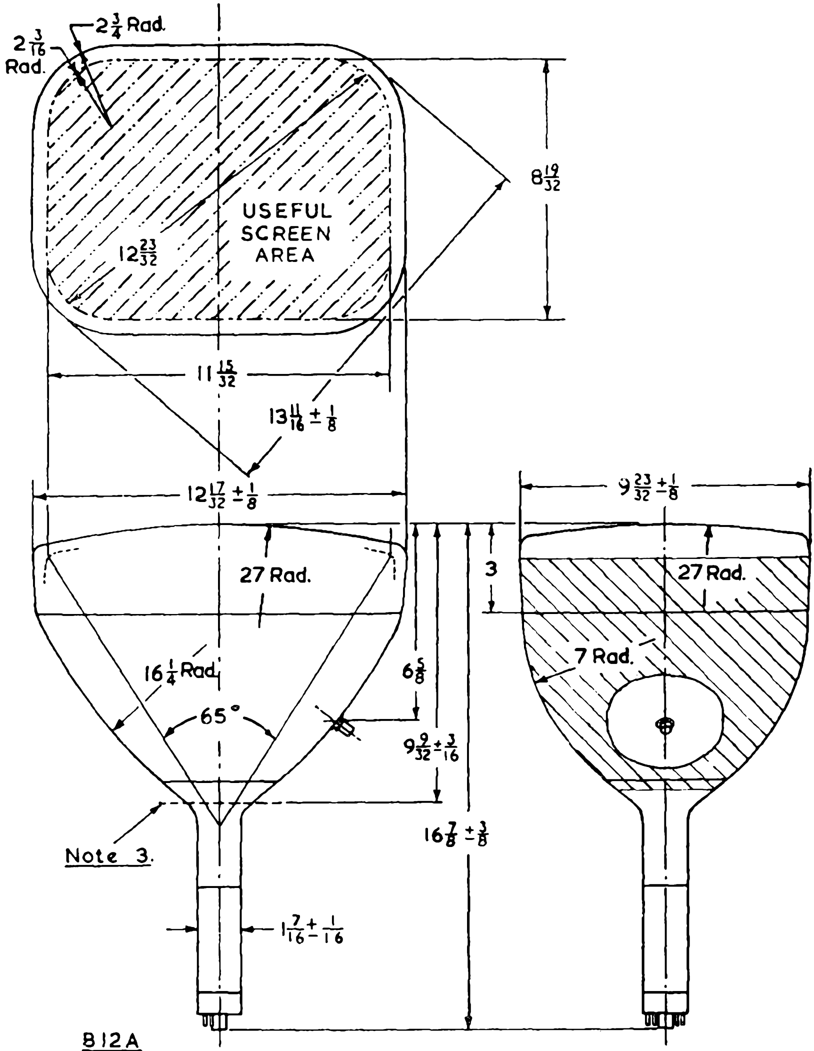
Anode Voltage	12 kV
Grid Voltage Limits for Cut-off	—50 to —100 volts
Peak to Peak Modulation for Beam Current of 150 μA ...	30 volts
Focusing requirements with $\frac{1}{4}$ inch Gap	800 amp. turns approx.
Distance from Modulator Grid Aperture to Centre of Focus Coil Gap	2 inches approx.
Scanning Power for Coil of Mean Length $2\frac{1}{4}$ inches ...	23 amp. turns per inch approx.
Distance from Modulator Grid Aperture to Reference Line	5.2 inches $\pm \frac{1}{8}$ in.

INTER-ELECTRODE CAPACITANCES

Grid to All (c_{g-all})	9.0 pF max.
Cathode to All (c_{k-all})...	7.0 pF max.
Anode to External Coating (c_{a-M})	1,500 pF

* *Heater Negative with respect to Cathode and only during warm-up period of 15 secs. maximum duration.*

C14BM



B12A
Duodecal Base

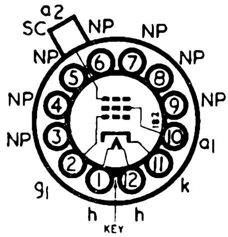
Pin No.	Electrode
1	Heater
2	Grid
3	Omitted
4	Omitted
5	Omitted
6	Omitted
7	Omitted
8	Omitted
9	Omitted
10	No connection
11	Cathode
12	Heater
Cap	Anode

Note

1. All dimensions in inches.
2. Anode cap in line ±10° with vacant base pin No. 6 position.
3. Reference line determined by position of gauge No. DD.705. (see V.A.D./392.12)

Replacement Type

TYPE C14FM
B12A (DUODECAL) BASE



Rectangular Wide Angle Deflection Teletube with tetrode gun, ion trap, aluminized screen and external conductive coating.

RATINGS

Heater Voltage*	12.6 volts
Heater Current	0.3 amps.
Final Anode Voltage (V_{a2})	14 kV max.
Final Anode Voltage (V_{a2})	10 kV min.
First Anode Voltage (V_{a1})	410 volts max.
Beam Current	250 μA max.
Grid Voltage	—2 volts min.
Peak Heater to Cathode Potential	150 volts max.
Peak Heater to Cathode Potential†	380 volts max.
Diagonal deflection angle	70 degrees approx.

* *Under series operated conditions, the maximum heater voltage must not exceed 15 volts R.M.S. This may be ensured by the use of a suitable Brimistor to reduce the switching surge.*

† *Heater negative with respect to cathode and only during warm-up period not exceeding 15 secs.*

OPERATING CHARACTERISTICS

Final Anode Voltage	12 kV
First Anode Voltage	300 volts
Peak to Peak Modulation for Beam Current of 150 μA	30 volts
Grid Voltage Limits for Spot Cut-off	—33 to —77 volts
Scanning Power for Coil of Mean Length 2¼ inches	23 ampere turns/inch approx.
Focusing Requirements with ¼ inch gap	800 ampere turns/inch approx.
Distance from Modulator Grid Aperture to Centre of Focus Coil Gap	2¼ inches approx.
Field Strength for Ion-Trap Magnet*	63 gauss

* *Centre of ion-trap magnet not less than 4.5 inches from reference line. Suitable magnet is the IT9 supplied by Messrs. ELAC Ltd.*

INTER-ELECTRODE CAPACITANCES

Grid to all	6.0 pF
Cathode to all	5.0 pF
Final Anode to External Coating	1,500 pF

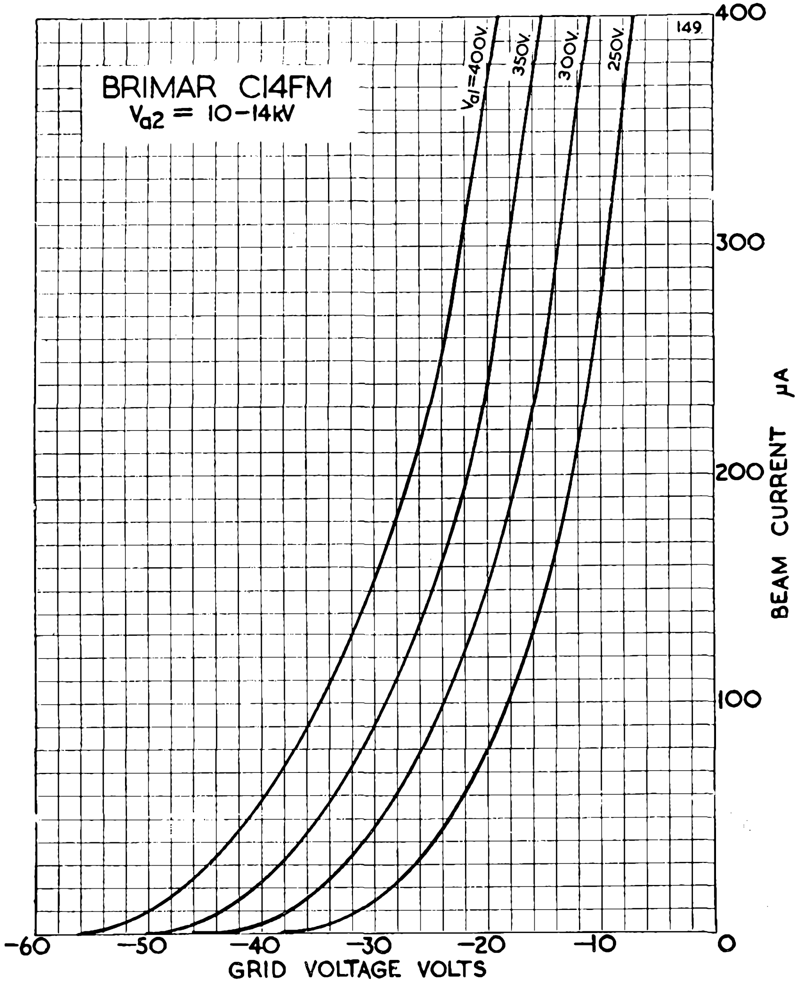
DIMENSIONS

Dimensions are the same as the C14BM, except that the overall length may be $\frac{1}{16}$ inch less.

NOTE : Tubes having a tinted faceplate will have a recessed type anode side-cap, type CT8.

ADJUSTMENT OF ION-TRAP MAGNET

The magnet should be located on the neck with the arrow pointing towards the screen along the line marked on the neck and between the top of the base shell and the line marked parallel to it. With an unmodulated raster the magnet should be slid up the neck to give the brightest picture. It may be necessary to re-adjust the focus during this operation and after doing so the magnet setting should again be adjusted for optimum brightness. It is important to set the ion-trap magnet correctly, as incorrect positioning may lead to premature failure of the tube.


BRIMAR C14FM
V_{a2} = 10–14kV
V_{a1}=400V.
350V.
300V.
250V.
149.
400
300
200
100
0
BEAM CURRENT μA
−60
−50
−40
−30
−20
−10
GRID VOLTAGE VOLTS

Current Equipment Type

TYPE **C14HM/1**
B12A (DUODECAL) BASE

The C14HM/1 is a wide angle Teletube with a tetrode gun, ion trap, aluminized screen, and external conductive coating, for use in television picture monitors and similar applications. This tube is manufactured to a strict specification and is capable of providing high-grade pictures for television monitoring and industrial purposes.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.6 amps.
Final Anode Voltage (V_{a2})	14 kilovolts max.
Final Anode Voltage (V_{a2})	12 kilovolts min.
First Anode Voltage (V_{a1})	410 volts max.
First Anode Voltage (V_{a1})	250 volts min.
Beam Current	250 μ A max.
Grid Voltage (Vg)	—2 volts max.
Peak Heater—Cathode Voltage (V_{hk})	180 volts max.
Peak Heater—Cathode Voltage (V_{hk})†	410 volts max.
Diagonal Deflection Angle	70° approx.

† *Heater negative with respect to cathode and only during a warm-up period not exceeding 15 seconds.*

OPERATING CHARACTERISTICS

Final Anode Voltage	14 kilovolts
First Anode Voltage	300 volts
Peak to Peak Modulation for beam current of 150 μA ...	30 volts
Grid Voltage Limits for Spot Cut-off	—55 to —77 volts
Field strength of Ion-Trap Magnet	45 gauss approx.

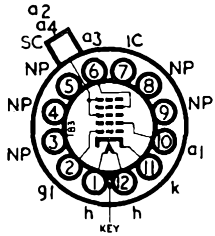
INTER-ELECTRODE CAPACITANCES

Grid to all	9.0 pF max.
Cathode to all	6.0 pF max.
Final Anode to external coating	1,500 pF max.

NOTES:

1. The ion-trap magnet should be adjusted to give the brightest picture. Failure to do this may shorten the life of the tube.
2. The spot shape depends to some extent upon the ion-trap magnet. A suitable type is the integral moulded ring type, which is magnetised at opposite ends of a diameter and gives a more uniform field than types using a single magnet with pole pieces.

Current Equipment Type



TYPE C14PM
B12A (DUODECAL) BASE

The BRIMAR C14PM is a rectangular 70° deflection angle teletube with electrostatic focus, an ion trap, aluminised screen and external conductive coating. The screen colour is white, with a grey glass faceplate with a transmission of approximately 70 per cent.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Final Anode Voltage (V_{a2+4})	18 kV max.
Final Anode Voltage (V_{a2+4})	12 kV min.
Focus Anode Voltage (V_{a3})	—500 to 1,000 volts max.
First Anode Voltage (V_{a1})	500 volts max.
First Anode Voltage (V_{a1})	200 volts min.
Grid Voltage (V_g), Peak	2 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Positive ...	200 volts
Heater to Cathode Voltage (V_{hk}) Cathode Postitive †	410 volts
Heater to Cathode Voltage (V_{hk}) Cathode Negative...	180 volts
Diagonal Deflection Angle	70° approx.

† During warm-up, for a period not exceeding 15 seconds.

OPERATING CHARACTERISTICS

Final Anode Voltage	16 kilovolts
Focus Anode Voltage	300 volts
First Anode Voltage	300 volts
Peak to Peak Modulating Voltage for Beam Current of 150 μA	30 volts
Grid Voltage to cut off Beam Current	—33 to —77 volts
Field Strength of Ion-Trap Magnet	63 gauss

INTER-ELECTRODE CAPACITANCES

Grid to all	9.0 pF max.
Cathode to all	6.0 pF max.
Final Anode to External Coating	1,500 pF max.

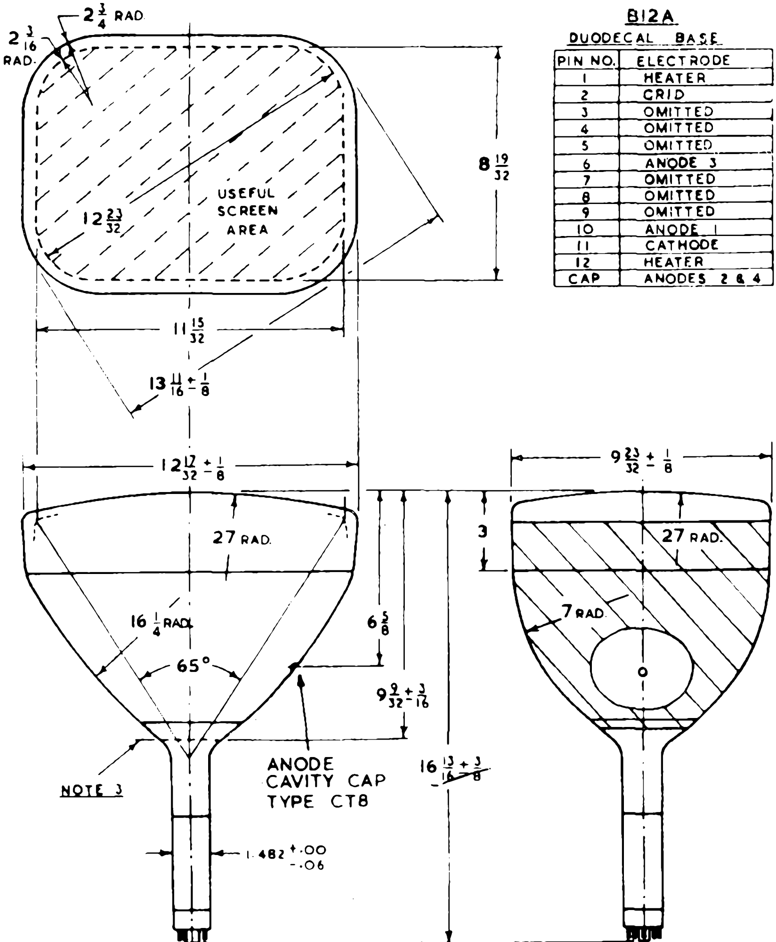
NOTES:

A. No harmful X-ray radiation is produced by this tube when operated at final anode voltages below 16 kV. At voltages above 16 kV some shielding may be necessary to protect against prolonged exposure at close range.

B. The ion-trap magnet should be adjusted to give the brightest picture. Failure to do this may shorten the life of the tube.

C. Shift magnets, when used, should be mounted in such a position that they do not interfere with the ion trap. This position is, normally, mounted immediately behind the scanning coils.

VAD/392.23



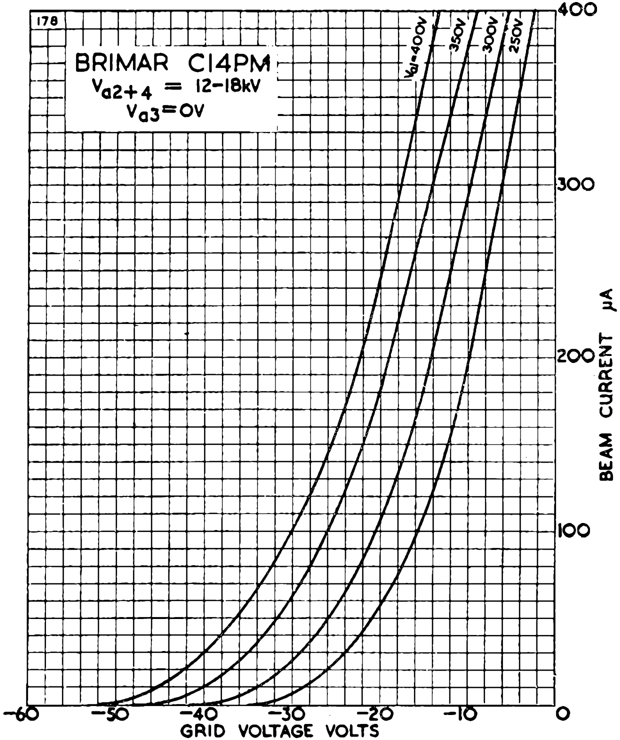
B12A

DUODECAL BASE

PIN NO.	ELECTRODE
1	HEATER
2	GRID
3	OMITTED
4	OMITTED
5	OMITTED
6	ANODE 3
7	OMITTED
8	OMITTED
9	OMITTED
10	ANODE 1
11	CATHODE
12	HEATER
CAP	ANODES 2 & 4

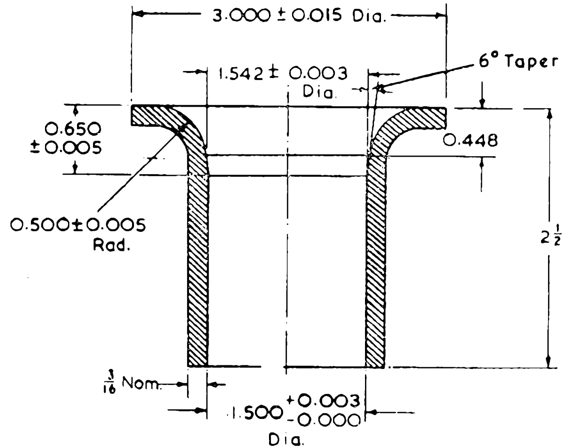
NOTE

1. ALL DIMENSIONS IN INCHES
2. ANODES 2 & 4 CAP IN LINE ± 10° WITH BASE PIN NO 6
3. REFERENCE LINE DETERMINED BY POSITION OF GAUGE D.D.705. (SEE VAD/392.12)



REFERENCE LINE GAUGE

DD 705



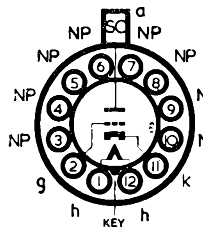
Note

1. All dimensions in inches.
2. Reference line determined by position where gauge rests on bulb cone. This gauge is also used to test neck ext. dia and straightness, and base alignment.

Replacement Type

TYPE C17BM

B12A (DUODECAL) BASE



RECTANGULAR WIDE ANGLE DEFLECTION TELETUBE WITH ALUMINIZED SCREEN AND EXTERNAL CONDUCTIVE COATING

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.6 amp.
Anode Voltage	17.5 kV abs. max.
Anode Voltage	12.0 kV min.
Beam Current	250 μA max.
Grid Voltage	–2 volts min.
Diagonal Deflection Angle	70° approx.
Peak Heater to Cathode Potential	150 volts max.
Peak Heater to Cathode Potential*	410 volts max.

* *Heater Negative with respect to cathode and only during warm-up period of 15 secs. maximum duration.*

OPERATING CHARACTERISTICS

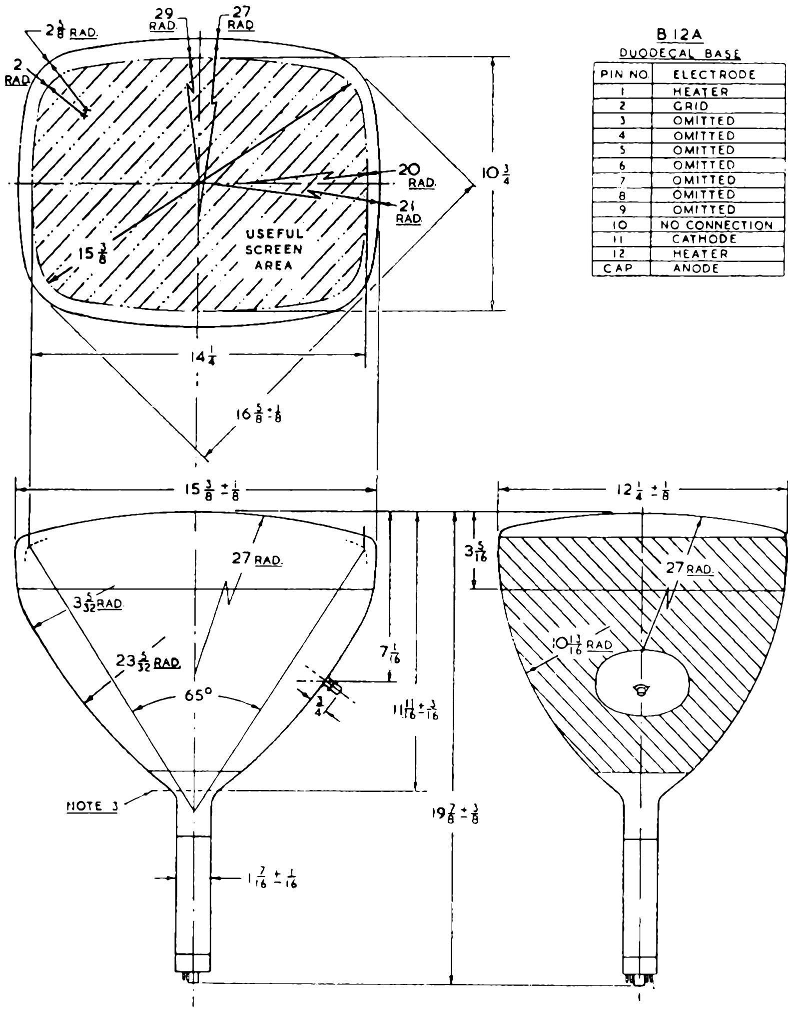
Anode Voltage	16 kV
Grid Voltage Limits for cut-off	–50 to –100 volts
Peak to Peak modulation for beam current of 150μA ...	30 volts
Focusing requirements with $\frac{1}{4}$-inch gap	850 amp. turns approx.
Distance from modulator grid aperture to centre of coil gap	2 inches approx.
Scanning power for coil of mean length $2\frac{1}{4}$ inches ...	25 amp. turns per inch approx.
Distance from modulating grid aperture to reference line	5.4 inches $\pm$ $\frac{1}{8}$ inch

INTER-ELECTRODE CAPACITANCES

Grid to all	9.0 pF max.
Cathode to all	7.0 pF max.
Anode to external coating	1,500 pF

VAD/392.15

CATHODE RAY TUBE C 17 BM



B 12A

DUODECAL BASE

PIN NO.	ELECTRODE
1	HEATER
2	GRID
3	OMITTED
4	OMITTED
5	OMITTED
6	OMITTED
7	OMITTED
8	OMITTED
9	OMITTED
10	NO CONNECTION
11	CATHODE
12	HEATER
CAP	ANODE

NOTE 1. ALL DIMENSIONS IN INCHES

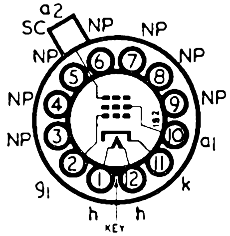
2. ANODE CAP IN LINE ± 10° WITH VACANT BASE PIN POSITION NO. 6.

3. REFERENCE LINE DETERMINED BY POSITION OF GAUGE NO. DD.705. (SEE VAD/392.12)

Replacement Type

TYPE C17FM

B12A (DUODECAL) BASE



Rectangular Wide Angle Deflection Teletube with tetrode gun, ion trap, aluminized screen and external conductive coating.

RATINGS

Heater Voltage*	12.6 volts
Heater Current	0.3 amps.
Final Anode Voltage (V_{a2})	17.5 kV absolute max.
Final Anode Voltage (V_{a2})	12 kV min.
First Anode Voltage (V_{a1})	410 volts max.
Beam Current	250 μA max.
Grid Voltage	—2 volts min.
Peak Heater to Cathode Potential	150 volts max.
Peak Heater to Cathode Potential†	380 volts max.
Diagonal Deflection Angle	70 degrees approx.

* *Under series operated conditions, the maximum heater voltage must not exceed 15 volts R.M.S. This may be ensured by the use of a suitable Brimistor to reduce the switching surge.*

† *Heater negative with respect to cathode and only during warm-up period not exceeding 15 secs.*

OPERATING CHARACTERISTICS

Final Anode Voltage	14 kV
First Anode Voltage	300 volts
Peak to Peak Modulation for Beam Current of 150 μA	30 volts
Grid Voltage Limits for Spot Cut-off	—33 to —77 volts
Scanning Power for Coil of Mean Length 2¼ inches	25 ampere turns/inch approx.
Focusing requirements with ¼ inch Gap	850 ampere turns/inch approx.
Distance from Modulator Grid Aperture to Centre of Focus Coil Gap	2¼ inches approx.
Field Strength of Ion-Trap Magnet*	63 gauss

* *Centre of ion-trap magnet not less than 4.5 inches from reference line. Suitable magnet is the IT9 supplied by Messrs. ELAC Ltd.*

INTER-ELECTRODE CAPACITANCES

Grid to all	6.0 pF
Cathode to all	5.0 pF
Final Anode to External Coating	1,500 pF

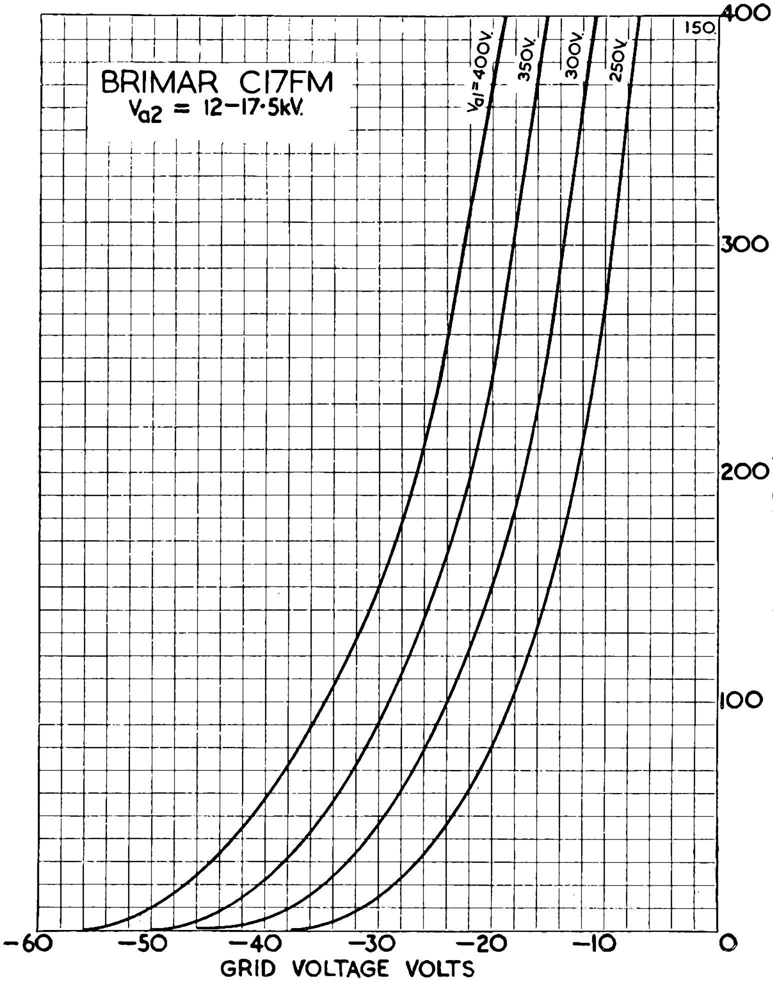
DIMENSIONS

Dimensions are the same as the C17BM, except that the overall length may be $\frac{11}{16}$ inch less

NOTE : Tubes having a tinted faceplate will have a recessed type anode side-cap, type CT8.

ADJUSTMENT OF ION-TRAP MAGNET

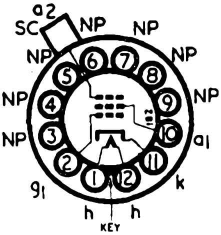
The magnet should be located on the neck with the arrow pointing towards the screen along the line marked on the neck and between the top of the base shell and the line marked parallel to it. With an unmodulated raster the magnet should be slid up the neck to give the brightest picture. It may be necessary to re-adjust the focus during this operation and after doing so the magnet setting should again be adjusted for optimum brightness. It is important to set the ion-trap magnet correctly, as incorrect positioning may lead to premature failure of the tube.



BRIMAR C17FM
V_{a2} = 12–17·5kV.
V_{a1}=400V.
350V.
300V.
250V.
150.
400
300
200
100
0
BEAM CURRENT µA
−60
−50
−40
−30
−20
−10
GRID VOLTAGE VOLTS

Current Equipment Type

TYPE C17HM/1
B12A (DUODECAL) BASE



The C17HM/1 is a wide angle Teletube with a tetrode gun, ion trap, aluminized screen, and external conductive coating, for use in television picture monitors and similar applications. This tube is manufactured to a strict specification and is capable of providing high-grade pictures for television monitoring and industrial purposes.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.6 amps.
Final Anode Voltage (V_{a2})	16 kilovolts max.
Final Anode Voltage (V_{a2})	14 kilovolts min.
First Anode Voltage (V_{a1})	410 volts max.
First Anode Voltage (V_{a1})	250 volts min.
Beam Current	250 μA max.
Grid Voltage (Vg)	—2 volts max.
Peak Heater—Cathode Voltage (V_{hk})	180 volts max.
Peak Heater—Cathode Voltage (V_{hk})†	410 volts max.
Diagonal Deflection Angle	70° approx.

† Heater negative with respect to cathode and only during a warm-up period not exceeding 15 seconds

OPERATING CHARACTERISTICS

Final Anode Voltage	16 kilovolts
First Anode Voltage	300 volts
Peak to Peak Modulation for Beam Current of 150 μA	30 volts
Grid Voltage limits for Spot Cut-off	—55 to —77 volts
Field Strength of Ion-Trap Magnet	45 gauss approx.

INTER-ELECTRODE CAPACITANCES

Grid to all	9.0 pF max.
Cathode to all	6.0 pF max.
Final Anode to External Coating	1,500 pF max.

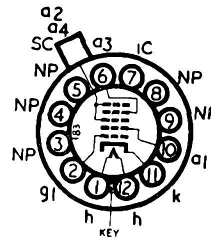
NOTES:

1. The ion trap should be adjusted to give the brightest picture. Failure to do this may shorten the life of the tube.
2. The spot shape depends to some extent upon the ion-trap magnet. A suitable type is the integral moulded ring type which is magnetised at opposite ends of a diameter and gives a more uniform field than types using a single magnet with pole pieces.

Replacement Type

TYPE C17JM

B12A (DUODECAL) BASE



Rectangular Wide Angle Deflection, Electrostatic Focus Teletube, with Ion trap, aluminized screen and external conductive coating.

