The Registered Number of this Handbook is:

CH 6268

All correspondence concerning this handbook should bear the above number and be addressed to:-

ITT Components Group Europe
Standard Telephones and Cables Limited
Components Handbook Section
Edinburgh Way
HARLOW, Essex

Tel. Harlow 26811
Telex 81146

Components ITT

Components Handbook

Volume 2b

Tetrodes

Beam Tetrodes and Pentodes

Special Quality Valves

Preface

This volume is one of a set that provides comprehensive technical information on the range of components manufactured and marketed by ITT Components and ITT Semiconductors.

A regular amendment service ensures that the data in these volumes is kept up to date with changes and additions. Data marked with an 'M' or 'Maintenance' refer to components that are only supplied as replacements for use in existing equipment and should not be used when designing new equipments.

Enquiries regarding this Handbook service should be addressed to Components Handbook Section, ITT Components Group Europe, Standard Telephones and Cables Limited, Edinburgh Way, Harlow, Essex or Telephone Harlow 26811. Ext. 249.

Technical and commercial enquiries concerning specific products should be addressed to the ITT Components Sales Office of the appropriate Division (see below and overleaf).

Sales Office Ref.	Address	Telephone No.	Extensions for enquiries Technical	Commercial
A	**Capacitor Division** Brixham Road, Paignton, Devon	Paignton 50762†	Capacitors 477 Film Circuits 451	 503 451
B	**Electro-Mechanical Division** West Road, Harlow, Essex	Harlow 26811	641	641
C	**Magnetic Materials Division** Edinburgh Way, Harlow, Essex	Harlow 26811	735	735
D	**Manufacturing Services Division** Cefndy Road, Rhyl, Flint	Rhyl 51501	13	13
E	**Quartz Crystal Division** Edinburgh Way, Harlow, Essex	Harlow 26811	585	560
F	**Rectifier Division** Edinburgh Way, Harlow, Essex	Harlow 26811	449 253	449 251
G	**Thermistor Division** Edinburgh Way, Harlow, Essex	Harlow 26811	502	503
H	**Valve Division** Brixham Road, Paignton, Devon	Paignton 50762†	536	532
J	**ITT Semiconductors** Footscray, Sidcup, Kent	Footscray 3333‡	524	571
K	**ITT Electronic Services** Edinburgh Way, Harlow, Essex	Harlow 26777		

† STD code 0803 50762. ‡ STD code 01-300 3333.

List of Products

The following list gives the products on which data is included in the Components Handbook, the volume in which the data appears and the Sales Office (see previous page) to which technical and commercial enquiries should be addressed.

Product	Handbook Volume	Sales Office
Brimistors (see Thermistors)	7	G*
Capacitors	4	A*
Crystal Filters	8	E
Diodes	6	J*
Film Circuits	5	A
Hermetic Seals	1	H
Infra-Red Filters	1	F
Klystrons	3	H
Lamps	1	H*
Magnetic Materials	9	C*
Microwave Oscillators	3	H
Microwave Tubes	3	H
Ministac	5	D
Potentiometers	7	G*
Quartz Crystal Units	8	E
Rectifiers, Selenium	5	F*
Rectifiers, Silicon	6	J*
Rectifiers, Silicon Assemblies	5	F*
Rectifiers, Valve	2C	H
Relays	10	B*
Resistors, Fixed	7	G*
Resistors, Temperature Sensitive (see Thermistors)	7	G
SafeTstaC Selenium Surge Suppressors	5	F
Silistors (see Thermistors)	7	G
Thermal Delay Switches	1	H*
Thermistors	7	G*
Thermocouples	3	H
Thyristors	6	J*
Transformers	9	F*
Transistors	6	J*
Travelling Wave Tubes	3	H
Vacuum Gauges	1	H
Valves	2A, B and C	H
Varactor Diodes	3	H
Wound Components	9	F*
Zener Diodes (see Diodes)	6	J*

*Also available from our distributor organisation. Ref. K

SPECIAL QUALITY
VALVES

Special Quality Valves
Index

Reference	Code	CV No.	Vf V	If A	Description
L.2S/280K L.2S/280F	S19G6 S19G6F	4057 4042	4 4	0·5 0·5	High vacuum half-wave rectifiers.
L.5A/201K L.5A/202F	S6F33 —	4064 4083	6·3 6·3	0·35 0·3	Dual control pentodes with short cut-off suppressor grid characteristic.
L.5A/210K L.5A/210F	S6F17 S6F17F	4040 4041	6·3 6·3	0·3 0·3	Pulse beam tetrodes.
L.5A/220K	S2P20	4097	5 2·5	0·23 0·46	Beam tetrodes. For battery operation.
L.5B/280D	S11E12	4060	6·3	1·6	Beam tetrode for series or shunt control.

STC

M

SPECIAL VALVES

Special Quality Half-Wave Rectifiers

Codes: S19G6 (CV4057)
S19G6F (CV4042)

These valves are special quality, high vacuum half-wave rectifiers intended for use in high voltage power supplies. The S19G6F is a flying lead version of the S19G6.

A special shock-resistant construction is employed which gives increased reliability and life expectancy. Quality tests are performed on electrical characteristics, vibration noise, glass strain, electrode resonance, vibration fatigue, shock resistance, heater cycling, stability and life.

CATHODE

Indirectly heated, oxide-coated*		
Heater voltage	4·0	V
Heater current	0·5	A

LIMIT RATINGS

Maximum r.m.s. anode voltage	2·0	kV
Maximum working peak inverse voltage	5·0	kV
Maximum no load peak inverse voltage	6·0	kV
Maximum mean anode current	30	mA
Maximum peak heater/cathode voltage	10*	V
Maximum peak anode current	180	mA
Maximum reservoir capacitor (50 c/s)	1·1	μF
Minimum surge limiting resistance	4 500†	Ω
Minimum h.t. switching delay for full rating	20	s
Maximum shock (short duration)	500	g
Maximum acceleration (continuous operation)	2·5	g

* Cathode and heater should normally be tied, externally.

† This resistance can be obtained in the distributed resistance of the transformer winding

MECHANICAL DATA

Base	S19G6	B7G
	S19G6F	Flying leads
Mounting position		Unrestricted

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4230
LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Codes: S19G6 (CV4057)
S19G6F (CV4042)

CONTINUED

LIMITS OF CHARACTERISTICS

The test limits are for guidance in equipment design. The quality is controlled statistically to ensure that only a small percentage are outside these limits. The quality control levels are related to the importance of the characteristic being tested.

Test	Conditions V_h (V)	V_a (V)	V_{h-k} (V)	C (μF)	Life Period	Limits Min.	Max.	Units
Heater current	4	.	.	.	Initial 500 hrs.	0·45 0·45	0·55 0·55	A A
Anode current	4	55	.	.	Initial 500 hrs.	50 48	. .	mA mA
Change in anode current	4	55	.	.	Initial to 1 hr.	.	10	%
Heater/cathode leakage current	4	.	10	.	Initial	.	10	μA
Voltage breakdown, tested in half-wave rectifier circuit $R_{lim} = 5$ kΩ, $R_L = 68$ kΩ, $I_a = 30$ mA approximately	4	2 kV r.m.s.	.	1	Initial	.	.	

Load conditions maintained for 10 seconds then supply voltage switched on and off three times at five-second intervals. There must be no persistent sparking, bias glow or other abnormal manifestations.

Test	V_h (V)	V_a (V)	V_{h-k} (V)	C (μF)	Life Period	Min.	Max.	Units
Life Test Conditions Tested in half-wave rectifier circuit. $R_{lim} = 4{\cdot}5$ kΩ, $R_L = 68$ kΩ, $I_a = 30$ mA approximately	4	2 kV r.m.s.	.	1				

GLASS ENVELOPE STRAIN TEST

A statistical sample is tested to control glass quality. No voltages are applied to the electrodes.

The valves are completely immersed in boiling water at a temperature between 97°C and 100°C for 15 seconds and then immediately plunged into ice-cold water for 5 seconds. The valves are then examined for glass cracks.

BASE STRAIN TEST

S19G6

A statistical sample is tested to control base strain. No voltages are applied to the electrodes. The pins of the valve are forced over a specified cone, valves and cones are then completely submerged in boiling water (97°C to 100°C) for 10 seconds. Valves and cones are allowed to cool to room temperature on a wooden support before examination for cracks.

S19G6F

A lead fragility test is carried out in place of the base strain test.

FATIGUE TEST

A statistical sample is tested to control heater failures and other mechanical defects. The heaters are successively run at 4·0 V for one minute and switched off for three minutes, no other voltages applied. The valves are rigidly mounted on a vibrating machine and vibrated for at least 100 hours, for not less than 30 hours in each of three mutually perpendicular planes at a frequency of 170 c/s with a minimum peak acceleration of 5 g.

SHOCK TEST

A statistical sample is tested to control mechanical defects likely to be caused by shock. No voltages are applied to the electrodes. The valves are subjected to five blows of approximately 500 g acceleration in each of four directions.

HOLDING PERIOD—Inoperative Control

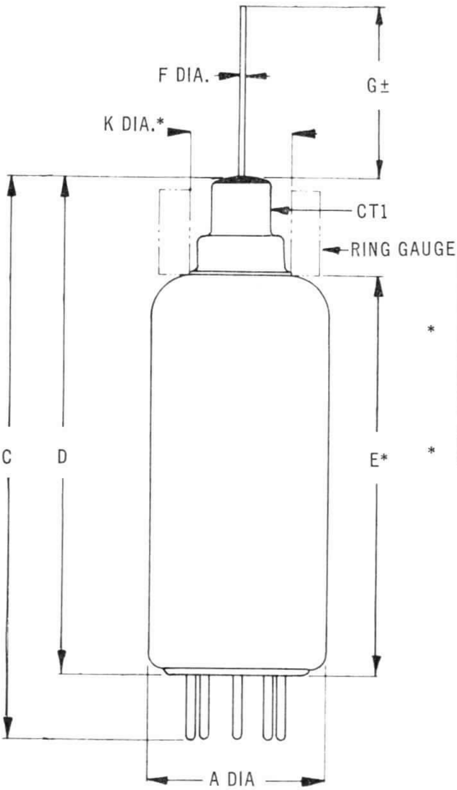
After completing the test specification the valves are held for at least 28 days and then retested to ensure that there has been no deterioration on storage.

STC

Code: S19G6 (CV4057)

CONTINUED

S19G6 Outline

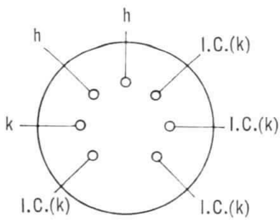


	DIM.	INCHES		MILLIMETRES	
	A	3/4	MAX.	19,0	MAX.
	C	2.11/32	MAX.	59,5	MAX.
	D	1.11/16	MIN.	43,0	MIN.
		2.1/16	MAX.	52,5	MAX.
*	E	1.13/32	MIN.	35,5	MIN.
		1.19/32	MAX.	40,5	MAX.
	F	0·015	MIN.	0,39	MIN.
		0·022	MAX.	0,55	MAX.
	G	1½	MIN.	38,1	MIN.
*	K	0·438 ± 0·001		11,13 ± 0,03	

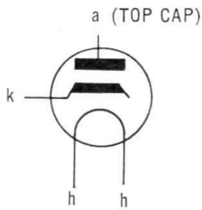
BASIC DIMS. ARE INCHES

± DENOTES:- TINNED OVER THIS AREA.

* DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



B7G BASE



Code: S19G6F (CV4042)

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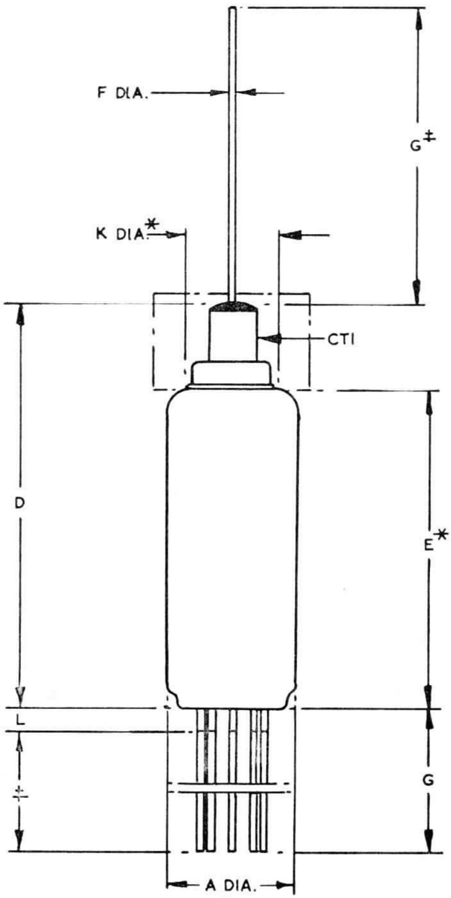
S19G6F Outline

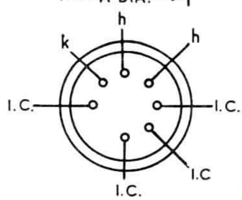


DIM.	INCHES	MILLIMETRES
A	3/4 MAX.	19,0 MAX.
D	2 1/8 MAX.	54,0 MAX.
* E	1 13/32 MIN.	35,5 MIN.
	1 19/32 MAX.	40,5 MAX.
F	0·015 MIN.	0,39 MIN.
	0·022 MAX.	0,55 MAX.
G	1 1/2 MIN.	38,1 MIN.
* K	0·438 ± 0·001	11,13 ± 0,03
L	0·118 MAX.	3,0 MAX.

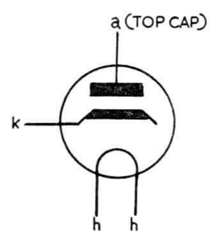
BASIC DIMS. ARE INCHES

‡ DENOTES:- TIN OVER THIS AREA

* DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



B7G/F BASE



M

SPECIAL VALVES

Special Quality
Dual Control Pentodes

Codes: S6F33 (CV4064)
CV4083

These miniature screened H.F. pentodes have a short cut-off suppressor grid characteristic and are intended for use where dependable performance is required under conditions of shock and vibration. They are suitable for modulation, gating and variable reactance applications where only a small input is available.

In the S6F33 a diode has been tied to the suppressor grid to prevent blocking when the grid is under positive drive conditions. The CV4083 is fitted with flexible leads.

CATHODE

Indirectly heated, oxide-coated

	S6F33	CV4083	
Heater voltage	6·3	6·3	V
Heater current	0·35	0·3	A

CHARACTERISTICS

	Conditions		
Mutual conductance	$V_a = V_{g2} = 200$ V, $V_{g3} = 0$, $I_a = 1{\cdot}75$ mA, $I_{g2} = 4{\cdot}5$ mA	4·05	mA/V
Inner amplification factor		42	

DIRECT INTERELECTRODE CAPACITANCES

(Measured with a close-fitting shield)

	S6F33	CV4083	
Input	7·55	7·2	pF
Output	4·55	4·3	pF
Anode-control grid	<0·15	<0·1	pF

MECHANICAL DATA

	S6F33	CV4083
Base	B7G	B7GF
Weight approximately	4 oz	

May 1964

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251
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STC

Codes: S6F33 (CV4064) CV4083

CONTINUED

MAXIMUM RATINGS

	S6F33 and CV4083	
Maximum anode dissipation	3·0	W
Maximum screen dissipation	1·5	W
Maximum anode voltage ($I_a = 0$)	550	V
Maximum anode voltage	300	V
Maximum screen voltage ($I_{g2} = 0$)	400	V
Maximum screen voltage	300	V
Maximum heater—cathode voltage	±150	V
Maximum bulb temperature	200	°C
Maximum shock (short duration)	500	g
Maximum acceleration (continuous operation)	2·5	g

LIMITS OF CHARACTERISTICS

The test limits are for guidance in equipment design. The quality is controlled statistically to ensure that only a small percentage are outside these limits. The quality control levels are related to the importance of the characteristic being tested.

Test	Conditions V_h (V)	V_a–E (V)	V_{g2}–E (V)	V_{g3}* (V)	R_k (Ω)	Life Period	Limits Min.	Max.	Units
Heater current	6·3	.	.	.	.	Initial	0·32	0·38	A
						500 hrs.	0·32	0·38	A
Anode current	6·3	200	200	0	287	Initial	5·6	8·6	mA
						500 hrs.	5·05	8·6	mA
						1 000 hrs.	4·6	8·6	mA
Screen current	6·3	200	200	0	287	Initial	2·7	6·0	mA
Mutual conductance	6·3	200	200	0	287	Initial	3·15	5·4	mA/V
						500 hrs.	2·7	5·4	mA/V
						1 000 hrs.	2·5	5·4	mA/V
Change of mutual conductance (1 hour life)	6·3	200	200	0	287	Initial to 1 hr.	.	10	%
Change of mutual conductance (c.f. gm at V_h = 6·3 V. Preheat valves for 5 mins.)	5·7	200	200	0	287	Initial	.	15	%
Average change of mutual conductance	6·3	200	200	0	287	Initial to 500 hrs.	.	15	%

Codes: S6F33 (CV4064) CV4083

CONTINUED

LIMITS OF CHARACTERISTICS—*continued*

Test	Conditions V_h (V)	V_a–E (V)	V_{g_2}–E (V)	V_{g_3}* (V)	R_k (Ω)	Life Period	Limits Min.	Max.	Units
Inner amplification factor (I_k = 12 mA, δV_{g_1} = 1 V)	6·3	200	200	0	287	Initial	30	46	
Grid No. 1 Cut-off (I_a = 0·1 mA)	6·3	200	200	0	.	Initial	.	11	V
Grid No. 3 Cut-off (With V_{g_3} = 0 vary V_{g_1} to give I_k = 10 mA then adjust V_{g_3} for I_a = 0·1 mA)	6·3	200	100	.	.	Initial	5	11·5	V
Grid No. 3 current (V_{g_1} = −30 V)	6·3	200	200	20	.	Initial	1	.	mA
Reverse grid No. 1 current (R_{g_1} = 0·5 MΩ (max.))	6·3	200	200	0	287	Initial	.	0·5	μA
						500 hrs.	.	1·0	μA
						1 000 hrs.	.	1·0	μA
Reverse grid No. 1 current**	6·9	300	300	0	560	Initial	.	1·0	μA
Heater/cathode leakage current (V_{h-k} = 100 V. Cathode positive and negative successively)	6·3	.	.	.	.	Initial	.	20	μA
						500 hrs.	.	40	μA
						1 000 hrs.	.	40	μA
Inter-electrode leakage resistance V_{g_1} to all = −100 V	6·3	.	.	.	.	Initial	100	.	MΩ
						500 hrs.	50	.	MΩ
						1 000 hrs.	30	.	MΩ
V_{g_2} to all = −300 V	6·3	.	.	.	.	Initial	100	.	MΩ
						500 hrs.	50	.	MΩ
						1 000 hrs.	30	.	MΩ
V_{g_3} to all = −300 V	6·3	.	.	.	.	Initial	100	.	MΩ
						500 hrs.	50	.	MΩ
						1 000 hrs.	30	.	MΩ

Codes: S6F33 (CV4064) CV4083

CONTINUED

LIMITS OF CHARACTERISTICS—*continued*

Test	Conditions V_h (V)	V_a–E (V)	V_{g_2}–E (V)	V_{g_3}* (V)	R_k (Ω)	Life Period	Limits Min.	Max.	Units
V_a to all $= -300$ V	6·3	.	.	.	.	Initial	100	.	MΩ
						500 hrs.	50	.	MΩ
						1 000 hrs.	30	.	MΩ
Vibration noise output voltage† ($V_{a(b)} = 250$ V, $V_{g1} = -4·5$ V, $R_L = 2$ kΩ at 50 c/s and 2 g min. peak acceleration)	6·3	.	250	0	.	Initial	.	15	mV (r.m.s.)
Life test conditions	6·3	250	200	0	150				
Capacitances‡ Electrodes									
g_1 to E							6·5	8·6	pF
a to E							3·9	5·2	pF
a to g_1							.	0·015	pF

* A zero indicates that grid 3 and cathode are joined.

** Preheat valve for 5 minutes under test conditions, after a further 5 minutes the grid 1 current must not be rising or out of limits.

† Valve mounted so that the direction of vibration is parallel to the minor axis of the electrode mounting structure.

Test of sufficient duration to obtain a steady reading of noise output.

‡ Inter-electrode capacity on 1 Mc/s bridge with valve mounted in a fully shielded socket and in a cylindrical screening can.

Codes: S6F33 (CV4064) CV4083

CONTINUED

GLASS ENVELOPE STRAIN TEST

A statistical sample is tested to control glass quality. No voltages are applied to the electrodes.