RATINGS

Heater Voltage ...	6.3 volts
Heater Current ...	0.6 amp.
Final Anode Voltage (V_{a2+4}) ...	17.5 kV absolute max.
Final Anode Voltage (V_{a2+4}) ...	12 kV min.
Focus Anode Voltage (V_{a3}) ...	—500 volts max. + 1,000 volts max.
First Anode Voltage (V_{a1}) ...	410 volts max. 200 volts min.
Beam Current ...	250 μA max.
Grid Voltage ...	—2 volts max.
Peak Heater to Cathode Potential ...	150 volts max.
Peak Heater to Cathode Potential† ...	380 volts max.
Diagonal Deflection Angle ...	70 degrees approx.

† *Heater negative with respect to cathode and only during warm-up period not exceeding 15 secs.*

OPERATING CHARACTERISTICS

Final Anode Voltage ...	14 kV
Focus Anode Voltage ...	—64 volts to + 350 volts
First Anode Voltage ...	300 volts
Peak to Peak Modulation for beam current of 150 μA ...	30 volts
Grid Voltage Limits for spot cut-off ...	—33 to —77 volts
Scanning Power for coil of mean length 2¼" ...	25 ampere turns/ inch approx.
Field Strength of Ion-Trap Magnet* ...	63 gauss

* *Suitable magnet is the IT9 supplied by Messrs. ELAC Ltd.*
Note.—Picture shifting devices should operate in space on neck within 3 inches of the reference line.

INTER-ELECTRODE CAPACITANCES

Grid to all ...	9.0 pF max.
Cathode to all ...	6.0 pF max.
Final Anode to external coating ...	1,500 pF max.

DIMENSIONS

Dimensions are the same as the C17BM, except that the overall length is $\frac{11}{16}$" less.

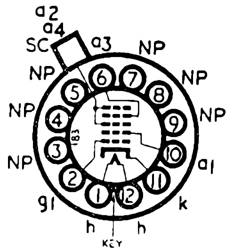
NOTE: Tubes having a tinted faceplate will have a recessed type anode side-cap, type CT8.

ADJUSTMENT OF ION-TRAP MAGNET

The magnet should be located on the neck with the arrow pointing towards the screen along the line marked on the neck, and between the top of the base shell and the line marked parallel to it. With an unmodulated raster the magnet should be slid up the neck to give the brightest picture. It may be necessary to re-adjust the focus during this operation and after doing so the magnet setting should again be adjusted for optimum brightness. It is important to set the ion-trap magnet correctly, as incorrect positioning may lead to premature failure of the tube.

Current Equipment Type

TYPE C17LM
B12A (DUODECAL) BASE



The BRIMAR C17LM is a rectangular 70° deflection angle Teletube with electrostatic focus, an aluminized screen and external conductive coating. The screen colour is white, with a grey glass faceplate with a transmission of approximately 70 per cent.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amps.
Final Anode Voltage (V_{a2+4})	18 kilovolts max.
Final Anode Voltage (V_{a2+4})	12 kilovolts min.
Focus Anode Voltage (V_{a3})	—500 to 1,000 volts max.
First Anode Voltage (V_{a1})	500 volts max.
First Anode Voltage (V_{a1})	200 volts min.
Grid Voltage (V_g), Peak	2 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Positive ...	200 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Positive *	410 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Negative...	180 volts max.
Diagonal Deflection Angle	70° approx.

** During warm-up, for a period not exceeding 15 seconds*

OPERATING CHARACTERISTICS

Final Anode Voltage	16 kilovolts
Focus Anode Voltage	400 volts
First Anode Voltage	400 volts
Peak to Peak Modulating Voltage for Beam Current of 150μA	30 volts
Grid Voltage to cut-off Beam Current	—33 to —77 volts

INTER-ELECTRODE CAPACITANCES

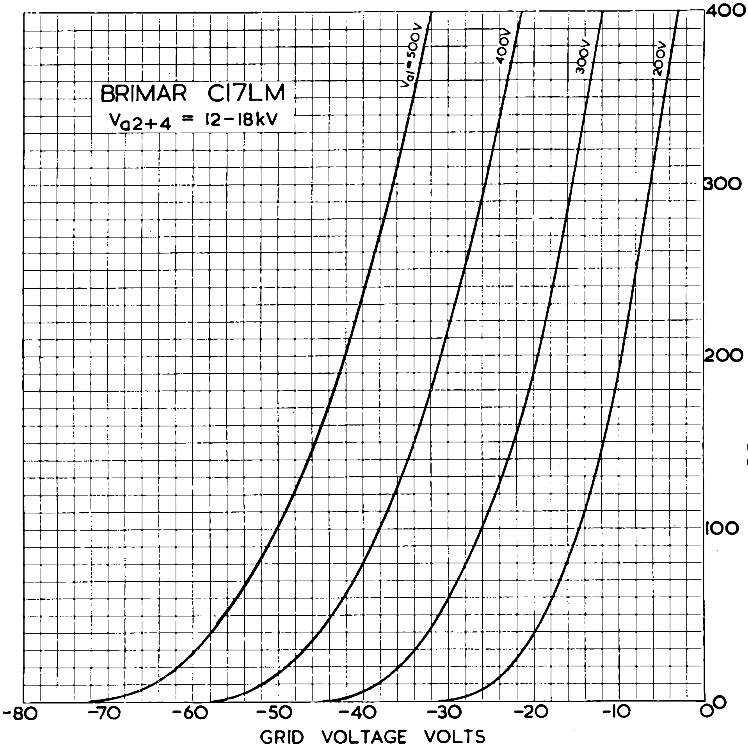
Grid to all	7 pF approx.
Cathode to all	5 pF approx.
Final Anode to External Coating	1,500 pF approx.

NOTES:

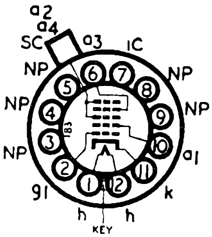
A. No harmful X-ray radiation is produced by the tube when operated at final anode voltage below 16 kV. At voltages above 16 kV some shielding may be necessary to protect against prolonged exposure at close range.

B. Shift magnets, when used, should be mounted in such a position that they do not interfere with the passage of the electron beam through the gun. This position is normally immediately behind the scanning coils.

For dimensions, see type C17PM.


BRIMAR C17LM
V_{a2+4} = 12-18kV
V_{a1}=500V
400V
300V
200V
400
300
200
100
0
BEAM CURRENT μA
-80
-70
-60
-50
-40
-30
-20
-10
0
GRID VOLTAGE VOLTS

Current Equipment Type



TYPE C17PM
B12A (DUODECAL) BASE

The BRIMAR C17PM is a rectangular 70° deflection angle teletube with electrostatic focus, an ion trap, aluminized screen and external conductive coating. The screen colour is white, with a grey glass faceplate with a transmission of approximately 70 per cent.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Final Anode Voltage (V_{a2+4})	18 kV max.
Final Anode Voltage (V_{a2+4})	12 kV min.
Focus Anode Voltage (V_{a3})	—500 to 1,000 volts max.
First Anode Voltage (V_{a1})	500 volts max.
First Anode Voltage (V_{a1})	200 volts min.
Grid Voltage (V_g) Peak	2 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Positive	200 volts
Heater to Cathode Voltage (V_{hk}) Cathode Positive †	410 volts
Heater to Cathode Voltage (V_{hk}) Cathode Negative	180 volts
Diagonal Deflection Angle	70° approx.

† During warm-up, for a period not exceeding 15 seconds.

OPERATING CHARACTERISTICS

Final Anode Voltage	16 kilovolts
Focus Anode Voltage	300 volts
First Anode Voltage	300 volts
Peak to Peak Modulating Voltage for Beam Current of 150 μA	30 volts
Grid Voltage to cut-off Beam Current	—33 to —77 volts
Field Strength of Ion-Trap Magnet	63 gauss

INTER-ELECTRODE CAPACITANCES

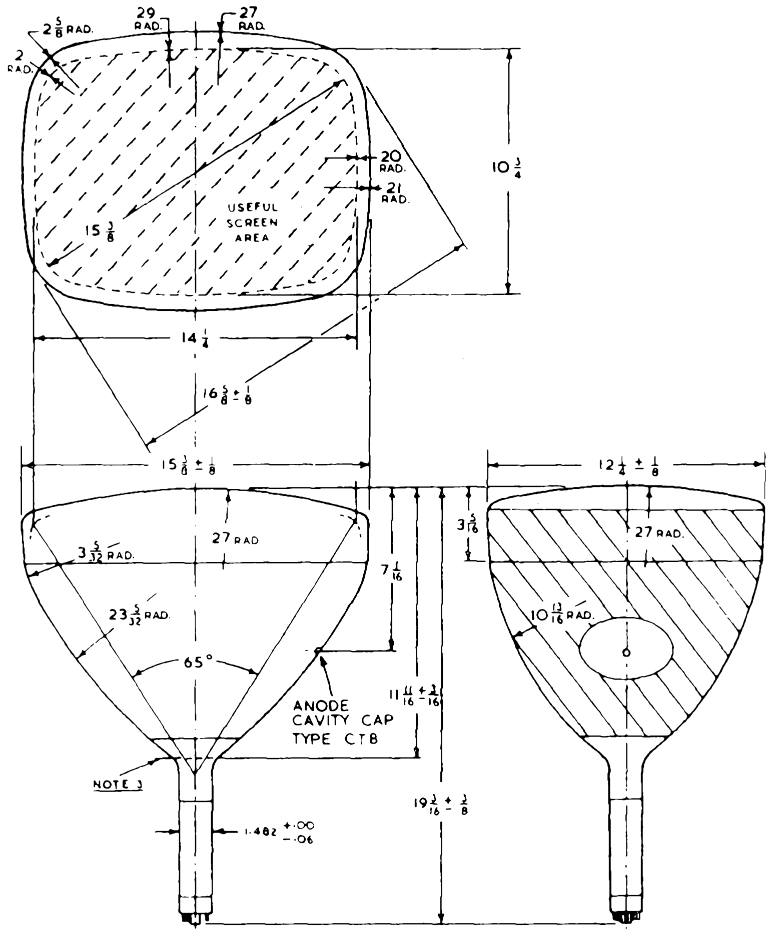
Grid to all	9.0 pF max.
Cathode to all	6.0 pF max.
Final Anode to external Coating	1,500 pF max.

NOTES:

A. No harmful X-ray radiation is produced by this tube when operated at final anode voltages below 16 kV. At voltages above 16 kV some shielding may be necessary to protect against prolonged exposure at close range.

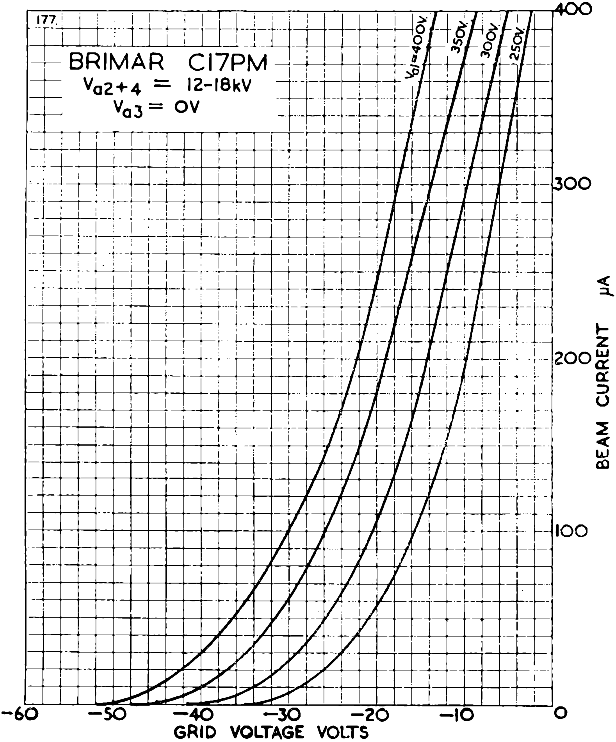
B. The ion-trap magnet should be adjusted to give the brightest picture. Failure to do this may shorten the life of the tube.

C. Shift magnets, when used, should be mounted in such a position that they do not interfere with the ion trap. This position is normally mounted immediately behind the scanning coils.



NOTE

1. ALL DIMENSIONS IN INCHES.
2. ANODES 2 & 4 CAP IN LINE ± 10° WITH BASE PIN NO 6.
3. REFERENCE LINE DETERMINED BY POSITION OF GAUGE NO. D.D. 705. (SEE VAD/392.12)

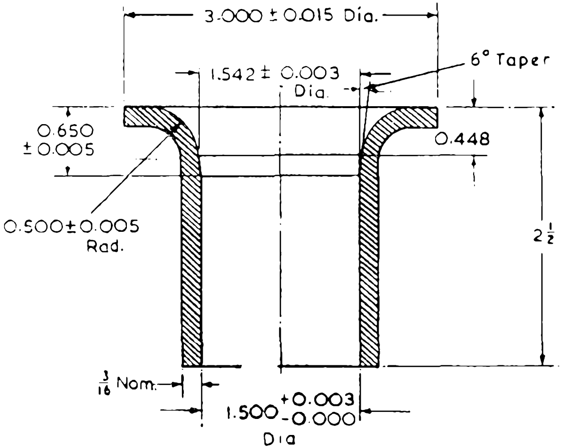


177.
BRIMAR C17PM
Va2+4 = 12-18kV
Va3 = 0V
Va1=400V.
350V.
300V.
250V.
400
300
200
100
0
BEAM CURRENT μA
−60
−50
−40
−30
−20
−10
0
GRID VOLTAGE VOLTS

V.A.D./392.12

REFERENCE LINE GAUGE

DD 705



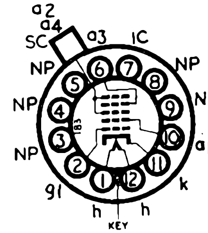
Note

1. All dimensions in inches.
2. Reference line determined by position where gauge rests on bulb cone. This gauge is also used to test neck ext. dia and straightness, and base alignment.

C17PM

Current Equipment Type

TYPE **C17SM**
B12A (DUODECAL) BASE



The Brimar C17SM is a rectangular 90° deflection angle teletube with electrostatic focus, an aluminized screen and external conductive coating. The screen colour is white with a grey glass faceplate with a transmission of approximately 70 per cent.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amps.
Final Anode Voltage (V_{a2+4})	18 kilovolts max.
Final Anode Voltage (V_{a2+4})	12 kilovolts min.
Focus Anode Voltage (V_{a3})	—500 to 1,000 volts max.
First Anode Voltage (V_{a1})	500 volts max.
First Anode Voltage (V_{a1})	200 volts min.
Grid Voltage (V_g) Peak	2 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Positive	200 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Postitive *	410 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Negative	180 volts max.
Diagonal Deflection Angle	90° approx.

* *During warm-up, for a period not exceeding 15 seconds.*

OPERATING CHARACTERISTICS

Final Anode Voltage	16 kilovolts
Focus Anode Voltage	300 volts
First Anode Voltage	300 volts
Peak to Peak Modulating Voltage for Beam Current of 150 μA	30 volts
Grid Voltage to cut-off Beam Current	—33 to —77 volts

INTER-ELECTRODE CAPACITANCES

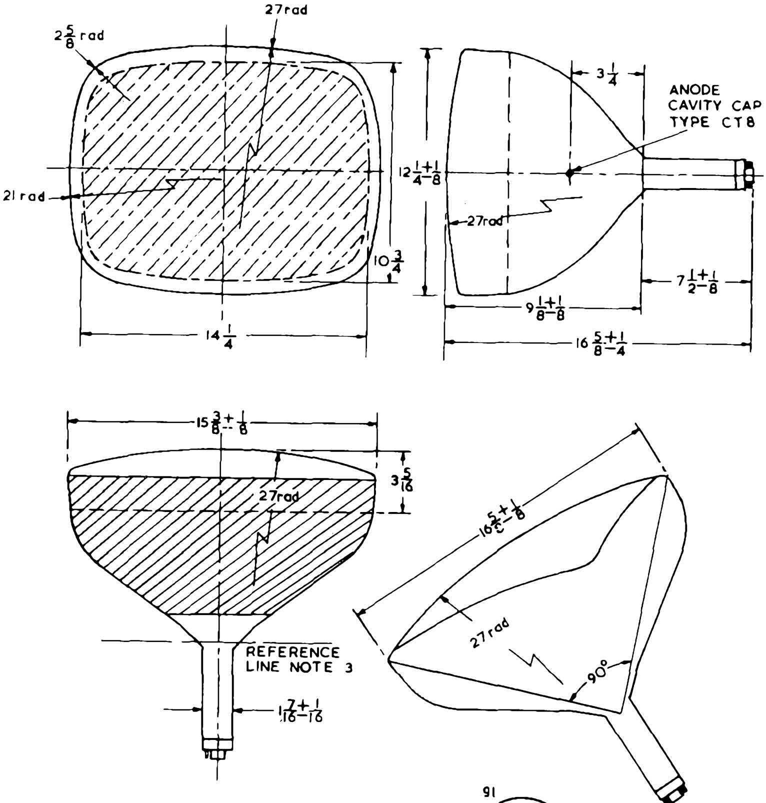
Grid to all	9.0 pF max.
Cathode to all	6.0 pF max.
Final Anode to External Coating	1,500 pF max.

NOTES:

A. No harmful X-ray radiation is produced by this tube when operated at final anode voltages below 16 kV. At voltages above 16 kV some shielding may be necessary to protect against prolonged exposure at close range.

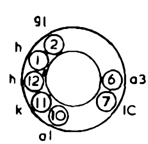
B. Shift magnets when used should be mounted in such a position that they do not interfere with the passage of the electron beam through the gun. This position is normally immediately behind the scanning coils.

VAD/392 50



NOTES

1 ALL DIMENSIONS IN INCHES
2 ANODE CAVITY CAP IN LINE ± 30° WITH VACANT BASE PIN No 6
3 REFERENCE LINE DETERMINED BY POSITION OF GUAGE RETMA No 116

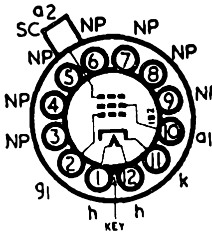


B12A
DUODECAL BASE

Replacement Type

TYPE C21HM

B12A (DUODECAL) BASE



RECTANGULAR WIDE ANGLE DEFLECTION TELETUBE WITH ALUMINIZED SCREEN AND EXTERNAL CONDUCTIVE COATING

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.6 amp. (nom.)
Final Anode Voltage (V_{a2})*	18,000 volts max.
Final Anode Voltage (V_{a2})	14,000 volts min.
First Anode Voltage (V_{a1})	500 volts max.
First Anode Voltage (V_{a1})	250 volts min.
Beam Current	250 μA max.
Peak Heater to Cathode Potential	180 volts max.
Peak Heater to Cathode Potential†	410 volts max.
Grid Voltage	—2 volts min.
Grid-Cathode Circuit Resistance	1 megohm max.
Diagonal Deflection Angle	70° approx.

** No harmful X-ray radiation is produced by this tube when operated at final anode voltages not greater than 16 kV. At voltages above 16 kV some shielding may be necessary to protect against possible injury from prolonged exposure at close range.*

† Heater Negative with respect to cathode and only during warm-up period of 15 secs. maximum duration.

OPERATING CONDITIONS

Final Anode Voltage	16,000 volts
First Anode Voltage	300 volts
Peak to Peak Modulation for Beam Current of 150 μA...	30 volts
Grid Voltage Limits for Spot Cut-off	—33 to —77 volts
Focusing requirements with $\frac{1}{4}''$ gap	750 amp. turns approx.
Distance from Modulator Grid Aperture to Centre of Focus Coil Gap	$2\frac{1}{4}''$ approx.
Field Strength of Ion-Trap Magnet**	63 gauss

***Centre of ion-trap magnet not less than 4.5 inches from reference line. Suitable magnet is the IT9 supplied by Messrs. ELAC Ltd.*

INTER-ELECTRODE CAPACITANCES

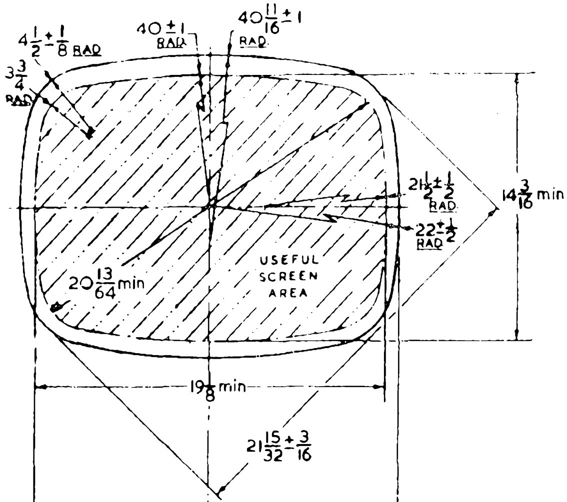
Grid to all	9.0 max.
Cathode to all	6.0 max.
External Conducting Coating to all	1,000 pF max.

ADJUSTMENT OF ION-TRAP MAGNET

The magnet should be located on the neck with the arrow pointing towards the screen along the line marked on the neck and between the top of the base shell and the line marked parallel to it. With an unmodulated raster the magnet should be slid up the neck to give the brightest picture. It may be necessary to re-adjust the focus during this operation and after doing so the magnet setting should again be adjusted for optimum brightness. It is important to set the ion-trap magnet correctly, as incorrect positioning may lead to premature failure of the tube.

VAD/392-27

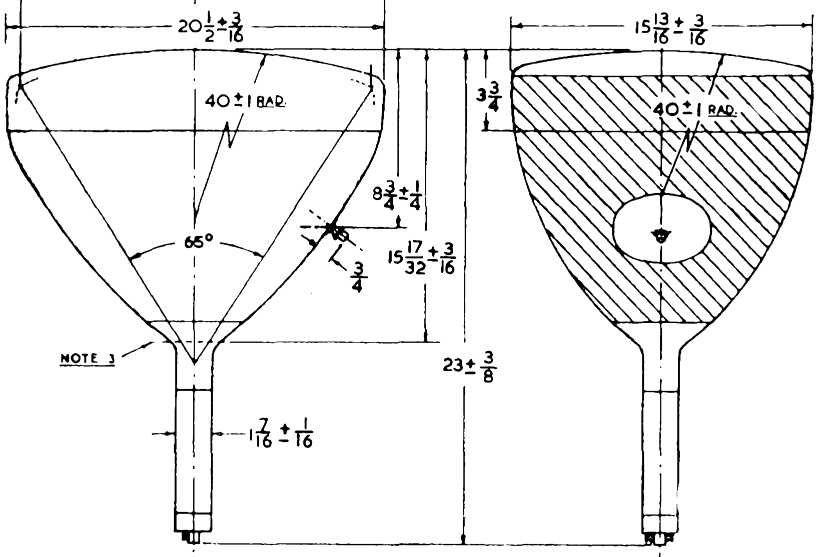
CATHODE RAY TUBE C21HM



B12A

DUODECAL BASE

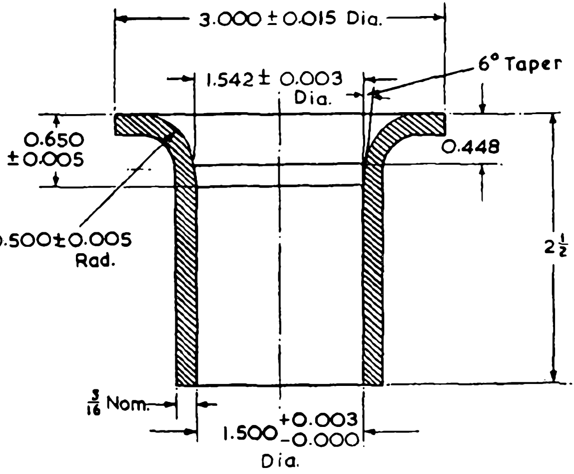
PIN NO.	ELECTRODE
1	HEATER
2	GRID
3	OMITTED
4	OMITTED
5	OMITTED
6	OMITTED
7	OMITTED
8	OMITTED
9	OMITTED
10	ANODE 1
11	CATHODE
12	HEATER
CAP	ANODE 2



NOTE
1. ALL DIMENSIONS IN INCHES.
2. ANODE CAP IN LINE $\pm$ 10° WITH VACANT BASE PIN POSITION No. 6.
3. REFERENCE LINE DETERMINED BY POSITION OF GAUGE No. DD. 705. (SEE VAD./392.12)
4. ON TUBES WITH TINTED FACEPLATE THE ANODE CAP WILL BE RECESSED TYPE CT8.

REFERENCE LINE GAUGE

For use in conjunction with wide angle tubes having a 1½" neck, i.e. types C14BM, C14FM, C17BM, C17FM, C17JM and C21HM.



Note: All dimensions in inches.

Use of Reference Line Gauge

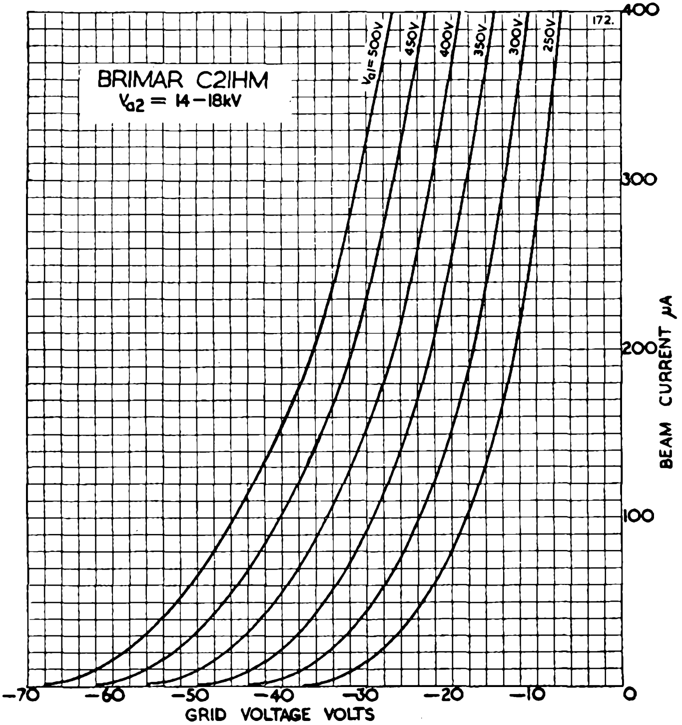
In order to ensure that correctly dimensioned deflector coils will fit all cathode ray tubes of any one type, a reference line gauge is specified. This checks for maximum neck diameter, straightness of neck and alignment of base and neck.

Deflector coils should be designed to pass over a mandrel which will fit the internal dimensions of the reference line gauge.

The position of the reference line is defined as the distance between the centre of the face of the bulb and the plane of the flared end of the gauge when the tube neck has been inserted into that end.

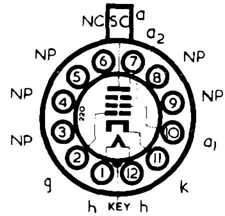
BRIMAR

C21HM


BRIMAR C21HM
V_{a2} = 14–18kV
V_{a1}=500V
450V
400V
350V
300V
250V
172.
400
300
200
100
0
BEAM CURRENT μA
–70
–60
–50
–40
–30
–20
–10
GRID VOLTAGE VOLTS

Replacement Type

TYPE **C21NM**
B12A (DUODECAL) BASE



The BRIMAR C21NM is a rectangular 70° deflection angle Teletube with magnetic focus, a pentode gun incorporating an ion trap, aluminized screen and external conductive coating. The screen colour is white, with a grey glass faceplate with a transmission of approximately 67 per cent.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amps.
Final Anode Voltage (V_{a3})	18 kilovolts max.
Final Anode Voltage (V_{a3})	12 kilovolts min.
First Anode Voltage (V_{a1})	500 volts max.
First Anode Voltage (V_{a1})	200 volts min.
Pre-focus Anode Voltage (V_{a2})	500 volts max.
Pre-focus Anode Voltage (V_{a2})	—100 volts min.
Grid Voltage (Vg)	0 volts max.
Grid Voltage (Vg)	—150 volts min.
Grid Voltage, Postive Peak	2 volts max.
Heater to Cathode Voltage (V_{h-k}) Cathode Positive ...	180 volts max.
Heater to Cathode Voltage (V_{h-k}) Cathode Positive *	410 volts max.
Heater to Cathode Voltage (V_{h-k}) Cathode Negative	125 volts max.
Grid Circuit Resistance	1.5 megohms max.
Heater to Cathode Circuit Impedance	10 kilohms max.

* *During warm-up, for a period not exceeding 15 seconds.*

OPERATING CHARACTERISTICS

Final Anode Voltage	16 kilovolts
First Anode Voltage	400 volts
Pre-focus Anode Voltage	400 volts
Grid Voltage to cut off Beam Current	—53 to —105 volts
Field Strength of Ion-Trap Magnet	60 gauss approx.

INTER-ELECTRODE CAPACITANCES

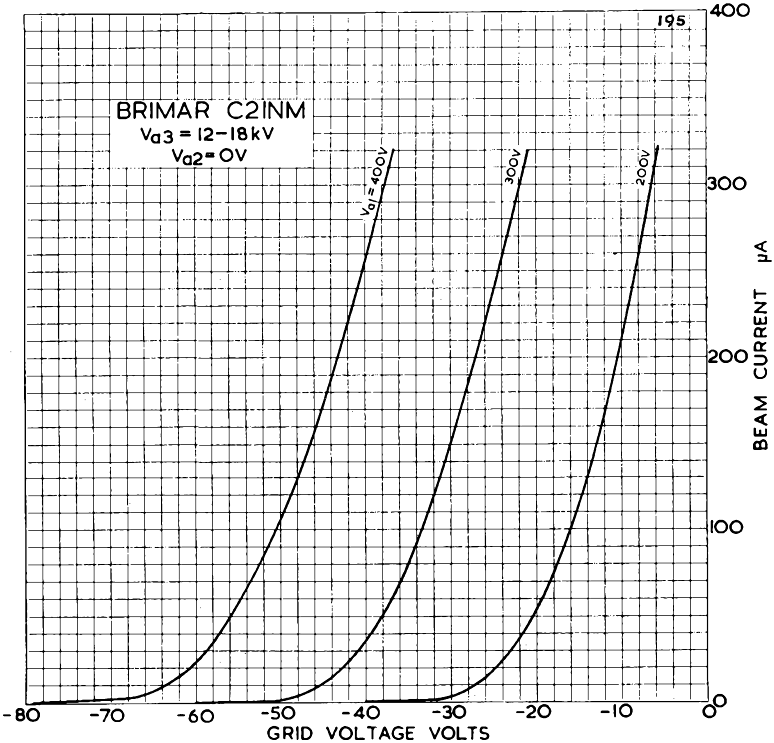
Grid to all	7 pF approx.
Cathode to all	7 pF approx.
Final Anode to External Coating	750-2,000 pF

NOTES:

A. No harmful X-ray radiation is produced by this tube when operated at final anode voltages below 16 kV. At voltages above 16 kV some shielding may be necessary to protect against prolonged exposure at close range.

(Outline drawing as for C21HM or C21TM.)

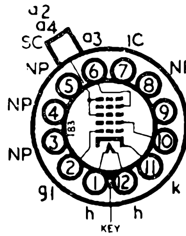
B. The ion-trap magnet should be adjusted to give the brightest picture. Failure to do this may shorten the life of the tube.


195
BRIMAR C21NM
Va3 = 12-18kV
Va2 = 0V
Va1 = 400V
300V
200V
400
300
200
100
0
BEAM CURRENT μA
-80
-70
-60
-50
-40
-30
-20
-10
0
GRID VOLTAGE VOLTS

Current Equipment Type

TYPE C21SM

B12A (DUODECAL) BASE



The BRIMAR C21SM is a rectangular 90° deflection angle teletube with electrostatic focus, an aluminized screen and external conductive coating. The screen colour is white with a grey glass faceplate with a transmission of approximately 70 per cent.

RATINGS

Heater Voltage	6.3 volts
Heater Current	0.3 amp.
Final Anode Voltage (V_{a2+4})	18 kV max.
Final Anode Voltage (V_{a2+4})	14 kV min.
Focus Anode Voltage (V_{a3})	—500 to 1,000 volts max.
First Anode Voltage (V_{a1})	500 volts max.
First Anode Voltage (V_{a1})	200 volts min.
Grid Voltage (V_g), Peak	2 volts max.
Heater to Cathode Voltage (V_{hk}) Cathode Positive ...	200 volts
Heater to Cathode Voltage (V_{hk}) Cathode Positive *	410 volts
Heater to Cathode Voltage (V_{hk}) Cathode Negative...	180 volts
Diagonal Deflection Angle	90° approx.

** During warm-up, for a period not exceeding 15 seconds.*

OPERATING CHARACTERISTICS

Final Anode Voltage	18 kilovolts
Focus Anode Voltage	300 volts
First Anode Voltage	300 volts
Peak to Peak Modulating Voltage for Beam Current of 150 μA	30 volts
Grid Voltage to cut off Beam Current	—33 to —77 volts

INTER-ELECTRODE CAPACITANCES

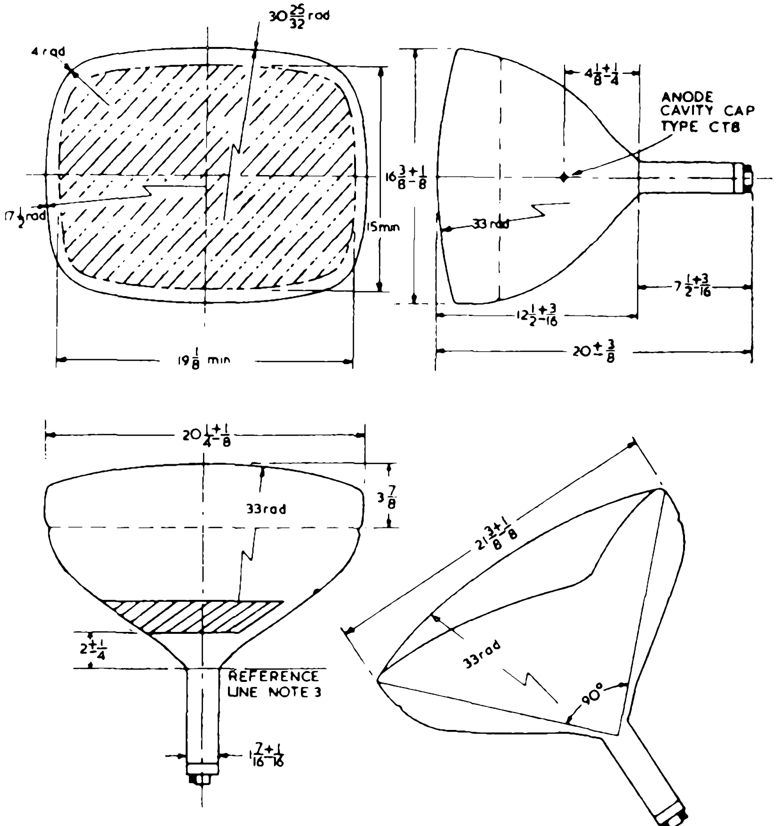
Grid to all	7 pF approx.
Cathode to all	5 pF approx.
Final Anode to External Coating	700 pF approx.

NOTES:

A. No harmful X-ray radiation is produced by this tube when operated at final anode voltages below 16 kV. At voltages above 16 kV some shielding may be necessary to protect against prolonged exposure at close range.

B. Shift magnets, when used, should be mounted in such a position that they do not interfere with the passage of the electron beam through the gun. This position is normally immediately behind the screening coils.

VAD/392·48



NOTES

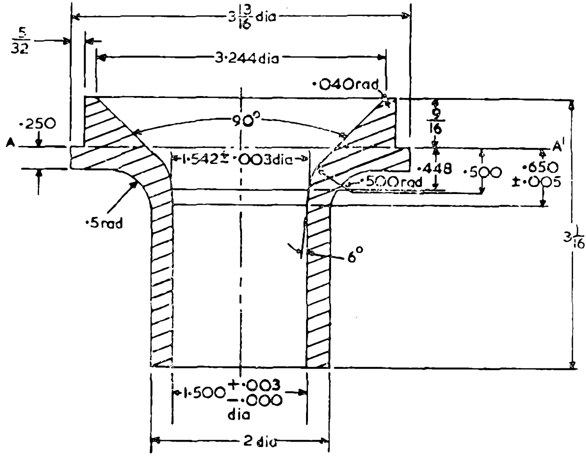
1. ALL DIMENSIONS IN INCHES
2. ANODE 2 CONTACT IN LINE ± 30° WITH VACANT BASE PIN No 6
3. REFERENCE LINE DETERMINED BY POSITION OF GAUGE RETMA No 116

REFERENCE LINE GAUGE

VAD/392·30

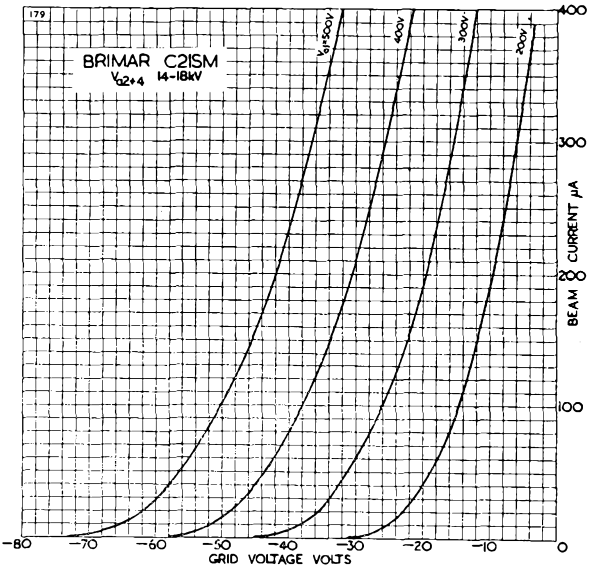
RMA 116 for types

C21SM & C21TM



NOTE.

1. ALL DIMENSIONS IN INCHES
2. YOKE REFERENCE LINE IS DETERMINED BY PLANE A—A' WHEN NECK OF BULB IS SEATED AGAINST EDGE

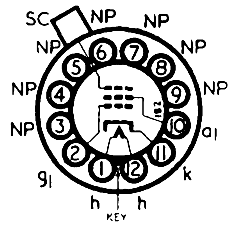


179
BRIMAR C21SM
Va2+4 14-18kV
Va1=500V
400V
300V
200V
400
300
200
100
0
BEAM CURRENT μA
−80
−70
−60
−50
−40
−30
−20
−10
0
GRID VOLTAGE VOLTS

C21SM

Current Equipment Type

TYPE **C21TM**
B12A (DUODECAL) BASE



The BRIMAR C21TM is a rectangular 90° deflection angle teletube with magnetic focus, a tetrode gun incorporating an ion trap, aluminized screen and external conductive coating. The screen colour is white, with a grey glass faceplate with a transmission of approximately 70 per cent.

RATINGS

Heater Voltage	12.6 volts
Heater Current	0.3 amp.
Final Anode Voltage (V_{a2})	20 kilovolts max.
Final Anode Voltage (V_{a2})	14 kilovolts min.
First Anode Voltage (V_{a1})	500 volts max.
Grid Voltage (V_g)	—125 volts max. negative
Heater-Cathode Voltage (V_{hk}), cathode positive ...	180 volts d.c. max.
Heater-Cathode Voltage (V_{hk}), cathode positive † ...	400 volts d.c. abs. max.
Diagonal Deflection Angle	90° approx.

† *During warm-up, for a period not exceeding 1 minute after switching on.*

OPERATING CHARACTERISTICS

Final Anode Voltage	18 kilovolts
First Anode Voltage	300 volts
Peak to Peak Modulating Voltage for Beam Current of 150 μA	26.5 volts average
Grid Voltage to cut off beam current	—30 to —72 volts
Field Strength of Ion-Trap Magnet	63 gauss

INTER-ELECTRODE CAPACITANCES

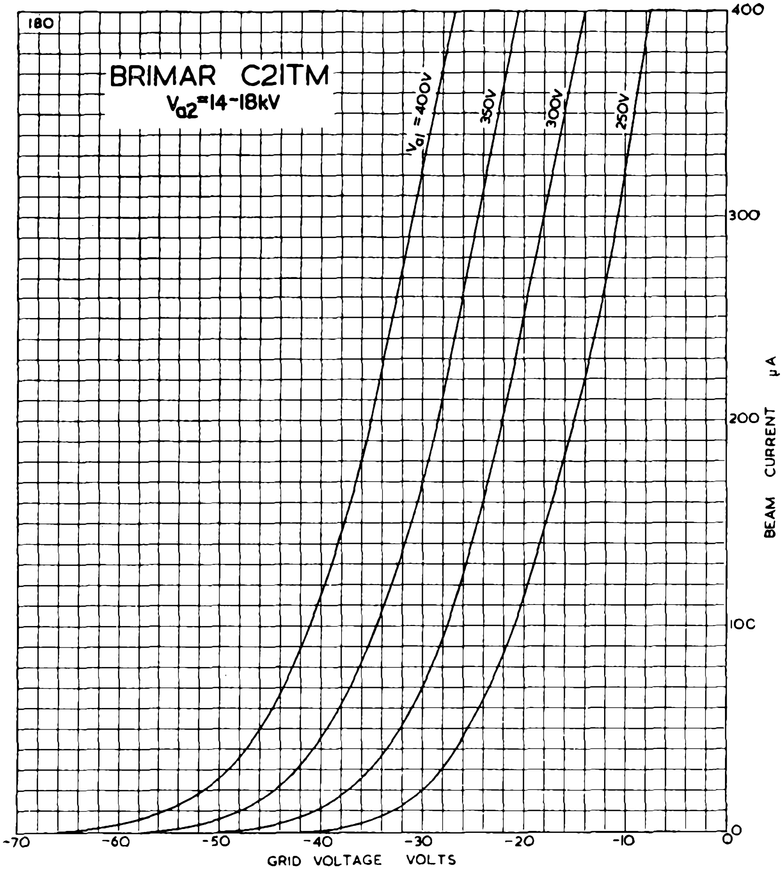
Grid to all	8.5 pF max.
Cathode to all	6.5 pF max.
Final Anode to External Coating	700 pF approx.

NOTES:

A. No harmful X-ray radiation is produced by this tube when operated at final anode voltages below 16 kV. At voltages above 16 kV. some shielding may be necessary to protect against prolonged exposure at close range.

B. The ion-trap magnet should be adjusted to give the brightest picture. Failure to do this may shorten the life of the tube.

Outline and Reference Line Gauge as type C21SM


180
BRIMAR C21TM
V_{a2}=14-18kV
V_{a1}=400V
350V
300V
250V
400
300
200
10C
0
BEAM CURRENT μA
-70
-60
-50
-40
-30
-20
-10
0
GRID VOLTAGE VOLTS

BRIMAR

SELENIUM SenTerCel RECTIFIERS

REGISTERED TRADE MARK

INTRODUCTION

The Brimar range of selenium metal rectifiers consists of a series of compact units which meet the power supply requirement of all radio and television receivers.

Three basic units, the RM1, RM2 and RM3 for a maximum input voltage of 125 volts rms, which have current ratings of 60, 100 and 120 mA respectively, are also available in series-connected pairs with a bracket for mounting for operation from an input voltage of 250 volts rms max. These double units are coded DRM1B, DRM2B and DRM3B respectively. Two or more units may be connected in series for higher input voltages, or paralleled for greater current output. In this latter application caution must be exercised ; due to slight differences in rectifier characteristics the load current may not be equally shared between the units. When operating near the maximum rating it is advisable to insert a resistor of value 10-25 ohms in series with each parallel branch to assist in balancing the load current.

For television receivers, two larger types are available for maximum input voltages of 250 volts rms, the RM4 being rated at 275 mA and the RM5 (using a series resistor of 20 Ω) at 325 mA.

The units may be connected as voltage multipliers, bridge and full-wave rectifiers. Circuits showing such applications and the current relationships occurring are given on page 275.

Because of their high efficiency and small size it is essential to operate these rectifiers in accordance with the recommendations given below.

RATINGS

The ratings are given for a mean ambient temperature of 20°C. (68°F.). If the rectifier is mounted with the radiating fins in a vertical plane and adequate ventilation is provided, an ambient temperature of 35°C. (95°F.) may be tolerated. Under limit conditions of supply voltage and load current, the actual disc temperature must never exceed 70°C. or failure will occur.

The load current rating must be reduced under conditions of high ambient temperature or poor ventilation to ensure that the maximum disc temperature is not exceeded. Disc temperature may be measured by means of a thermocouple inserted between two of the middle radiating fins and in contact with the selenium coated disc.

MOUNTING

Types RM1, RM2 and RM3 have a centre fixing hole of 4BA size. Types DRM1B, DRM2B and DRM3B are provided with a mounting bracket, the dimensicns being given in the outline drawing. Types RM4 and RM5 have a 2BA spindle and are not provided with brackets.

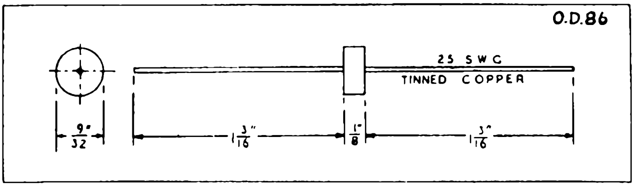
Where possible rectifiers should be mounted away from hot components and with the fins in a vertical plane so as to allow a free circulation of air.

Considerable assistance to conduction cooling may be obtained by providing mounting brackets which permit good thermal conductance to the chassis. Where a number of units are mounted on a common spindle the centre unit tends to run hotter than the end ones. If an additional bracket is provided at the centre of the spindle a noticeable temperature reduction can usually be obtained.

Current Equipment Types

TYPES **M1, M3**

MINIATURE H.F. RECTIFIERS



BRIMAR types M1 and M3 are miniature single plate selenium rectifiers which may be used to replace valve diodes in many applications, some advantages being the extremely small size, and absence of heater, simplifying the problem of avoiding hum.

RATINGS

Ambient temperature not exceeding 55°C.

D.C. CIRCUITS	*M1*	*M3*
Forward Current	0.25 mA max.	1.5 mA max.
Reverse Voltage	20 volts max.	20 volts max.
A.C. CIRCUITS		
Mean Output Current—Half-wave	0.25 mA max.	1.0 mA max.
Mean Output Current—Bridge ...	0.5 mA max.	2.0 mA max.
Reverse Voltage (r.m.s.) per Rectifier	40 volts r.m.s. max.	40 volts r.m.s. max.
Peak Inverse Voltage per Rectifier, half-wave with Capacitor Input Filter	68 volts max.	68 volts max.
Peak Inverse Voltage per Rectifier, Bridge	56 volts max.	56 volts max.

NOTE : The maximum permissible diode temperature is 75°C. and under no circumstances should this be exceeded.

CHARACTERISTICS

	M1	*M3*
Self Capacitance	22 pF	65pF
Forward Resistance at 5 volts D.C.	10,000 Ω	1,200 Ω
Reverse Resistance at —5 volts D.C.	1,000 M Ω	45 MΩ
Minimum A.C. Input for satisfactory Rectification	0.5 volts	0.5 volts
Maximum Frequency	5 Mc/s.	100 kc/s.

Polarity—case negative, red end positive.

RM0
RM1
RM1A
RM2
RM3
DRM1B
DRM2B
DRM3B

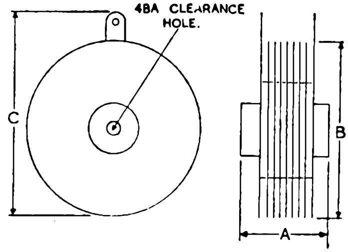
HALF-WAVE SELENIUM METAL RECTIFIERS

Current Equipment Types

TYPES **RM0, RM1, RM1A, RM2, RM3**

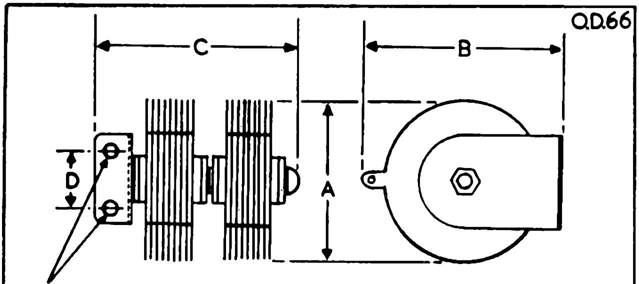
RMS Input per unit .. 125 volts max.
D.C. Disc to Rivet Voltage ... 700 volts max.

Type	D.C. Output	Dimension "A" ins.	Dimension "B" ins.	Dimension "C" ins.
RM0	30 mA	.875	.812	1.062
RM1	60 mA	.875	1.375	1.625
RM1A	100 mA	.875	1.375	1.625
RM2	100 mA	.875	1.750	2.00
RM3	120 mA	.875	1.750	2.00



TYPES **DRM1B, DRM2B, DRM3B**

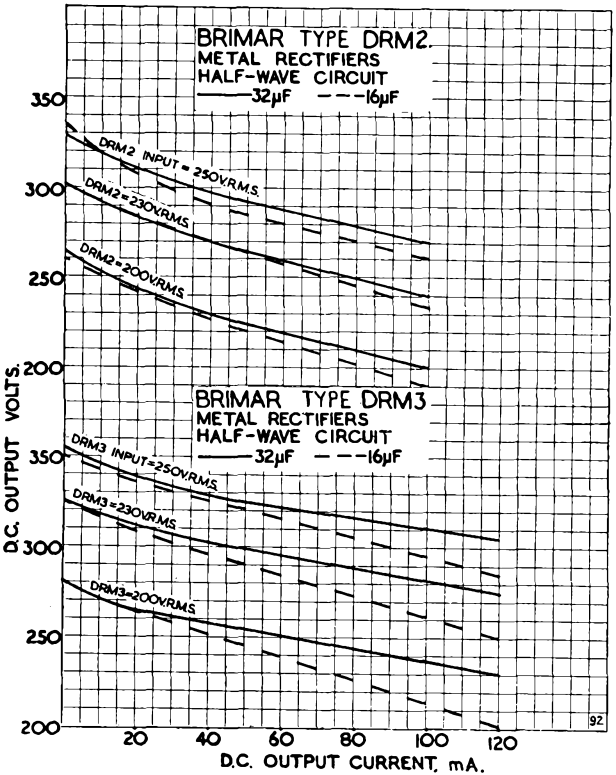
RMS Input per Double unit ... ... 250 volts max.
D.C. Disc to Rivet Voltage ... ... 700 volts max.

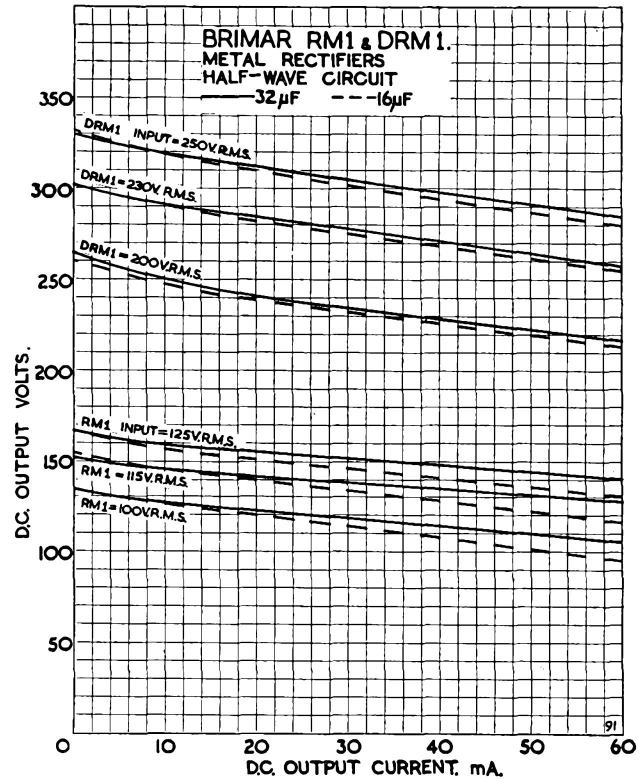


Note:—The two centre tags must be connected together before rectifier is put into operation.

Type	Dimensions in inches A	B	C	D	D.C. Output
DRM1B	1.375	2.00	2.25	0.625	60 mA
DRM2B	1.750	2.25	2.312	0.750	100 mA
DRM3B	1.750	2.25	2.312	0.750	120 mA

NOTE. Types DRM1, DRM2, DRM3 comprise series connected pairs of type RM1, RM2, RM3 respectively.



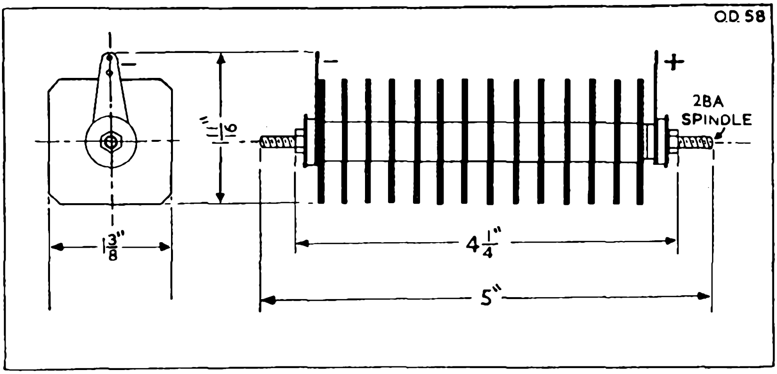


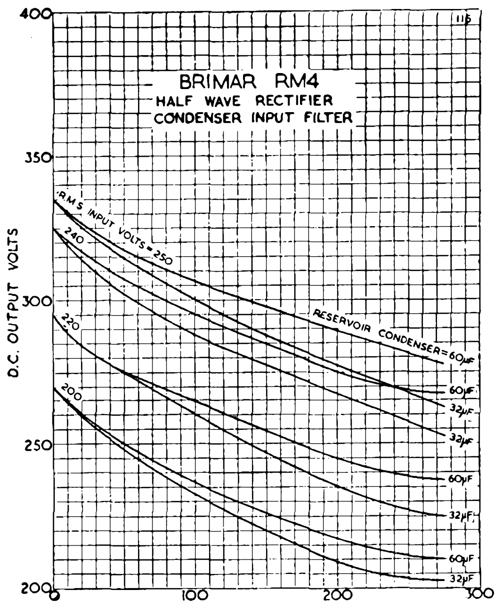
RM1
DRM1
DRM2
DRM3

Current Equipment Type

TYPE **RM4**

RMS Input Voltage			250 volts max.
Ambient Temperature	37	40	55°C
D.C. Output current	275	250	125 mA max.





Replacement Type

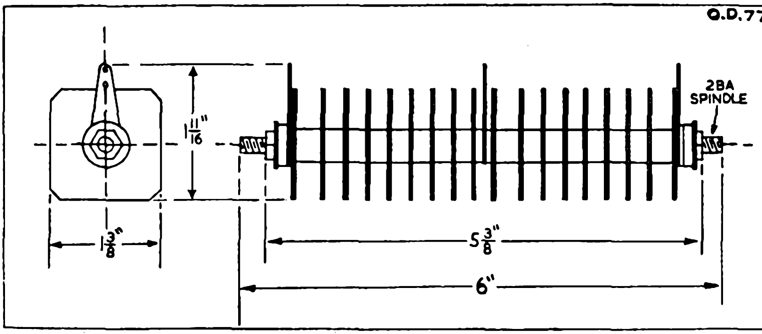
TYPE **RM4B**

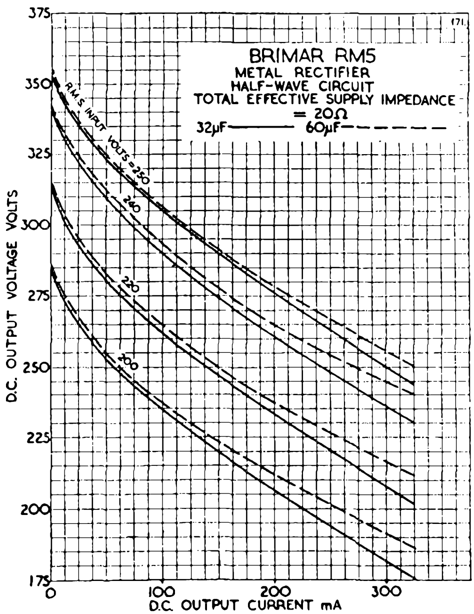
Ratings are nominally the same as for the RM4. The overall length is $5\frac{1}{2}$ inches.

Current Equipment Type

TYPE **RM5**

RMS Input Voltage ...	... ...	250 volts
Ambient Temperature	 40	55°C.
D.C. Output Current	 300	150 mA
D.C. Disc. to Spindle	... ...	700 volts max.





Replacement Types

TYPE **SB2**

RMS Input 125 volts max.
D.C. Output 40 mA max.

TYPE **SB3**

RMS Input 250 volts max.
D.C. Output 60 mA max.

SUMMARY OF RATINGS Current Equipment Types

CIRCUIT	RM0	RM1	RM2	RM3	RM4	RM5 *
Half-Wave (1 rectifier)						
Maximum rms input voltage ...	125 volts	125 volts	125 volts	125 volts	250 volts	250 volts
Maximum output current (mean)	30 mA	60 mA	100 mA	120 mA	275 mA	300 mA
Approx. output voltage with $32\mu F$ reservoir	140 volts	140 volts	135 volts	150 volts	275 volts	250 volts
Full-Wave (2 rectifiers)						
Maximum rms input voltage ...	100–0–100 volts	100–0–100 volts	100–0–100 volts	100–0–100 volts	210–0–210 volts	225–0–225 volts
Maximum output current (mean)	60 mA	120 mA	200 mA	240 mA	550 mA	600 mA
Approx. output voltage with $32\mu F$ reservoir	110 volts	110 volts	110 volts	110 volts	225 volts	250 volts
Bridge (4 rectifiers)						
Maximum rms input voltage ...	200 volts	200 volts	200 volts	200 volts	420 volts	450 volts
Maximum output current (mean)	60 mA	120 mA	200 mA	240 mA	550 mA	600 mA
Approx. output voltage with $32\mu F$ reservoir	210 volts	210 volts	210 volts	210 volts	450 volts	510 volts
Voltage Doubler (2 rectifiers)						
Maximum rms input voltage ...	125 volts	125 volts	125 volts	125 volts	250 volts	250 volts
Maximum output current (mean)	30 mA	60 mA	100 mA	120 mA	275 mA	300 mA
Approx. output voltage with $32\mu F$ reservoir	240 volts	240 volts	270 volts	300 volts	550 volts	560 volts

*With 20 ohms series resistor.

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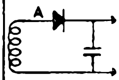
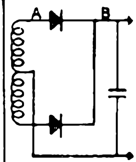
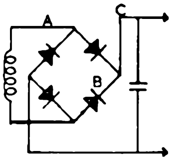
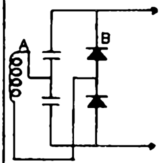
METAL RECTIFIER CIRCUITS												
CIRCUIT	HALF WAVE			FULL WAVE			BRIDGE			VOLTAGE DOUBLER		
												
SECTION	A	B	C	A	B	C	A	B	C	A	B	C
APPROX. RATIO OF RMS. TO D.C. OUTPUT CURRENT	2·5	—	—	1·2	1·6	—	1·7	1·2	1·6	3·0	2·5	—

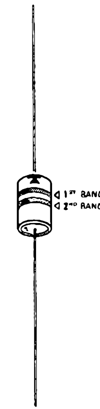
METAL RECTIFIER EQUIVALENTS

Type	Brimar Replacement	Remarks
14A86 14A100	**RM4**	Half-wave rectifiers used in TV. Brimar RM4 features higher ratings and reduced ageing
15B14 or 15B261	**DRM1B** or 2 **RM1's**	Half-wave rectifier used in Sobell Radio Series 500
15D39	**DRM1B** or 2 **RM1's**	Full-wave (Push-Pull) rectifier used in Pye 31MBQ
14B261	**DRM2B** or 2 **RM2's**	Half-wave rectifier used in normal A.C./D.C./Battery receivers
13H21S	**RM4**	Half-wave TV rectifier
14A89	**RM4**	Half-wave TV rectifier
LW9	**RM4**	Half-wave TV rectifier

BRIMAR SenTerCel REPLACEMENT RECTIFIERS

TYPE	A.C. CIRCUITS (Max. Ambient Temp. 55° C.)				D.C. CURRENT (Max. Ambient Temp. 55° C.)		
	Nominal Output Current (mA mean) Half-wave Circuit	Input Voltage RMS in half-wave circuit with reservoir capacitor	Peak Inverse Voltage		D.C. Current Rating in Max. Ambient Temp. (mA)	Max. Continuous Reverse D.C. Voltage	Max. Instantaneous Reverse D.C. Voltage
			Half-wave	Bridge			
K3/15	1.0	360	1020	840	1.5	300	840
K3/25	1.0	600	1700	1400	1.5	500	1400
K3/40	1.0	960	2720	2240	1.5	800	2240
K3/45	1.0	1080	3060	2520	1.5	900	2520
K3/50	1.0	1200	3400	2800	1.5	1000	2800
K3/100	1.0	2400	6800	5600	1.5	2000	5600

BRIMAR SenTerCel REPLACEMENT RECTIFIERS

TYPE	A.C. CIRCUITS (Max. Ambient Temp. 55° C.)				D.C. CURRENT (Max. Ambient Temp. 55° C.)			Self Capacitance (Approx.)	Outline	Colour Code	
	Nominal Output Current (mA mean) Half-wave Circuit	Reverse Voltage V. (V.r.m.s.)	Peak Inverse Voltage V.		D.C. Current Rating in Max. Ambient Temp.(mA)	Max. Continuous Reverse D.C. Voltage	Max. Instantaneous Reverse D.C. Voltage			1st Band	2nd Band
			Half-wave	Bridge							
Q1/1	0.25	40	68	56	0.25	20	56	22 pF		Brown	Brown
Q1/2	0.25	80	136	112	0.25	40	112	11 pF		Brown	Red
Q1/5	0.25	200	340	280	0.25	100	280	4 pF		Brown	Green
Q3/3	1.0	120	204	168	1.5	60	168	22 pF		Orange	Orange
Q3/4	1.0	160	272	224	1.5	80	224	16 pF		Orange	Yellow
Q3/5	1.0	200	340	280	1.5	100	280	13 pF		Orange	Green
Q6/1	3.5	40	68	56	7.0	20	56	500 pF		Blue	Brown
Q6/5	3.5	200	340	280	7.0	100	280	100 pF		Blue	Green
D3/2/1Y	1.0	80 per arm.	136 per arm.	112	1.5	40 per arm.	112 per arm.	32 pF per arm.			
V3/2/1Y	1.0 per arm.	80 per arm.	136 per arm.	112	1.5 per arm.	40 per arm.	112 per arm.	32 pF per arm.			
V3/1/1Y	1.0 per arm.	40 per arm.	68 per arm.	56	1.5 per arm.	20 per arm.	56 per arm.	65 pF per arm.			