The valves are completely immersed in boiling water at a temperature between 97°C and 100°C for 15 seconds and then immediately plunged into ice-cold water for 5 seconds. The valves are then examined for glass cracks.

BASE STRAIN TEST

S6F33

A statistical sample is tested to control base strain. No voltages are applied to the electrodes.

The pins of the valves are forced over a specified cone, valves and cones are then completely submerged in boiling water at a temperature between 97°C and 100°C for 10 seconds. The valves and cones are allowed to cool to room temperature on a wooden support before examining for glass cracks.

CV4083

A lead fragility test is carried out in place of the base strain test.

FATIGUE TESTS

A statistical sample is tested to control heater failures and other mechanical defects. The heaters are successively run at 6·9 V for 1 minute and switched off for 3 minutes, no other voltages applied.

The valves are rigidly mounted on a vibrating machine and vibrated for at least 100 hours, for not less than 30 hours in each of three mutually perpendicular planes at a frequency of 170 c/s with a minimum peak acceleration of 5 g.

SHOCK TEST

A statistical sample is tested to control mechanical defects likely to be caused by shock. No voltages are applied to the electrodes.

The valves are subjected to five blows of approximately 500 g acceleration in each of four directions.

HOLDING PERIOD—Inoperative Control

After completing the test specification the valves are held for at least 28 days and then retested to ensure that there has been no deterioration in storage.

STC

Codes: S6F33 (CV4064)
CV4083

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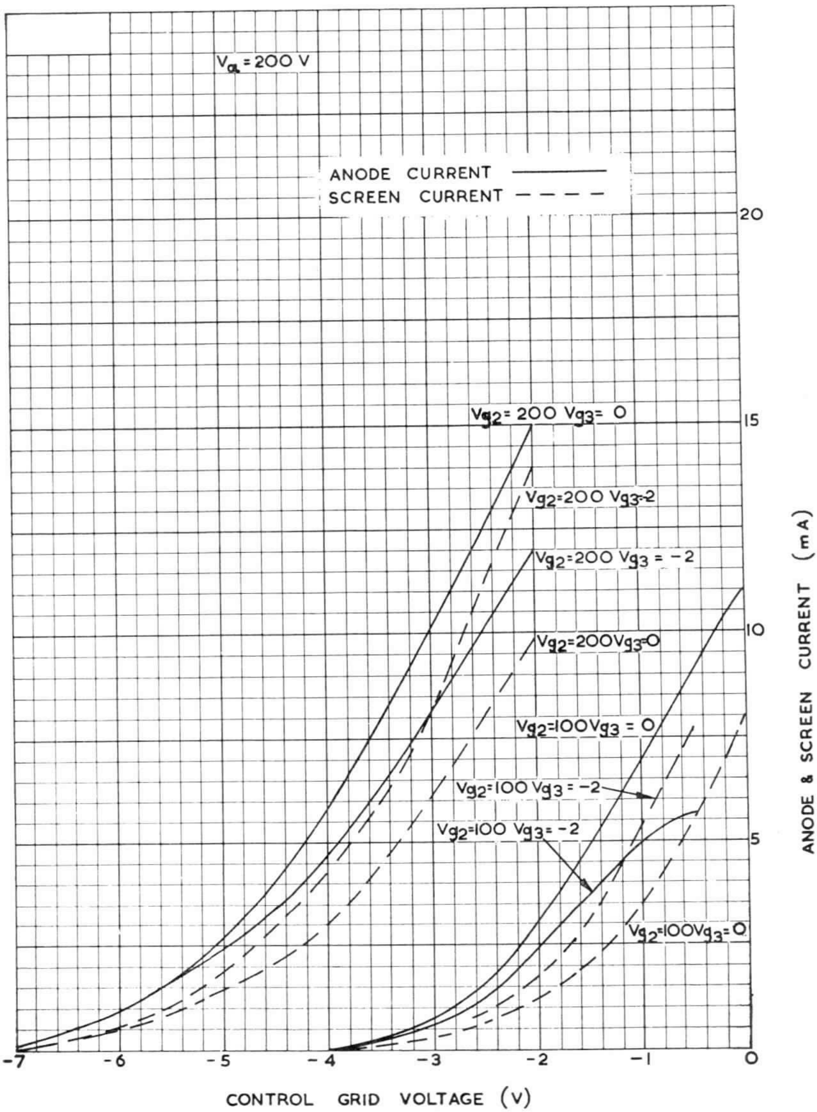

Codes: S6F33 (CV4064)
CV4083

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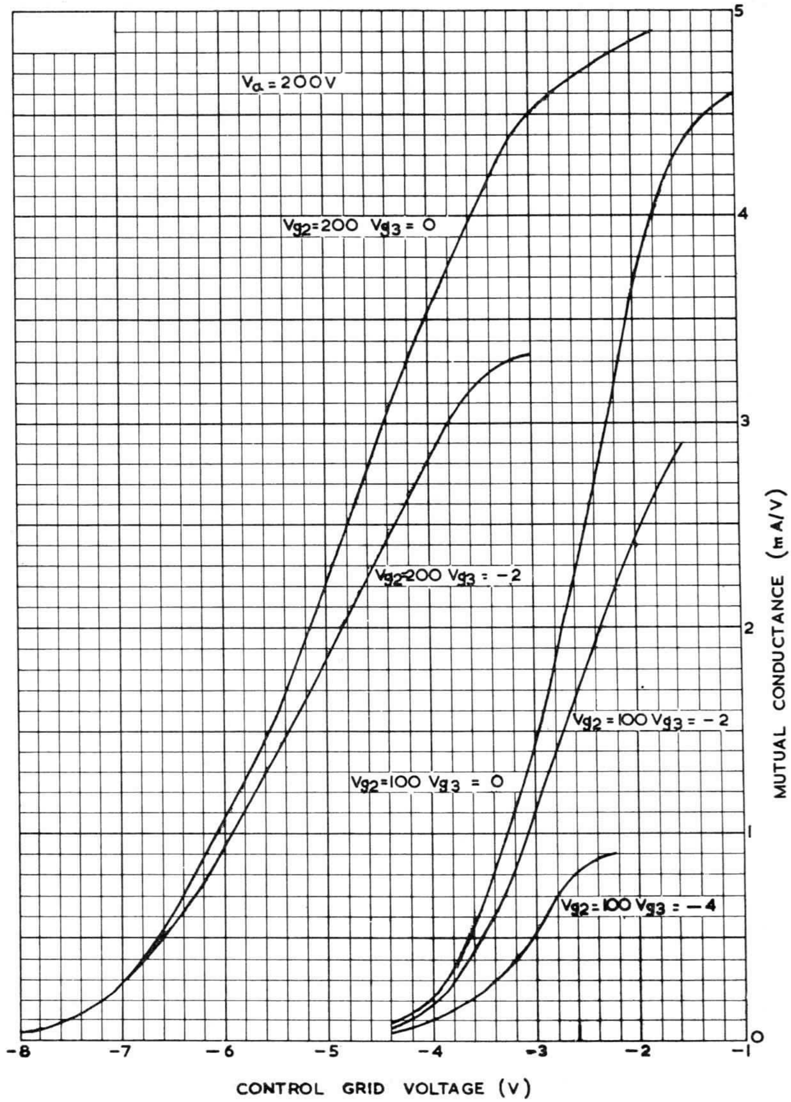

STC

Codes: S6F33 (CV4064)
CV4083

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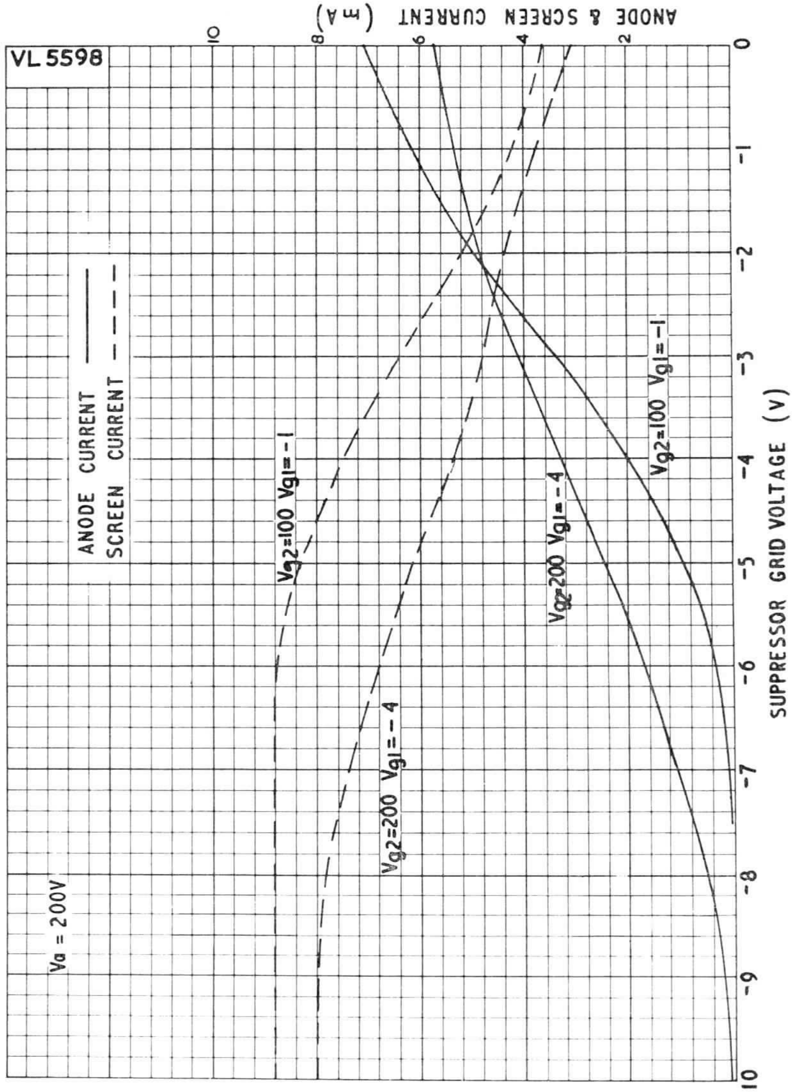

May 1964

Codes: S6F33 (CV4064)
CV4083

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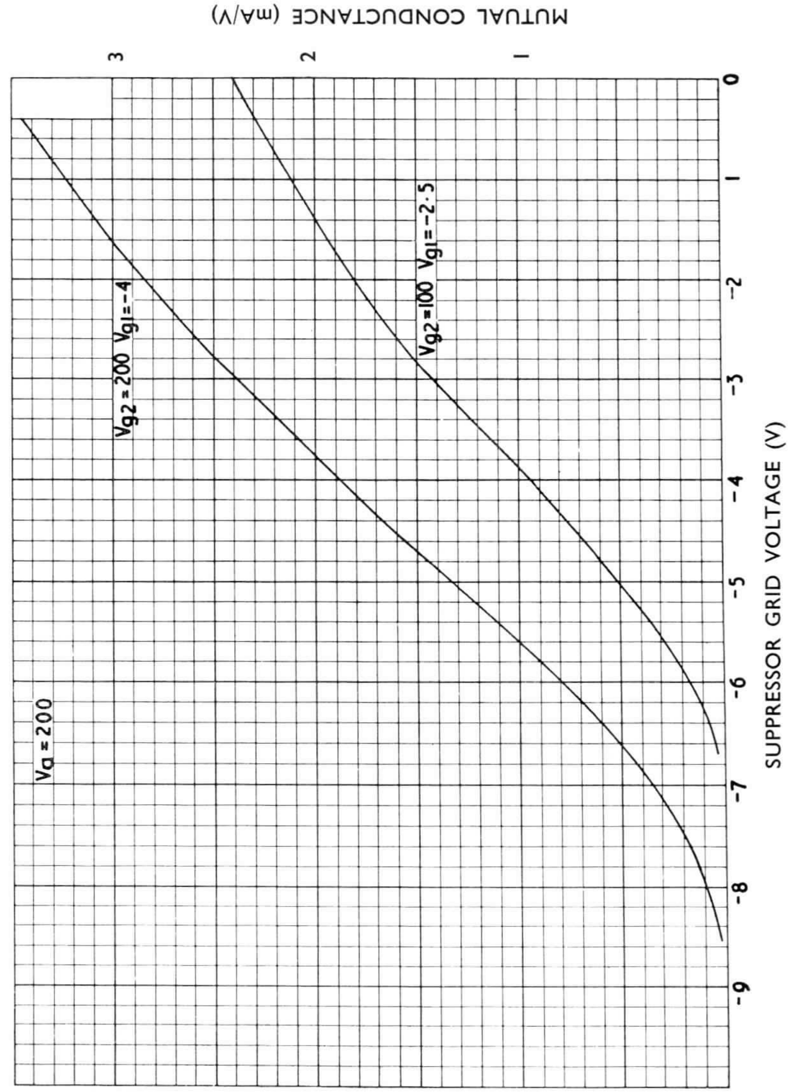

STC

Codes: S6F33 (CV4064) CV4083

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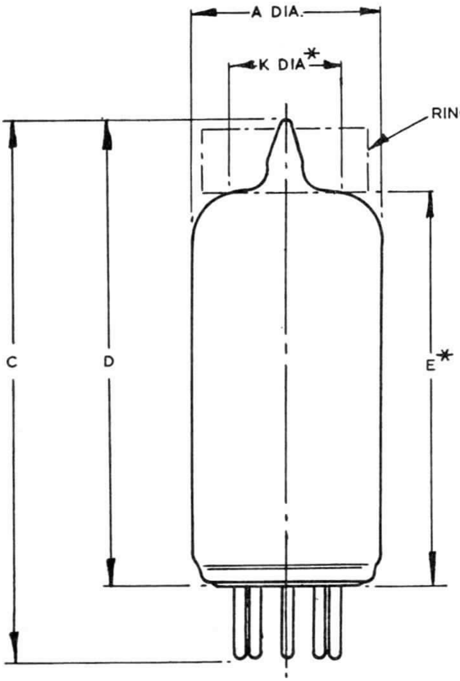
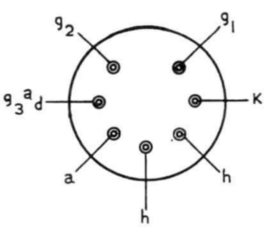
S6F33 Outline



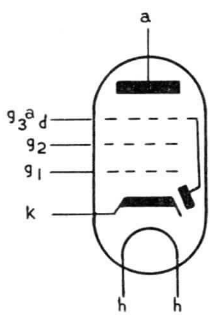
DIM	INCHES		MILLIMETRES	
A	3/4	MAX.	19·0	MAX.
C	2 5/32	MAX.	54·5	MAX.
D	1 7/8	MAX.	47·5	MAX.
* E	1 13/32 1 19/32	MIN MAX.	35·5 40·5	MIN. MAX.
* K	0·438 ± 0·001		11,13 ± 0,03	

BASIC DIMS. ARE INCHES

* DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT DIA.



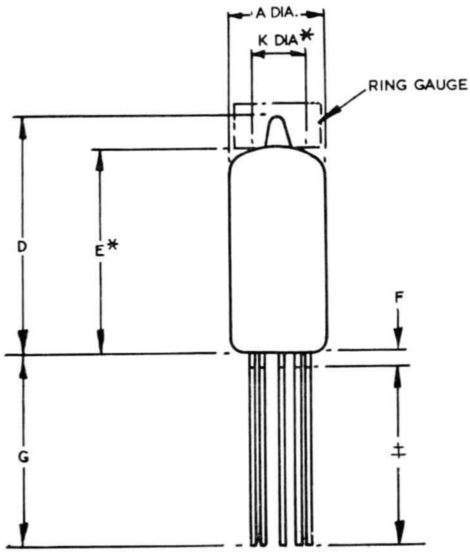
B7G BASE



Codes: S6F33 (CV4064) CV4083

CONTINUED

CV4083 Outline

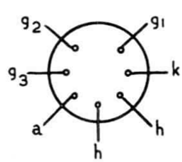


DIM.	INCHES		MILLIMETRES	
A	3/4	MAX.	19,0	MAX.
D	1 7/8	MAX.	47,5	MAX.
* E	1 13/32	MIN.	35,5	MIN.
	1 19/32	MAX.	40,5	MAX.
F	0·118	MAX.	3,0	MAX.
G	1 1/2	MIN.	38,1	MIN.
* K	0·438 ± 0·001		11,13 ± 0,03	

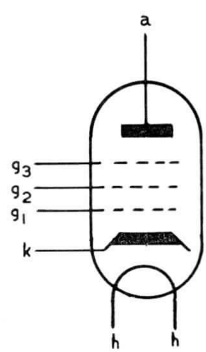
BASIC DIMS. ARE INCHES

‡ DENOTES:-TINNED OVER THIS AREA

* DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



B7G/F BASE



STC

M

SPECIAL VALVES

Special Quality
Pulse Beam Tetrodes
Codes: S6F17 (CV4040)
S6F17F (CV4041)

These valves are special quality beam tetrodes with indirectly heated oxide-coated cathodes. They are intended for use in pulse and r.f. amplifiers where dependable performance is required under shock and vibration conditions. The S6F17F is a flying lead version of the S6F17. A special shock-resistant construction is employed which gives increased reliability and life expectancy.

Quality tests are performed on electrical characteristics, vibration noise, lead fragility, glass strain, electrode resonance, vibration fatigue, shock resistance, heater cycling, stability and life.

ABRIDGED CHARACTERISTICS

Heater voltage	6·3	V
Heater current	0·3	A
Mutual conductance		
$V_a = V_{g2} = 200$ V. $I_a = 17$ mA	4·0	mA/V
Pulse condition $V_a = V_{g2} = 250$ V. $I_a = 64$ mA, $V_{g1} = -6{\cdot}25$ V	8·3	mA/V
Inner amplification factor	10	

RATING*

Maximum anode voltage	600	V
Maximum screen voltage	600	V
Mutual conductance	8·3†	mA/V
Maximum anode dissipation	3·5‡	W
Maximum screen dissipation	0·7	W
Maximum heater/cathode voltage d.c.	100	V
Maximum bulb temperature	165	°C
Maximum shock (short duration)	500	g
Maximum acceleration (continuous operation)	2·5	g

* All limiting values are Absolute Values, not Design Centres.

†$V_a = V_{g2} = 250$ V, $V_{g1} = -6{\cdot}25$ V. Tested under pulse conditions.

‡ If used in a can at maximum rating, the can must be matt black both internally and externally.

June 1965

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4230
LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Codes: S6F17 (CV4040)
S6F17F (CV4041)

CONTINUED

LIMITS OF CHARACTERISTICS

The test limits are for guidance in equipment design. The quality is controlled statistically to ensure that only a small percentage are outside these limits. The quality control levels are related to the importance of the characteristic being tested.

Test	Conditions V_h	V_a	V_{g2}	I_a	Life Period	Limits Min.	Max.	Units
Heater current	6·3	.	.	.	Initial	0·27	0·33	A
					500 hrs.	0·27	0·33	A
					1 000 hrs.	0·27	0·33	A
Negative grid voltage	6·3	200	200	17	Initial	8·4	15·8	V
					500 hrs.	7·4	15·8	V
					1 000 hrs.	6·6	15·8	V
Screen current	6·3	200	200	17	Initial	2·05	5·1	mA
Mutual conductance	6·3	200	200	17	Initial	2·6	5·0	mA/V
Pulse anode current	6·3	300	300	.	Initial	133	.	mA
V_{g1} = −100 V, Pulse Amp. = +100 V					500 hrs.	100	.	mA
tp = 10–15 μs, duty cycle 0·0025					1 000 hrs.	90	.	mA
Change in pulse anode current	6·3	300	300	.	Initial to 1 hr.	.	20	%
Inner amplification factor V_{g1} (sig.) = +2 V	6·3	200	200	17	Initial	7·5	12·5	
Anode current cut-off	6·3	200	200	0·1	Initial	.	38	V
Reverse grid current	6·3	200	200	17	Initial	.	0·75	μA
R_{g1} = 500 kΩ (max.)					500 hrs.	.	1·0	μA
					1 000 hrs.	.	1·5	μA
Reverse grid current R_{g1}=500 kΩ, V_{g1}=−38 V	7·0	200	200	.	Initial	.	−1·5	μA
Heater/cathode leakage current $V_{h\text{-}k}$ = ±100 V	6·3	.	.	.	Initial	.	10	μA
					500 hrs.	.	10	μA
					1 000 hrs.	.	10	μA

June 1965

Codes: S6F17 (CV4040)
S6F17F (CV4041)

CONTINUED

LIMITS OF CHARACTERISTICS—*continued*

Test	Conditions V_h	V_a	V_{g2}	I_a	Life Period	Limits Min.	Limits Max.	Units
Interelectrode leakage resistance.								
V_{g1} to all $= -100$ V	6·3	.	.	.	Initial	100	.	MΩ
					500 hrs.	50	.	MΩ
V_{g2} to all $= -300$ V	6·3	.	.	.	Initial	100	.	MΩ
					500 hrs.	50	.	MΩ
V_a to all $= -300$ V	6·3	.	.	.	Initial	100	.	MΩ
					500 hrs.	50	.	MΩ
Vibration noise output voltage, $V_{a(b)} = 250$ V, $V_{g1} = -17$ V, $R_L = 2$ kΩ	6·3	.	250	.	Initial	.	60	mV(p–p)
Life Test Conditions								
$R_{g1} = 500$ kΩ, $V_{h\text{-}k} = 100$ V, $R_k = 1$ kΩ	6·3	250	200	.				
Capacitances measured in fully shielded socket but with holder capacity balanced out.	Electrodes		g_1 to E			5·2	7·1	pF
			a to E			4·4	6·1	pF
			a to g_1			.	0·05	pF

STC

Codes: S6F17 (CV4040)
S6F17F (CV4041)

CONTINUED

SPECIAL TESTS

GLASS ENVELOPE STRAIN TEST

A statistical sample is tested to control glass quality. No voltages are applied to the electrodes.