SenTerCel CONTACT COOLED RECTIFIERS

The practice of employing metal rectifiers instead of rectifying valves in H.T. supply circuits for domestic radio and television receivers is now widespread, and SenTerCel " RM " type rivet and spindle mounted selenium rectifiers have been used for this purpose by many of the well-known radio manufacturers. Standard Telephones and Cables Limited have now developed a range of Contact Cooled selenium rectifiers for similar applications but offering important reductions in size, weight and cost.

SenTerCel Contact Cooled rectifiers are of novel construction and utilize a new type of selenium plate of square format. The plate assembly is also a new arrangement permitting considerable savings in space and weight as compared to conventional spindle mounted rectifiers. Dimensional drawings are given on page 280.

Seven alternative rectifiers are available in the SenTerCel Contact Cooled range, and provision is made for half-wave, voltage-doubler, push-pull and bridge connections. Electrical ratings of the rectifiers in various circuits are given in the tables on page 279.

AMBIENT TEMPERATURE AND MOUNTING

Cooling of Contact Cooled rectifiers is achieved by heat conduction from the metal case of the rectifier to the metal chassis or other metal work on to which the rectifier is mounted. To facilitate conduction, the mounting surface must be flat.

Contact Cooled rectifiers permit greater facility in chassis lay-out than in cases where convection cooled rectifiers are employed, since the former may be mounted at any angle.

The rating tables given relate to a chassis mounting position in which the rectifier case temperature does not exceed 65° C. when the rectifier is delivering its full rated output. An average aluminium chassis which, without the rectifier, would have a working temperature of 40° C. at the rectifier position, should be satisfactory. On a steel chassis, due to the lower thermal conductivity, the working temperature at the rectifier position would need to be approximately 10 degrees lower.

SERIES RESISTANCE

For half-wave and voltage-doubler applications it is recommended that a series resistor of 22 ohms be connected between the A.C. input and the rectifier in order to reduce the peak current.

RATINGS OF SENTERCEL CONTACT COOLED RECTIFIERS

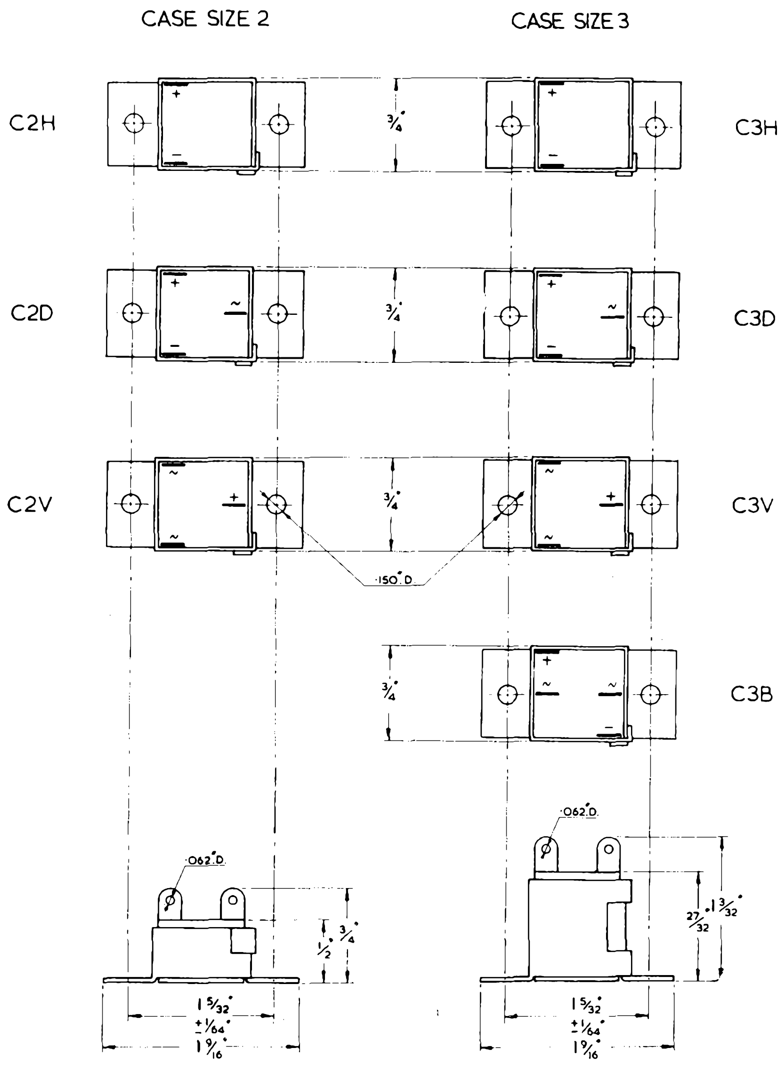
HALF-WAVE AND VOLTAGE DOUBLER CONNECTIONS

QTY.	TYPE	CIRCUIT	MAXIMUM INPUT VOLTS (r.m.s.)	MAXIMUM OUTPUT CURRENT mA (mean)	TYPICAL D.C. OUTPUT VOLTAGE			
					16 mfd. Resvr. Cap.		60 mfd. Resvr. Cap.	
					Half Load	Full Load	Half Load	Full Load
1	**C2H**	HALF-WAVE	125	60	135	115	135	120
1	**C3H**	,, ,, ...	125	120	120	85	130	120
1	**C2D**	,, ,, ...	250	60	275	245	280	255
1	**C3D**	,, ,, ...	250	120	275	245	290	275
1	**C2D**	VOLTAGE DOUBLER...	125	60	275	245	280	255
1	**C3D**	,, ,, ...	125	120	260	205	285	265

PUSH-PULL AND BRIDGE CONNECTIONS

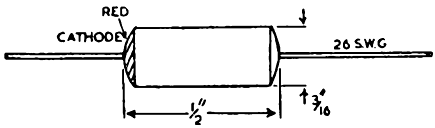
QTY.	TYPE	CIRCUIT	MAXIMUM INPUT VOLTS (r.m.s.)	MAXIMUM OUTPUT CURRENT mA (mean)	TYPICAL D.C. OUTPUT VOLTAGE			
					16 mfd. Resvr. Cap.		32 mfd. Resvr. Cap.	
					Half Load	Full Load	Half Load	Full Load
1	**C2V**	PUSH-PULL	125-0-125	120	140	120	140	130
2	**C2D**	,, ,, ...	250-0-250	120	275	250	280	255
1	**C3V**	,, ,, ...	125-0-125	240	130	115	140	130
2	**C3D**	,, ,, ...	250-0-250	240	280	250	280	260
1	**C3B**	BRIDGE	250	120	275	250	280	255
2	**C3D**	,, ...	250	240	280	250	280	260

DIMENSIONS



CASE SIZE 2
CASE SIZE 3
C2H
C3H
C2D
C3D
C2V
C3V
C3B
3/4"
·150" D
·062" D
1/2"
27/32"
1 3/32"
1 5/32"
± 1/64"
1 9/16"

TYPES GD3, GD4, GD5
GERMANIUM DIODES



BRIMAR Germanium Diodes GD3, GD4 and GD5 are suitable for use in place of thermionic diodes in circuits specially designed for their characteristics. Their small size and absence of heater allow them to be wired directly into the circuit.

Type GD3 is suitable for the vision and sound detector stages of television receivers and similar applications. Type GD4 may also be used in detector stages and as a noise limiter, where a higher reverse resistance and voltage may be required. Type GD5 is recommended for use as detector and noise limiter in radio receivers where the operating frequency is low and the load impedances relatively high.

RATINGS at 20°C.

	GD3	GD4	GD5
Resistance at + 1 volt...	350 Ω max.	350 Ω max.	350 Ω max.
Resistance at — 10 volts	50,000 Ω min.	250,000 Ω min.	500,000 Ω min.
Resistance at — 30 volts	—	—	300,000 Ω min.
Reverse Voltage ...	— 25 volts max.	— 50 volts max.	— 85 volts max.
Continuous forward D.C. Current ...	30 mA max.	30 mA max.	30 mA max.
Peak Forward Current	100 mA max.	100 mA max.	100 mA max.
Shunt Capacitance ...	1.0 pF approx.	1.0 pF approx.	1.0 pF approx.

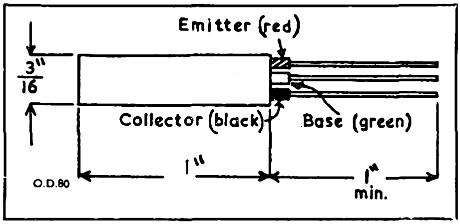
EQUIVALENTS

BRIMAR	G.E.C.	B.T.H.	MULLARD	WESTINGHOUSE
GD3	GEX33 GEX35 GEX99	CG5-C CG5E CG12E	OA60	WG4A
GD4	GEX34 GEX44 GEX44/1 GEX45 GEX45/1	CG1E CG6-C CG6E CG7-C	—	WG5A
GD5	GEX54 GEX55	CGIE CG4E	OA61	WG6A

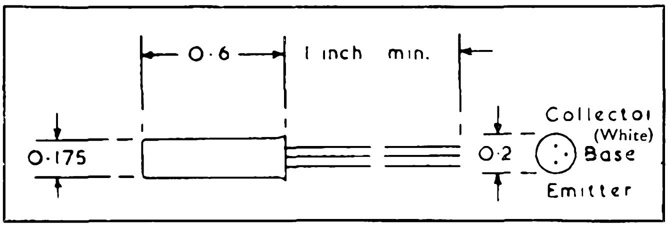
TRANSISTORS

JUNCTION TYPES

Types TJ1, TJ2 and TJ3



Types TS1, TS2 and TS3



The TJ1, TJ2 and TJ3 are p.n.p germanium alloy junction transistors intended for use in audio frequency applications. The TS1, TS2 and TS3 have similar characteristics but are hermetically sealed and are smaller than the TJ1, TJ2 and TJ3.

RATINGS

Maximum total dissipation (TJ1, TJ2 and TJ3)	200 mW at 20° C. 100 mW at 50° C.
Maximum total dissipation (TS1, TS2 and TS3)	50 mW at 20° C. 30 mW at 50° C.
Maximum ambient temperature (all Types)	60° C.

CHARACTERISTICS (at 20° C.)

I_{co} in common base connection with V_{cb}=—10 volts and I_e=0	—10 μA max.
Emitter floating potential with V_{cb}= —10 volts	150 mV max.
Collector turnover voltage in common emitter connection with I_b=0	—20 volts min.
Typical noise figure at V_{ce}=—1.5 volts, I_c=—0.2 mA with source resistance of 500 Ω at 1 kc/s approx.	15 dB
Typical common base cut-off frequency (α_{ce} 2 dB down) ...	500 kc/s

Parameters measured at 1 kc/s in common emitter connection with V_{ce}=—1.5 volts and I_e=—2.0 mA

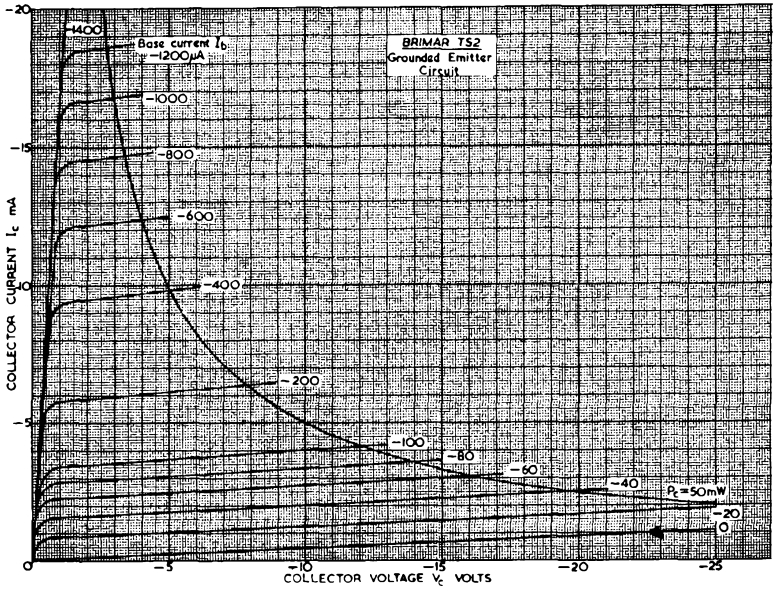
		TS1 & TJ1	TS2 & TJ2	TS3 & TJ3
Current gain α_{cb}	min.	10	30	50
Typical characteristics :				
Emitter Resistance r_e		15 Ω	15 Ω	15 Ω
Base Resistance r_b		350 Ω	650 Ω	850 Ω
Collector Resistance r_c'		30 kΩ	25 kΩ	17.5 kΩ

CURVES

The curves for the TS1, 2 and 3 apply to the TJ1, 2 and 3 with the exception of the 50 mW dissipation limit.

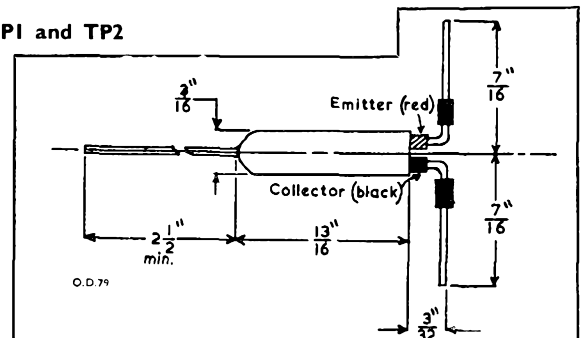
OPERATING NOTES

1. Correct polarity of the power supplies must be observed.
2. To avoid damage to the transistor by surges, connections should not be made or broken with the power supplies on.
3. Improved operation may be obtained by mounting in a heat sink.
4. When soldering into the circuit the joints should be made as rapidly as possible and preferably in conjunction with a thermal shunt on the wires between the crystal and the joints.



POINT CONTACT TYPES

Types TP1 and TP2



The BRIMAR TP1 and TP2 are point contact, n type, germanium transistors.
Type TP1 may be used in control and switching circuits at frequencies up to 100 kc/s and will work consistently and reliably within this range.
Type TP2 may be used as an amplifier or oscillator at frequencies up to 2 Mc/s. The small size and the power consumption of these transistors permit the design of light, compact equipment. Since the cases are of metal there is little danger of accidental fracture, and the transistors are also thereby rendered lightproof.

MECHANICAL DATA

Lead Lengths ... Emitter and collector—$\frac{7}{16}$″ nom. from axis of transistor
Base— $2\frac{1}{2}$″ min.

Colour Coding ... Emitter— Red
Base— Plain
Collector— Black

The two sleeves on the extensions of these leads indicates the type. Thus Black/Black indicates type TP1 and Black/Brown type TP2.

Mounting Position ... Any

MAXIMUM RATINGS TP1 AND TP2

	Max.		Max.
Negative Emitter Voltage ...	30 volts	Collector Current	30 mA
Emitter Current	30 mA	Total Dissipation ...	150 mW at 20°C.
Negative Collector Voltage...	50 volts	Storage Temperature	75°C.

CHARACTERISTICS (at 20° C.)

	TP1	TP2
Current Gain with V_c=—20 V ...	2 min. (with I_e=0.05 mA)	2 min. (with I_e=0.75 mA) 5 max. (with I_e=0.75 mA)
Emitter Resistance with V_e=—10 V and Collector open circuited ...	1 MΩ min.	
Base to Collector Current with V_c=—12 V and Emitter open circuited	1 mA max.	
Base to Collector Current with V_c=—20 V and Emitter open circuited		2 mA max.
Base to Collector Current with V_c=—20 V and I_e=1 mA		2 mA min. 7 mA max.
Negative Collector Voltage with I_e=1 mA and I_c=—2 mA ...	3 V max.	
Negative Collector Voltage with I_e=3 mA and I_c=—5 mA ...	3 V max.	4 V max.

Open Circuit Input Resistance (R11) with I_e=0.75 mA and V_c=—20 V 250 Ω

Open Circuit Output Resistance (R22) with I_e=0.75 mA and V_c=—20 V 25 kΩ

Feedback Resistance (R12) with I_e=0.75 mA and V_c=—20 V 110 Ω

Frequency Response for type TP2:

With V_c=—20 V and I_e=0.75 mA current gain at 500 kc/s is not less than 0.7 of that at 10 kc/s.

The typical frequency at which the current gain drops to 0.7 of that at 10 kc/s is 2 Mc/s.

Stability of type TP2:

With V_c=—20 V, I_e=0.75 mA, collector short circuited to base for A.C. and 150 Ω in series with the emitter, the input impedance is positive.

For operating notes see Types TS1/2/3

"STANDARD" HIGH GRADE CARBON RESISTORS

TYPE Nos. **4302, 4303, 4304, 4305.**

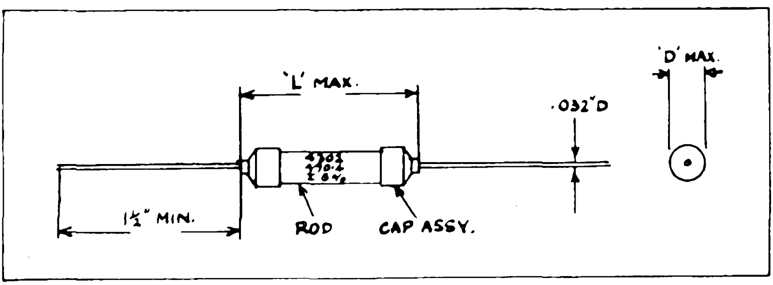
INTRODUCTION

Standard High Stability Carbon Resistors are Grade 1 types designed to maintain their resistance values within close limits under various conditions. They were originally developed for use in equipment manufactured by the Company and have had a long proving period under conditions in which this type of resistor excels. They are now offered generally to industry to meet the needs of projects where reliable, high stability, close tolerance resistors are required. They have been designed to meet the Services R.C.S.C. Specification R.C.S.112, and will remain stable under extreme conditions of use and for very long periods.

The resistors are made in four sizes, corresponding to dissipation ratings of ¼, ½, ¾ and 1 watt. All types are made to 1 per cent tolerance and are obtainable in preferred values, but special values can be made to meet customers' requirements.

Details are as follows:—

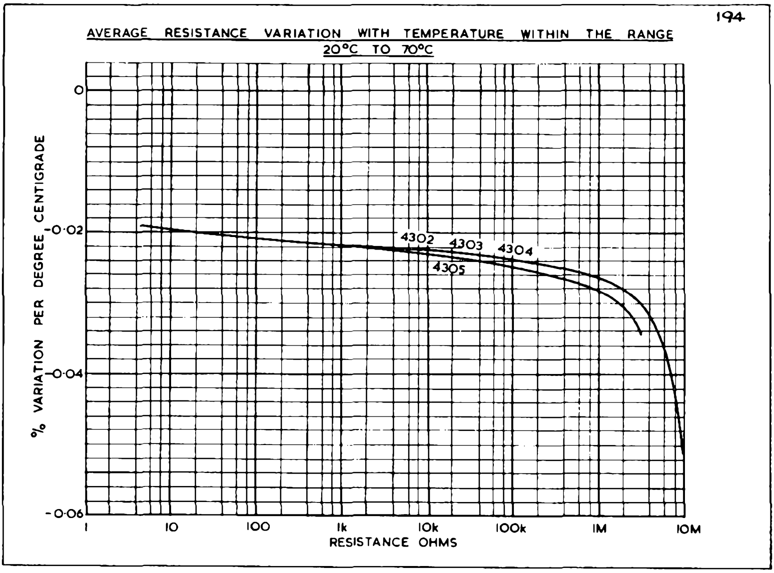
Wattage at 70° C.	Code	D.C. Volts	Max. Length L	Max. Diam. D	R.C.S.C. Designation
¼	4305	150	.593″	.152″	RC2E
½	4304	200	.982″	.222″	RC2D
¾	4303	300	1.343″	.222″	RC2C
1	4302	400	1.640″	.354″	RC2B



The resistance value is indicated directly by figures, followed by the symbol " U " for ohms, " K " for kilohms, or " M " for megohms.

VARIATION OF RESISTANCE WITH TEMPERATURE

The resistance of S.T.C. High Stability Resistors decreases with increasing temperature and the curves below show how the variation depends upon resistance value. It will be seen that the variation is greater with the higher resistance values.



INSULATION

These resistors are classed as non-insulated types, but are covered with a high temperature varnish which has good insulating properties. It will be appreciated, however, that the insulation will be reduced if the varnish is chipped or abraded.

ORDERING

When ordering, the resistors should be completely specified as shown in the following example.

If a resistor, rated at $\frac{1}{2}$ watt at 70° C., resistance value 2,200 ohms, is required the code will be

4304 A 2.2 K Resistor.

The number 4304 indicates the rating, $\frac{1}{2}$ watt, as shown in the table above, the letter "A" indicates a ± 1 per cent tolerance, and 2.2 K indicates the resistance value.

CURRENT SURGE

BRIMISTOR SECTION

RESISTORS

INTRODUCTION

BRIMISTORS are resistive elements made from thermistor material in a form suitable for use in Radio and Telecommunication equipment. Thermistor material is an oxidation semi-conductor formed from pure metallic oxides and has a large negative temperature coefficient of resistance.

Its Resistance R decreases with increasing (absolute) temperature T according to the relationship $R = a \times e^{\frac{b}{T}}$ where a and b are constants. At room temperatures an increase of 20° C. approximately will halve the resistance value whereas at maximum operating temperatures (200-250° C.) an increase of approximately 50° C. is necessary for a resistance change of the same ratio.

The resistance of a Brimistor depends entirely upon its operating temperature. It is unaffected by the applied voltage except in so far as the resulting current causes warming of the material.

Brimistors are made in rod form with wire ends and may be soldered directly into the circuit. Type " C " is supplied with silvered ends for insertion into clips.

The types given below have proved suitable for most radio applications. Types having widely differing values of resistance can, however, be manufactured to special order.

NOTES ON OPERATION

When supplied from a low impedance source a series limiting resistor must always be employed to prevent excessive current flow.

At the maximum current ratings the body temperature may reach 250° C. and the element must therefore be carefully positioned to prevent damage to other components. It may be supported by its wire ends, at least half an inch of wire being left free before soldering.

Because of their specialized construction Brimistors should not be subjected to excessive mechanical stress or fracture may occur.

RATINGS

The maximum operating current is a design centre rating allowing for normal supply voltage variation and an ambient temperature of 50° C.

The maximum instantaneous current rating must in no circumstances be exceeded. A surge of this order may be experienced for a brief period soon after switch on in certain valve heater circuits. Should the surge exceed the stated value a suitable resistor must be shunted across the Brimistor. Such a resistor will ensure an almost constant current during the warm-up period.

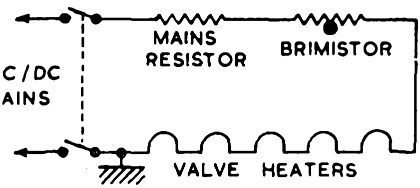
TYPE	Dimen. "A" ins.	Dimen. "B" ins.	Initial Resistance (ohms)			Max. Operating Current amp.	Resistance at max. Current ohms.	Max. Instant. Current amp.
			0° C.	20° C.	50° C.			
CZ1	$1\frac{1}{4}$	$\frac{5}{16}$	6,080	3,800	1,650	0.3	44	0.6
***CZ1A**	$1\frac{1}{4}$	$\frac{5}{16}$	6,080	3.800	1.650	0.3	44	0.6
CZ2	$\frac{7}{8}$	$\frac{1}{4}$	8,550	5,500	2,440	0.3	38	0.4
CZ3	$\frac{5}{16}$	$\frac{3}{16}$	2,340	1,500	670	0.2	35	0.3
CZ4 / C4	$1\frac{1}{2}$	$\frac{7}{16}$	1,165	750	335	1.25	5.5	2.0
CZ6	$1\frac{1}{4}$	$\frac{3}{8}$	4,800	3,000	1,300	0.45	27	0.7
CZ8A	$\frac{3}{4}$	$\frac{5}{16}$	3,480	1,500	540	0.3	30	0.6
CZ9A	$\frac{3}{4}$	$\frac{5}{16}$	800	350	120	1.0	3.7	1.3
CZ10	$\frac{5}{16}$	$\frac{3}{32}$	—	10,000	—	0.075	—	—
CZ11	$1\frac{1}{4}$	$\frac{3}{8}$	—	140	—	1.5	2.5	—
CZ12	$1\frac{1}{2}$	$\frac{7}{16}$	—	120	—	2.5	1.5	—

NOTE—Dimension A refers to the overall length of the Brimistor and dimension B to its maximum diameter

* *Type CZ1A is normally supplied to Equipment Makers only. The CZ1 has the same characteristics and is the recommended replacement for maintenance purposes.*

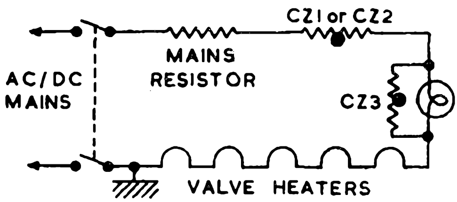
APPLICATIONS

1. SURGE SUPPRESSION IN A.C./D.C. RECEIVERS



The Brimistor should be connected as shown between the mains resistor and the heater of the rectifier valve. It must not be connected between valve heaters or between the valve heater chain and chassis. For 0.3 amp. circuits, types CZ1 or CZ8A should be used and for 0.15 or 0.2 amp. circuits, type CZ2. For 0.1 amp. circuits CZ1 is recommended, but types CZ2, CZ3, or CZ8A may be employed if a shorter heating time is required. It should be noted that it may be necessary to shunt the Brimistor with a resistor in some circuits to delay the heating time and keep the current within the maximum instantaneous current rating of the Brimistor. A typical value using a CZ1 in a television 0.3 amp. heater chain would be 500 ohms.

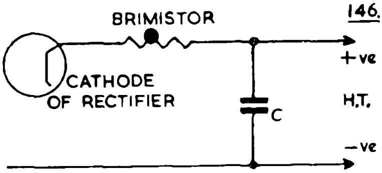
2. EFFICENT OPERATION OF DIAL LAMPS



When a CZ1 or CZ2 Brimistor is fitted as a surge suppressor the pilot lamp may often be run safely at a higher temperature. The shunt resistor across the lamp may be removed and a type CZ3 Brimistor wired in place of it. Should the lamp eventually fail, the CZ3 will warm up quickly and the set will continue to operate at full efficiency.

3. PROTECTION OF RECTIFIER VALVES AND RESERVOIR CONDENSERS

146.

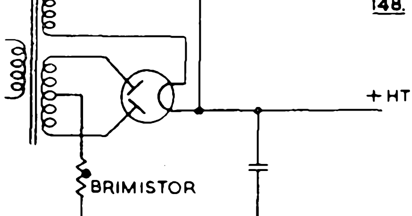


In order to reduce the switch-on current surge obtained with the large reservoir condensers associated with condenser input filters, a Brimistor should be connected between the rectifier cathode and the leads to the reservoir condenser and the H.T. lead as shown. The types to be used are as follows:

D.C. Current	Brimistor
Up to 100 mA.	CZ1 or CZ1A
100 to 200 mA.	CZ6
Above 200 mA.	CZ4

4. DELAY OF H.T. VOLTAGE FROM DIRECTLY HEATED RECTIFIERS

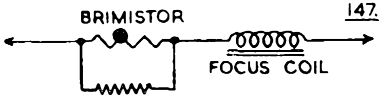
148.



The application of the full H.T. voltage to equipment when a directly-heated full wave rectifier is used, may be delayed by connecting a Brimistor in the centre-tap of the mains transformer. Due allowance must be made for the fact that the R.M.S. current value must be used for selecting the correct Brimistor. The R.M.S. current in the centre-tap will be 1.6 times the D.C. output current of the rectifier.

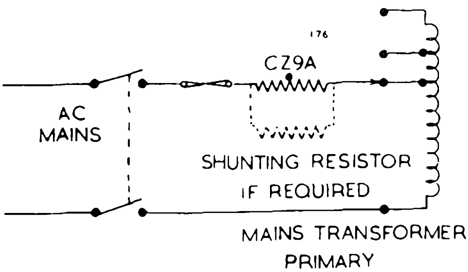
5. COMPENSATION FOR INCREASE IN RESISTANCE OF FOCUS COILS

147.



A Brimistor may be used to compensate for the increase of resistance of a focus coil due to its rise of temperature while operating. It should be connected in series as shown, in close proximity to the coil, to ensure that it reaches a similar temperature. A shunt resistor may also be required for exact compensation of resistance charge. Brimistors type CZ2 or CZ3 are normally used in this application according to the current involved.

6. PROTECTION FROM SWITCH-ON SURGES IN MAINS TRANSFORMERS



A Brimistor may be used to limit the switch-on surge in the primary of the mains transformer of T.V. and radio receivers. The use of a Brimistor will enable the rating of the fuse or other protective device in the primary circuit to be reduced, and so give more efficient protection from overload due to component breakdown.
The type CZ9A Brimistor is suitable for this purpose with a shunting resistor if required, to maintain the peak surge current within the ratings of the Brimistor. A typical value of resistance for this purpose is 200 ohms, ½-1 watt.

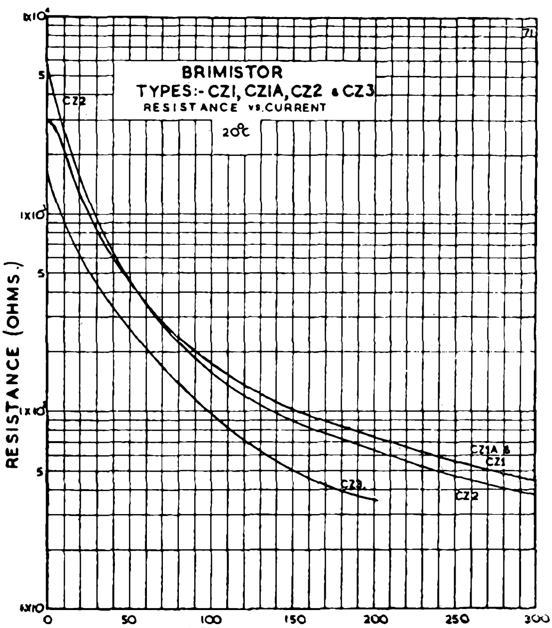
The cooling effect of the connections to this Brimistor should be taken into account when designing equipment. The data given on the CZ9A was taken with ½" of free wire between the Brimistor and solder tags.

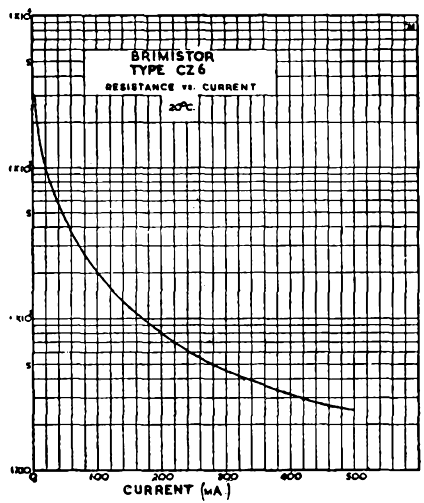
7. PROTECTION FROM FILAMENT BURN-OUT WHEN REPLACING VALVES IN MAINS BATTERY RECEIVERS

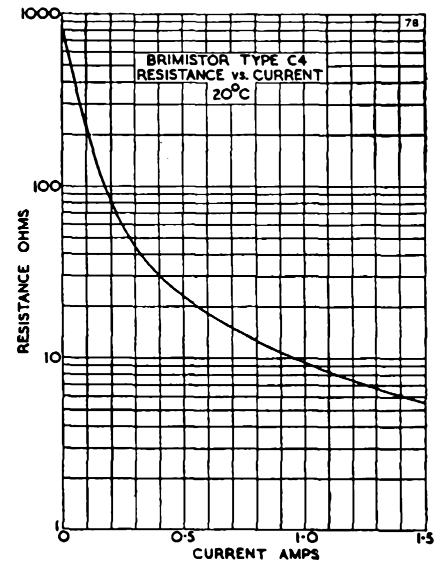
When a valve is removed or a filament becomes open-circuit in a mains/battery receiver, it is possible under some conditions, for the full H.T. voltage to appear across the filament chain. Thus it is possible to burn out one or more filaments when the valve is replaced.
By connecting a type CZ10 Brimistor in parallel with the filament chain, the voltage across the chain is maintained at a safe value should the filament circuit be broken. The type CZ10 Brimistor is suitable for both 25 mA. and 50 mA. filament chains.

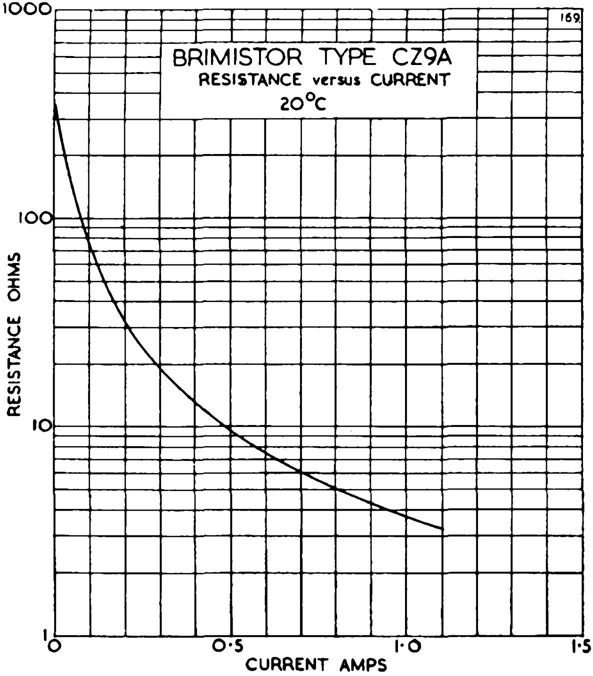
8. SUPPRESSION OF SWITCH-ON SURGES IN PROTECTION LAMPS. TYPES CZ11, CZ12

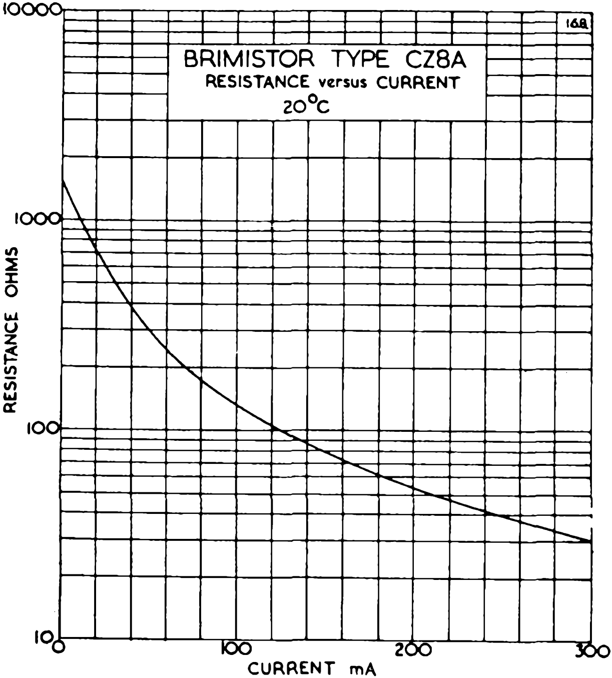
These high-current Brimistors are designed especially for use with projection lamps to suppress switch-on surges. Type CZ11 is suitable for lamps of up to 300 watt rating, and type CZ12 for lamps of up to 500 watt rating, operated at 200–250 volts. Both types are wire-ended.




BRIMISTOR
TYPE CZ6
RESISTANCE vs. CURRENT
20°C.
0
100
200
300
400
500
CURRENT (MA.)

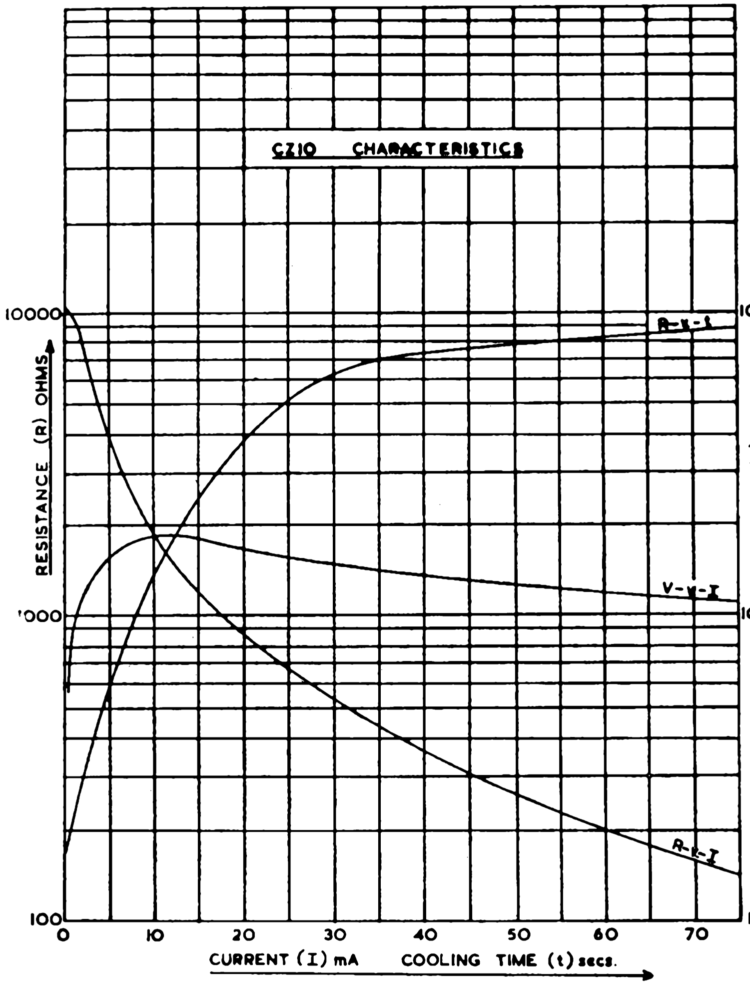

78
BRIMISTOR TYPE C4
RESISTANCE vs. CURRENT
20°C
1000
100
10
1
RESISTANCE OHMS
0
0·5
1·0
1·5
CURRENT AMPS


BRIMISTOR TYPE CZ9A
RESISTANCE versus CURRENT
20°C
169.
RESISTANCE OHMS
1000
100
10
1
CURRENT AMPS
0
0·5
1·0
1·5


168
BRIMISTOR TYPE CZ8A
RESISTANCE versus CURRENT
20°C
10000
1000
100
10
RESISTANCE OHMS
0
100
200
300
CURRENT mA

CZ8A
CZ9A

The **CZ10** Brimistor is intended primarily for use in mains-battery receivers to prevent the filaments from being burnt out on replacing a damaged valve. It is possible in some conditions for the full H.T. voltage to appear across the filament chain if this is discontinuous. The CZ10 is connected directly across the series filament chain and will maintain the voltage across the chain at a safely low level should a filament break. It may be used with 25 mA and 50 mA filaments.



FORMULAE IN RADIO ENGINEERING

1. OHMS LAW

If V equals the voltage existing across a resistance of R ohms when a current of I amperes is flowing, then :—

$$V = I \times R,\ I = \frac{V}{R},\ \text{or}\ R = \frac{V}{I}$$

2. POWER

Power is normally expressed in watts and given by the formula :—

$$W = V \times I = V^2/R = I^2 \times R$$

(V expressed in volts, I in amperes, R in ohms.)
NOTE—1 Horse Power = 746 watts.

3. RESISTORS IN SERIES AND PARALLEL

Series connection.

The total resistance of a number of resistors connected in series is the sum of their separate resistances.

Parallel Connection.

The total resistance of a number of resistors connected in parallel is given by the equation :—

$$R = \frac{1}{\frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}}$$

where R1, R2 and R3 are the separate resistors. For two resistors only the formula becomes :—

$$R = \frac{R1 \times R2}{R1 + R2}$$

4. CAPACITORS IN SERIES AND PARALLEL

Parallel connection.

The capacitance of two or more capacitors connected in parallel is equal to the sum of their capacitances.

Series Connection.

The total capacitance of a number of capacitors connected in series is given by the equation :—

$$C = \frac{1}{\frac{1}{C1} + \frac{1}{C2} + \frac{1}{C3}}$$

where C1, C2 and C3 are the separate capacitors. For two condensers only the formula becomes :—

$$C = \frac{C1 \times C2}{C1 + C2}$$

5. REACTANCES OF CAPACITORS AND COILS

Capacitor Reactance $X_C = \frac{1}{2\pi fC}$ ohms

Coil Reactance $X_L = 2\pi fL$ ohms

$2\pi = 6.28$, f expressed in cycles per sec., C in farads, L in henries.

6. RESONANCE

At resonance $X_L = X_C$ and $f = \frac{1}{2\pi\sqrt{LC}}$

Alternatively $f = \frac{160}{\sqrt{LC}}$

(f in megacycles/sec., L in microhenries, C in micro-microfarads.)

7. Q FACTOR OF SINGLE TUNED CIRCUIT

$$Q = \frac{fo}{f_1 - f_2}$$

Where fo is the frequency giving maximum response, f_1 and f_2 the frequencies either side of fo where the response falls to 0.71 of maximum. All frequency measurements must be expressed in the same units.

Q factors of between 50 and 100 are normal for modern coils.

8. INDUCTANCE OF SINGLE LAYER COILS

$$L \text{ (in microhenries)} = \frac{a^2 N^2}{9a + 10\,l} \text{ approx.}$$

If desired inductance is known, the number of turns required may be determined by the formula :—

$$N = \frac{5L}{na^2}\left[1 + \sqrt{\left(1 + \frac{0.36n^2 a^3}{L}\right)}\right]$$

N = number of turns.
a = radius of coil in inches.
n = number of turns per inch.
L = inductance in microhenries (μH).
l = length of coil in inches.

9. VALVE CHARACTERISTICS

Amp. factor (μ) = Impedance (r_a) X Mutual Conductance (g_m)
r_a measured in thousands of ohms, g_m measured in mA/volt.
Alternatively :—

$$g_m = \frac{\mu}{r_a}, \quad r_a = \frac{\mu}{g_m}$$

10. STAGE GAIN

$$\text{Amplification (A)} = \frac{\mu \times R_a}{R_a + r_a}$$

where R_a is the anode load, measured in the same units as r_a. If R_a is small compared with r_a, e.g., television R.F. stages :—

$$A = g_m \times R_a \text{ approximately.}$$

11. NEGATIVE FEEDBACK

VOLTAGE FEEDBACK.

Gain with feedback $= \frac{A}{1 + Ab}$

where A is the original gain of the amplifier section over which feedback is applied (including the output transformer if necessary) and b is the fraction of the output voltage fed back.

$$\text{Distortion with feedback} = \frac{d}{1 + Ab} \text{ approx.}$$

where d is the original distortion of the amplifier.

$$\text{Effective output Impedance} = \frac{r_a}{1 + \mu b}$$

where μ is the amplication factor of the output valve and r_a its anode impedance.

CURRENT FEEDBACK.

This form of feedback may be secured by un-bypassing the cathode bias resistor. Current feedback results in an increase of effective output impedance and is not recommended for output stages.

12. DECIBELS

The bel may be defined as the common logarithm of the ratio of two powers. Normally the decibel (one-tenth of a bel) is employed as a more convenient unit.

$$\text{Decibels (db)} = 10 \times \log \frac{W_1}{W_2}$$

where W_1 and W_2 are the two power levels.

If equal impedances are employed :—

$$\text{Decibels} = 20 \times \log \frac{V_1}{V_2}$$

$$= 20 \times \log \frac{I_1}{I_2}$$

where V_1, V_2 are the two voltage levels and I_1, I_2 the two current levels.

db	Power Ratio	Voltage Ratio	db	Power Ratio	Voltage Ratio
1	1.26	1.12	15	31.6	5.62
2	1.58	1.26	20	100	10
3	2.0	1.41	30	1000	31.6
4	2.51	1.58	40	10^4	10^2
5	3.16	1.78	50	10^5	316
6	3.98	2.0	60	10^6	10^3
7	5.01	2.24	70	10^7	3160
8	6.31	2.51	80	10^8	10^1
9	7.94	2.82	90	10^9	31600
10	10	3.16	100	10^{10}	10^5

Figures not given in the table may easily be calculated. If two db figures are added, their corresponding power or voltage ratios must be multiplied together.

e.g., 45 db = 40 db + 5 db = 100 × 1.78 = 178 Voltage Ratio.

13. FORMULAE FOR EQUIVALENT R.F. NOISE RESISTANCE OF VALVES

Saturated Diode $\quad R_{eq.} = \dfrac{0.05}{I_a}$ ohms.

Space Charge Limited Diode $\quad R_{eq.} = \dfrac{0.0333}{I_a}$ ohms.

Triode $\quad R_{eq.} = \dfrac{2.5}{g_m}$ ohms.

Pentode $\quad R_{eq.} = \dfrac{I_a}{I_a + I_{g2}}\left(\dfrac{2.5}{g_m} + \dfrac{20\, I_{g2}}{g_m{}^2}\right)$ ohms.

Triode Mixer $\quad R_{eq.} = \dfrac{4.0}{g_c}$ ohms.

Pentode Mixer and Multigrid Mixer $\quad R_{eq.} = \dfrac{I_a}{I_a + I_{g2}}\left(\dfrac{4.0}{g_c} + \dfrac{20\, I_{g2}}{g_c{}^2}\right)$ ohms.

I_a and I_{g2} are measured in amps., g_m and g_c are in amps. per volt.

TELEVISION & RADIO FREQUENCIES

Television—B.B.C. (Band I) 41-68 Mc/s

Name and Location	Channel	Frequency in Mc/s	Polarization
Crystal Palace (London) Divis (Belfast)	1 1	S. 41.5 V. 45.0	Vertical Horizontal
Holme Moss (Near Manchester) North Hessary Tor (Near Plymouth) Truleigh Hill (Near Brighton)	2 2 2	S. 48.25 V. 51.75	Vertical Vertical Vertical
Kirk o' Shotts (S. Scotland) Rowridge (Isle of Wight) Tacolneston (Near Norwich)	3 3 3	S. 53.25 V. 56.75	Vertical Vertical Horizontal
Sutton Coldfield (Near Birmingham) Meldrum (Aberdeen) Channel Islands	4 4 4	S. 58.25 V. 61.75	Vertical Horizontal Horizontal
Wenvoe (Near Cardiff) Pontop Pike (Near Newcastle) Douglas (Isle of Man)	5 5 5	S. 63.25 V. 66.75	Vertical Horizontal Vertical

Television—I.T.A. (Band III) 174-216 Mc/s

Name and Location	Channel	Frequency in Mc/s	Polarization
Midland (Hints, near Lichfield, Staffs.)	8	S. 186.25 V. 189.75	Vertical
London (Temporary Site at Norwood)	9	S. 191.25 V. 194.75	Vertical
Northern Emley Moor (Near Huddersfield)	10	S. 196.25 V. 199.75	Vertical
Scottish Blackhill, Lanarkshire	10	S. 196.23 V. 199.73	Vertical

Television Channel Frequencies (Band III)

Channel	Sound (Mc/s)	Vision (Mc/s)
6	176.25	179.75
7	181.25	184.75
11	201.25	204.75
12	206.25	209.75
13	211.25	214.75

Radio—FM Band II 87.5-100 Mc/s

Programme	Location	Frequency in Mc/s	Remarks
LIGHT	North Hessary Tor, Devon	88.1	
	Sandale, Cumberland	88.1	
	Sutton Coldfield	88.3	
	Pontop Pike	88.5	
	Rowridge, Isle of Wight	88.5	
	Meldrum	88.7	
	Blaen Plwy	88.7	
	Wrotham	89.1	
	Holme Moss	89.3	
	Rosemarkie, Morayfirth	89.3	
	Anglesey	89.6	
	Corwen, North Wales	89.6	
	Norwich	89.7	
	Wenvoe	89.9	
	Kirk o' Shotts	89.9	
	Divis	90.1	
THIRD	North Hessary Tor	90.3	
	Sandale, Cumberland	90.3	
	Sutton Coldfield	90.5	
	Pontop Pike	90.7	
	Rowridge, Isle of Wight	90.7	
	Meldrum	90.9	
	Blaen Plwy	90.9	
	Wrotham	91.3	
	Holme Moss	91.5	
	Rosemarkie, Morayfirth	91.5	
	Anglesey	91.8	
	Corwen, North Wales	91.8	
	Norwich	91.9	
	Wenvoe	92.1	
	Kirk o' Shotts	92.1	
	Divis	92.3	
HOME	North Hessary Tor	92.5	
	Sandale, Cumberland	92.5	Northern Home Service
	Sutton Coldfield	92.7	
	Pontop Pike	92.9	
	Rowridge, Isle of Wight	92.9	
	Meldrum	93.1	
	Blaen Plwy	93.1	
	Wrotham	93.5	
	Holme Moss	93.7	

Radio—FM Band II 87.5-100 Mc/s—*contd.*

Programme	Location	Frequency in Mc/s	Remarks
HOME (*contd.*)	Rosemarkie, Moray Firth	93.7	
	Anglesey	94.0	
	Corwen, North Wales	94.0	
	Norwich	94.1	
	Wenvoe	94.3	
	Kirk o' Shotts	94.3	
	Divis	94.5	
	Sandale	94.7	Scottish Home Service

Radio—B.B.C. Long and Medium Wave Frequencies

647 kc/s	Third Programme
692 kc/s	North Home Service
809 kc/s	Scottish Home Service
881 kc/s	Welsh Home Service
908 kc/s	London Home Service
1,052 kc/s	West Home Service
1,088 kc/s	Midland Home Service
1,151 kc/s	North and Northern Ireland Home Service
1,214 kc/s	Light Programme
1,457 kc/s	West Home Service
1,546 kc/s	Third Programme

Amateur Band Frequencies

Region I Allocations	Exclusive Amateur Frequencies	
1.8— 2.0 Mc/s		
3.5— 3.8 Mc/s		
7.0— 7.15 Mc/s	7.0— 7.1 Mc/s	
14.0— 14.35 Mc/s	14.0— 14.35 Mc/s	
21.0— 21.45 Mc/s	21.0— 21.45 Mc/s	
28.0— 30.0 Mc/s	28.0— 30.0 Mc/s	
144.0— 146.0 Mc/s	145.5— 146.0 Mc/s	
420 — 460.0 Mc/s		
1,215 — 1,325.0 Mc/s		
2,300 — 2,450 Mc/s	2,300 — 2,450 Mc/s	
5,650 — 5,850 Mc/s	5,650 — 5,850 Mc/s	
10,000 —10,500 Mc/s	10,000 —10,500 Mc/s	

Region I, as defined by the Atlantic City Radio Conference, 1947, includes Europe, with the European portion of the U.S.S.R., Africa, Arabia, Spitzbergen and Iceland.

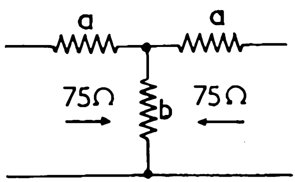
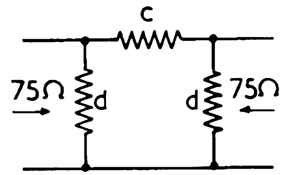
Frequencies within the Region I allocations not exclusively for the Amateur Service are allocated on a non-interference basis, to be shared with other Services.

U.K. amateur stations are at present (1957) permitted to use 70.3 Mc/s $\pm$0.1 Mc/s, on a shared basis with the Fixed and Mobile Services.

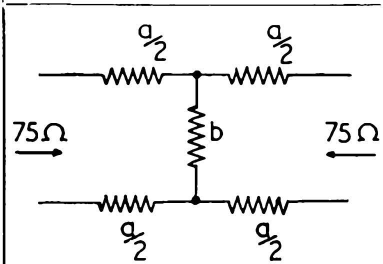
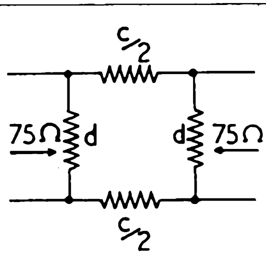
U.H.F. Broadcasting Frequency Allocations

Band IV 470—585 Mc/s
Band V 610—960 Mc/s

75 Ω Attenuator Pads for insertion in aerial input of television receivers

	T Pad		TT Pad	
	 		 	
Loss in decibels	a	b	c	d
1	4.31	647.3	8.65	1,304.5
2	8.60	322.9	17.43	654.1
3	12.81	212.9	26.39	439.0
4	16.97	157.3	35.78	331.4
5	21.00	123.4	45.63	267.8
6	24.93	100.4	56.01	225.8
7	28.70	83.75	67.16	196.1
8	32.30	70.94	79.26	174.3
9	35.70	60.90	92.36	157.5
10	38.96	52.74	106.6	144.4
11	42.02	45.90	122.5	133.9
12	44.90	40.21	139.9	125.4
13	47.56	35.33	159.1	118.3
14	50.05	31.16	180.5	112.4
15	52.35	25.01	204.1	107.4
20	61.36	15.15	371.3	91.67
25	67.00	8.45	665.5	83.93
30	70.40	4.75	1,186	79.87
35	72.38	2.67	2,108	77.70
40	73.64	1.50	3,750	76.51
45	74.16	0.844	6,669	75.85
50	74.53	0.474	11,858	75.48

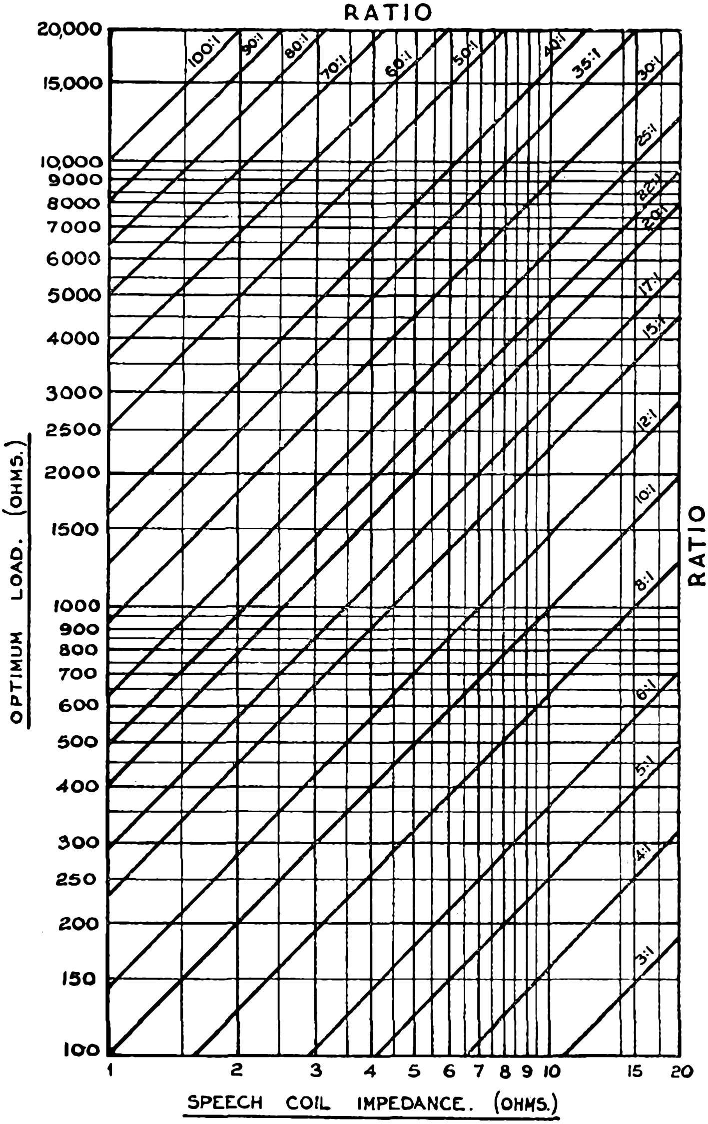
For pads of characteristic impedance R, the values of a, b, c and d given may be multiplied by the factor R/75. Equivalent configurations for balanced pads giving the same loss are given below:—

Balanced T Pad	Balanced TT Pad
 	

OUTPUT TRANSFORMER RATIOS

Derived from the formula :—

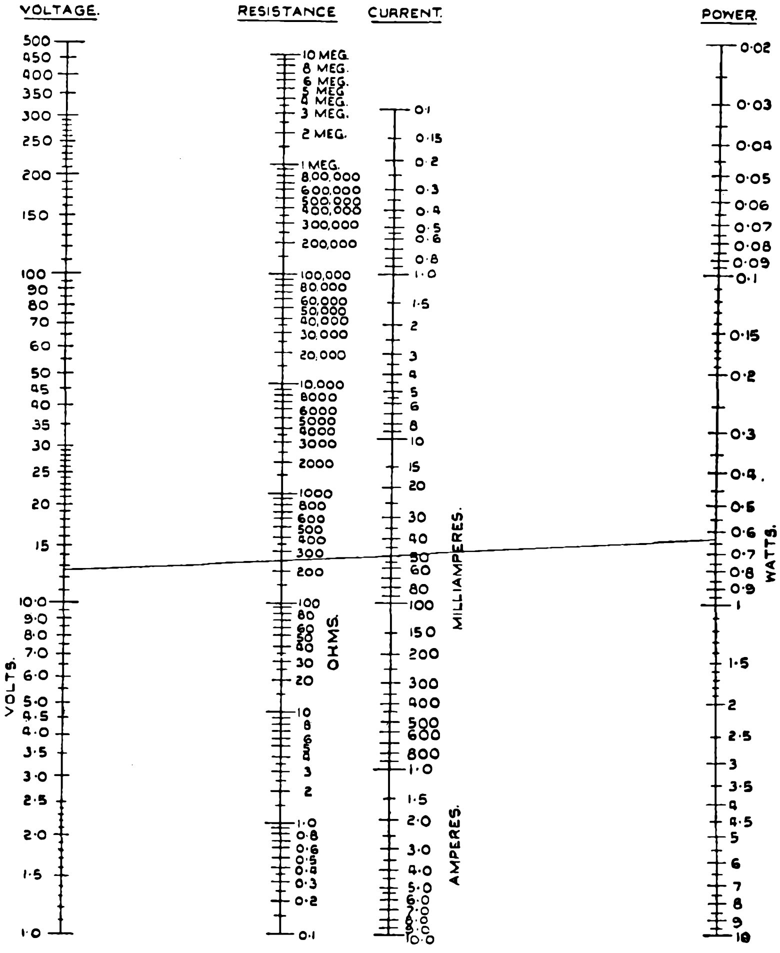
$$\frac{\text{Optimum Load}}{\text{Speech Coil Impedance}} = (\text{Transformer Ratio})$$



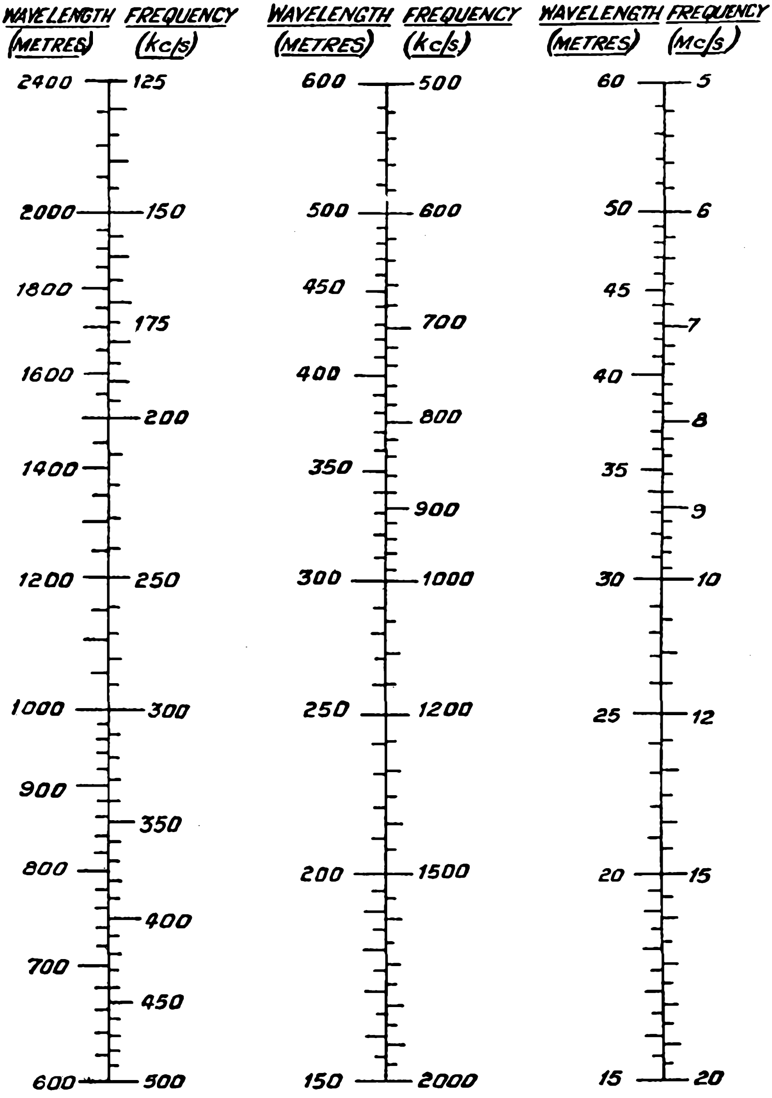
POWER AND RESISTANCE ABAC

To use the abac, select known points on any two of the vertical scales and lay a ruler across these points so as to cut the other two scales. The points where the ruler cuts these latter scales will give the values required, e.g., to obtain the correct bias resistor for a 6V6G proceed as follows :—

The Anode and Screen Currents total 50 mA and the recommended Grid Bias is 12.5 volts. A line drawn through these points cuts the powers and resistance scales at 0.635 watt and 250 ohms respectively. A 1 watt, 250 ohm resistor would therefore be satisfactory.



CONVERSION TABLE
FREQUENCY AND WAVELENGTH

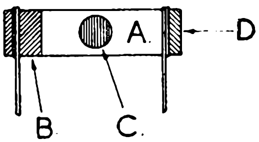


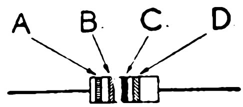
The velocity of radio waves in air is approximately 300,000 kilometres/sec.
Thus :—f (kc/s) × Wavelength in metres = 300,000.

RESISTOR AND CONDENSER COLOUR CODES

1. Resistors

The colour coding may take one of two forms as shown in the diagrams below. In each case the letters have the following meanings :—A gives the first significant figure, B the second, whilst C gives the number of noughts following the figures. D gives the tolerances of the resistor ; if D is not present, the tolerances are ± 20 per cent of the nominal value.