The valves are completely immersed in boiling water at a temperature between 97°C and 100°C for 15 seconds and then immediately plunged into ice-cold water for 4 seconds. The valves are then examined for glass cracks.

BASE STRAIN TEST

S6F17

A statistical sample is tested to control base strain. No voltages are applied to the electrodes. The pins of the valve are forced over a specified cone, valves and cones are then completely submerged in boiling water (97°C to 100°C) for 10 seconds. Valves and cones are allowed to cool on a wooden support before examination for cracks.

S6F17F

A lead fragility test is carried out in place of the base strain test.

FATIGUE TEST

A statistical sample is tested to control heater failures and other mechanical defects. The heaters are successively run at 6·9 V for one minute and switched off for three minutes, no other voltages applied. The valves are rigidly mounted on a vibrating machine and vibrated for at least 100 hours, for not less than 30 hours in each of three mutually perpendicular planes at a frequency of 170 c/s with a minimum peak acceleration of 5 g.

SHOCK TEST

A statistical sample is tested to control mechanical defects likely to be caused by shock. No voltages are applied to the electrodes. The valves are subjected to five blows of approximately 500 g acceleration in each of four directions.

HOLDING PERIOD—Inoperatives Control

After completing the test specification the valves are held for at least 28 days and are then retested to ensure that there has been no deterioration on storage.

Codes: S6F17 (CV4040)
S6F17F (CV4041)

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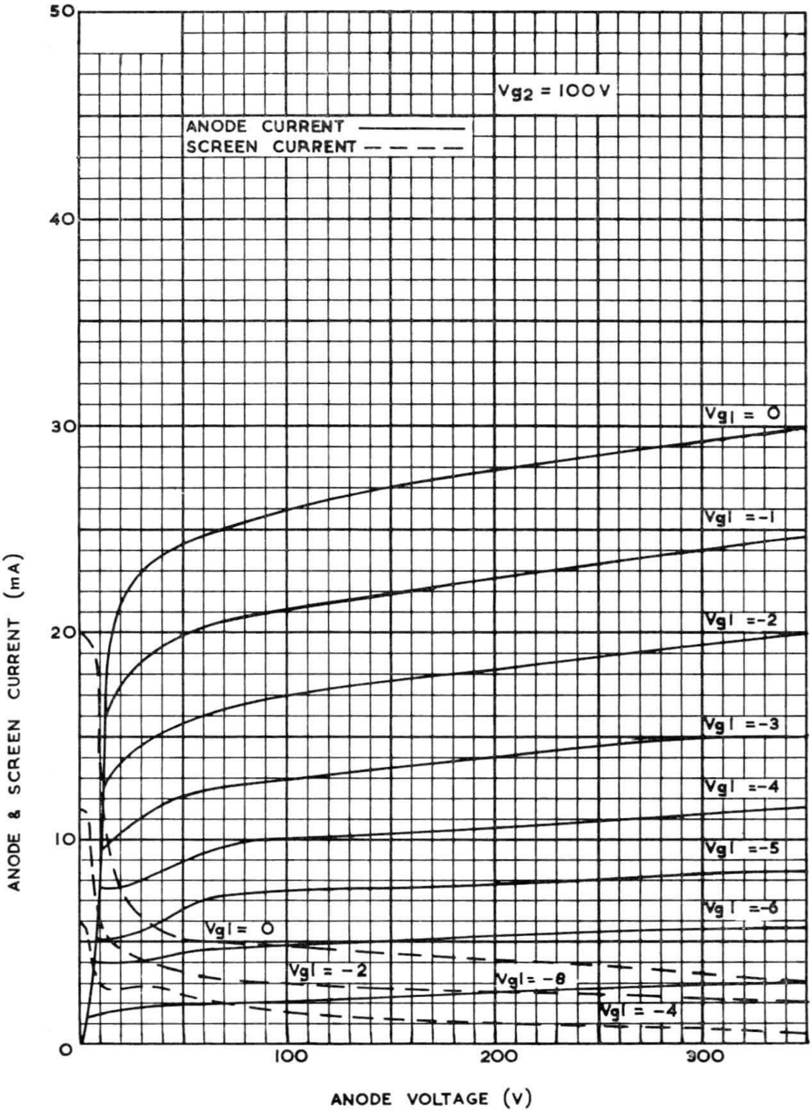

STC

Codes: S6F17 (CV4040)
S6F17F (CV4041)

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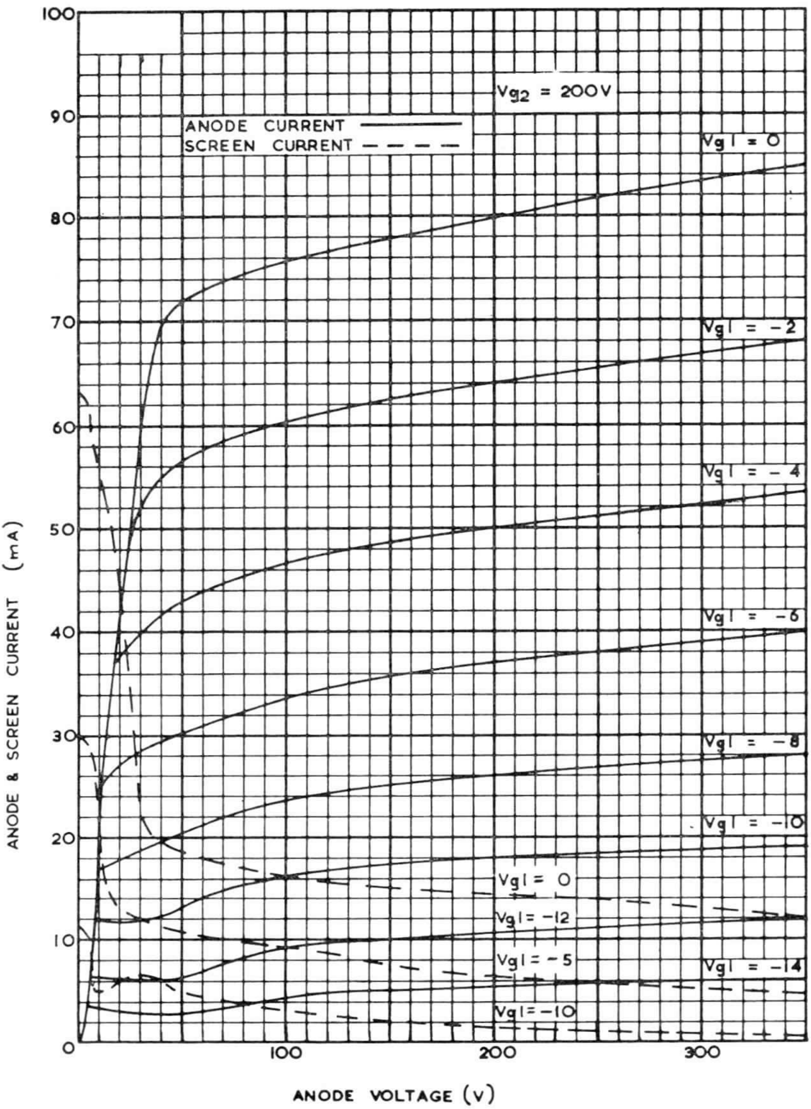

Codes: S6F17 (CV4040)
S6F17F (CV4041)

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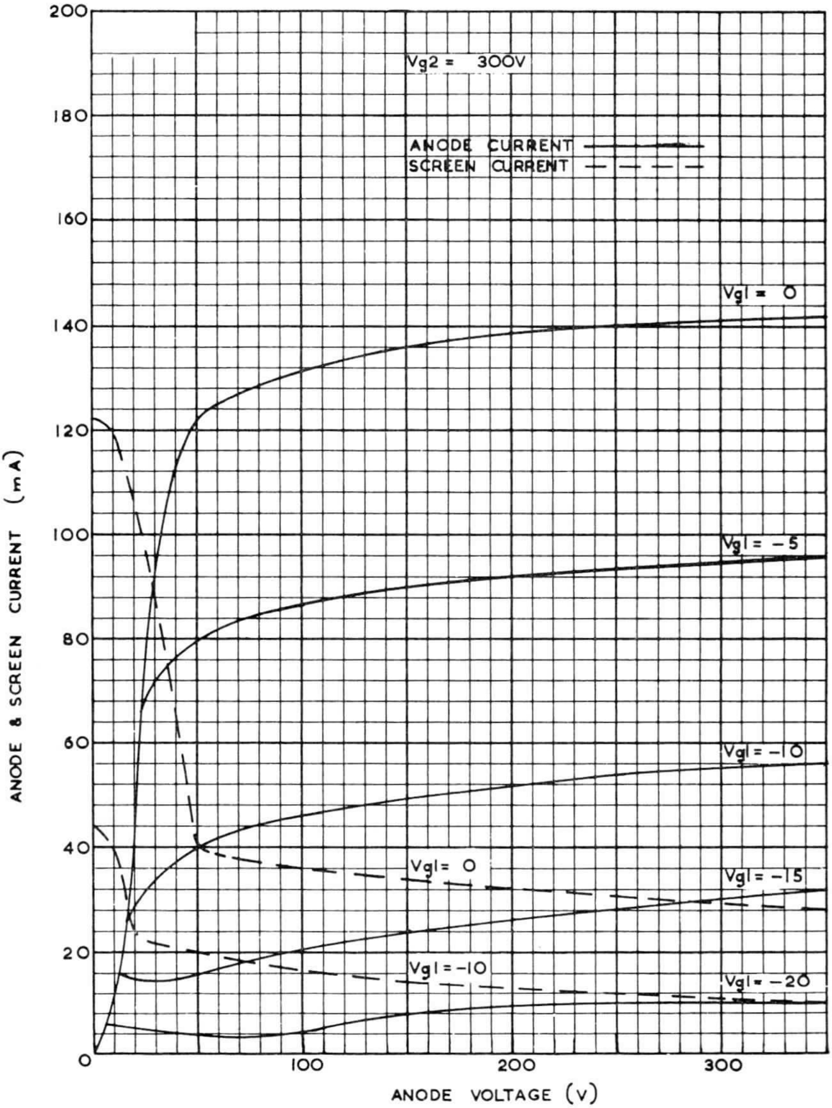

STC

Codes: S6F17 (CV4040)
S6F17F (CV4041)

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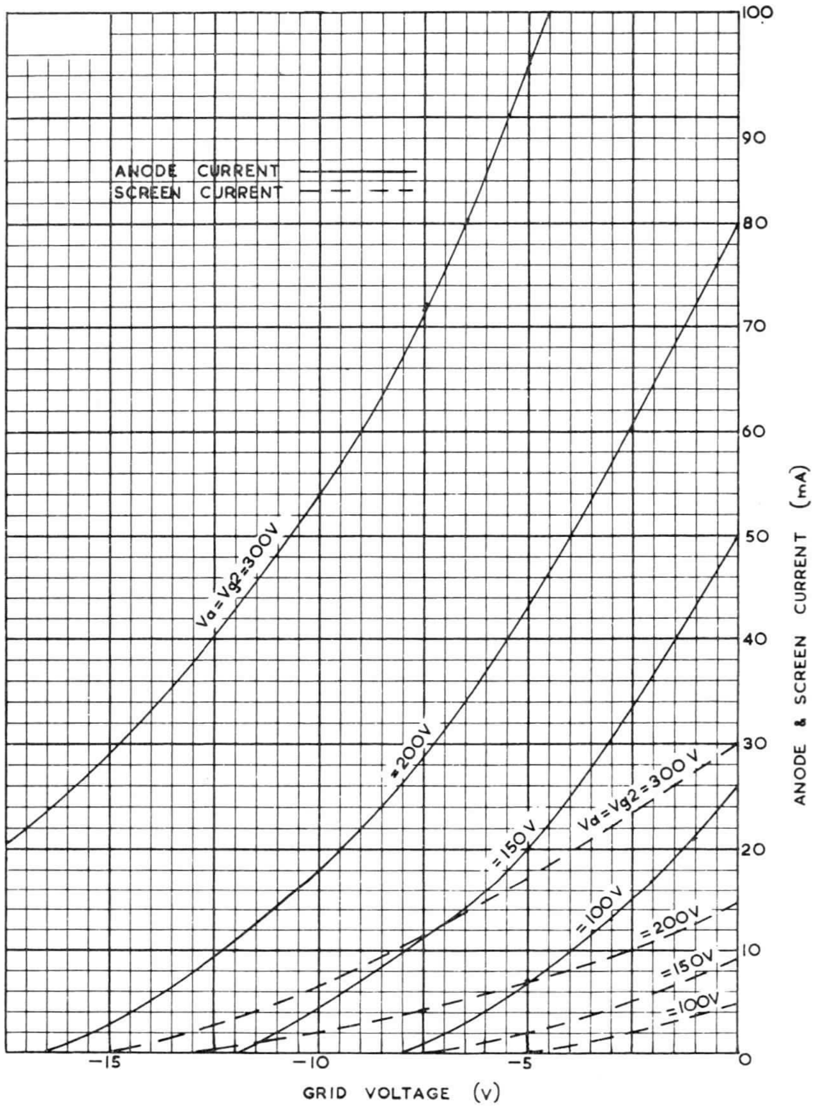

Codes: S6F17 (CV4040)
S6F17F (CV4041)

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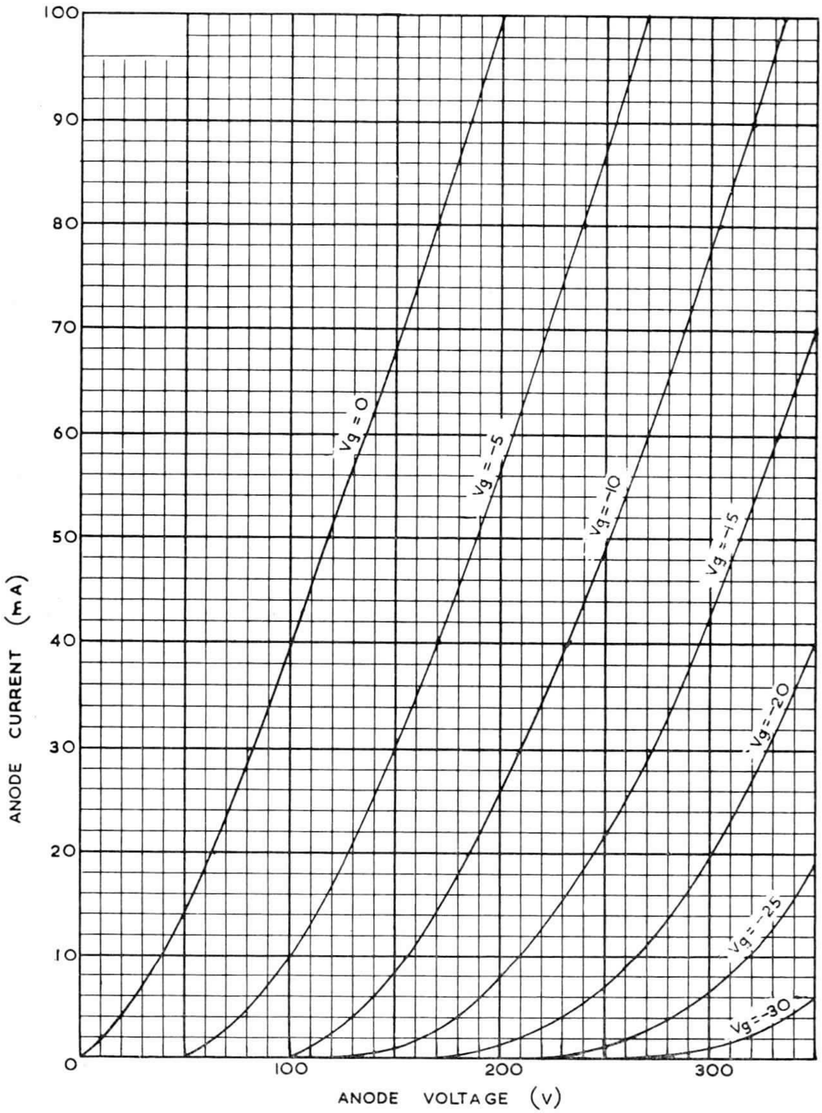
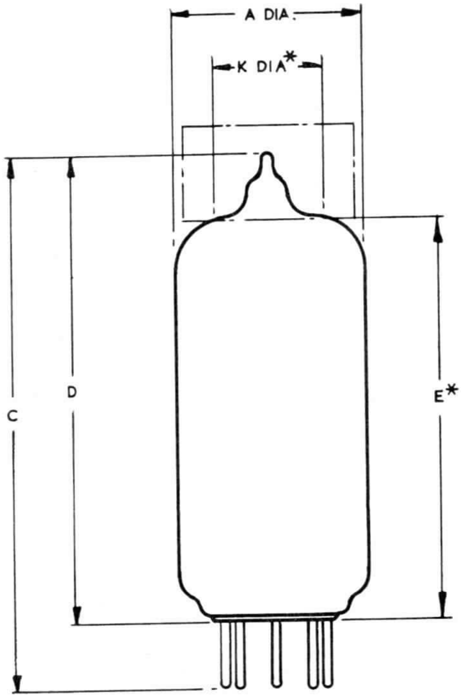
CONSTANT VOLTAGE CHARACTERISTICS—TRIODE CONNECTED



Code: S6F17 (CV4040)

CONTINUED

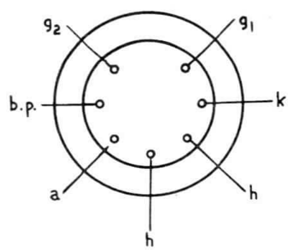
S6F17 (CV4040) Outline



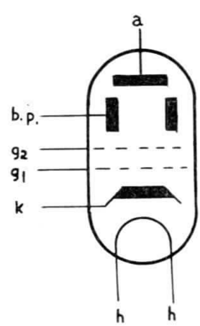
	DIM	INCHES		MILLIMETRES	
	A	3/4	MAX.	19,0	MAX.
	C	2 5/32	MAX.	54,5	MAX.
	D	1 7/8	MAX.	47,5	MAX.
*	E	1 13/32	MIN.	35,5	MIN.
		1 19/32	MAX.	40,5	MAX.
*	K	0·438 ± 0·001		11,13 ± 0,03	

BASIC DIMS. ARE INCHES

* DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



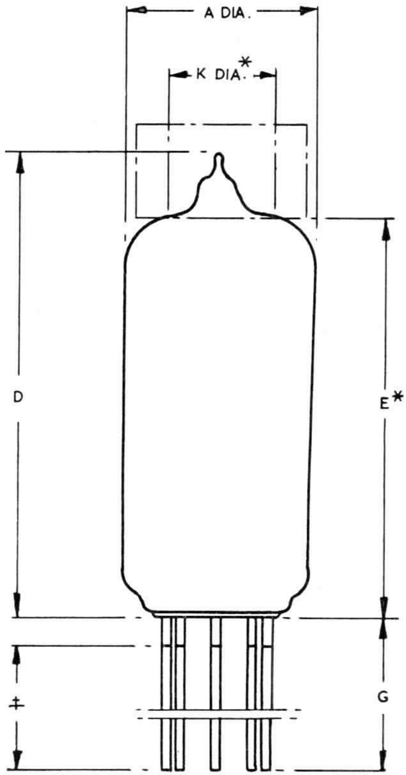
B7G BASE



Code: S6F17F (CV4041)

CONTINUED

S6F17F Outline

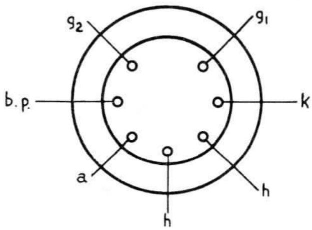


DIM	INCHES		MILLIMETRES	
A	3/4	MAX.	19,0	MAX.
D	1 7/8	MAX.	47,5	MAX.
* E	1 13/32	MIN.	35,5	MIN.
	1 19/32	MAX.	40,5	MAX.
G	1 1/2	MIN.	38,1	MIN.
* K	0·438 ± 0·001		11,13 ± 0,03	
L	0·118	MAX.	3,0	MAX.

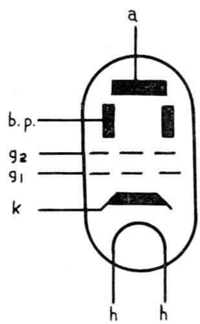
BASIC DIMS. ARE INCHES

± DENOTES:- TIN OVER THIS AREA

* DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



B7G/F BASE



M

SPECIAL VALVES

Special Quality Beam Tetrode
Directly Heated—for Battery Operation

Code: S2P20 (CV4097)

GENERAL

The S2P20 can withstand continuous vibration at an acceleration of 2·5 g and a short duration shock of 500 g. Further interesting design features are as follows:

Miniature construction for portable equipment.		
For use as an R.F. power amplifier up to	100	Mc/s
R.F. power, single ended	$\geqslant$2·4	W
R.F. power, parallel or push-pull	$\geqslant$4·8	W

Designed to operate with a low H.T. voltage of 150 V.
Centre tapped filament for series or parallel operation.

CATHODE

Oxide-coated, directly heated cathode

	Series	Parallel	
Filament voltage V_f	5·0	2·5	V
Filament current I_f	0·23	0·46	A

RATINGS—Absolute Values

Maximum anode dissipation	5	W
Maximum screen dissipation	2	W
Maximum anode voltage	150	V
Maximum screen voltage	150	V
Maximum operating frequency	100	Mc/s
Maximum shock (short duration)	500	g
Maximum acceleration (continuous operation)	2·5	g

INTERELECTRODE CAPACITANCES†

Anode/Grid 1	<0·17	pF
Grid 1/Earth	8·5	pF
Anode/Earth	6·6	pF

† Measured with fully shielded socket, without can and skirt.

MOUNTING POSITION—Unrestricted

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251
LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

Code: S2P20 (CV4097)

CONTINUED

LIMITS OF CHARACTERISTICS

The test limits are for guidance in equipment design. The quality is controlled statistically to ensure that only a small percentage are outside these limits. The quality control levels are related to the importance of the characteristic being tested.

Test	V_f (dc) (V)	V_a* (V)	V_{g2}* (V)	V_{g1}* (V)	V_{bp}* (V)	Life Period	Limits Min.	Limits Max.	Units
Filament current	5	.	.	.	.	Initial	0·21	0·25	A
Anode current	5	150	150	−10	0	Initial	21	35	mA
Screen current	5	150	150	−10	0	Initial	.	4	mA
Mutual conductance	5	150	150	−10	0	Initial	3·2	5·4	mA/V
Grid No. 1 cut-off voltage ($I_a = 2$ mA)	5	150	150	.	0	Initial	.	25	V
Peak anode current (†$V_{a(b)} = 120$ V, $R_L = 320\ \Omega$, $V_{sig} = 20\ V_{r.m.s.}$, $R_{g1} = 22\ k\Omega$)	5	.	120	.	0	Initial	110	.	mA
						250 hrs.	100	.	mA
Change in peak anode current	4·5	.	120	.	0	Initial	.	25	mA
Change in peak anode current	5	.	120	.	0	Initial to 1 hr.	.	20	%
Reverse grid current	5	150	150	−10	0	Initial	.	2	μA
						250 hrs.	.	4	μA
Interelectrode leakage resistance									
V_{g1} to all = −100 V	0	.	.	.	.	Initial	.	100	MΩ
						250 hrs.	.	50	MΩ
V_{g2} to all = −300 V	0	.	.	.	.	Initial	.	100	MΩ
						250 hrs.	.	50	MΩ
V_a to all = −300 V	0	.	.	.	.	Initial	.	100	MΩ
						250 hrs.	.	50	MΩ
V_{bp} to all = −300 V	0	.	.	.	.	Initial	.	100	MΩ
						250 hrs.	.	50	MΩ
Vibration noise output voltage‡ $V_{a(b)} = 150$ V, $R_L = 2\ k\Omega$	5	.	150	−10	0	Initial	.	500	$mV_{r.m.s.}$

Code: S2P20 (CV4097)

CONTINUED

LIMITS OF CHARACTERISTICS—*continued*

Test	Conditions					Life Period	Limits		Units
	V_f (dc) (V)	V_a* (V)	V_{g2}* (V)	V_{g1}* (V)	V_{bp}* (V)		Min.	Max.	
Life Test Conditions Adjust grid No. 1 voltage to give I_a = 33 mA (r.m.s.)	5	150	150	.	0				
Capacitances measured in fully shielded socket, without can and skirt	Electrodes		g_1 to E				6·5	10·5	pF
			a to E				5·6	7·6	pF
			a to g_1				.	0·17	pF

* Voltages measured with respect to filament negative (pin 4).

† All power supplies shall have negligible impedance to operating frequency. Grid signal impedance shall be less than 5 ohms; voltage sinusoidal.

‡ Preheat for 15 minutes before test at Anode Current test conditions.

STC

Code: S2P20 (CV4097)

CONTINUED

SPECIAL TESTS

Glass Envelope Strain Test

A statistical sample is tested to control glass quality. No voltages are applied to the electrodes.

The valves are completely immersed in boiling water at a temperature between 97°C and 100°C for 15 seconds and then immediately plunged into ice-cold water for 5 seconds. The valves are then examined for glass cracks.

Base Strain Test

A statistical sample is tested to control base strain. No voltages are applied to the electrodes.

The pins of the valves are forced over a specified cone, valves and cones are then completely submerged in boiling water at a temperature between 97°C and 100°C for 10 seconds. The valves and cones are allowed to cool to room temperature on a wooden support before examining for glass cracks.

Fatigue Test

A statistical sample is tested to control heater failures and other mechanical defects. The heaters are successively run at 5 V r.m.s. for one minute and switched off for three minutes, no other voltages applied.

The valves are rigidly mounted on a vibrating machine and vibrated for at least 100 hours, for not less than 30 hours in each of three mutually perpendicular planes at a frequency of 170 c/s with a minimum peak acceleration of 5 g.

Shock Test

A statistical sample is tested to control mechanical defects likely to be caused by shock. No voltages are applied to the electrodes.

The valves are subjected to five blows of approximately 500 g acceleration in each of four directions.

Holding Period—Inoperatives Control

After completing the test specification the valves are held for at least 28 days and are then retested to ensure that there has been no deterioration on storage.

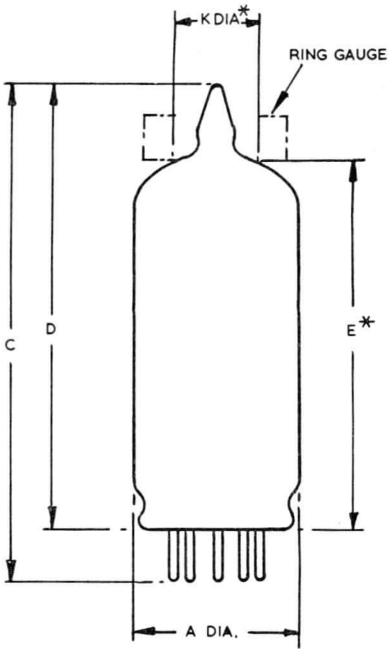
TYPICAL OPERATION—Class "C" Power Amplifier (at 70 Mc/s)

Anode voltage	150	V
Screen supply voltage	150	V
Screen feed resistor	3·9	kΩ
Anode current	40	mA
Control grid current	1·0	mA
Control grid voltage	−22	V
Grid bias resistor	22	kΩ
R.F. power output (min.)	2·4	W

Code: S2P20 (CV4097)

CONTINUED

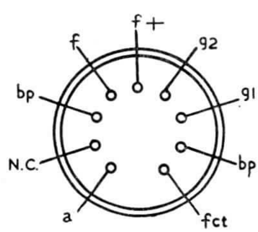
S2P20 Outline



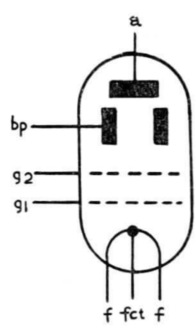
	DIM	INCHES	MILLIMETRES
	A	7/8 MAX.	22,2 MAX.
	C	2 21/32 MAX.	67,5 MAX.
	D	2 3/8 MAX.	60,5 MAX.
*	E	1 29/32 MIN. 2 3/32 MAX.	48,5 MIN. 53,0 MAX.
*	K	0·438 ± 0·001	11,13 ± 0,03

BASIC DIMS. ARE INCHES

X DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT DIA.



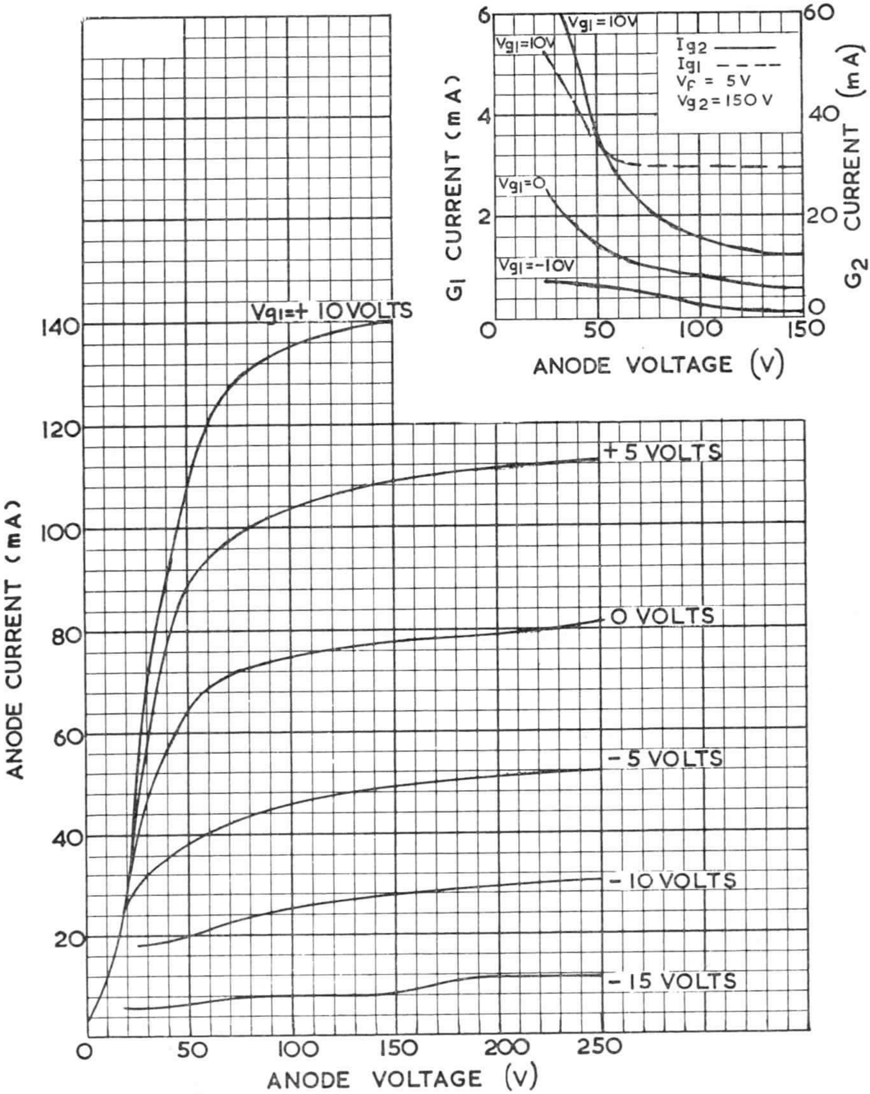
B9A BASE



STC

Code: S2P20 (CV4097)

CONTINUED



SPECIAL VALVES

Special Quality
Beam Tetrode

Code: S11E12 (CV4060)

Intended for use as a series or shunt control valve in stabilised power supply units. It has similar characteristics (within ratings) to the type 12E14 valve. A special shock-resistant construction is employed which gives increased reliability and life expectancy. Quality tests are performed on electrical characteristics, vibration noise, base strain, glass strain, electrode resonance, vibration fatigue, shock resistance, heater cycling, stability and life.

CATHODE

Indirectly heated, oxide-coated		
Heater voltage	6·3 ± 5%	V
Heater current	1·6	A

CHARACTERISTICS

Mutual conductance	$V_a = V_{g2} = 150$ V. $I_a = 200$ mA	13·5	mA/V
Inner amplification factor	$I_{g2} = 12$ mA. $V_{g1} = -8{\cdot}5$ V	5·5	

DIRECT ELECTRODE CAPACITANCES

Anode to grid 1	1·8	pF
Grid 1 to earth	19·5	pF
Anode to earth	16·5	pF

MECHANICAL DATA

Base		I0–8	
Mounting position		Vertical	
Weight	2·5 oz	70,2	gm

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COMPONENTS GROUP
VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251
LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Code: S11E12 (CV4060)

CONTINUED

MAXIMUM RATINGS

Maximum anode voltage	800	V
Maximum screen voltage	300	V
Maximum control grid voltage	−100	V
Maximum voltage between grids 1 and 2	400	V
Mutual conductance*	13·5	mA/V
Inner mu*	5·5	
Maximum anode dissipation	28	W
Maximum screen dissipation	5·0	W
Maximum cathode current	300	mA
Maximum heater to cathode voltage (d.c. heater negative)	350	V
Maximum heater to cathode voltage (d.c. heater positive)	150	V
Maximum resistance grid 1 to cathode—fixed bias	100 000	Ω
Maximum resistance grid 1 to cathode—cathode follower	1·0	MΩ
Maximum acceleration (continuous operation)	2·0	g
Maximum shock (short duration)	500	g
Maximum peak anode voltage† (scanning operation)	1 500	V

* Measured at $V_a = V_{g2} = 150$ V; $I_a = 200$ mA; $I_{g2} = 12$ mA; $V_{g1} = -8{\cdot}5$ V.

† For duty cycle of 1/25 and maximum pulse duration 200 μ seconds. All maximum ratings are Absolute Values, not Design Centres.

Code: S11E12 (CV4060)

CONTINUED

LIMITS OF CHARACTERISTICS

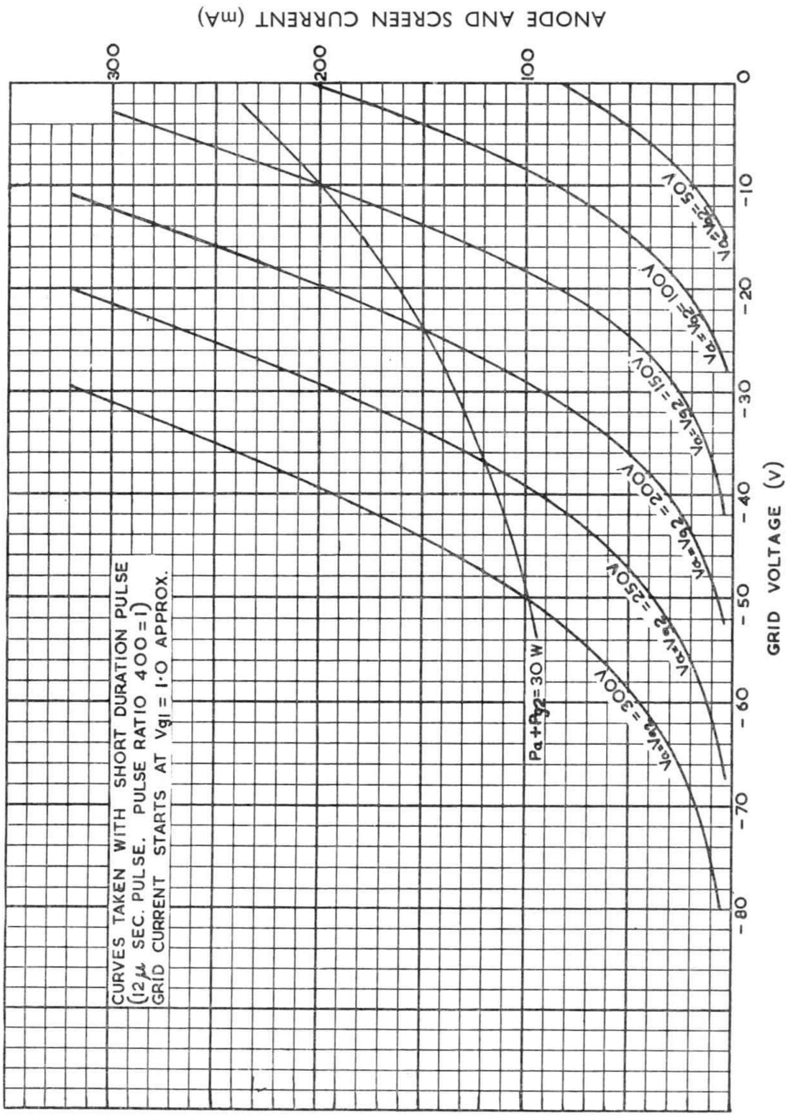
The test limits are for guidance in equipment design. The quality is controlled statistically to ensure that only a small percentage are outside these limits. The quality control levels are related to the importance of the characteristic being tested.

Test	Conditions				Limits		Units
	V_h V	V_a V	V_{g2} V	I_a mA	Min.	Max.	
Heater current	6·3				1·4	1·8	A
Anode current ($V_{g1} = 0$)	6·3	100	100	—	164	—	mA
Screen current	6·3	150	150	200	—	19·5	mA
Screen current	6·3	50	150	200	—	40	mA
Anode current rise ($\triangle V_{g1} = +6$ V)	6·3	150	150	—	70	95	mA
Negative grid 1 voltage	6·3	150	150	200	6·5	13	V
Anode current tail ($V_{g1} = -60$ V)	6·3	150	150	—	—	5·0	mA
Inner amplification factor ($\triangle V_{g1} = -6$ V, $V_{g2} = 150$ initially)	6·3	150	—	200	4·5	7·2	
Reverse grid current	6·3	150	150	200	—	2·0	mA
Reverse grid current ($V_{g1} = -60$ V)	6·3	150	150	—	—	4·0	mA
Interelectrode leakage resistance							
V_{g1} to all $= -100$ V	—	—	—	—	60	—	MΩ
V_{g2} to all $= -500$ V	—	—	—	—	100	—	MΩ
V_a to all $= -500$ V	—	—	—	—	100	—	MΩ
Vibration noise output voltage $V_{a(b)} = 200$ V. $R_L = 1·2$ kΩ at 50 c/s and 2 g acceleration	6·3	—	100	100	—	450	mV r.m.s.