Colour	Figure	Resistors Tolerance	Condensers Tolerance	Condensers Voltage Rating
Black	0	—	—	—
Brown ...	1	—	± 1%	100 volts
Red	2	—	± 2%	200 ,,
Orange ...	3	—	± 3%	300 ,,
Yellow	4	—	± 4%	400 ,,
Green	5	—	± 5%	500 ,,
Blue	6	—	± 6%	600 ,,
Purple	7	—	± 7%	700 ,,
Grey	8	—	± 8%	800 ,,
White	9	—	± 9%	900 ,,
Gold	—	± 5%	± 5%	1,000 ,,
Silver	—	±10%	±10%	2,000 ,,
None	—	±20%	±20%	500 ,,

2. Condensers

The colour coding takes the form of three dots, the colours of which have the same numerical values as in the table above. The colours are read from left to right, the first two giving the significant figures and the third the number of noughts following the figures.

The ratings of such condensers is assumed to be 500 volts working, and the tolerance 20%.

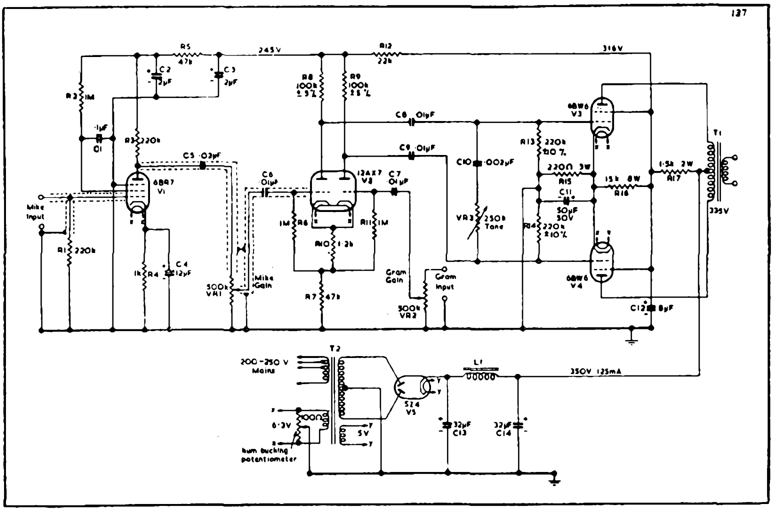
If two rows of three coloured dots are used, the top row represents the significant figures, read from left to right, whilst the bottom row indicates the number of noughts, the tolerance and the voltage rating ; read from *right to left*.

If the condenser is circular, two groups of coloured bands may be used, one group made up of wide bands and the other of narrow bands. When the condenser is viewed with the wide bands on the right, the wide bands indicate the significant figures read from left to right whilst the narrow bands indicate the number of noughts, the tolerance and the voltage rating read from *right to left*.

All values are given in picofarads (pF), also known as micromicrofarads ($\mu\mu$F). 1,000,000 pF or $\mu\mu$F = 1 microfarad (μF).

CIRCUIT SECTION

6BW6 PUSH-PULL AMPLIFIER



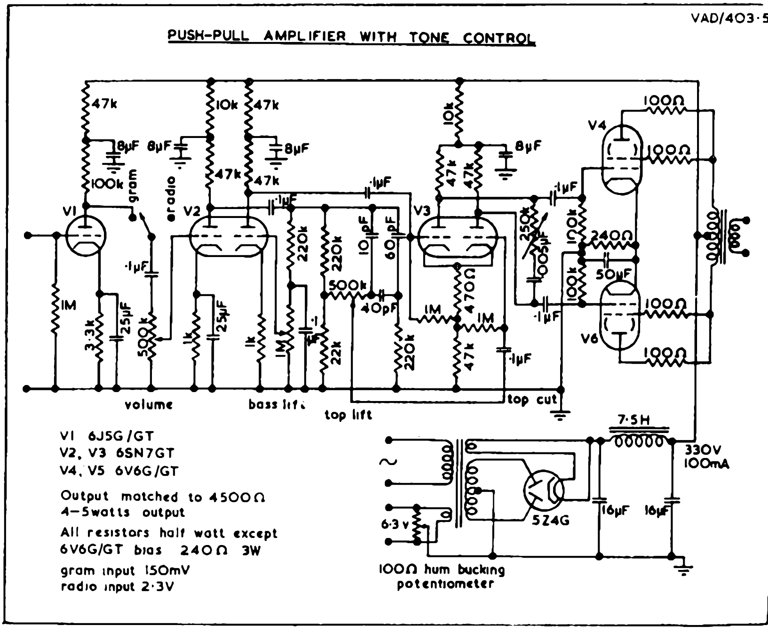
Output transformer impedance 10,000 Ω anode to anode.

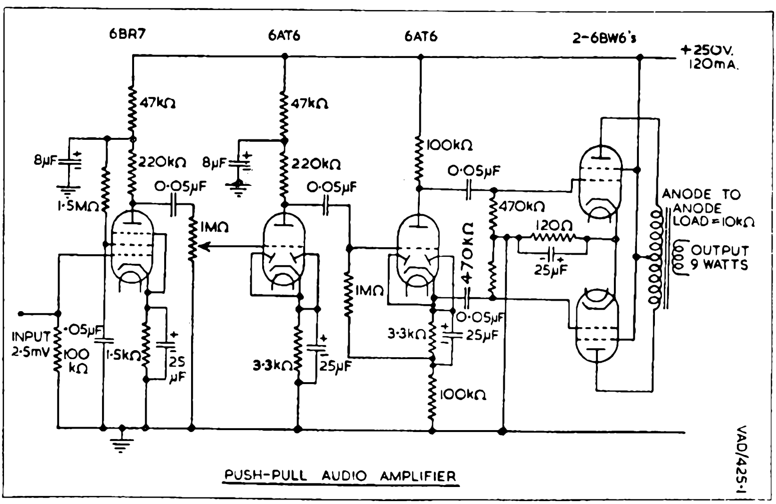
HARMONIC DISTORTION 1,000 c/s.

Output Watts	Mike		Gram	
	2nd	3rd	2nd	3rd
5	3.2	2.3	1	2.4
10	4.8	3.9	1.7	4.3
13	3.9	5.9	1.5	5.8

FREQUENCY RESPONSE 8 WATTS AT 1,000 c/s.

Frequency c/s	Gram db no top cut	Mike db no top cut	Mike db max. top cut
50	−2.0	−2.4	−2.4
200	0.2	0	+0.45
1,000	0.3	0	+0.25
3,000	0.3	0	−4
8,000	−0.4	−0.6	−10.2
15,000	−0.8	−1.7	−14.0


VAD/403·5
PUSH-PULL AMPLIFIER WITH TONE CONTROL
V1 6J5G/GT
V2, V3 6SN7GT
V4, V5 6V6G/GT
Output matched to 4500Ω
4–5watts output
All resistors half watt except
6V6G/GT bias 240Ω 3W
gram input 150mV
radio input 2·3V
volume
bass lift
top lift
top cut
100Ω hum bucking
potentiometer
5Z4G
330V
100mA
7·5H


6BR7
6AT6
6AT6
2–6BW6's
+250V.
120mA.
INPUT
2·5mV
ANODE TO
ANODE
LOAD = 10kΩ
OUTPUT
9 WATTS
VAD/425·1
PUSH-PULL AUDIO AMPLIFIER

PUSH PULL AMPLIFIER WITH TONE CONTROL

CONSTRUCTIONAL NOTES

Owing to the good bass response of this amplifier it is essential to minimise the hum pick up in the early stages. These should be mounted well away from the mains transformer and smoothing choke. Grid leads should be kept short and well away from heater wiring.

The output transformer should be wound as follows :—

OUTPUT TRANSFORMER T2

Laminations	Sankey 60A ¾ in. stack butt joint.
Primary	2 sections each 1,800 turns 36 s.w.g. S.S.E. wire.
Secondary	3 sections each 70 turns 24 s.w.g. enamel wire to match from 4,500 ohms to 15 ohms.

The five primary and secondary sections are interleaved to reduce leakage inductance.

Total primary D.C. resistance 280 ohms.

Total secondary D.C. resistance 2.2 ohms.

Primary impedance approx. 5,000 ohms measured with 10 mA D.C and 1 V. A.C. at 50 c.p.s.

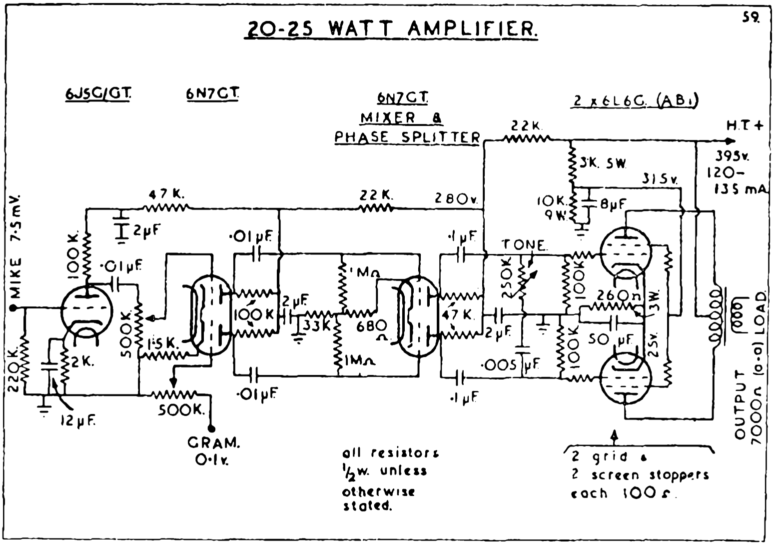
PERFORMANCE DATA

Harmonic Distortion at 1,000 c.p.s. (tone controls at flat frequency response).

Output watts	% 2nd harmonic	% 3rd harmonic	Total harmonic
2	0.68	0.34	0.76
3	0.56	0.64	0.85
4	0.75	0.46	0.88
5	0.18	5.0	5.1

FREQUENCY RESPONSE (gain control at maximum)

Frequency c.p.s.	Min. top Min. bass (Flat response) (40mV input) db	Max. top Min. bass (40mV input) db	Min. top Max. bass (5mV input) db	Max. top Max. bass (5mV input) db	Top cut Max. Top Boost Min. Bass Boost Min. db
50	—0.5	—0.4	+20 (3.5 watts)	+20 (1.4 watts)	0
100	0	0	+14.5	+16	0
200	0	+0.4	+9.5	+10.5	0
400	0	+0.4	+5.2	+5.5	—0.4
1,000	0 (0.5 watt)	0 (0.33 watt)	0 (0.035 watt)	0 (0.014 watt)	—2
2,500	—0.2	+1.4	—2.5	—3.5	—7
5,000	—0.2	+7	—3.5	+2.5	—13
10,000	+0.2	+10	—3.5	+7	—19
20,000	+0.3	+11 (4.1 watts)	—3.5	+7.5 (0.78 watt)	—30



FREQUENCY RESPONSE

Relative outputs for constant input. Gain controls at maximum.

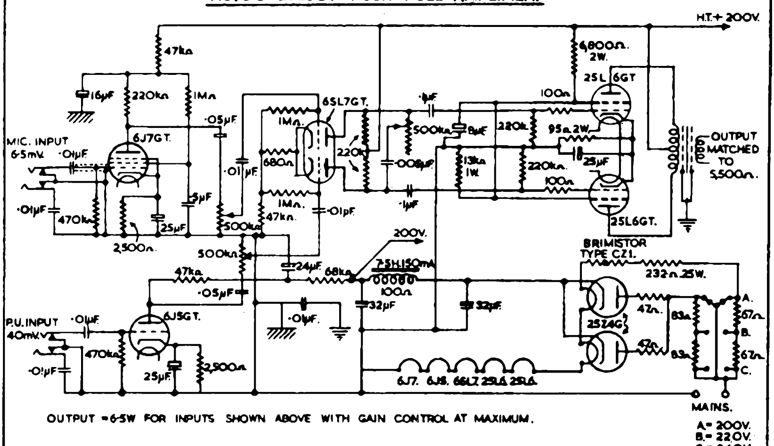
Frequency c.p.s.	Gram channel no top cut db	Mike channel no top cut db	Mike channel max. top cut db
50	—0.2	—1.0	+0.35
200	0	0	+0.3
1,000	0 (15 watts)	0 (15 watts)	0 (15 watts)
3,000	—0.3	0	—4.0
8,000	+0.3	+0.3	—9.0
15,000	—3.3	—3.3	—16.5

HARMONIC DISTORTION AT 1,000 c.p.s. (No top cut on tone control)

Output watts	Gram		Mike	
	% 2nd harmonic	% 3rd harmonic	% 2nd harmonic	% 3rd harmonic
5	0.5	1.25	0.9	1.4
12	1.1	3.1	1.2	3.2
20	1.3	4.5	1.8	4.4
25	3.4	12	5.2	11

Higher order harmonics small in comparison with 2nd and 3rd.

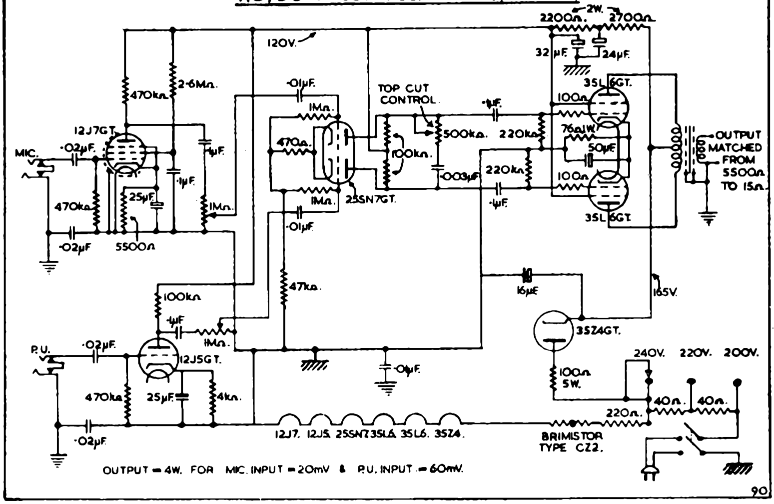
AC/DC 25L6GT PUSH PULL AMPLIFIER.



OUTPUT =6·5W FOR INPUTS SHOWN ABOVE WITH GAIN CONTROL AT MAXIMUM.

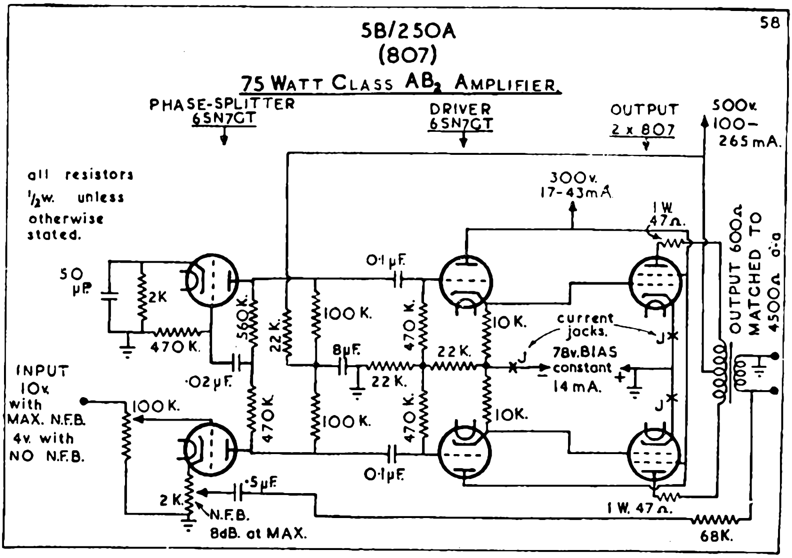
89

AC/DC 35L6GT PUSH PULL AMPLIFIER.



OUTPUT = 4W. FOR MIC. INPUT = 20mV & P.U. INPUT = 60mV.

90

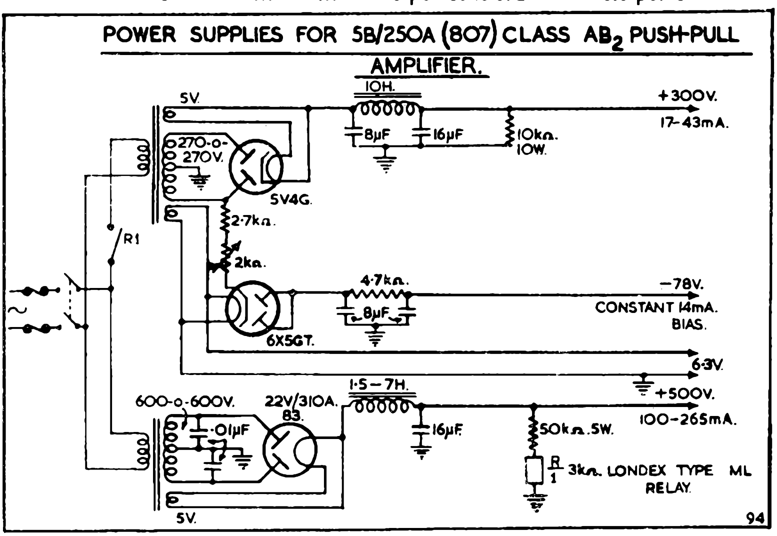


FREQUENCY RESPONSE

At 50 c.p.s.—0.5 db., 1,000 c.p.s. 0 db., 20,000 c.p.s.—1.4 db.

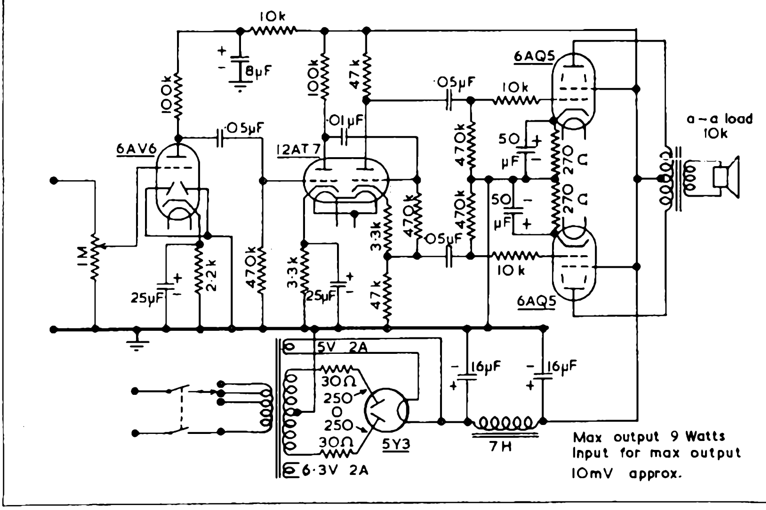
HARMONIC DISTORTION (70 watts output)

Without feed-back	6 per cent 3rd	6.9 per cent Total
With full feed-back	3 per cent 3rd	3.3 per cent Total



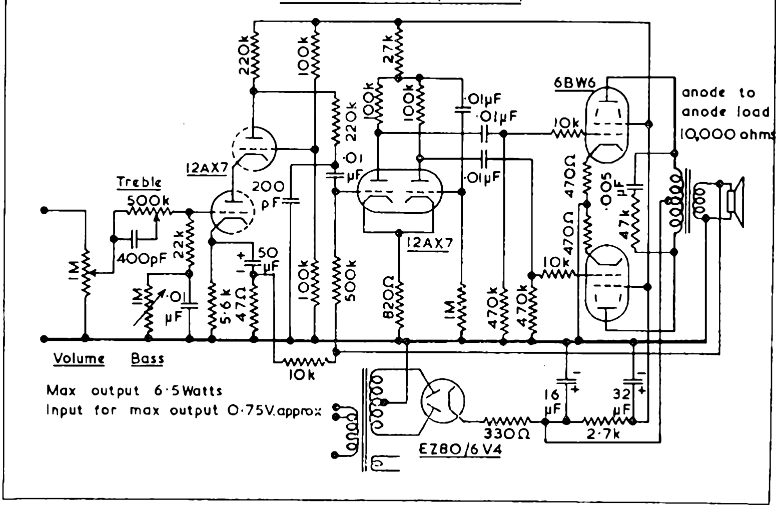
6AQ5 PUSH-PULL AMPLIFIER

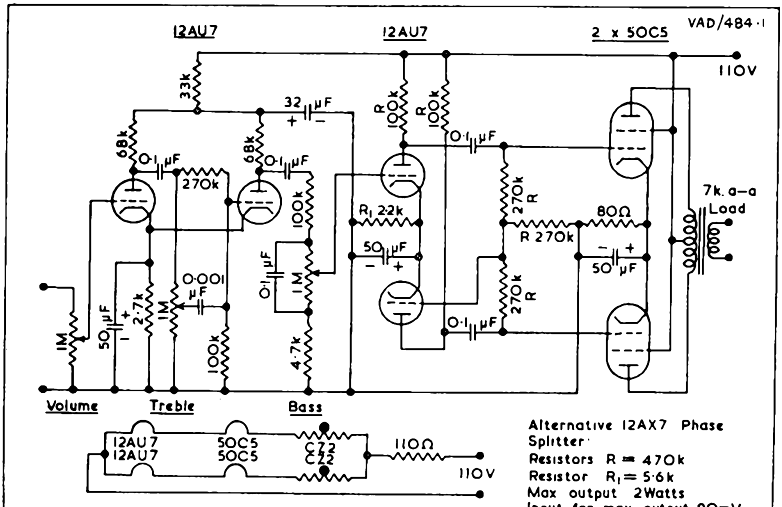
VAD/469·1



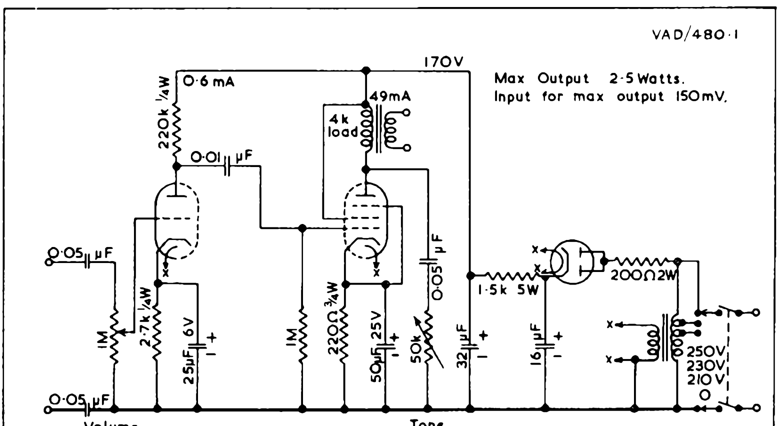
6BW6 AMPLIFIER (Push–Pull)

VAD/470·1

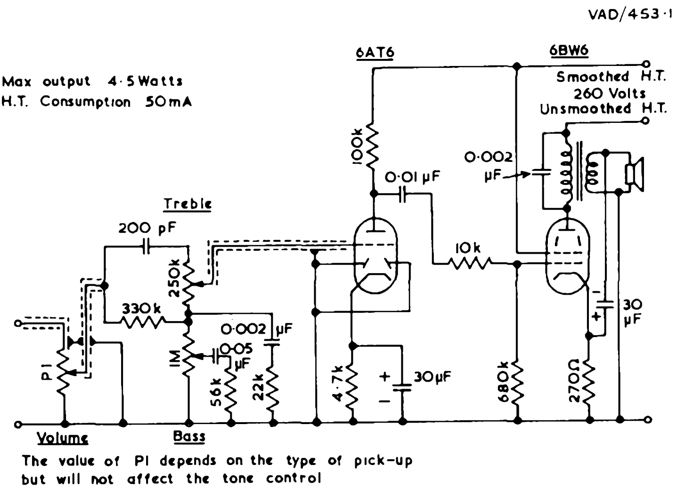




PUSH PULL 50C5 AMPLIFIER

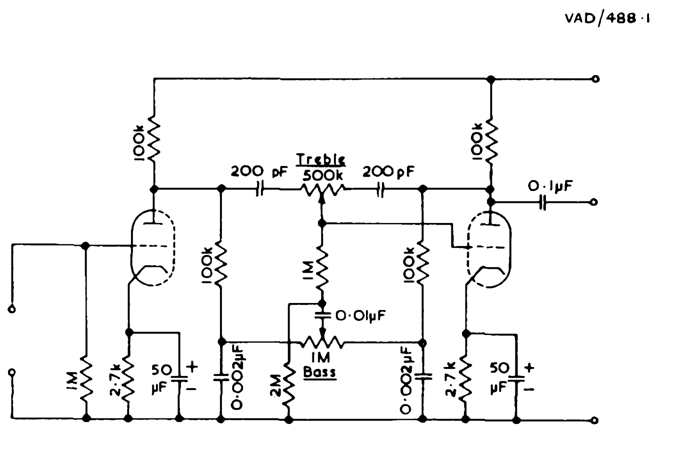


ECL82 AMPLIFIER



The value of P1 depends on the type of pick-up but will not affect the tone control

GRAMOPHONE AMPLIFIER WITH BASS AND TREBLE BOOST

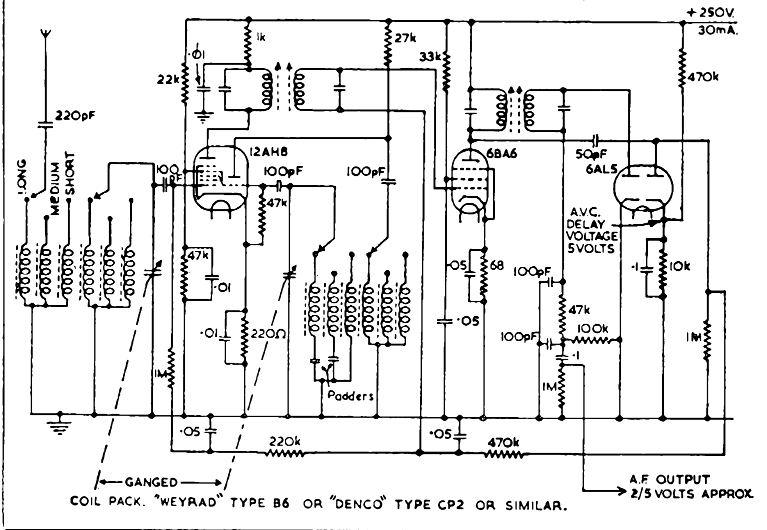


12AX7 TONE CONTROL CIRCUIT

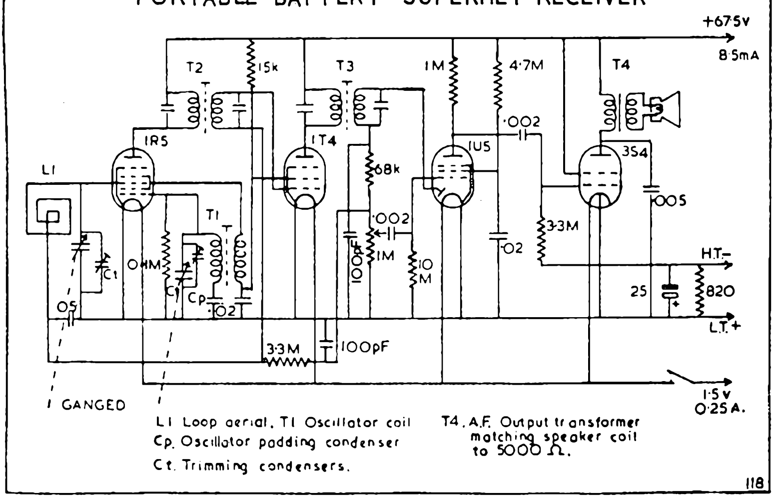
RADIO TUNER UNIT.

FOR USE IN FRONT OF A.F. AMPLIFIER CIRCUITS.

Dwg 136

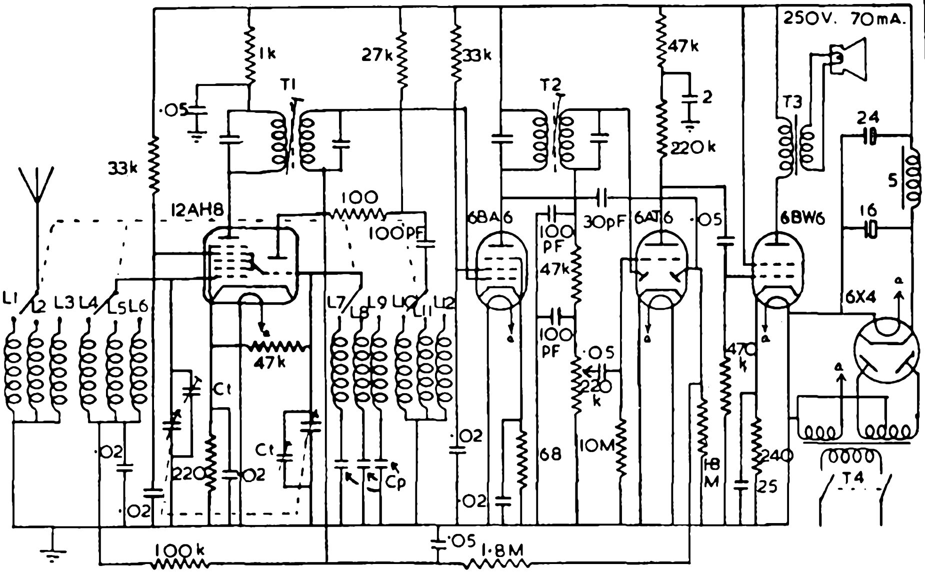


PORTABLE BATTERY SUPERHET RECEIVER



AC OPERATED SUPERHET RECEIVER

USING MINIATURE VALVES



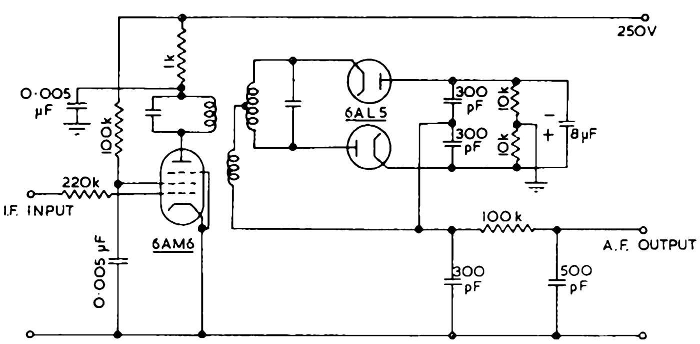
L1-6. Long, medium & short wave aerial transformers.

L7-12. " " " " oscillator transformers.

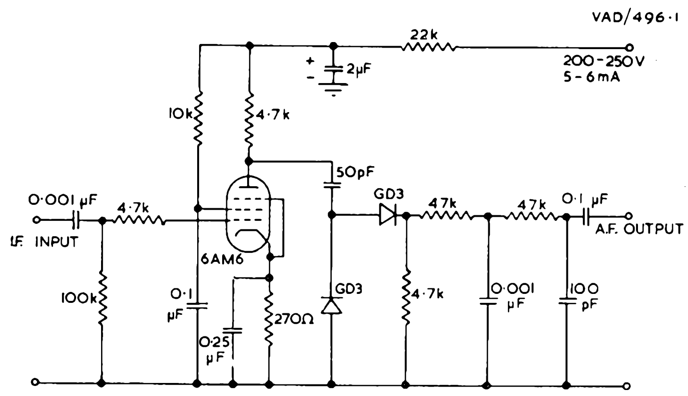
T3. A.F. Output transformer, matching to 5000 Ω.