STC

Code: S11E12 (CV4060)

CONTINUED



Code: S11E12 (CV4060)

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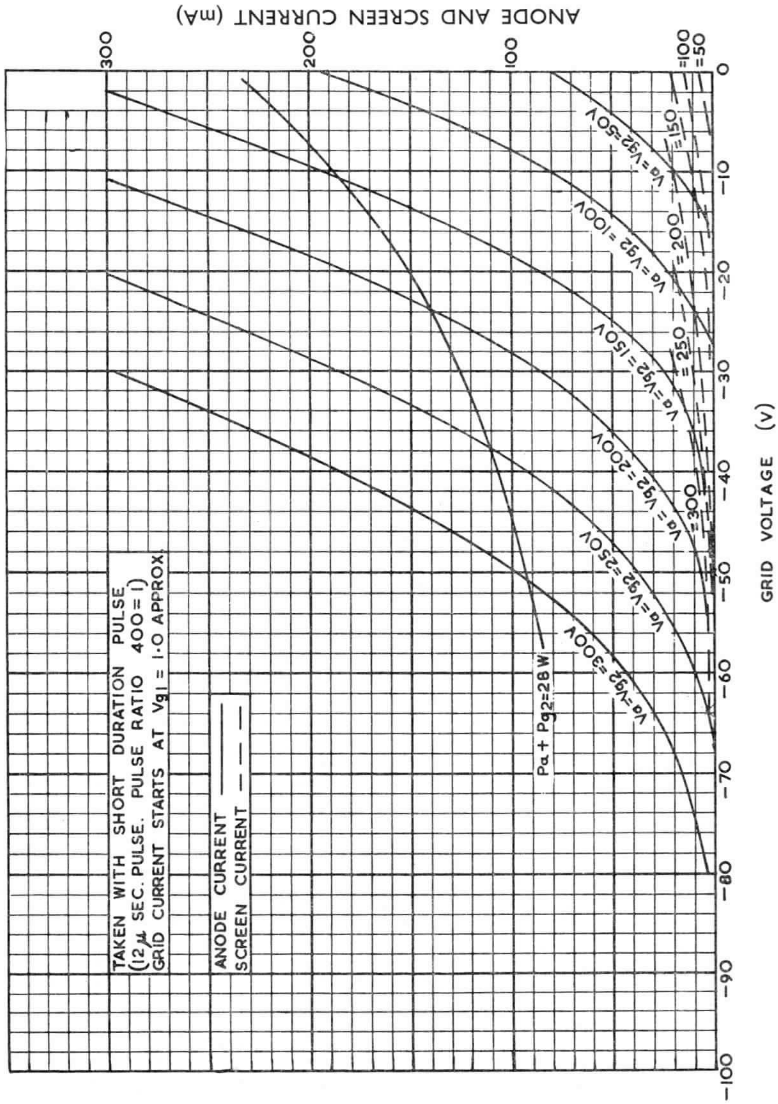

STC

Code: S11E12 (CV4060)

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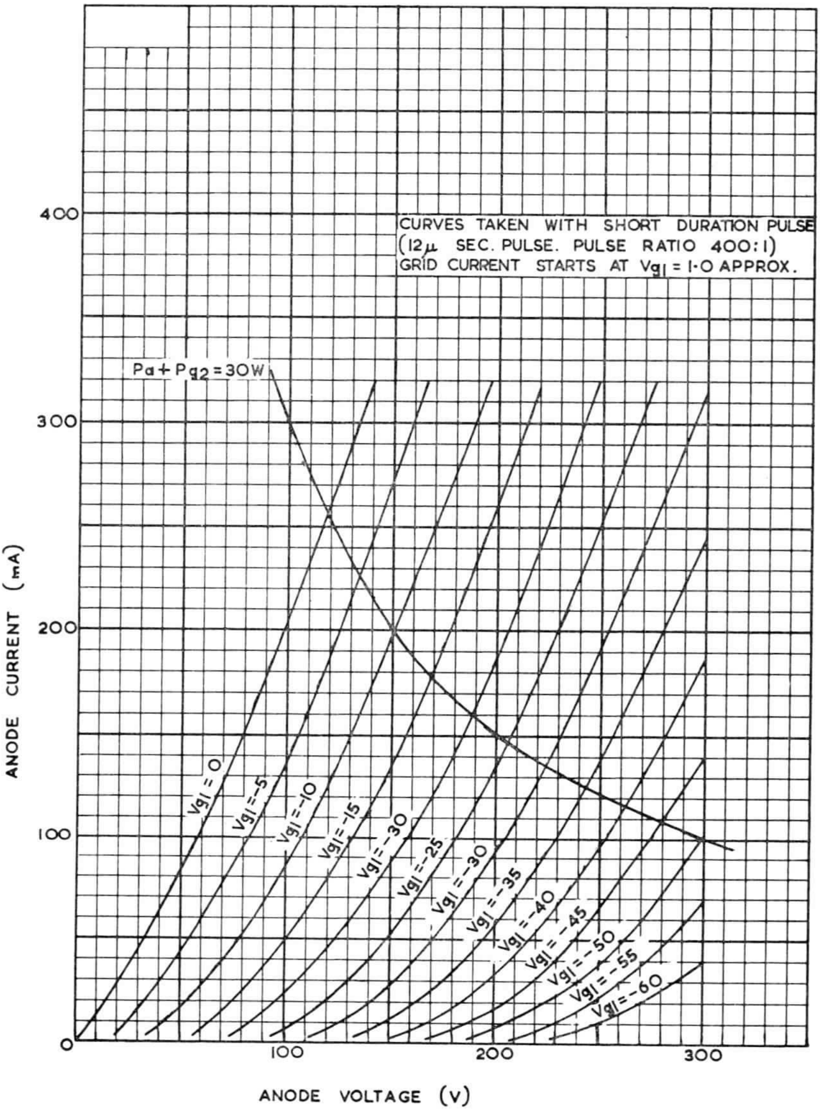
TRIODE CONNECTED



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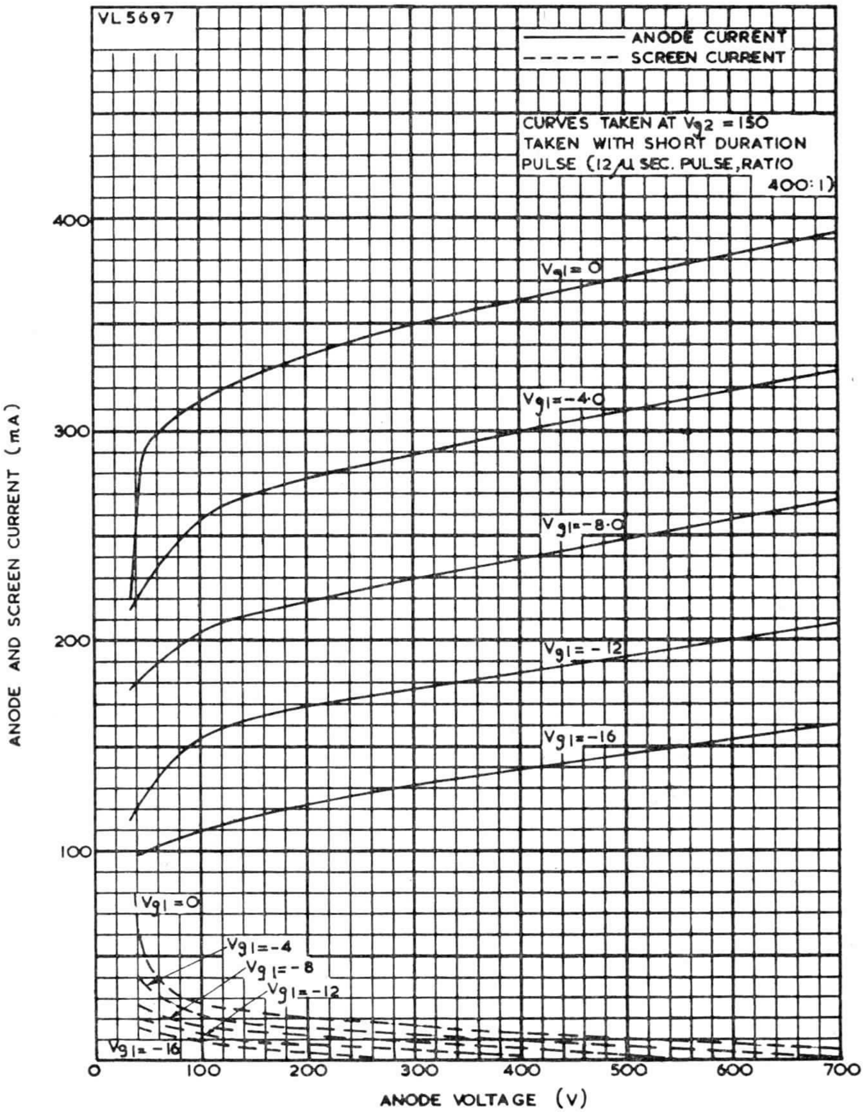
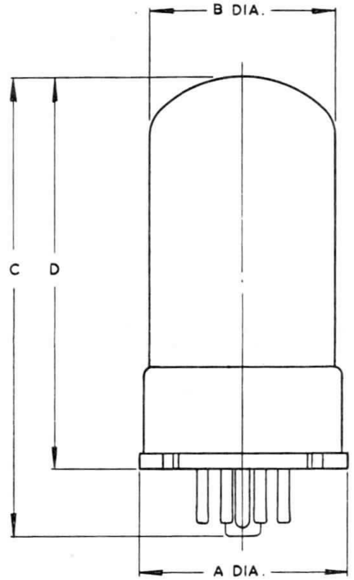


Code: S11E12 (CV4060)

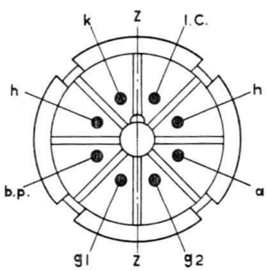
CONTINUED

S11E12 Outline

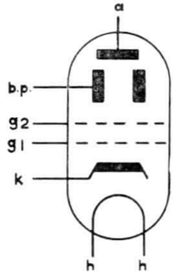


DIM	INCHES	MILLIMETRES
A	$1^{23}/_{32}$ MAX.	43,7 MAX.
B	1·535 ± 0·039	39,0 ± 1,0
C	3·858 MAX.	98,0 MAX.
D	3·268 MAX.	83,0 MAX.

BASIC DIMS. ARE MILLIMETRES



INTERNATIONAL OCTAL BASE
(WITH METAL SLEEVE 8 PIN)



TETRODES

SPECIAL VALVES

Tetrodes

General Information

TETRODES

Pulse Modulators

Reference	Code	Vf V	Screen Grid μ	g_m mA/V	Max. V_a kV	Max. p_a W	Max. Frequency Full Ratings MHz
4B/550E	4B/550E	26	—	—	12	40	—
4B/551B	4B/551B	6·3	—	—	14	40	—
4B/551BD	4B/551BD						
4B/603E	4B/603E	26	—	—	15	60	—

Forced-Air-Cooled

Reference	Code	V_f V	Screen Grid μ	g_m mA/V	Max. V_a kV	Max. p_a W	Max. Frequency Full Ratings MHz
4H/135M	4X150A	6	5	12	1·25	150	500
4H/136M	4X150D	26·5	5	12	1·25	150	500
4H/160M	4X250B	6	5	12	2·0	250	500
4HC/160M	4CX250B	6	5	12	2·0	250	500
4JC/201E	7007	5	10	>17	7·5	12kW	220
4JC/201S	4JC/201S	5	10	>17	7·5	12kW	220
4JC/300J	4JC/300J						
4JC/301J	4JC/301J	8	5·4	100	14	30kW	30
4JC/302J	4JC/302J						

Conduction-Cooled

Reference	Code	V_f V	Screen Grid μ	g_m mA/V	Max. V_a kV	Max. p_a W	Max. Frequency Full Ratings MHz
4KC/160M	4KC/160M	6	5·2	12	2·0	250	500

General Information

CONTINUED

Water-Cooled

Reference	Code	V_f V	Screen Grid μ	g_m mA/V	Max. V_a kV	Max. p_a W	Max. Frequency Full Ratings MHz
4QC/300J	4QC/300J	8	5·4	100	14	40	30

Vapour-Cooled

Reference	Code	V_f V	Screen Grid μ	g_m mA/V	Max. V_a kV	Max. p_a kW	Max. Frequency Full Ratings Mc/s
4ZC/300J	4ZC/300J	8	5·4	100	14	40	30

SPECIAL VALVES

Tetrode Pulse Modulator

Code: 4B/550E

This valve is a special purpose tetrode for pulse use.

CATHODE

Indirectly heated, oxide-coated		
Heater voltage	26	V
Nominal current	1·2	A
Minimum cathode heating time	1	min

CATHODE PRE-HEATING TIME

The pre-heating time is dependent upon the peak anode current to be taken. The table below gives the minimum pre-heating time for different conditions. These figures represent minimum times. Whenever practicable, it is recommended that the pre-heating time be increased to about 15 or 20 minutes.

Peak anode current	*Minimum pre-heating time*
Up to 5 Amperes	1 minute
Up to 10 Amperes	2 minutes

DIRECT INTERELECTRODE CAPACITANCES

Input	30	pF
Output	7·5	pF
Anode to grid	1·6	pF

MECHANICAL DATA

Dimensions	As shown in outline drawing		
Base		B4A	
Top cap*		CT3 with cupped flange	
Net weight	6 oz	170	g

*The design of the valves is such that it is not necessary to provide supplementary cooling of the top cap connection.

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STC

Code: 4B/550E

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

PULSE MODULATOR. RECTANGULAR WAVE

LIMIT RATINGS

Maximum direct anode voltage	12	kV
†Maximum peak anode current	12	A
Maximum direct anode dissipation	40	W
Maximum direct screen voltage	1·25	kV
Maximum peak screen current	6·5	A
Maximum direct screen dissipation	8	W
Maximum negative grid voltage	1·0	kV
Maximum peak positive grid voltage	250	V
Maximum peak grid current	4	A
Maximum direct grid dissipation	1·0	W
Minimum grid bias for cut-off		
(I_a = 0·5mA), V_{g2} = 700V,	−400	V
V_{g2} = 1 250V,	−700	V

†For a peak current of 12 amperes the product of pulse duration in seconds and the pulse repetition frequency in cycles per second should not exceed 0·001.

For peak currents in excess of 5 amperes the product of peak current in amperes and the pulse duration in microseconds should not exceed 20. The valves should not be operated for more than 5 microseconds in any 100 microsecond interval.

For peak currents of less than 5 amperes the duty cycle is determined by the anode dissipation.

TYPICAL OPERATING CONDITIONS
(DUTY CYCLE 0·001)

*Direct anode voltage	10	12	kV
*Direct screen voltage	700	700	V
Direct grid voltage	−500	−500	V
Peak pulse grid voltage	150	200	V
Direct anode current	8·5	10	mA
Peak anode current	8·5	10	A
Direct screen current (approx.)	4·0	4·5	mA
Direct grid current (approx.)	1·5	2·5	mA
Load resistor	1 050	1 050	Ω

*VALVE PROTECTION

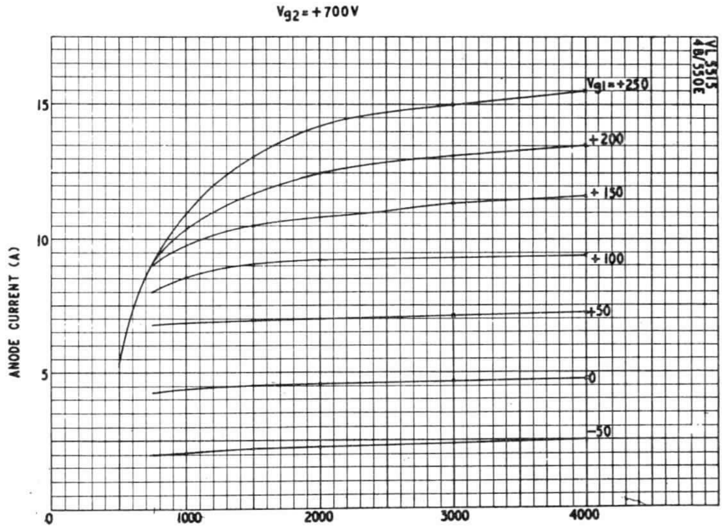
During the course of the operational life of these valves internal discharges are likely to occur occasionally. In the interest of valve protection and long life, certain protective measures designed to limit the power in such discharges are desirable. The recommended precautions are:

1. The inclusion of sufficient d.c. resistance in series with the anode and screen power supplies to limit the short circuit current to about 500mA in either circuit.
2. The location of a ferrite bead or resistance of approximately 10 ohms in series with the screen as close to the pin of the valve as possible.
3. The use of a by-pass capacitor to earth, about 0·5μF is a suitable value, connected to the supply side of the ferrite bead or 10 ohms resistor as mentioned above.

Code: 4B/550E

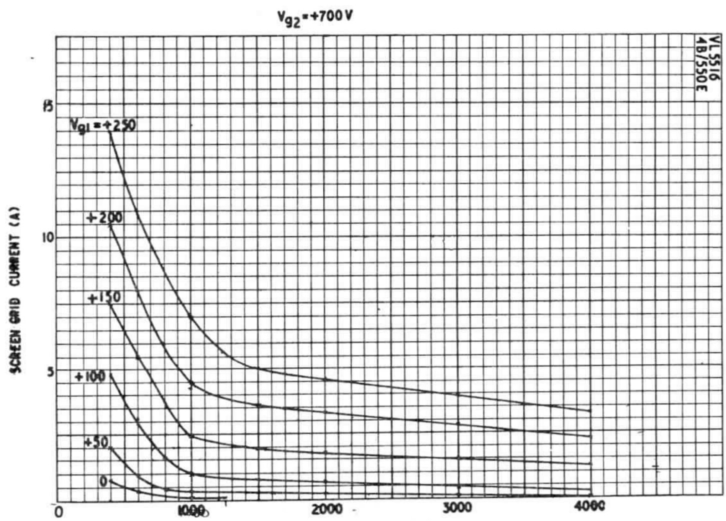
CONTINUED

TYPICAL CHARACTERISTICS



ANODE VOLTAGE (V)

TYPICAL CHARACTERISTICS



ANODE VOLTAGE (V)

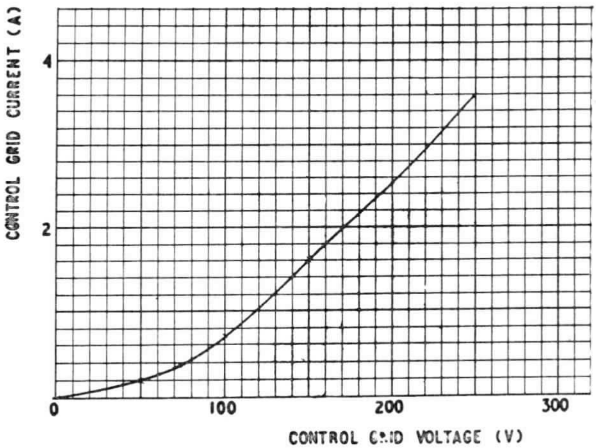
STC

Code: 4B/550E

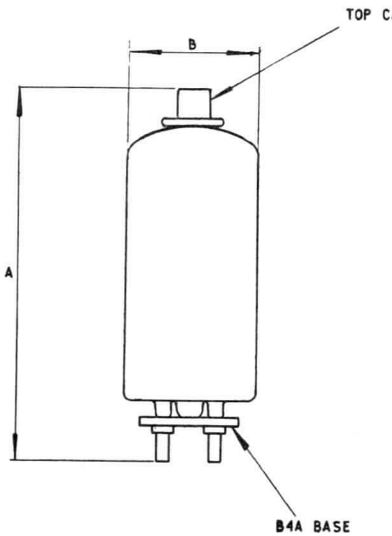
CONTINUED

TYPICAL CHARACTERISTICS

$V_a = +1\,250V \qquad V_{g2} = +700V$



OUTLINE 4B/550E



BASING

1 HEATER
2 GRID 2
3 GRID 1
4 HEATER & CATHODE
TC ANODE.

NOTE:-BASIC FIGURES ARE INCHES

DIM	MILLIMETRES	INCHES
A	142·9 MIN. 149·2 MAX.	5 5/8 MIN. 5 7/8 MAX.
B	60·3 MAX.	2 3/8 MAX.

STC VALVES

PROVISIONAL DATA

Tetrode Pulse Modulators

Codes: 4B/551B
4B/551BD

These high vacuum-type beam tetrodes are designed for use in pulse applications. They have a maximum direct anode dissipation of 40W and peak anode ratings of 14kV and 12A.

The valves have identical electrical and mechanical characteristics except that their top cap sizes are different.

CATHODE

Indirectly heated, oxide coated		
Heater voltage	6·3	V
Heater current	5	A
Cathode heating time, minimum (Note 1)	60	s

Note 1. The pre-heating time is dependent upon the peak anode current to be taken. The pre-heat time for a peak anode current of 12A is 120 seconds and proportionally less for lower values of anode current, but it should never be less than 60 seconds. It is recommended that whenever practicable the pre-heating time be increased to between 15 and 20 minutes.

DIRECT INTERELECTRODE CAPACITANCES

Input	30	pF
Output	7·5	pF
Grid to anode	2	pF

MECHANICAL DATA

Dimensions	As shown in outline drawings			
Base	B5F			
Top cap (Note 2)	$\frac{3}{8}$ in. diameter (4B/551B) CT3 with flange (4B/551BD)			
Net weight, approx.		5·9 oz.	162	g

Note 2. The design of the valve is such that it is not necessary to provide supplementary cooling of the top cap connection.

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Codes: 4B/551B
4B/551BD

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Pulse Modulator. Rectangular Wave.

Limit Ratings

Maximum direct anode voltage	14	kV
Maximum peak anode current (Note 3)	12	A
Maximum direct anode dissipation	40	W
Maximum direct screen voltage	1·2	kV
Maximum direct screen dissipation	4	W
Maximum negative grid voltage	−800	V
Maximum direct grid dissipation	2	W
Minimum grid bias for cut-off (I_a = 0·1mA)		
At V_{g2} = 1 000V	−380	V
At V_{g2} = 700V	−280	V

Note 3. For a peak current of 12A the product of pulse duration in seconds and the pulse repetition frequency in cycles per second should not exceed 0·001. For peak current in excess of 5A the valve should not be operated for more than 5 microseconds in any 100 microseconds interval.

The product of peak current in amperes and the pulse duration in microseconds should not exceed 25.

Typical Operating Conditions (Duty Cycle 0·001)

Direct anode voltage	10	14	kV
Direct screen voltage	700	1 000	V
Direct grid voltage	−300	−400	V
Peak pulse grid voltage	+150	+225	V
Direct mean anode current	8·5	12	mA
Peak anode current	8·5	12	A
Direct screen current, approx.	1	2	mA
Direct grid current, approx.	0·4	0·5	mA
Load resistor	1 050	1 050	Ω
Pulse output power	76	150	kW

OPERATING NOTE

During the operational life of these valves occasional discharges are likely to occur. It is desirable to limit the power of these discharges and so protect the valves and ensure long life. The following protective measures are recommended:

(a) the inclusion of sufficient d.c. resistance in series with the anode and screen power supplies to limit the short-circuit current to 500mA or less.

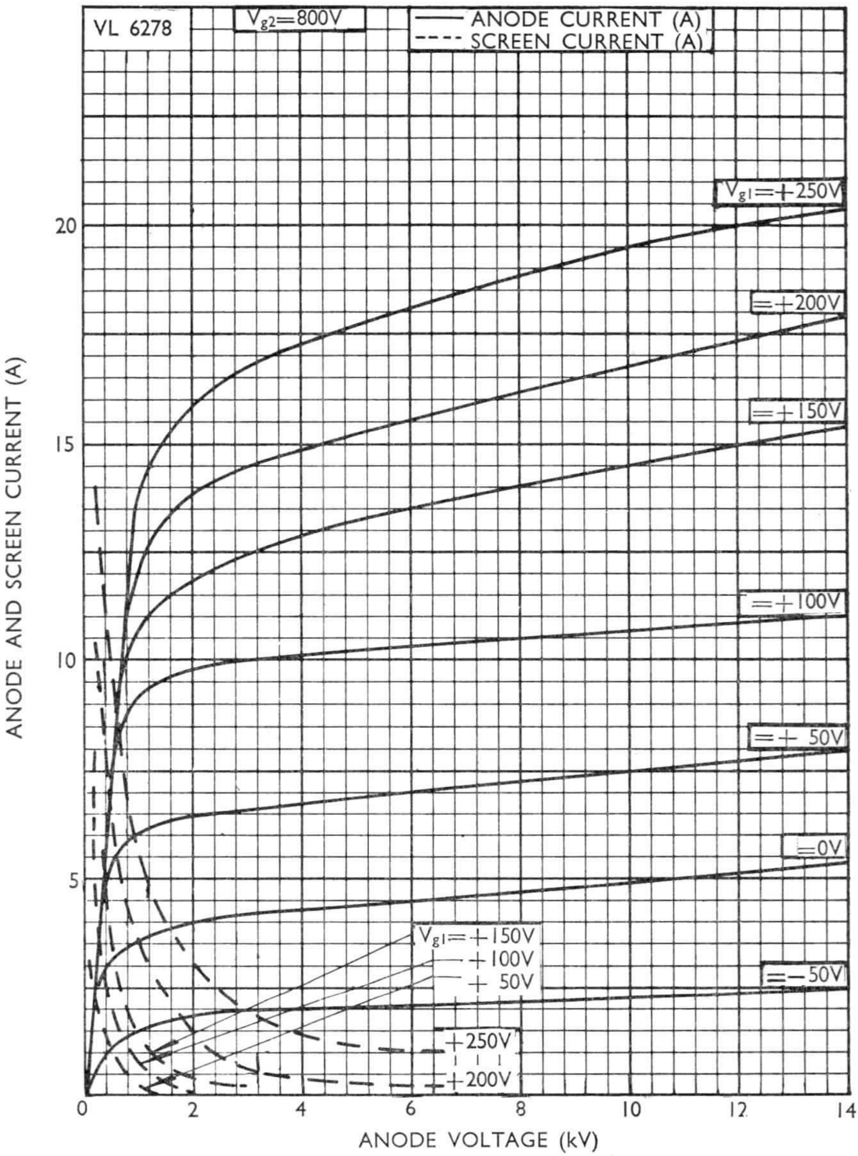
(b) the use of a ferrite bead on the screen lead adjacent to the valve pin, or alternatively a 10 Ω series resistor connected as close as possible to the valve pin.

(c) the use of a by-pass capacitor of about 0·5μF connected between the screen grid pin and earth.

Codes: 4B/551B
4B/551BD

CONTINUED

Fig. 1. Typical Anode and Screen Current versus Anode Voltage (V_{g2} = 800V)

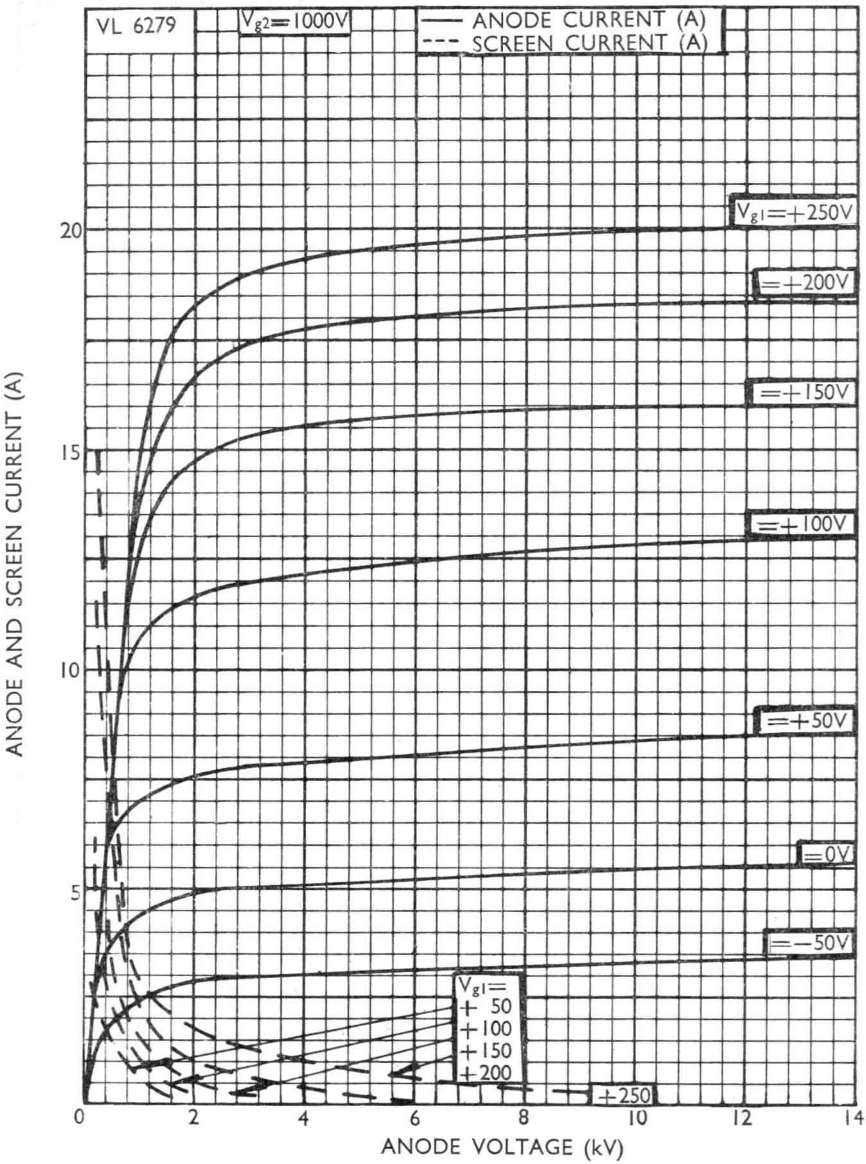


STC

Codes: 4B/551B
4B/551BD

CONTINUED

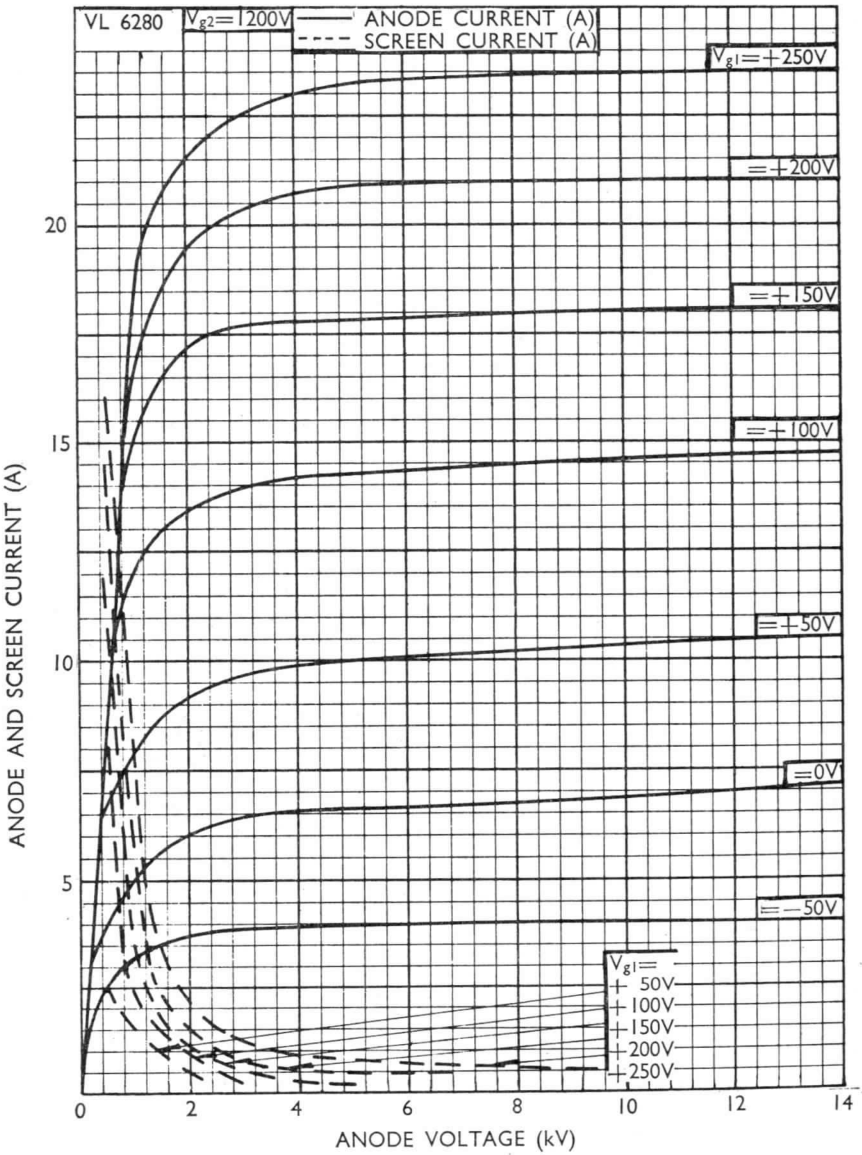
Fig. 2. Typical Anode and Screen Current versus Anode Voltage (V_{g2} = 1 000V)



Codes: 4B/551B
4B/551BD

CONTINUED

Fig. 3. Typical Anode and Screen Current versus Anode Voltage (V_{g2} = 1 200V)



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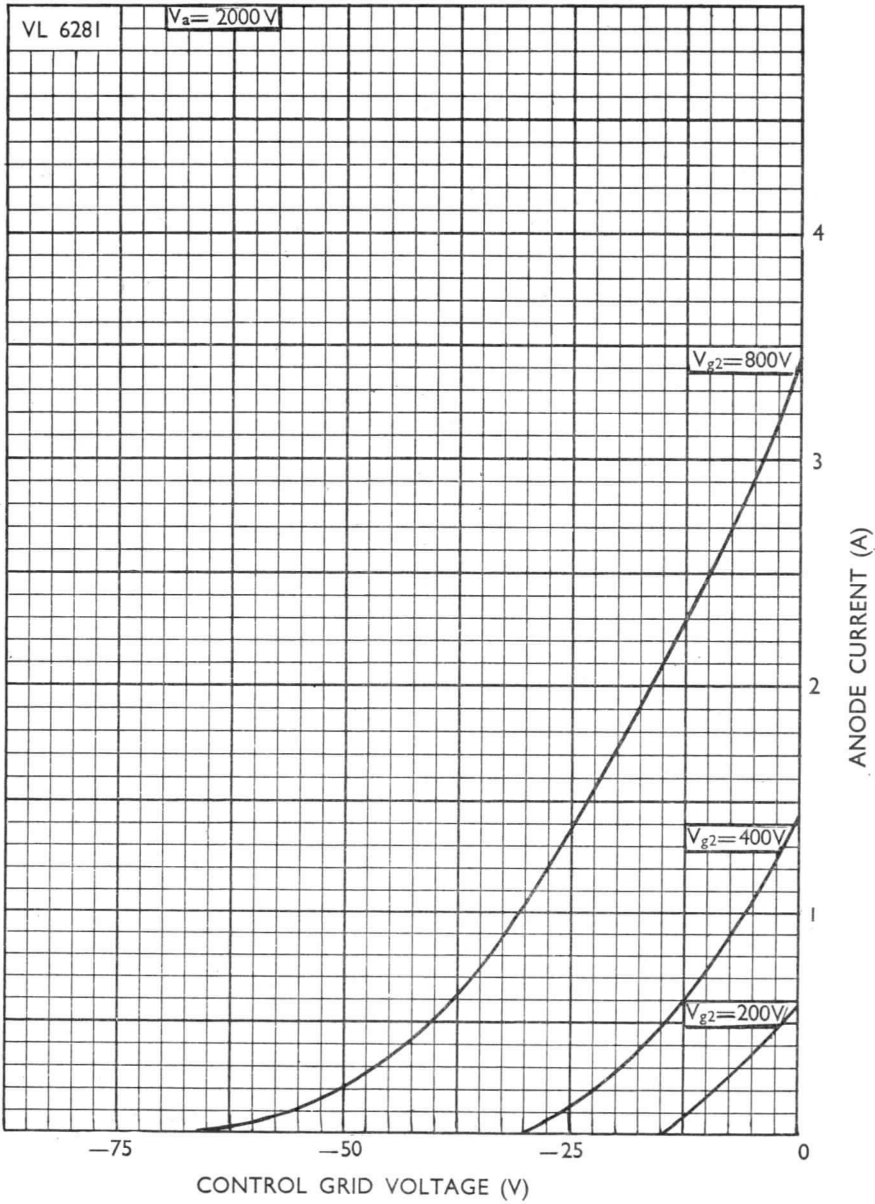
Codes: 4B/551B
4B/551BD

CONTINUED

Fig. 4. Typical Anode Current versus Control Grid Voltage ($V_a = 2\,000V$)



Codes: 4B/551B
4B/551BD

CONTINUED

Fig. 5. Typical Cut-off Characteristics ($I_a = 0{\cdot}1mA$)

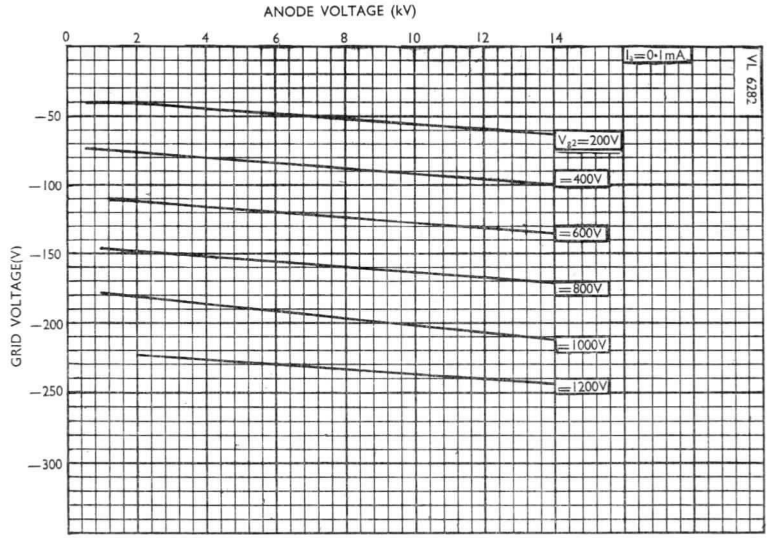
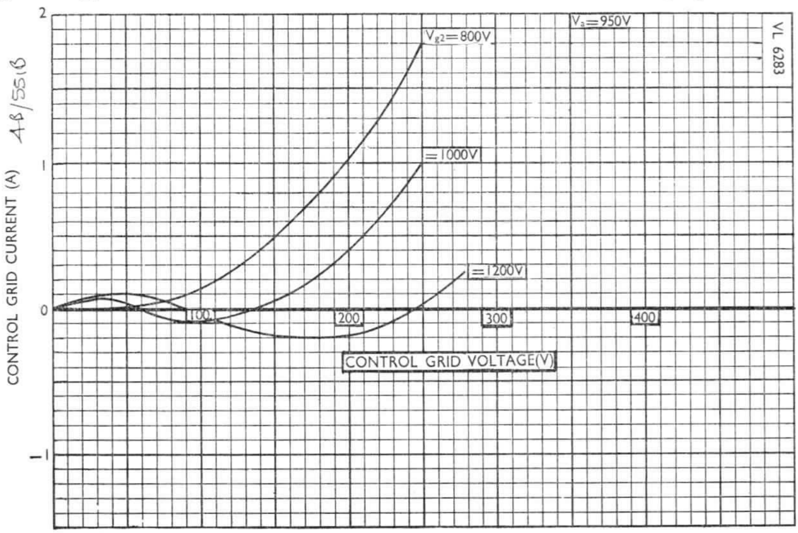


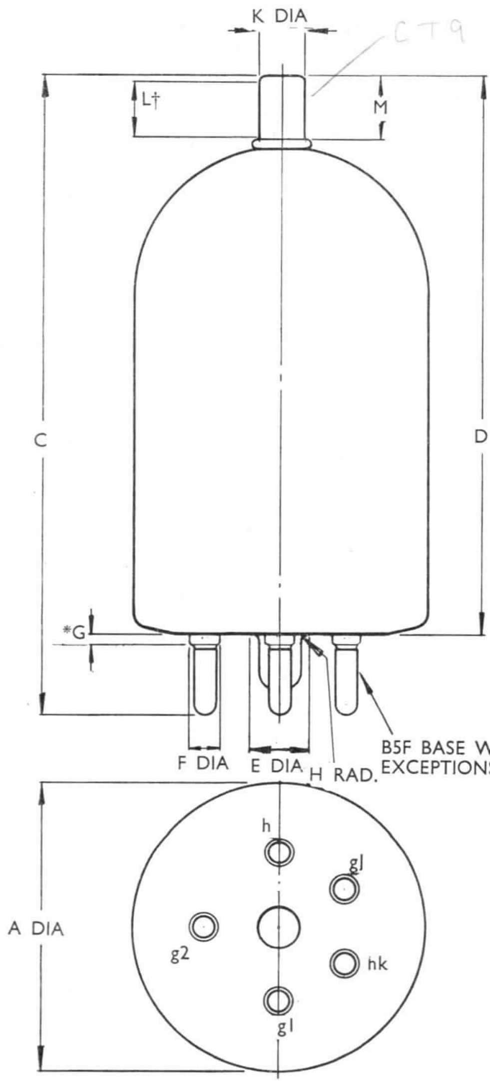
Fig. 6. Typical Control Grid Current versus Control Grid Voltage ($V_a = 950V$)



Code: 4B/551B

CONTINUED

Fig. 7. 4B/551B Outline

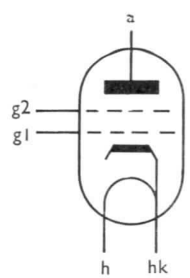


DIM	INCHES	MILLIMETRES
A	2·440 MAX.	61,98 MAX.
C	5 7/16 MAX.	138,1 MAX.
D	4 11/16 MAX.	119,1 MAX.
E	1/2 MAX.	12,7 MAX.
F	0·234 MAX.	5,94 MAX.
G	0·098 MAX.	2,49 MAX.
H	0·090 MAX.	2,29 MAX.
K	0·375 +0·001 −0·002	9,53 +0,03 −0,05
L	0·500 MIN.	12,7 MIN.
M	11/16 MAX.	17,5 MAX.