T4 Mains transformer, 250-0-250 v. 70mA. 6·3 v. 2·0 A

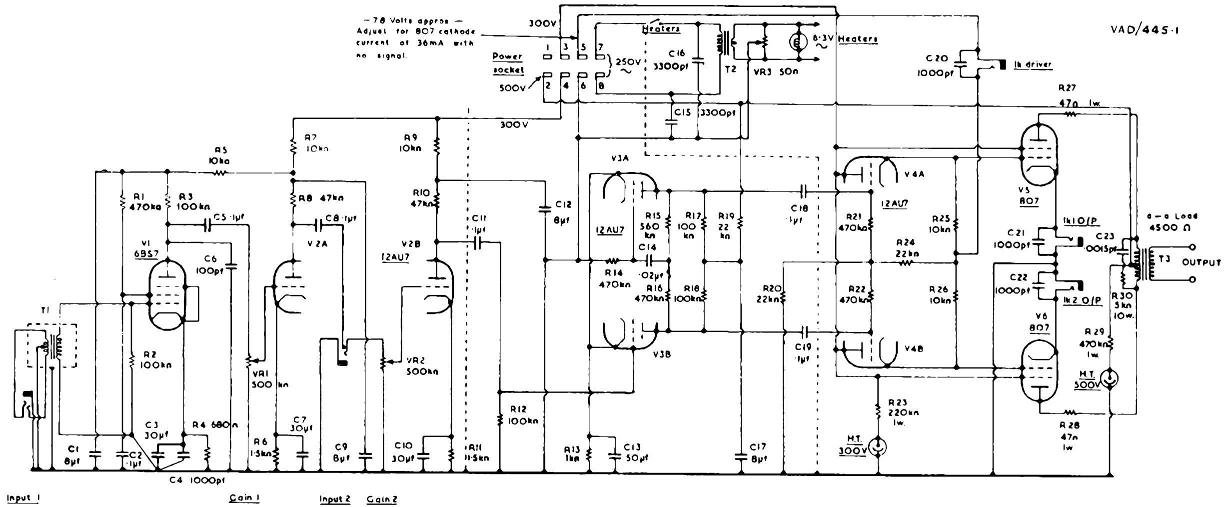
119.



BALANCED RATIO DETECTOR CIRCUIT

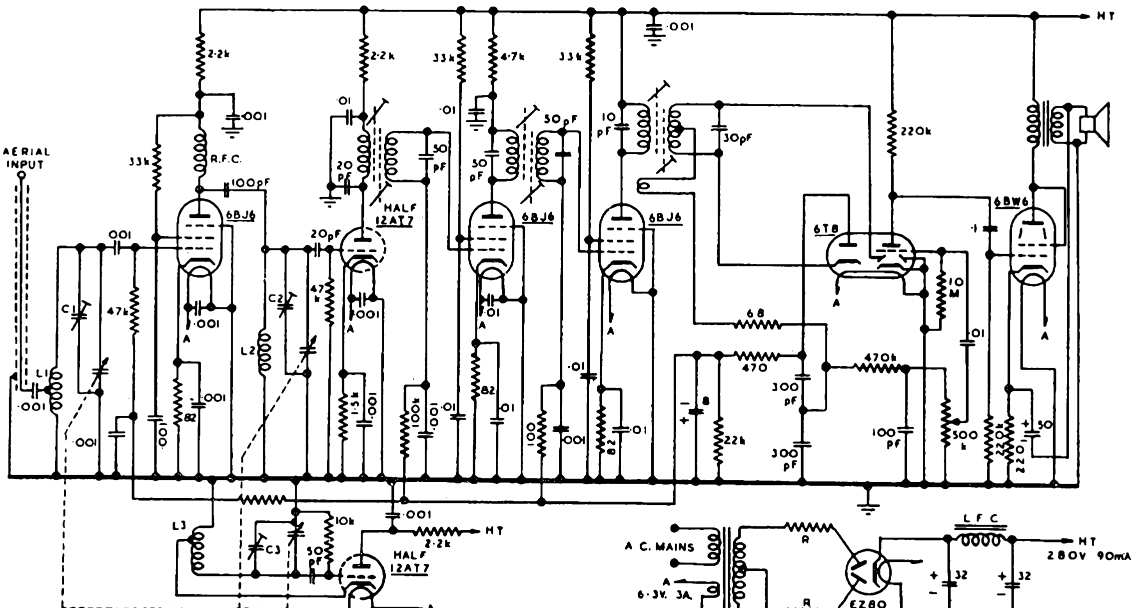


PULSE COUNTING DISCRIMINATOR CIRCUIT



75 WATT AMPLIFIER

F.M. RECEIVER



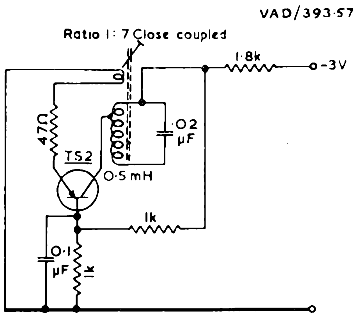
5—25pF GANGED
C1, C2, C3, 3—30pF TRIMMER
L2, L3, INDUCTIVELY COUPLED

I.F. 10·7 Mc/s

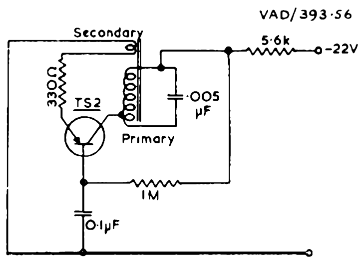
CAPACITIES IN MICRO FARADS UNLESS OTHERWISE STATED

R TO BE SUCH THAT THE TOT. SUPPLY IMPEDANCE PER ANODE IS NOT LESS THAN 300 OHMS

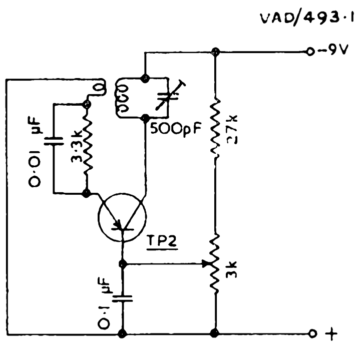
TRANSISTOR CIRCUITS



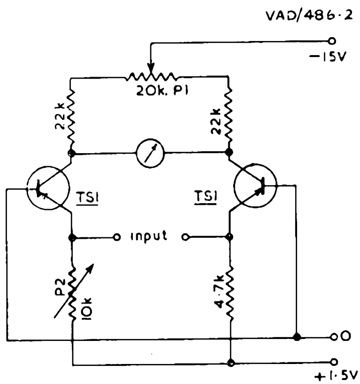
50 kc/s OSCILLATOR



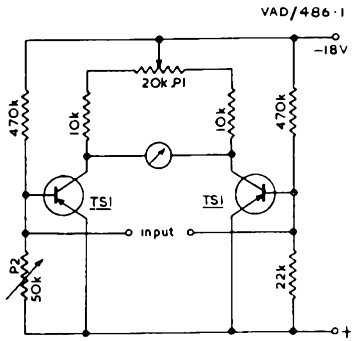
1000 c/s OSCILLATOR



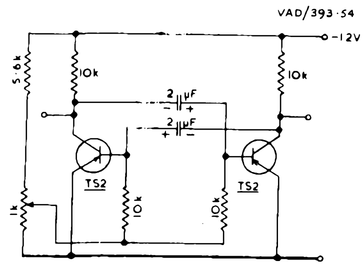
2 Mc/s TRANSISTOR OSCILLATOR



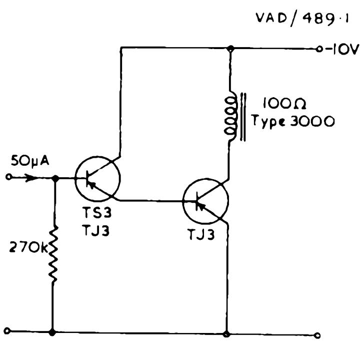
TRANSISTOR DC AMPLIFIER COMMON BASE



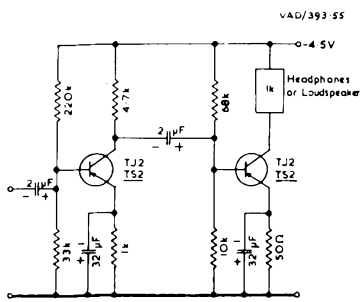
TRANSISTOR DC AMPLIFIER
COMMON EMITTER



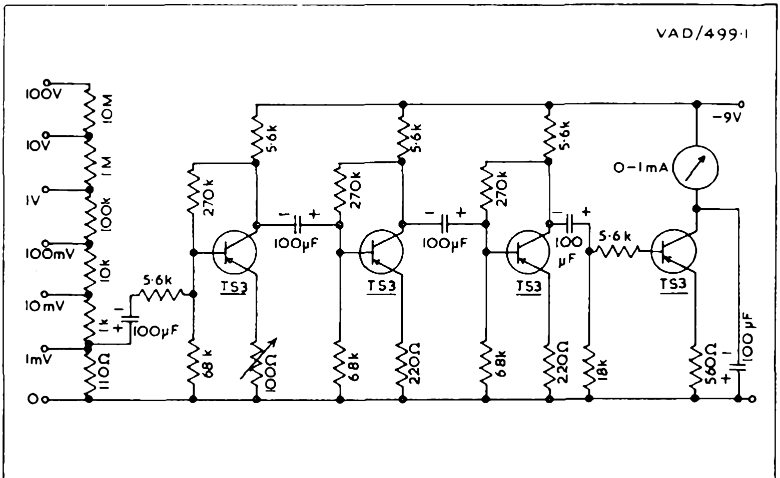
TRANSISTOR
MULTIVIBRATOR



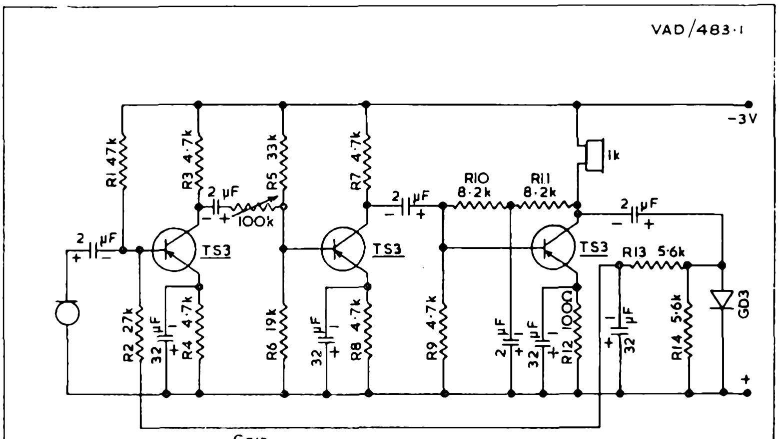
TRANSISTOR OPERATED RELAY



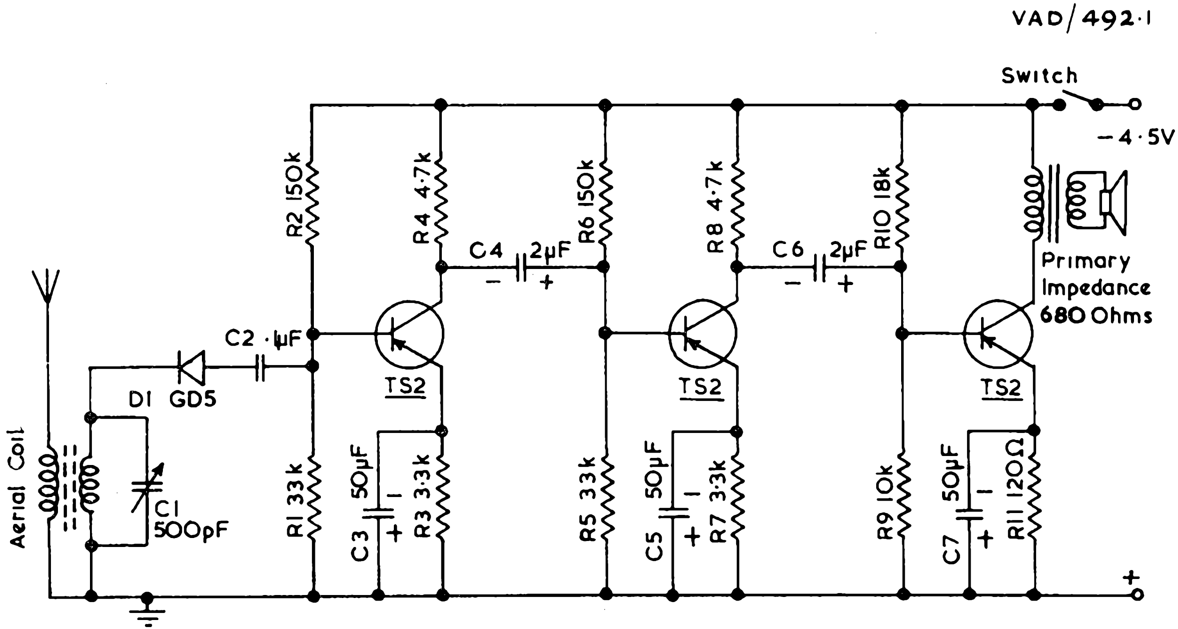
AUDIO AMPLIFIER



TRANSISTOR VOLTMETER



TRANSISTOR HEARING AID



TRANSISTOR T. R. F. RECEIVER

BRIMARIZE SECTION

This section is written especially for the Service Engineer, to help him to select a satisfactory replacement valve for one that is obsolete or unobtainable.

A brief guide to the correct Brimarizing procedure is followed by a general consideration of the problem, particular reference being made to certain cases where conflicting requirements tend to cause confusion. The section closes with a list of tried and tested substitutions involving minor circuit changes.

Brimarize Procedure

1. Check valve function.

Determine whether the valve is being used normally, or for some special function. R.F. Pentodes are often used as frequency changers or as L.F. Amplifiers, whilst certain triode-pentodes and heptodes can be employed as I.F. and L.F. amplifiers simultaneously. In the latter case, Brimarizing may require two valves.

2. Check the heater rating.

In A.C. receivers the heater voltage is the important parameter whilst A.C./D.C. sets require the correct heater current rating. In car radios, both voltage and current may be important.

3. Check the base.

Valves with identical characteristics are often available in two base ranges. It may be more convenient to change the valve socket rather than make extensive circuit alterations.

4. Check the operating voltages and currents.

These must not exceed the maximum specified ratings for the valve nor should the receiver power supply be overloaded.

5. Check valve performance.

The sensitivity of a set fitted with A.V.C. or operated well within the Service Area may be reduced by 6db or so without noticeable change in performance. This is approximately equivalent to a 2 : 1 change in conversion or mutual conductance of a valve. Reduced power output may be nullified by fitting a loud speaker of high flux density.

NOTES ON BRIMARIZING

VALVE HEATERS

In A.C./D.C. and some A.C. receivers where several valves are connected in series, heater current is the important characteristic, slight differences in heater voltage being absorbed in the other valves and in the mains resistor. Where the voltage difference exceeds 5 per cent of the mains voltage, however, it is advisable to alter the value of this resistor. When a line cord is used which carries the H.T. current to the receiver, the total value of current flowing including H.T. must be employed in the calculation for resistance.

Receivers without barretters-or voltage tappings often give trouble in areas where the mains supply is on the low side (200 volts) or on the high side (250 volts). It is good practice to fit a tap on such receivers so as to provide the correct heater current at the nominal mains voltage of the locality.

Too low a current will cause premature loss of emission in rectifiers and output valves where these are used at maximum cathode ratings. Frequency changers tend to stop oscillating and this may cause the set to cease functioning during certain times of the day. Valves used for resistance coupled amplifiers or where very low ratings are employed may often be operated successfully at reduced heater currents.

Too high a heater current will cause premature heater failure, or heater-cathode leakage which may cause hum in the receiver. A secondary effect caused by excessive cathode temperature is grid emission. When this occurs on R.F. pentodes, gradual loss of gain results whilst in output valves an increase of distortion is noticeable a few minutes after " switch-on." Grid emission may be checked by inserting a 50 micro-amp. meter in series with the earthy end of the grid leak of the valve. A few micro-amps. will often be sufficient to cause trouble.

In normal A.C. mains receivers with parallel connected valve heaters, a substitute valve must have the same heater voltage rating, differences in current being of small importance. An exception occurs in the case of certain obsolete rectifying valves having a very low heater current. Substitution by a modern type may cause excessive voltage drop in the transformer winding. Provided the H.T. current drawn by the receiver is well within the rating of the new valve, however, a drop of 10 per cent in heater voltage will not seriously shorten its life. For 6 volt car radios and 12 volt receivers employing 12 volt valves the same considerations apply as for A.C. receivers.

Many 12 volt receivers employ series-connected pairs of 6 volt valves, connected directly across the battery. In these cases, both heater voltage and current are important. Current differences may be balanced by fitting the correct value of resistor across the heater drawing the lower current.

SOCKET CHANGES

When socket changes and rewiring are involved the positioning of the leads is of importance. Heater leads must be kept clear of grid connections, whilst the control grid and anode connections of R.F. valves must be placed well apart or instability will result. Single ended valves are particularly prone to trouble from this cause

Replacement of a valve having a top anode connection by one having a top cap grid requires special care. The new top cap connection is best brought from the top of the coil can, the old anode connection being withdrawn and brought out from the bottom. This will avoid the necessity of employing a long length of screened lead which besides increasing the capacity of the tuned circuit, usually has a very poor power factor, resulting in loss of gain.

OPERATING CONDITIONS

The substitute valve may require a lower or higher screen voltage for optimum results, a change of bias or optimum load may also be advisable. Always ensure that the voltages and currents are within the maximum ratings given in the valve data sheet. Note that a valve may give satisfactory service in circumstances widely varying from the published operating conditions provided the maximum ratings (including anode and screen dissipation) are not exceeded.

FREQUENCY CHANGERS

The older types of octodes and heptodes are interchangeable but it should be noted that the newer specialized types which have no oscillator anode cannot be used for replacement without considerable circuit modification. Valves of this type include the 1R5, 6BE6 and 6SA7. Type 6SA7 may be replaced by type 6K8GT together with slight wiring changes, in sets without a short-wave band.

Triode-heptodes and triode-hexodes are interchangeable when used for frequency conversion. The triode-heptode employs a suppressor grid to increase the conversion impedance and so reduce the I.F. transformer damping. This feature is achieved in types 6K8GT and 12K8GT by the addition of confining plates.

The triode-pentode used with cathode injection is conveniently replaced by a pentagrid or triode-hexode of more modern design. A change in value of screen grid and oscillator anode resistors will usually be necessary, to ensure that the valve ratings are not exceeded.

Early sets employing H.F. tetrodes as self-oscillating frequency changers may be Brimarized by the use of a modern H.F. pentode of the " sharp cut-off " type. Vari-mu valves are not usually satisfactory owing to their lower conversion factor. Note that the metallizing on 5-pin valves is connected to cathode and in this circuit will be at R.F. potential. If instability results, a clear type should be used or a 7-pin type substituted and its metallizing earthed.

A Heptode used with a separate oscillator valve may usually be replaced by a modern type of triode-hexode, the oscillator anode connection being taken to cathode.

Always re-align the receiver after substitution of the frequency changer. Whistles present after re-alignment may be due to excessive oscillation and this may be reduced by inserting a resistor of 1,000 ohms or so in series with the oscillator grid coil of the appropriate wave band.

Strength of oscillation may be measured by inserting a 0.5 mA D.C. meter in the earthy end of the oscillator grid leak. The approximate peak heterodyne voltage may be obtained by multiplying the reading in milliamps by 1.2 and by the value of grid leak in thousands of ohms. The optimum value of grid current or heterodyne voltage is usually given in the valve ratings. In most receivers the figure will be achieved only at certain parts of the band, tolerances of ±50 per cent usually being satisfactory. Too low a value will cause greatly reduced gain.

H.F. PENTODES

Substitution by a modern type may cause instability. Check that internal shields, suppressor grids, etc., which are brought out to base pins are properly earthed and that the metallizing connection, if any, is making good connection to the metallizing. A resistance of a few ohms in this lead may be sufficient to cause feedback. Make sure that the wiring is properly arranged and that the anode and grid leads are well apart. If the new valve gives much higher gain than the old type it may be necessary to reduce the screen voltage or increase the bias to preserve stability.

A.F. AMPLIFIERS

A slight change in gain of this stage is usually permissible. Adjustment of the anode load will enable the output to be varied quite widely. Note that the anode resistor is effectively in parallel with the grid leak of the following valve for purposes of stage gain calculation.

A transformer coupled L.F. amplifier usually employs a valve with a low or medium amplification factor. If a resistance capacity coupled stage is to be substituted a valve having a higher amplification factor should be employed, R.C. coupling data is included for all suitable valves in the Brimar Valve Manual.

If data for operation of a pentode amplifier is not available, a good guide is to arrange the anode voltage to be 40 per cent of the H.T. supply and the screen voltage 25 per cent. The cathode resistor should be adjusted to give 1.25-2.0 volts bias.

OUTPUT VALVES

In sets employing no intermediate A.F. stage the use of a high slope power valve is essential. Substitution by a valve having a low slope will result in overloading of the I.F. stage before full loud speaker volume is obtained. Where an A.F. stage is fitted, the difference in power sensitivity between the two types is not usually apparent. If the new valve calls for more bias, check that the by-pass condenser is still working within its rating and replace if necessary.

Class AB2 and Class B stages are often best replaced with valves working under Class " A " conditions when the original valve types are no longer available. Note that valves which are similar when used as tetrodes or pentodes may no longer be equivalent when connected as triodes (grid 2 joined to Anode). In these cases, screen dissipation is usually the limiting factor

POWER OUTPUT AND OPTIMUM LOAD

Power outputs are often deceptive particularly at higher volume levels. A power change of 2 to 1 is but 3db, a change of 2db being only just discernible to the average person. Substitution of the old loudspeaker by a new type can more than compensate for a change of 3db.

The optimum load specified in the valve data is always a compromise between power output and harmonic distortion. The rated speech coil impedance holds only for a particular frequency, usually 400 c.p.s. At other frequencies the impedance may be from ten to twenty times higher. Perfect matching is thus only possible with a resistive load. Provided the output valve is working well within its rating, however, the distortion arising from mismatching is usually considerably less than that which occurs in the loudspeaker itself or in its output transformer.

The optimum load for one set of valve ratings will not hold for another. Where two alternative tappings on the transformer are available at nearly the correct load, always choose that giving the lower figure.

If the rated impedance of a speech coil is unknown, a good guide is to take 1.4 times the D.C. resistance.

Harmonic distortion in valves is specified as the percentage of the voltage of the fundamental. The power distortion is much less, 10 per cent voltage distortion being equal to only 1 per cent power distortion.

RECTIFIERS

The replacement of a rectifier even by one of the identical type requires certain precautions. The filter condensers should be checked before the new valve is fitted. The modern valve may be more efficient than its old counterpart and will deliver a higher output voltage. If the set has seen considerable service, the reservoir condenser should be replaced and if possible the smoothing condenser also.

Always use an indirectly heated rectifier where the output valve is of the indirectly heated type.

Procedure

1. *Check heater rating.* In A.C./D.C. receivers, in which a separate heater transformer has not been used, the heater current must be correct. Where there is an increase in current from the transformer winding, ensure that the socket does not cause excessive voltage drop.

2. Check the base.

3. Check tube dimensions. The tube to be used may be larger than that formerly employed or if changing to a wide-angle tube the neck diameter will be greater.

4. Check screen contour. Change to a flat-faced tube may involve modifications of the mask.

5. Check the operating voltages and currents. These should be in accordance with the ratings given for the new tube. When changing to an aluminized tube (other than C12D) from a non-aluminized tube, increased E.H.T. will usually be required.

6. Check scanning requirements. Change from 55° scanning angle tube to a wide-angle tube, will involve complete rebuilding of the time base and E.H.T. circuits and different scanning components. Suitable circuit data is available on request. Change from triode to tetrode will involve additional H.T. voltage supply. Use of a flat-faced tube may involve changes to deflector coils to eliminate defocusing or pin cushion distortion.

Due to the changes in the neck of the tube, some shadowing may occur at the corners of the picture. This may usually be eliminated by the use of a small permanent magnet, such as an ion-trap magnet mounted near the base.

7. Check focus requirements. Change from non-aluminized tube to an aluminized tube, or from tetrode to triode, or from 55° scanning angle to wide angle, will involve change of permanent magnet focus unit or of focus coil current. Due to dimensional changes the position of the focus unit may have to be changed.

8. Check whether ion-trap magnet is required.

9. If an internal coating is available on the new tube it should be connected to the chassis and the original E.H.T. reservoir condenser disconnected if a fly back or R.F. oscillator system is used, but should be left connected if a 50 c/s system is used.

	C12A	C12D	Notes.
Heater ratings	2.0 v., 1.4 A	2.0 v., 2.5 A	This increase of current should be within the capacity of the transformer winding. Check voltage at pins.
Base	English octal	International octal	Pin connections to be changed also. Refer to base diagrams in manual.
Dimensions	C12D approx. 1½ in. longer than C12A		Longer leads to socket may be required, in addition to any changes to back panel of cabinet.
Screen Contour	Round-Faced Tube	Flat-Faced Tube	Modification to mask may be necessary.
Operating voltages	No change		
Scanning requirements	Due to change in face contour, change of deflector coil may be necessary, but this depends upon the components involved.		
Focus requirements	No change in coil current or permanent magnet		The focus assembly may have to be moved about ½-¾ in. nearer the back of the chassis.
Ion-trap magnet	None required		

SUBSTITUTION LIST OF AMERICAN TYPES

Many of the following types have identical characteristics except for the type of base or slight differences of base connections. Others require a slight modification to the receiver.

AMERICAN TYPE	BASE TYPE	BRIMAR TYPE	BASE TYPE	REMARKS
1A7GT	Octal	1LA6	Loctal	No top cap
		1AC6	B7G	Increase screen and oscillator anode resistors. Increased gain
1C5GT	Octal	1S4	B7G	
		3S4	B7G	Parallel filaments
1H5GT	Octal	1LH4	Loctal	No top cap
1L6	B7G	1AC6	B7G	Re-trim
1LA4	Loctal	1A5GT	Octal	
1LA6	Loctal	1A7GT	Octal	Top cap lead
1LB4	Loctal	1A5GT	Octal	
1LC5	Loctal	1N5GT	Octal	Top cap lead
1LC6	Loctal	1A7GT	Octal	Top cap lead
1LE3	B7G	1L4	B7G	Strapped as a Triode
1LG5	Loctal	1T4	B7G	
1P5GT	Octal	1N5GT	Octal	Direct replacement
1Q5GT	Octal	3V4	B7G	Parallel filaments
1T5GT	Octal	1A5GT	Octal	Reduced power output
1U4	B7G	1L4	B7G	Direct replacement
1V	U.X.4	6X5GT	Octal	A.C. receivers
		25Z4G	Octal	A.C./D.C. receivers
*2A5	U.X.6	42	U.X.6	Change heater voltage
*2A6	U.X.6	75	U.X.6	Change heater voltage
*2A7	U.X.7	6A7	U.X.7	Change heater voltage
*2B7	U.X.7	6B7	U.X.7	Change heater voltage
3A4	B7G	3D6	Loctal	Increased filament consumption
3Q5GT	Octal	3V4	B7G	
		3Q4	B7G	
5T4	Octal	5U4G	Octal	Direct replacement
5W4	Octal	5Y3GT	Octal	Increased filament consumption
5X3	U.X.4	80	U.X.4	Check R.M.S. input
		5V4G	Octal	
5X4G	Octal	5U4G	Octal	Change connections
5Y4G	Octal	5Z4G	Octal	Change connections
5Z3	U.X.4	5U4G	Octal	
6A6	U.X.6	6N7GT	Octal	
6AB7	Octal	6SG7	Octal	Direct replacement
		6BA6	B7G	
6AC7	Octal	6AM6	B7G	Reduced sensitivity
6AF5G	Octal	6J5G	Octal	Increase bias voltage
6AG5	B7G	6AU6	B7G	Restricted frequency range

* See page 329

AMERICAN TYPE	BASE TYPE	BRIMAR TYPE	BASE TYPE	REMARKS
6AH7	Octal	6SN7GT	Octal	A.C. receivers
		12AU7	B9A	
6AQ6	B7G	6AT6	B7G	A.C. receivers
		12AT6	B7G	A.C./D.C. receivers
6AR5	B7G	6AQ5	B7G	Higher heater current
		6BW6	B9A	Higher heater current
6B5	U.X.6	6N6G	Octal	
		42	U.X.6	Add bias resistor
		6F6G	Octal	Add bias resistor
6B6G	Octal	6Q7G	Octal	Direct replacement
6B7	U.X.7	6B8G	Octal	
6C5G	Octal	6J5G	Octal	Direct replacement
6D6	U.X.6	78	U.X.6	Direct replacement
		6U7G	Octal	
6E5	U.X.6	6U5/6G5	U.X.6	Lower sensitivity
		6U5G	Octal	Lower sensitivity
6F5	Octal	6Q7GT	Octal	Change connections
6F8G	Octal	6SN7GT	Octal	Change connections
6G5	U.X.6	6U5/6G5	U.X.6	Direct replacement
		6U5G	Octal	
		6G5G	Octal	
6G6G	Octal	6AK6	B7G	
6H6G/GT	Octal	6AL5	B7G	
6J8G	Octal	6K8G	Octal	Direct replacement
6K5G	Octal	6Q7G	Octal	Remove wires on pins 4 & 5
6K6GT	Octal	6V6GT	Octal	Higher heater current
6L5G	Octal	6J5GT	Octal	A.C. or 6 volt sets only
6N6G	Octal	6B5	U.X.6	
		6F6G	Octal	Fit bias resistor
6P5G	Octal	6J5G	Octal	Increase bias
6P8G	Octal	6K8G	Octal	Reduced gain
6Q6G	Octal	6Q7G	Octa	Connect pin 4 to cathode
6R6G	Octal	6K7G	Octal	Change connections
6S7	Octal	7B7	Loctal	
6SA7	Octal	6BE6	B7G	
6SF5	Octal	6Q7GT	Octal	Change connections
6SF7	Octal	6B8GT	Octal	Change connections
6SG7	Octal	6BA6	B7G	
6SH7	Octal	6AU6	B7G	
6SJ7	Octal	6BR7/8D5	B9A	Reduced heater current
		6J7GT	Octal	Change connections
6SK7	Octal	7B7	Loctal	Reduced heater current
		6K7GT	Octal	Change connections
6SQ7	Octal	6Q7GT	Octal	Change connections
		7B6	Loctal	
6SR7	Octal	6R7G	Octal	Change connections
6SS7	Octal	7B7	Loctal	
		6K7GT	Octal	A.C. sets. Change connections
		12K7GT	Octal	A.C./D.C. sets. Change connections

AMERICAN TYPE	BASE TYPE	BRIMAR TYPE	BASE TYPE	REMARKS
6ST7	Octal	7C6	Loctal	
		6Q7GT	Octal	A.C. sets. Change connections
		12Q7GT	Octal	A.C./D.C. sets. Change connections
6U7G	Octal	6K7G	Octal	Direct replacement
6ZY5G	Octal	6X5G	Octal	Increased heater current
7A4	Loctal	6J5GT	Octal	Increased heater current
7A6	Loctal	6AL5	B7G	A.C. sets only
7A7	Loctal	6K7GT	Octal	
7A7	Loctal	7B7	Loctal	Reduced heater current
7A8	Loctal	6A8GT	Octal	Increased heater current
7B5	Loctal	7C5	Loctal	Increased heater current
		6V6GT	Octal	Increased heater current
7B6	Loctal	7C6	Loctal	Reduced heater current
7B8	Loctal	6A8GT	Octal	Top cap connection
7C7	Loctal	6BR7/8D5	B9A	
7F7	Loctal	6SL7GT	Octal	
7J7	Loctal	7S7	Loctal	Direct replacement
7N7	Loctal	6SN7GT	Octal	
7Q7	Loctal	6BE6	B7G	
7Y4	Loctal	6X5GT	Octal	Increased heater current
12A7	U.X.7	18	U.X.6	Add metal rectifier.
		7Y4	Loctal	Direct replacement
12B8GT	Octal	6K7GT	Octal	Fit B7G socket for 6AT6 triode sectic
		6AT6	B7G	
12SA7	Octal	12BE6	B7G	
12SF5	Octal	12Q7GT	Octal	Change connections
12SG7	Octal	12BA6	B7G	
12SJ7	Octal	12J7GT	Octal	Change connections
		6BR7/8D5	B9A	A.C./D.C. receivers
12SK7	Octal	12K7GT	Octal	Change connections
12SQ7	Octal	12Q7GT	Octal	Change connections
12Z3	U.X.4	25Z4G	Octal	A.C./D.C. receivers
14A7 (12B7)	Loctal	7B7	Loctal	A.C./D.C. receivers
14B6	Loctal	7C6	Loctal	A.C./D.C. receivers
14B8	Loctal	12K8GT	Octal	
14F7	Loctal	12SL7GT	Octal	
14J7	Loctal	14S7	Loctal	Direct replacement
14N7	Loctal	12SN7GT	Octal	
14Q7	Loctal	12BE6	B7G	
25A7G	Octal	25A6G	Octal	Fit metal rectifier DRM1B
25B8GT	Octal	12K7GT	Octal	
		12AT6	B7G	Fit B7G socket for 12AT6 triode section
25Y5 25RE	U.X.6	1D6	U.X.6	Half-wave rectifier only
25Z5	U.X.6	1D6	U.X.6	Half-wave rectifier only
25Z6	Octal	25Z4G	Octal	Half-wave rectifier only
32L7GT	Octal	25L6GT	Octal	Fit rectifier type SB3 or DRM1B
35A5	Loctal	35L6GT	Octal	
35RE	U.X.6	1D6	U.X.6	Half-wave rectifier only
35Y4	Loctal	35Z4GT	Octal	Dial lamp inoperative

AMERICAN TYPE	BASE TYPE	BRIMAR TYPE	BASE TYPE	REMARKS
35Z3	Loctal	35Z4GT	Octal	
35Z5GT	Octal	35Z4GT	Octal	Dial lamp inoperative
		35W4	B7G	
36	U.X.5	6J7G	Octal	
37	U.X.5	76	U.X.5	Direct replacement
39/44	U.X.5	6K7G	Octal	
40Z5GT	Octal	35Z4GT	Octal	Fit Brimistor type CZ2
45Z5GT	Octal	35Z4GT	Octal	Fit Brimistor type CZ2
41	U.X.6	6K6GT	Octal	
		6V6GT	Octal	Increased heater current
42	U.X.6	6F6G	Octal	
43	U.X.6	25A6G	Octal	
45	U.X.4	2A3	U.X.4	
45Z3	Octal	DRM1B	—	Alter mains resistor
47	U.X.5	2A3	U.X.4	
50A5	Loctal	50L6GT	Octal	
50B5	B7G	50C5	B7G	Change connections
*53	U.X.7	6N7GT	Octal	Change heater voltage
*57	U.X.6	6C6 / 77	U.X.6	Change heater voltage
*58	U.X.6	6D6 / 78	U.X.6	Change heater voltage
70L7GT	Octal	35L6GT	Octal	Metal rectifier required
75	U.X.6	6Q7G	Octal	
79	U.X.7	6N7GT	Octal	Increased current drain
84/6Z4	U.X.5	6X5GT	Octal	Increased heater current
85	U.X.6	6R7G	Octal	Change bias
117L/M7GT	Octal	DRM1B	—	
117N7GT	Octal	DRM1B	—	
117P7GT	Octal	DRM1B	—	
117Z3	Octal	DRM1B	—	Alter mains resistor
117Z6GT	Octal	DRM1B	—	
2151	U.X.6	18	U.X.6	Reduced power output

TELETUBES

TUBE TYPE	SUBSTITUTE	NEW SOCKET	OTHER INFORMATION
C12A	C12D	Octal	Approx. 1½ in. longer. 1h increased to 2.5 amps. For additional information see page 322

* These valves are of the 2.5 volt type and require the addition of a small transformer before substitution of the 6.3 volt equivalent. This transformer may be auto-wound, from 2.5 volts to 6.3 volts or a double wound type operating direct from the mains supply.