BASIC DIMS. ARE INCHES

†DENOTES:—CONTACT LENGTH

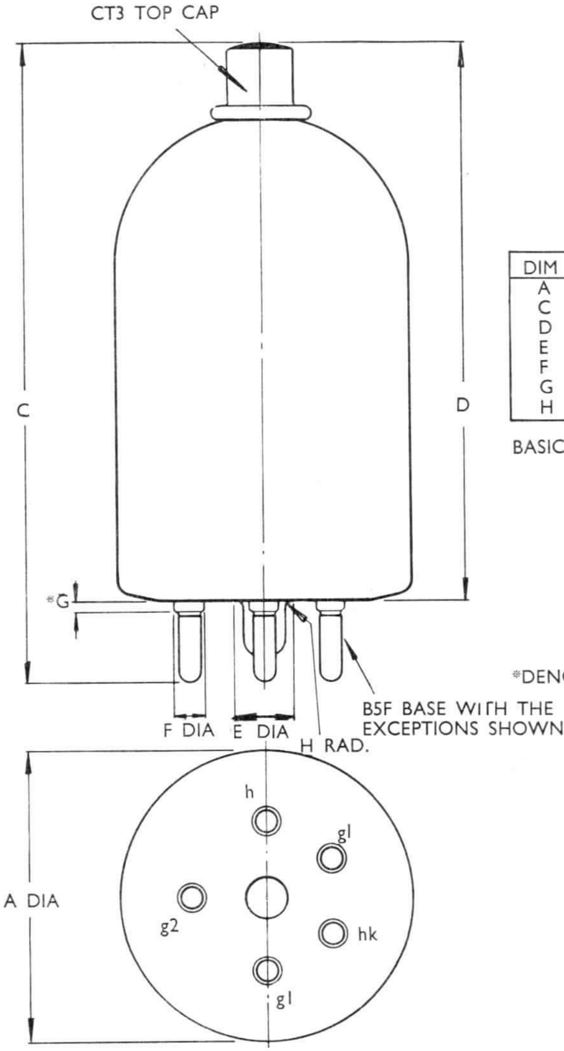
*DENOTES:—GLASS CREEP ON PINS



Code: 4B/551BD

CONTINUED

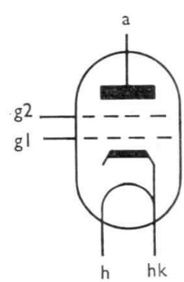
Fig. 8. 4B/551BD Outline



DIM	INCHES	MILLIMETRES
A	2·440 MAX.	61,98 MAX.
C	5 3/8 MAX.	136,5 MAX.
D	4 5/8 MAX.	117,5 MAX.
E	1/2 MAX.	12,7 MAX.
F	0·234 MAX.	5,94 MAX.
G	0·098 MAX.	2,49 MAX.
H	0·090 MAX.	2,29 MAX.

BASIC DIMS. ARE INCHES

*DENOTES:—GLASS CREEP ON PINS



SPECIAL VALVES

Tetrode Pulse Modulator

Code: 4B/603E

This valve is a mechanically reliable special purpose tetrode for pulse use. It replaces type P535/1E (CV398).

CATHODE

Indirectly heated, oxide coated		
Heater voltage	26	V
Heater current, nominal	2	A
Cathode pre-heating time, minimum (Note 1)	60	s

Note 1. The pre-heating time is dependent upon the peak anode current to be taken. The table below gives the minimum pre-heating time for various conditions. Whenever practicable, it is recommended that the pre-heating time be increased to between 15 and 20 minutes.

Peak Anode Current	Minimum Pre-heating Time
Up to 5A	1 minute
Up to 10A	2 minutes
Up to 15A	3 minutes

DIRECT INTERELECTRODE CAPACITANCES

Input	37·5	pF
Output	7·5	pF
Anode to grid	2	pF

MECHANICAL DATA

Dimensions	As shown in outline drawing			
Base	B4A			
Top cap (Note 2)	CT3 with flange			
Net weight		7 oz	195	g

Note 2. The design of the valves is such that it is not necessary to provide supplementary cooling of the top cap.

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Code: 4B/603E

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Pulse Modulator. Rectangular wave.

Maximum Ratings:

Maximum direct anode voltage	15	kV
Maximum peak anode current (Note 3)	15	A
Maximum direct anode dissipation	60	W
Maximum direct screen voltage	1·25	kV
Maximum peak screen current	5	A
Maximum direct screen dissipation	8	W
Maximum negative grid voltage	1	kV
Maximum peak positive grid voltage	300	V
Maximum peak grid current	2	A
Maximum direct grid dissipation	1	W

Note 3. For a peak current of 15A the product of pulse duration in seconds and the pulse repetition frequency in cycles per second should not exceed 0·001.

For peak currents in excess of 5A the product of peak current in amperes and the pulse duration in microseconds should not exceed 30. The valves should not be operated for more than 5 microseconds in any 100 microsecond interval

For peak currents of less than 5A the duty cycle is determined by the anode dissipation.

Code: 4B/603E

CONTINUED

TYPICAL OPERATING CONDITIONS (Duty cycle 0·001)

Direct anode voltage (Note 4)	15	kV
Direct screen voltage (Note 4)	1·25	kV
Direct grid voltage	−800	V
Peak pulse grid voltage	1 025	V
Direct anode current	15	mA
Peak anode current	15	A
Direct screen current (approx.)	1·5	mA
Direct grid current (approx.)	10	mA
Load resistor	800	Ω

Note 4. Valve Protection

During the course of the operational life of this valve internal discharges are likely to occur occasionally. In the interest of valve protection and long life, certain protective measures designed to limit the power in such discharges are desirable. The recommended precautions are:

1. The inclusion of sufficient d.c. resistance in series with the anode and screen power supplies to limit the short circuit current to about 500mA in either circuit.
2. The location of a resistance of approximately 100 Ω in series with the screen as close to the pin of the valve as possible.
3. The use of a by-pass capacitor to earth, about 0·05μF is a suitable value connected to the supply side of the 100 Ω resistor as mentioned above.

Code: 4B/603E

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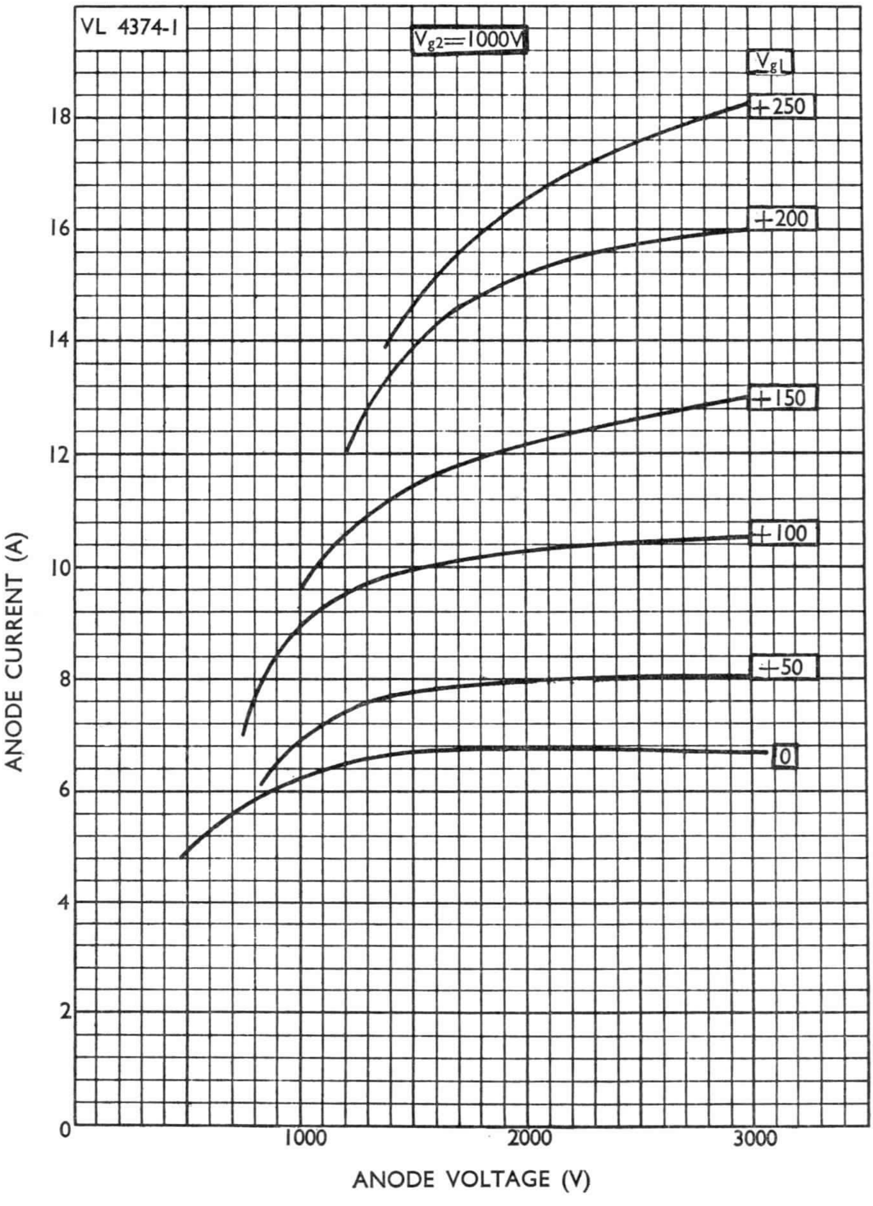

Code: 4B/603E

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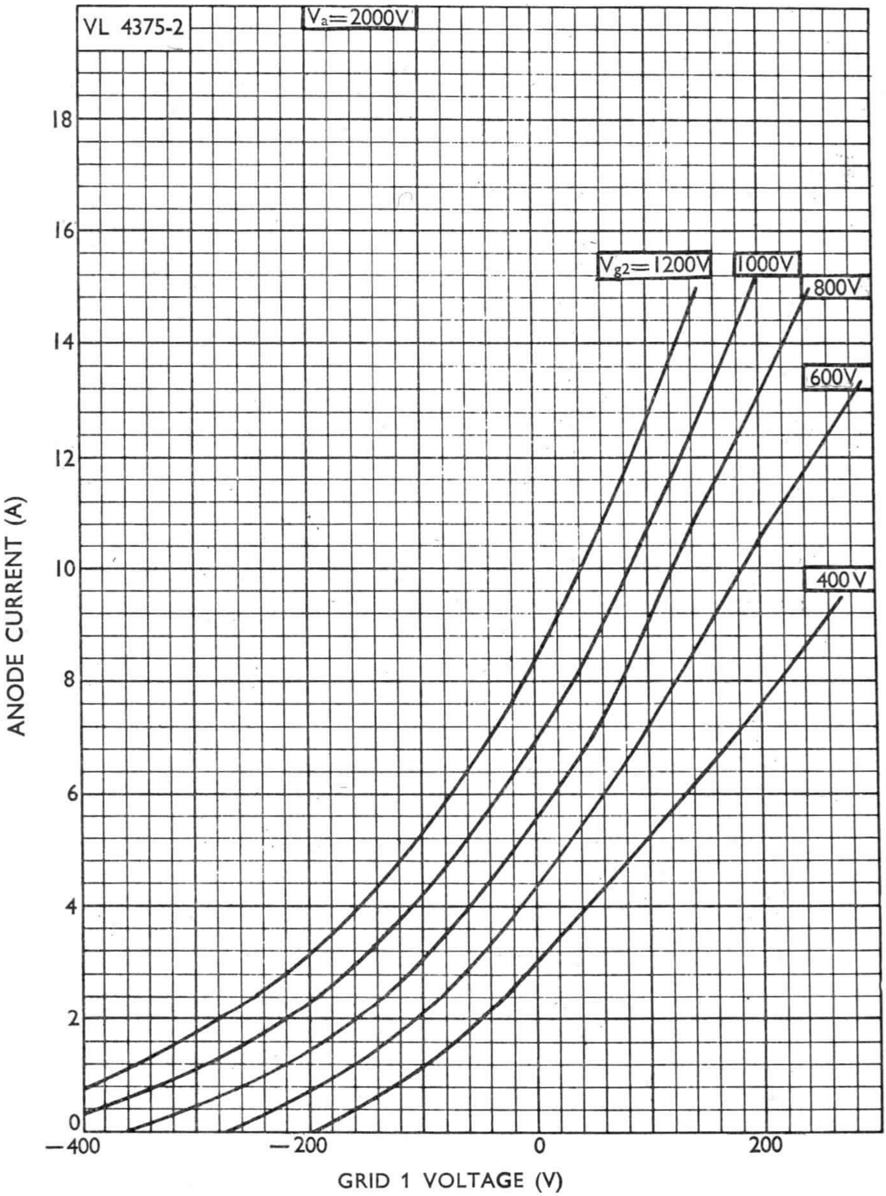

Code: 4B/603E

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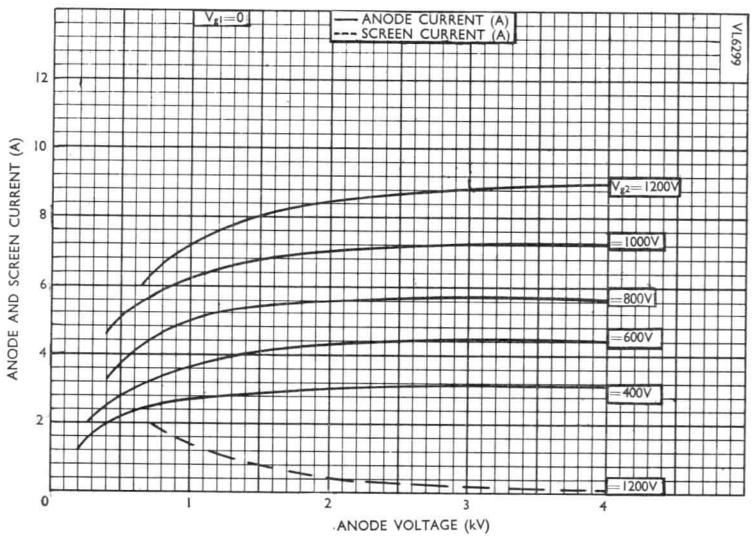

Code: 4B/603E

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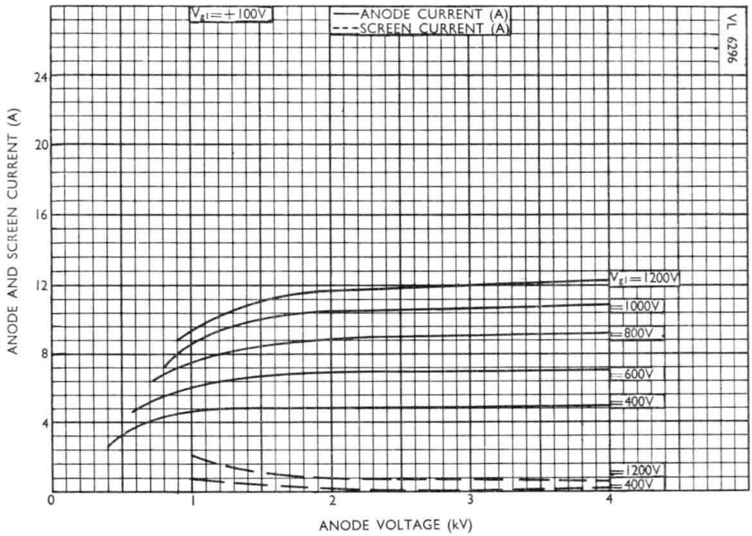

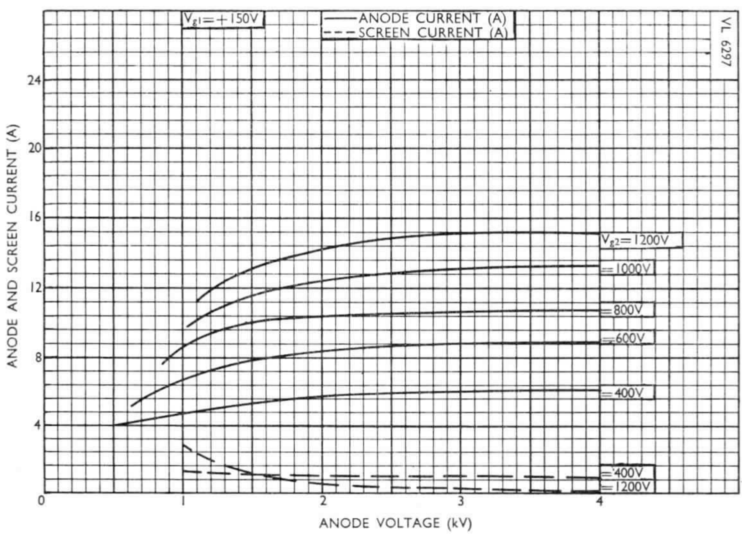

Code: 4B/603E

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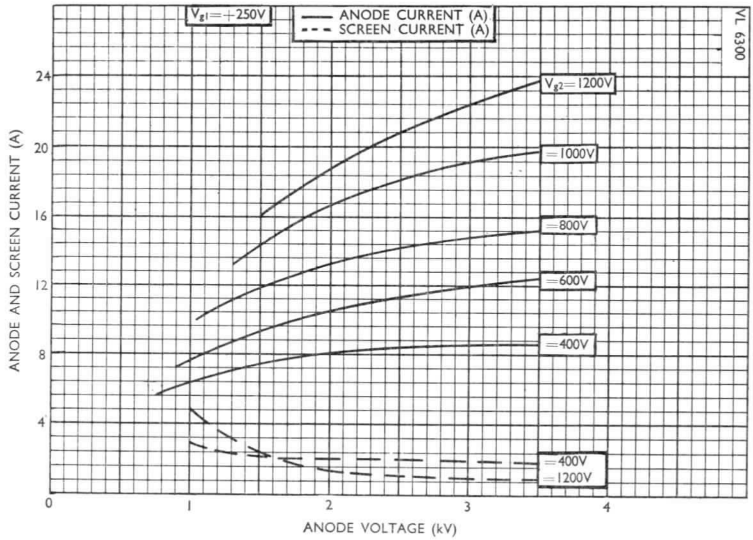

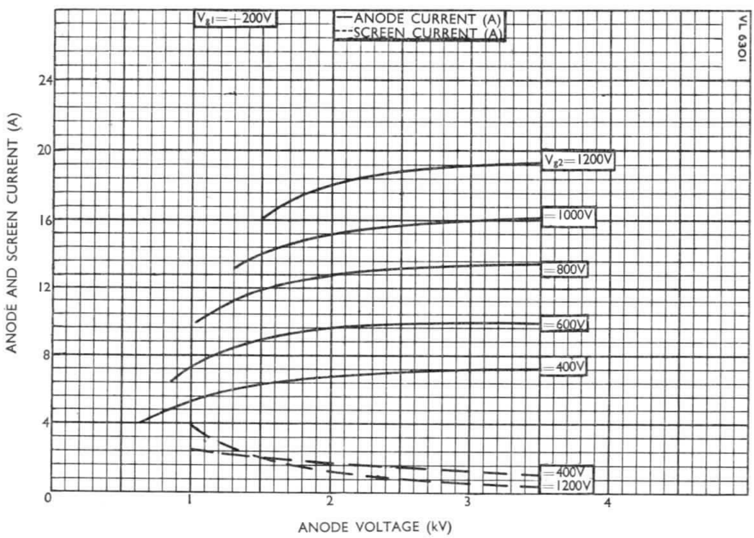

Code: 4B/603E

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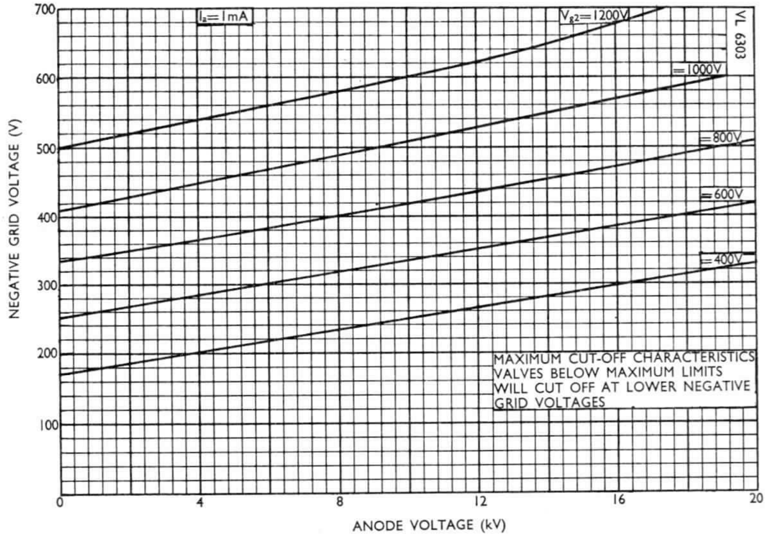
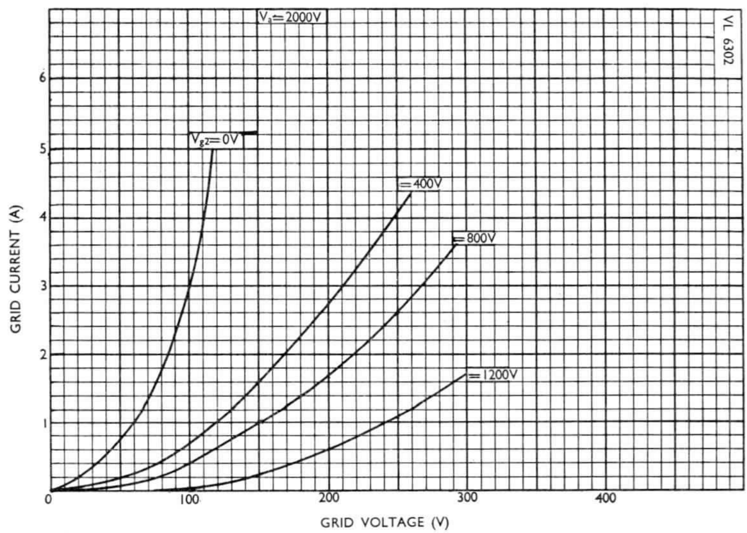


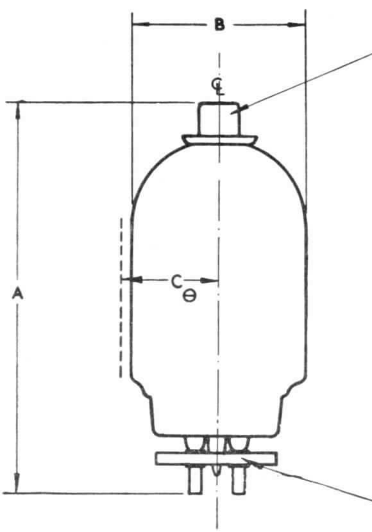


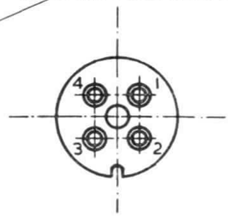
STC

Code: 4B/603E

CONTINUED

4B/603E Outline





BASING

1. HEATER
2. GRID No. 2.
3. GRID No. 1.
4. HEATER & CATHODE

T.C. ANODE.