DIRECT REPLACEMENTS

TYPE	BRIMAR Equivalent	TYPE	BRIMAR Equivalent	TYPE	BRIMAR Equivalent
OA3	VR75/30	20D3	12AH8	D152	6AL5/EB91
OC3	VR105/30	21A6	PL81/21A6	DA	4D1
OD3	VR150/30	30L1	PCC84/7AN7	DAF91	1S5
1C1	DK91/1R5	40PPA	7D3	DAF96	DAF96
1C2	DK92/1AC6	40SUA	1D5	DD6	6AL5/EB91
1C3	DK96	41MPG	15A2	DF91	DF91/1T4
1F1	DF96	42OT	7A3	DF92	1L4
1F2	1L4	42MP/Pen	7A3	DH63	6Q7G
1F3	DF91/1T4	431U	R2	DH76	12Q7GT
1FD1	DAF96	441U	R3	DH77	6AT6
1FD9	DAF91/1S5	442BU	R2	DH81	7B6
1P1	DL96	460BU	R3	DH147	6Q7G *
1P10	DL92/3S4,	62DDT	EBC41	DH149	7C6
1P11	DL94/3V4	62TH	ECH42	DH150	EBC41
1X2B	R19	62VP	EF41	DH719	EABC80
3C4	DL96	66KU	EZ40	DK91	DK91/1R5
6AB8	ECL80	67PT	EL41	DK92	DK96/1AC6
6AK8	EABC80	121VP	UF41	DL33	3Q5
6AQ8	ECC85	141DDT	UBC41	DL74M	12Q7GT
6BQ5	EL84	141TH	UCH42	DL82	7B6
6BX6	EF80	311SU	UY41	DL91	1S4
6C10	ECH42	442BU	R2	DL92	DL92/3S4
6CK5	EL41	451PT	UL41	DL94	DL94/3V4
6CJ5	EF41	460BU	R3	DW3	R2
6CQ6	9D6/EF92	4274A	5Z3	DW4	R3
6CV7	EBC41	A11B	R2	DW4-350	R3
6CU7	ECH42	A11C	R3	DW4-500	R3
6D2	6AL5/EB91	A11D	R2	EABC80	EABC80
6F12	8D3/6AM6/EF91	A50A	8A1 (5 pin)	EB34	6H6GT *
6F15	EF41	A50M	9A1 (5 pin)	EB91	6AL5/EB91
6G5	6U5G	A70B	7A2 (7 pin)	EBC33	6Q7G *
6LD3	EBC41	A70C	7A3 (7 pin)	EBC90	6AT6
6LD12	EABC80	A80A	15A2 (7 pin)	ECC32	6SN7GT
6M1	6U5G	AC2/Pen	7A3	ECC35	6SL7GT
6N8	EBF80	AC/Pen	7A2	ECC81	12AT7
6U8	ECF82	APP4A	7A2 (7 pin)	ECC82	12AU7
6V4	EZ80/6V4	APP4B	7A3	ECC83	12AX7
6W2	EY51/R12/R12A	APV4	R3	ECH35	6K8G *
6X2	EY51/R12/R12A	B65	6SN7GT	EF22	7B7
7AN7	PCC84/7AN7	B152	12AT7	EF39	6K7GT
7D9	6AM5	B309	12AT7	EF89	EF89/6DA6
7D10	6CH6	B319	PCC84	EF91	8D3/6AM6/EF91
8D3	8D3/6AM6/EF91	B329	12AU7	EF92	9D6/EF92
9U8	PCF82	B339	12AX7	EF93	6BA6
10LD3	UBC41	B719	ECC85	EF94	6AU6
13DHA	11D3	C10B	1D5	EF95	6AK5
13PGA	15D1	C20C	10D1	EK90/6BE6	6BE6
13SPA	8D2	C30B	4D1	EL33	EL33/6AG6G
13VPA	9D2	C50B	8D2	EL35	6L6G
14L7	UBC41	C50N	9D2	EL90	6AQ5
20A3	2D21	C70D	7D6	EL91	6AM5
		C80B	15D1	EL821	6CH6
		D63	6H6G	EM35	6U5G
		D77	6AL5/EB91		

* A.C. or 6 volt receivers only.

TYPE	BRIMAR Equivalent
EN91	2D21
EY51/6X2	EY51/R12
EY84	R18
EZ35	6X5GT/EZ35
EZ90/6X4	6X4
FC4	15A2
GZ30	5Z4G
GZ31	5U4G
HAD	11D3
HBC90	12AT6
HF93	12BA6
HK90	12BE6
HL13C	4D1
HL92	50C5
HL1320	4D1
HL/DD/1320	11D3
HN309	PCL82
HR1	R10
HR2	R10
HY90	35W4
1W3	R2
1W4/350	R3
1W4/500	R3
KT30	7D5
KT41	7A3
KT42	7A2 (7 pin)
KT61	6AG6G/ EL33
KT63	6F6G
KT66	6L6G
KT71	50L6GT
KT81	7C5
KTW63	6K7G, 6U7G
KTW74M	12K7GT
KTZ63	6J7G
L63	6J5G
L77	6C4
LN152	ECL80
MKT4	7A2 (5 or 7 pin)
MP/Pen	7A2 (5 or 7 pin)
MPT4	7A2 (7 pin)
MS/Pen	8A1 (5 or 7 pin)
MU12	R3, R2
MU14	R3
MX40	15A2
N17	DL92/3S4
N18	3Q4
N19	DL94/3V4
N30	7D5
N40	7A2 (7 pin)
N41	7A3
N77	6AM5
N142	UL41
N144	6AM5
N147	6AG6G
N148	7C5

TYPE	BRIMAR Equivalent
150	EL41
NN152	PL81
N339	PL81
N709	EL84
N727	6AQ5
OM4	6Q7G *
OM6	6K7G *
OM10	6K8G *
Pen A4	7A3
Pen/4VA	7A2 (7 pin)
Pen 4VB	7A3
Pen 13C	7D8
Pen 36C	7D6
Pen 383	7D6
Pen 1340	7D8
Pen 3520	7D6
PT4	7A3
PTA	7D8
QS150/40	VR150/30
QVO5-25	807
QVO3-12	5763
R4	R2
R4A	R3
R16	1T2/R16
R52	5Z4G
RZ	1D5
S11D	R2
SP6/6AM6	6AM6/8D3/ EF91
SP13C	8D2
SP1320	8D2
SU61	R12 or R12A
TDD13C	11D3
U12	R2
U14	R3
U37	1T2/R16
U43	EY51/R12 or R12A
U50	5Y3GT, 5Z4G
U52	5U4G
U70	6X5G/EZ35
U74	35Z4GT
U76	35Z4GT
U78	6X4
U82	7Z4, 7Y4
U142	UY41
U147	6X5G/EZ35
U149	7Y4
U150	EZ40
U151	EY51/R12 or R12A
U153	PY81
U329	PY81
U4020	1D5
URIC	1D5
UU2	R2
UU3	R2
UU4	R3, R2
UU5	R3

TYPE	BRIMAR Equivalent
UU9	EZ40
UU60/250	R2
UU120/350	R2
UU120/500	R3
VHT4	15A2
VHTA	15D1
VP6	9D6/EF92
VP13C	9D2
VP1322	9D2
W17	1T4
W63	6K7G, 6U7G
W76	12K7GT
W77	9D6/EF92
W81	7H7
W147	6K7G *
W148	7H7
W149	7B7
W150	EF41
W727	6BA6
WD709	EBF80
X17	DK91/1R5
X18	DK92/1AC6
X30	15D1
X31	20D2
X42	15A2
X63	6A8G
X64	6L7G
X65	6K8G
X71M	12K8GT
X76M	12K8GT
X77	6BE6
X81M	7S7
X142	UCH42
X147	6K8G *
X148	7S7
X150	ECH42
X727	6BE6
Y61	6U5G
Y63	6U5G
Z63	6J7G
Z77	8D3/6AM6/ EF91
Z150	EF42
Z152	EF80, 6BW7
Z719	EF80, 6BW7
ZD17	1S5
ZD152	EBF80

TELETUBES

TYPE	BRIMAR Equivalent
12MW3	C12D
12MW3A	C12B
12XP4	C12FM
15MW3A	C15B
121K	C12FM
CRM91	C9A
CRM92	C9A
CRM121	C12A
MW31-16	C12FM

* A.C. or 6 volt receivers only.

BRIMAR EQUIVALENTS TO THE C.V. SERIES OF VALVES

NOTE: The inclusion of a Brimar type in this list does not necessarily imply that such a valve is obtainable from stock. Details of delivery and price are available on application.

BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.
0A2	1832	5Z3	1861	6J7GT	1937	7C6	887
0B2	1833	5Z4G	1863	6K5G	860	7C7	1777
0Z4	692	5Z4GT	2748	6K6G	1938	7D5	1425
1A5G	755	6A3	730	6K7G	1941	7D8	889
1A5GT	756	6A6	1867	6K7GT	1943	7H7	895
1A6	757	6A7	1870	6K8G	1944	7K7	896
1A7G	1800	6A8G	578	6K8GT	1946	7R7	900
1A7GT	1802	6A8GT	580	6L6G	1947	7Y4	901
1C5G	1803	6AB5	843	6L6GA	2817	7Z4	1790
1C5GT	1805	6AK6	1762	6L7G	1950	8A1	1124
1D5	764	6AL5	140	6N6G	1953	8D2	1108
1H5G	1818	6AM5	136	6N7G	1956	8D3	138
1H5GT	1820	6AM6	138	6N7GT	1958	8D5	2135
1L4	1758	6AQ5	1862	6Q7G	587	9A1	1172
1LD5	779	6AT6	452	6Q7GT	589	9D2	1106
1LH4	780	6AU6	2524	6R7G	1962	9D5	1053
1LN5	781	6B4G	851	6SA7	1966	9D6	131
1N5G	1821	6B5	1885	6SC7GT	1970	10D1	1300
1N5GT	1823	6B6G	1887	6SG7	1978	11D3	1419
1Q5GT	1826	6B7	1891	6SH7	594	12A6	525
1R5	782	6B8G	1893	6SJ7	591	12A7	909
1S4	783	6BA6	454	6SK7	1981	12AT7	455
1S5	784	6BE6	453	6SQ7	1990	12AU6	1961
1T4	785	6BH6	3908	6SL7GT	1985	12AU7	491
2A3	1831	6BJ6	3909	6SN7GT	1988	12AX7	492
2A5	1834	6BR7	2135	6U5/6G5	504	12BA6	1928
2C26A	1759	6BW6	2136	6U5G	2747	12C8	531
3D6	815	6C4	133	6U7G	706	12J7GT	917
3Q4	818	6C5G	581	6V6G	509	12K7GT	918
3S4	820	6C6	585	6V6GT	511	12K8	703
3Q5GT	819	6CH6	2127	6X4	493	12Q7GT	547
4D1	1109	6D6	1900	6X5G	572	12SA7	537
5A/157D	358	6F5	1909	6X5GT	574	12SJ7	697
5A/159N	2000	6F6G	1911	6ZY5G	873	12SK7	543
5R4GY	717	6F7	1915	7A2	1174	12SL7GT	924
5U4G	575	6H6G	1929	7A7	877	12SQ7	546
5V4G	729	6H6GT	1931	7A8	878	12SR7	700
5X4G	1851	6J5G	1932	7B6	882	13D1	423
5Y3GT	1856	6J5GT	1934	7B7	522	13D3	2212
5Y4G	1857	6J7G	1935	7C5	885	15D1	2956

BRIMAR EQUIVALENTS TO THE C.V. SERIES OF VALVES

BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.
15D2	1107	56	611	6062	4039	F/6057	4035
20A1	1424	57	612	6063	4005	F/6060	4033
25A6GT/G	550	58	613	6064	4014	F/6061	4045
25A7GT/G	937	75	614	6065	4015	F/6063	4001
25B8GT	940	76	615	6067	4003	F/6064	4002
25Y5	942	77	616	6100	4022	F/6067	4034
25L6GT	553	78	2544	6132	4055	F/6132	4056
25Z5	555	79	2545	6158	4068	F/6158	4069
27	944	80	617	6516	4063	F/6443	4036
30	604	83	618	C12R	429		
32E	957	84	2548	HLA2	1678		
32L7GT	948	85	2549	PA1	1732		
35L6GT	562	117N7GT	2557	R3	1039	**S.T.C. TYPE**	**C.V. No.**
35Z3	564	117Z6GT	2558	R10	261		
35Z4GT	2500	807	124	R11	1111	3D21A	2659
35Z5GT	568	1629	1756	R12	426	5B/254M	428
36	1775	5654	4010	R17	2218	5B/255M	391
37	606	5726	4007	R18	2235	5B/257M	.2220
39/44	1771	5749	4009	VR75/30	3798	5B/258M	2347
41	608	5750	4012	VR105/30	686	G1/236G	3524
42	1712	5763	2129	VR150/30	216	G1/371K	.2224
43	2514	6057	4004			G10/241E	.2223
46	610	6058	4025	Flying lead versions of		G50/1G	2208
47	1772	6059	4006	F/5654	4050	G150/2D	413
50C5	1959	6060	4024	F/5726	4049	G240/2D	2174
50L6GT	571	6061	4043	F/5750	4037	G400/1K	2194

C.V. NUMBERS TO BRIMAR EQUIVALENTS

C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE
124	807	429	C12R	522	7B7	568	35Z5GT
131	9D6	452	6AT6	525	12A6	571	50L6GT
133	6C4	453	6BE6	531	12C8	572	6X5G
136	6AM5	454	6BA6	537	12SA7	574	6X5GT
138	6AM6/8D3	455	12AT7	543	12SK7	575	5U4G
140	6AL5	491	12AU7	546	12SQ7	578	6A8G
216	VR150/30	492	12AX7	550	25A6GT/G	580	6A8GT
261	R10	493	6X4	553	25L6GT	581	6C5G
358	5A/157D	504	6U5/6G5	555	25Z5	585	6C6
423	13D1	509	6V6G	562	35L6GT	587	6Q7G
426	R12	511	6V6GT	564	35Z3	589	6Q7GT

C.V. NUMBERS TO BRIMAR EQUIVALENTS

C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE	C.V. No.	BRIMAR TYPE
591	6SJ7	918	12K7GT	1870	6A7	2748	5Z4GT
594	6SH7	924	12SL7GT	1885	6B5	2817	6L6GA
604	30	937	25A7GT/G	1887	6B6G	2956	15D1
606	37	940	25B8GT	1891	6B7	3798	VR75/30
608	41	942	25Y5	1893	6B8G	3908	6BH6
610	45	944	27	1900	6D6	3909	6BJ6
611	56	948	32L7GT	1909	6F5	4001	F/6063
612	57	957	32E	1911	6F6G	4002	F/6064
613	58	1039	R3	1915	6F7	4003	6067
614	75	1053	9D5	1928	12BA6	4004	6057
615	76	1106	9D2	1929	6H6G	4005	6063
616	77	1107	15D2	1931	6H6GT	4006	6059
617	80	1108	8D2	1932	6J5G	4007	5726
618	83	1109	4D1	1934	6J5GT	4009	5749
686	VR105/30	1111	R11	1935	6J7G	4010	5654
692	0Z4	1124	8A1	1937	6J7GT	4012	5750
697	12SJ7	1172	9A1	1938	6K6G	4014	6064
700	12SR7	1174	7A2	1941	6K7G	4015	6065
703	12K8	1300	10D1	1943	6K7GT	4022	6100
706	6U7G	1419	11D3	1944	6K8G	4024	6060
717	5R4GY	1424	20A1	1946	6K8GT	4025	6058
729	5V4G	1425	7D5	1947	6L6G	4033	F/6060
730	6A3	1678	HLA2	1950	6L7G	4034	F/6067
755	1A5G	1712	42	1953	6N6G	4035	F/6057
756	1A5GT	1732	PA1	1956	6N7G	4036	F/6443
757	1A6	1756	1629	1958	6N7GT	4037	F/5750
764	1D5	1758	1L4	1959	50C5	4039	6062
779	1LD5	1759	2C26A	1961	12AU6	4043	6061
780	1LH4	1762	6AK6	1962	6R7G	4045	F/6061
781	1LN5	1771	39/44	1966	6SA7	4049	F/5726
782	1R5	1772	47	1970	6SC7GT	4050	F/5654
783	1S4	1775	36	1978	6SG7	4055	6132
784	1S5	1777	7C7	1981	6SK7	4056	F/6132
785	1T4	1790	7Z4	1985	6SL7GT	4063	6516
815	3D6	1800	1A7G	1988	6SN7GT	4068	6158
818	3Q4	1802	1A7GT	1990	6SQ7	4069	F/6158
819	3Q5GT	1803	1C5G	2000	5A/159N		
820	3S4	1805	1C5GT	2127	6CH6		
843	6AB5	1818	1H5G	2129	5763		
851	6B4G	1820	1H5GT	2135	6BR7/8D5		
860	6K5G	1821	1N5G	2136	6BW6		
873	6ZY5G	1823	1N5GT	2212	13D3		
877	7A7	1826	1Q5GT	2218	R17		
878	7A8	1831	2A3	2235	R18		
882	7B6	1832	0A2	2500	35Z4GT		
885	7C5	1833	0B2	2514	43		
887	7C6	1834	2A5	2524	6AU6		
889	7D8	1851	5X4G	2544	78		
895	7H7	1856	5Y3GT	2545	79		
896	7K7	1857	5Y4G	2548	84		
900	7R7	1861	5Z3	2549	85		
901	7Y4	1862	6AQ5	2557	117N7GT		
909	12A7	1863	5Z4G	2558	117Z6GT		
917	12J7GT	1867	6A6	2747	6U5G		

C.V. No.	S.T.C. TYPE
391	5B/255M
413	G150/2D
428	5B/254M
2174	G240/2D
2194	G400/1K
2208	G50/1G
2347	5B/258M
2659	3D21A
3524	G1/236G
2220	5B/257M
2223	G10/241E
2224	G1/371K

PRICE LIST

VALVES

Type	Price	P. Tax
OA2	17/6	—
OB2	17/6	—
OZ4	12/6	4/11
IA5G/GT	11/6	4/6
1A7G/GT	16/6	6/6
1AC6	13/–	5/1
IC5G/GT	13/–	5/1
1D5	12/6	4/11
1D6	12/6	4/11
IH5G/GT	13/–	5/1
1L4	11/6	4/6
1R5	13/–	5/1
1S4	11/6	4/6
1S5	13/–	5/1
1T4	11/6	4/6
1U5	13/–	5/1
2A3	20/–	7/10
2D21	15/–	—
3D6	11/6	4/6
3Q4	11/6	4/6
3Q5GT	13/–	5/1
3S4	11/6	4/6
3V4	11/6	4/6
4D1	12/6	4/11
5R4GY	17/6	—
5U4G	15/–	5/11
5V4G	12/6	4/11
5Y3GT	12/6	4/11
5Z3	15/–	5/11
5Z4G	12/6	4/11
6A7	20/–	7/10
6A8G/GT	17/6	6/10
6AF4A	20/–	—
6AG6G	14/6	5/8
6AK5	20/–	7/10
6AK6	13/–	5/1
6AL5	9/–	3/7
6AM4	25/–	—
6AM5/7D9	13/–	5/1
6AM6/8D3	17/6	6/10
6AQ5	11/6	4/6
6AT6	10/6	4/2
6AU6	17/6	6/10
6AV6	10/6	4/2
6B4G	20/–	7/10
6B8GT	17/6	6/10
6BA6	11/6	4/6
6BD4A	120/–	—
6BE6	13/–	5/1
6BG6G	17/6	6/10
6BH6	11/6	4/6
6BJ6	11/6	4/6
6BQ7A	15/–	—
6BR7/8D5	17/6	6/10
6BS7	25/–	—
6BW6	11/6	4/6
6BW7	14/–	5/6
6C4	10/–	3/11

Type	Price	P. Tax
6C5G	12/6	4/11
6C6	17/6	6/10
6CD6G	22/6	8/10
6CH6/7D10	20/–	7/10
6D6	17/6	6/10
6F6G	14/6	5/8
6H6G/GT	10/6	4/2
6J5G/GT	12/6	4/11
6J6	20/–	7/10
6J7G/GT	15/–	5/11
6K6G/GT	13/–	5/1
6K7G/GT	15/–	5/11
6K8G/GT	17/6	6/10
6L6G	17/6	6/10
6N7G/GT	18/6	7/3
6Q7G/GT	14/6	5/8
6R7G	14/6	5/8
6SC7GT	18/6	7/3
6SL7GT	18/6	7/3
6SN7GT	18/6	7/3
6T8	13/–	5/1
6U4GT	12/6	4/11
6U5/6G5	13/–	5/1
6U5G	13/–	5/1
6U7G	15/–	5/11
6V6G/GT	14/6	5/8
6X4	8/6	3/4
6X5G/GT	12/6	4/11
7A2	17/6	6/10
7A3	17/6	6/10
7B6	14/6	5/8
7B7	15/–	5/11
7C5	14/6	5/8
7C6	14/6	5/8
7D3	17/6	6/10
7D5	17/6	6/10
7D6	17/6	6/10
7D8	17/6	6/10
7H7	15/–	5/11
7K7	14/6	5/8
7R7	17/6	6/10
7S7	17/6	6/10
7Y4	12/6	4/11
7Z4	12/6	4/11
9BW6	11/6	4/6
9D2	17/6	6/10
9D6	13/–	5/1
9D7	14/–	5/6
11D3	18/6	7/3
11D5	18/6	7/3
12A6	13/–	5/1
12AC6	11/6	4/6
12AD6	13/–	5/1
12AE6	10/6	4/2
12AH8	13/–	5/1
12AT6	10/6	4/2
12AT7	14/–	5/6
12AU6	17/6	6/10
12AU7	14/–	5/6

Type	Price	P. Tax
12AV6	10/6	4/2
12AX7	14/–	5/6
12BA6	11/6	4/6
12BE6	13/–	5/1
12BH7	16/–	6/3
12C8GT	17/6	6/10
12J7GT	15/–	5/11
12K5	13/6	5/4
12K7GT	15/–	5/11
12K8GT	17/6	6/10
12Q7GT	14/6	5/8
12U5G	13/–	5/1
13D1	17/6	—
13D3	25/–	—
14B6	14/6	5/8
14H7	15/–	5/11
14R7	17/6	6/10
14S7	17/6	6/10
15A2	20/–	7/10
15D1	20/–	7/10
15D2	20/–	7/10
19AQ5	11/6	4/6
19BG6G	17/6	6/10
19T8	13/–	5/1
20D2	20/–	7/10
20D4	13/–	5/1
25A6G	14/6	5/8
25L6GT	14/6	5/8
25Z4G	12/6	4/11
35A5	14/6	5/8
35L6GT	14/6	5/8
35W4	8/6	3/4
35Z3	12/6	4/11
35Z4GT	12/6	4/11
42	17/6	6/10
43	17/6	6/10
50A5	14/6	5/8
50C5	13/6	5/4
50CD6G	22/6	8/10
50L6GT	14/6	5/8
75	18/6	7/3
76	10/–	3/11
77	17/6	6/10
78	17/6	6/10
80	12/6	4/11
80S	12/6	4/11
83	15/–	—
83V	12/6	4/11
807	25/–	—
1629	13/–	5/1
5763	20/–	—
D15	10/6	—
DAF96	13/–	5/1
DF96	11/6	4/6
DK96	13/–	5/1
DL96	11/6	4/6
EABC80	13/–	5/1
EBC41	10/6	4/2
EBF80	13/–	5/1
ECC84	15/–	5/11

Type	Price	P. Tax	Type	Price	P. Tax	Type	Price	P. Tax
ECC85	15/–	5/11	EY83	12/6	4/11	R12	13/6	5/4
ECF82	16/6	6/6	EZ40	8/6	3/4	R16	20/–	7/10
ECH42	13/–	5/1	EZ80/6V4	8/6	3/4	R17	17/6	—
ECL80	14/–	5/6	EZ81	8/6	3/4	R18	17/6	—
ECL82	16/6	6/6	PCC84	15/–	5/11	R19	15/–	5/11
EF41	11/6	4/6	PCF82	16/6	6/6	UBC41	10/6	4/2
EF80	14/–	5/6	PCL82	16/6	6/6	UCH42	13/–	5/1
EF89	11/6	4/6	PL81	15/6	6/1	UF41	11/6	4/6
EL41	11/6	4/6	PY81	12/6	4/11	UL41	11/6	4/6
EL84	11/6	4/6	PY83	12/6	4/11	UY41	8/6	3/4
EM71	17/6	6/10	R2	12/6	4/11	VR75/30	17/6	—
EM85	17/6	6/10	R3	12/6	4/11	VR105/30	17/6	—
EM840	17/6	6/10	R10	25/–	9/9	VR150/30	15/–	—

TELETUBES

C9A	180/–	79/–	C14BM	255/–	111/11	C17PM	295/–	129/6
C9B	195/–	85/7	C14FM	255/–	111/11	C17SM	295/–	129/6
C12A	240/–	105/4	C17BM	295/–	129/6	C21HM	360/–	158/–
C12B	255/–	111/11	C17FM	295/–	129/6	C21SM	360/–	158/–
C12D	255/–	111/11	C17JM	295/–	129/6	C21TM	360/–	158/–
C12FM	240/–	105/4	C17LM	295/–	129/6			

METAL RECTIFIERS

DRM1B	15/4	—	SB2	9/–	—	Q1/2	3/2	—
DRM2B	16/2	—	SB3	10/6	—	Q1/5	3/6	—
DRM3B	23/3	—	M1	2/8	—	Q3/3	3/4	—
RMO	7/11	—	M3	2/8	—	Q3/4	3/5	—
RM1	8/6	—	K3/15	5/–	—	Q3/5	3/6	—
RM1A	13/6	—	K3/25	6/5	—	Q6/1	3/1	—
RM2	9/–	—	K3/40	8/6	—	Q6/5	3/6	—
RM3	12/6	—	K3/45	9/4	—	D3/2/1Y	7/6	—
RM4	25/–	—	K3/50	9/10	—	V3/2/1Y	7/6	—
RM4B	25/–	—	K3/100	16/8	—	V3/1/1Y	4/–	—
RM5	31/–	—	Q1/1	3/1	—			

CHASSIS COOLED TYPES

C2D	8/6	—	C3B	14/–	—	C3H	8/6	—
C2H	5/6	—	C3D	10/6	—	C3V	10/6	—
C2V	8/6	—						

TRANSISTORS

TJ1	40/–	—	TP1	40/–	—	TS2	21/–	—
TJ2	45/–	—	TP2	40/–	—	TS3	24/–	—
TJ3	50/–	—	TS1	18/–	—			

BRIMISTORS

CZ1	3/6	—	C4	5/–	—	CZ10	1/6	—
CZ2	2/6	—	CZ6	3/6	—	CZ11	4/–	—
CZ3	1/6	—	CZ8A	2/6	—	CZ12	5/6	—
CZ4	5/–	—	CZ9A	2/6	—			

GERMANIUM DIODES

GD3	7/6	—	GD5	7/6	—	GD6	7/6	—
GD4	7/6	—						