DIM.	MILLIMETRES	INCHES
A	142,88 MIN. 149,23 MAX.	5.625 MIN. 5.875 MAX.
B	65,09 MAX.	2.563 MAX.
⊡ C	35,71 MAX.	1.406 MAX.

⊡ DENOTES: ECCENTRICITY WITH RESPECT TO C/L OF BASE

NOTE: BASIC FIGURES ARE INCHES

SPECIAL VALVES

Forced-Air-Cooled U.H.F. Power Tetrodes

Codes: 4X150A (CV2519) 4X150D (CV3991)

These tetrodes are for use as power amplifiers or oscillators at frequencies up to 500MHz. The design of their electrode terminals enables the valves to be operated in coaxial circuits.

Except for their heater ratings, the two valves have identical electrical and physical characteristics and are directly equivalent to the American 4X150A and 4X150D types.

CATHODE

	4X150A	4X150D	
Indirectly heated, oxide coated			
Heater voltage (Note 1)	6	26·5	V
Heater current (Note 1)	2·6	0·57	A
Minimum cathode heating time	30	30	s

NOTE 1.—See APPLICATION NOTES section.

CHARACTERISTICS

		4X150A	4X150D	
Mutual conductance	at $V_a = 500V$, $V_{g2} = 250V$, $I_a = 250mA$	12	12	mA/V
Screen grid μ		5	5	

DIRECT INTERELECTRODE CAPACITANCES

	4X150A	4X150D	
Input	16·5	16·5	pF
Output	4·5	4·5	pF
Anode to grid	0·06	0·06	pF

MECHANICAL DATA

Dimensions	As shown in Figure 6	
Base	B8F (Note 2)	
Mounting position	Unrestricted	
Net weight	5·6 oz 160	g

NOTE 2.—In order to achieve the required degree of cooling of the base seals it is recommended that a socket of the air-flow type be used. Suitable sockets which include also a "built-in" screen grid decoupling capacitor are:

Socket Code	*Manufacturer*	*Capacitor*
VH88/802	Ediswan	3 000 to 3 600 pF
4X150A/4000	Eimac	2 500 to 3 000 pF

COOLING REQUIREMENTS

Forced-air-cooling of the anode core and seal and of the base seals is required. Cooling characteristics are given in Figure 5.

Typically, for an anode dissipation of 250 watts:

Volume of air, at 20°C, required	5·6ft³/min	0,15	m³/min
At a water gauge pressure of	0·6 inch	15,2	mm
Maximum permissible temperature of anode seal and core		200	°C
Maximum permissible temperature of base seals		150	°C

May 1967

Standard Telephones and Cables Limited

Valve Division, Brixham Road, Paignton, Devon

Telephone: Paignton 50762 Telex: 4230

London Sales Office, Telephone: Footscray 3333 Telex: 21836

COMPONENTS GROUP

STC

Codes: 4X150A (CV2519) 4X150D (CV3991)

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS AB_1. LINEAR R.F. POWER AMPLIFIER

Maximum Ratings	Up to 150 MHz	Up to 500 MHz	
Maximum direct anode voltage	2 000	1 250	V
Maximum direct screen grid voltage	400	400	V
Maximum direct anode current, maximum signal	250	250	mA
Maximum anode dissipation	250	250	W
Maximum screen grid dissipation	12	12	W
Maximum control grid dissipation	2	2	W

Typical Operating Conditions

Direct anode voltage	1 000	1 500	2 000	V
Direct screen grid voltage	350	350	350	V
Direct control grid voltage, approx. (Note 3)	−50	−50	−50	V
Direct anode current (zero signal)	100	100	100	mA
Direct anode current (maximum single-tone signal)	250	250	250	mA
Direct screen current (maximum single-tone signal)	25	20	15	mA
Power output (maximum single-tone signal)	125	225	325	W
Direct anode current (maximum two-tone signal)	175	175	175	mA
Direct screen current (maximum two-tone signal)	15	12	9	mA
Peak envelope power (maximum two-tone signal)	125	225	325	W
Peak r.f. grid voltage (Note 4)	50	50	50	V
3rd order intermodulation distortion products (Note 5)	−31	−31	−30	dB
5th order intermodulation distortion products	−45	−50	−50	dB

NOTE 3.—Adjust grid voltage to obtain specified zero-signal anode current.

NOTE 4.—The peak r.f. control grid voltage is the same under both single-tone and two-tone maximum conditions; the level of the single tone being reduced by 6 dB when the second tone is added. The second tone is then set to the same level as the first.

NOTE 5.—Intermodulation distortion products are measured with respect to either tone.

Codes: 4X150A (CV2519) 4X150D (CV3991)

CONTINUED

CLASS AB_1. A.F. AMPLIFIER OR MODULATOR (For balanced 2-valve operation)

Maximum Ratings (per valve)

Maximum direct anode voltage	2 000	V
Maximum direct anode current	250	mA
Maximum direct anode dissipation	250	W
Maximum direct screen grid voltage	400	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid dissipation	2	W

Typical Operating Conditions

Direct anode voltage	800	1 000	1 500	2 000	V
Direct screen grid voltage	300	300	300	300	V
Direct control grid voltage, approx. (Note 6)	−40	−43	−50	−50	V
Total direct anode current, zero signal	210	165	100	100	mA
Total direct anode current, maximum signal	435	450	456	470	mA
Total direct screen grid current, zero signal	0	0	0	0	mA
Peak a.f. signal (grid to grid) voltage	80	86	100	100	V
Total direct screen grid current, maximum signal	76	52	42	36	mA
Effective load resistance, anode to anode	3 400	4 250	6 570	8 760	Ω
Power output (approx.), maximum signal	170	230	400	580	W

NOTE 6.—Adjust grid voltage to obtain specified zero signal anode current.

CLASS AB_2. A.F. AMPLIFIER OR MODULATOR (For balanced 2-valve operation)

Maximum Ratings

Maximum direct anode voltage	2 000	V
Maximum direct anode current	250	mA
Maximum direct anode dissipation	250	W
Maximum direct screen grid voltage	400	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid dissipation	2	W

Typical Operating Conditions

Direct anode voltage	800	1 000	1 500	2 000	V
Direct screen grid voltage	300	300	300	300	V
Direct control grid voltage	−40	−45	−50	−50	V
Peak a.f. signal (grid-to-grid) voltage	90	98	106	106	V
Direct anode current, zero signal	210	166	100	100	mA
Direct anode current, maximum signal	500	500	500	500	mA
Direct screen grid current, zero signal	0	0	0	0	mA
Direct screen grid current, maximum signal	80	58	46	36	mA
Effective load resistance, anode to anode	3 140	3 950	5 970	8 100	Ω
Driving power (approx.), maximum signal	0·15	0·15	0·2	0·2	W
Power output (approx.), maximum signal	215	270	440	630	W

STC

Codes: 4X150A (CV2519) 4X150D (CV3991)

CONTINUED

CLASS C. R.F. POWER AMPLIFIER. Anode subject to modulation
(Carrier conditions for use with 100 per cent modulation)

Maximum Ratings	Up to 150 MHz	Up to 500 MHz	
Maximum direct anode voltage	1 600	1 000	V
Maximum direct anode current	200	200	mA
Maximum direct anode dissipation	165	165	W
Maximum direct screen grid voltage	300	300	V
Maximum direct screen grid dissipation	12	12	W
Maximum direct control grid voltage	−250	−250	V
Maximum direct control grid dissipation	2	2	W

Typical Operating Conditions up to 150 MHz

Direct anode voltage	1 200	1 600	V
Direct screen grid voltage (modulated approx. 55%)	275	275	V
Direct control grid voltage	−118	−118	V
Direct anode current	200	200	mA
Direct screen grid current	23	23	mA
Direct control grid current, approx.	5	5	mA
Peak r.f. control grid voltage	136	136	V
Control grid drive power, approx.	2	3	W
Useful power output, approx.	160	230	W

Typical Operating Conditions at 165 MHz

Direct anode voltage	400	600	800	1 000	V
Direct screen grid voltage (modulated approx. 55%)	250	250	250	250	V
Direct control grid voltage	−90	−95	−100	−105	V
Direct anode current	200	200	200	200	mA
Direct screen grid current	40	35	25	20	mA
Direct control grid current, approx.	7	8	10	15	mA
Peak r.f. control grid voltage	110	120	120	125	V
Control grid drive power, approx.	1	1	1·5	2	W
Useful power output, approx.	55	80	100	140	W

Codes: 4X150A (CV2519)
4X150D (CV3991)

CONTINUED

CLASS C. R.F. POWER AMPLIFIER OR OSCILLATOR. Unmodulated

Maximum Ratings

	Up to 150 MHz	Up to 500 MHz	
Maximum direct anode voltage	2 000	1 250	V
Maximum direct anode current	250	250	mA
Maximum direct anode dissipation	250	250	W
Maximum direct screen grid voltage	300	300	V
Maximum direct screen grid dissipation	12	12	W
Maximum direct control grid voltage	−250	−250	V
Maximum direct control grid dissipation	2	2	W

Typical Operating Conditions up to 150 MHz

Direct anode voltage	1 500	2 000	V
Direct screen grid voltage	250	250	V
Direct control grid voltage	−88	−88	V
Direct anode current	250	250	mA
Direct screen grid current	24	24	mA
Direct control grid current, approx.	8	8	mA
Peak r.f. control grid voltage	110	110	V
Control grid drive power, approx.	1·5	2·5	W
Useful power output, approx.	260	370	W

Typical Operating Conditions at 165 MHz

Direct anode voltage	600	750	1 000	1 250	V
Direct screen grid voltage	250	250	250	250	V
Direct control grid voltage	−75	−80	−80	−90	V
Direct anode current	200	200	200	200	mA
Direct screen grid current	37	37	31	20	mA
Direct control grid current, approx.	11	11	11	11	mA
Peak r.f. control grid voltage	91	96	96	106	V
Control grid drive power, approx.	1	1	1	1·2	W
Useful power output, approx.	85	110	150	195	W

STC

Codes: 4X150A (CV2519) 4X150D (CV3991)

CONTINUED

CLASS C. R.F. POWER AMPLIFIER OR OSCILLATOR. Unmodulated (continued)

Typical Operating Conditions at 500 MHz (with coaxial cavity)

Direct anode voltage	600	800	1 000	1 250	V
Direct screen grid voltage	250	250	250	280	V
Direct control grid voltage	−110	−110	−110	−115	V
Direct anode current	170	200	200	200	mA
Direct screen grid current	6	7	7	5	mA
Direct control grid current, approx. (Note 9)	6	10	10	10	mA
Control grid drive power, approx.	15	20	25	30	W
Useful power output, approx.	50	95	120	140	W

NOTE 9.—Subject to wide variation dependent upon the impedance of the load circuit.

APPLICATION NOTES

At frequencies up to 300 MHz the 4X150A and 4X150D heaters should be operated at their rated voltages.

At frequencies above 300 MHz, back-heating of the cathode occurs and must be compensated for by a reduction in heater voltage to obtain increased life.

The figures given below apply to straight-through amplifier operation. In no case should the 4X150A heater be operated at less than 5·4 volts.

Frequency (MHz)	Heater Voltage (V)	
	4X150A	4X150D
Up to 300	6	26·5
301 to 400	5·75	25·5
401 to 500	5·5	24·5

Full applications information is contained in booklet MS/123 which is available on request to the address given at the foot of page 1.

Codes: 4X150A (CV2519)
4X150D (CV3991)

CONTINUED

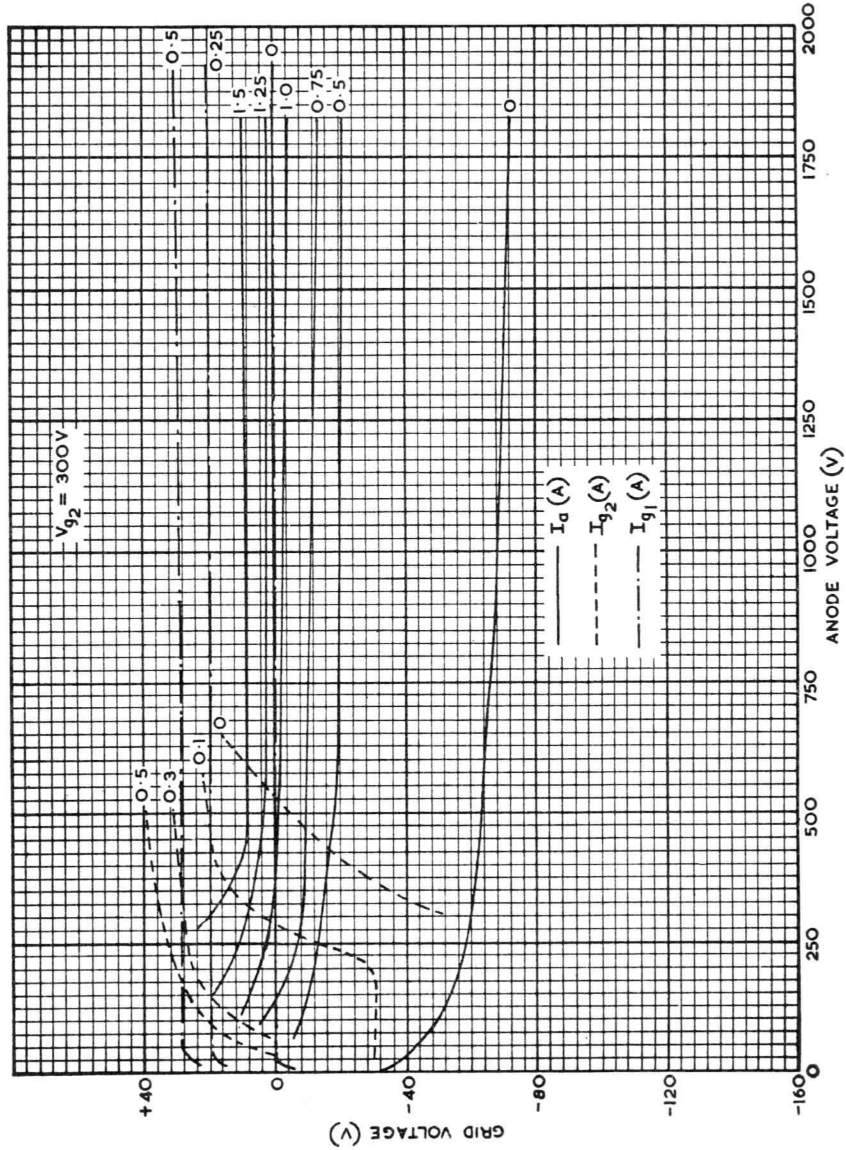
Fig. 1.—Anode Characteristics (V_{g_2} = 250V)

STC

Codes: 4X150A (CV2519)
4X150D (CV3991)

CONTINUED

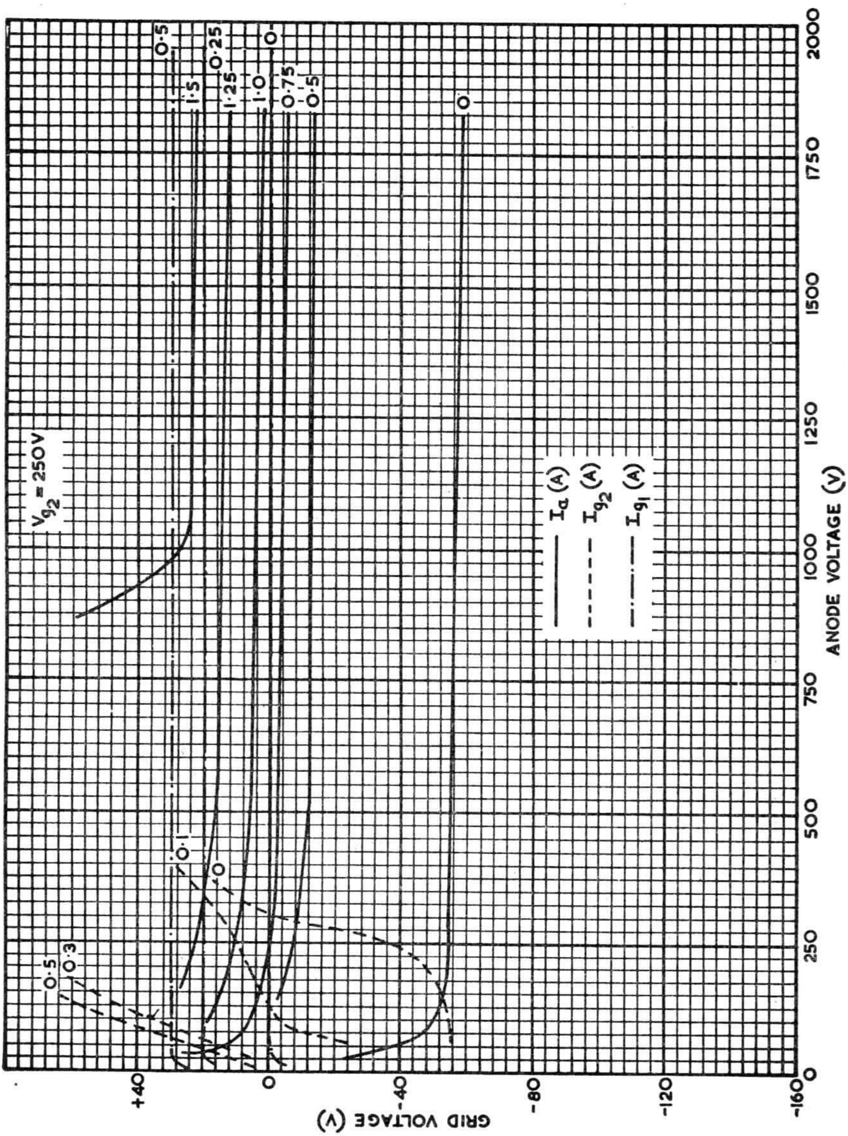
Fig. 2.—Constant Current Characteristics (V_{g2} = 300V)



Codes: 4X150A (CV2519)
4X150D (CV3991)

CONTINUED

Fig. 3.—Constant Current Characteristics (V_{g_2} = 250V)



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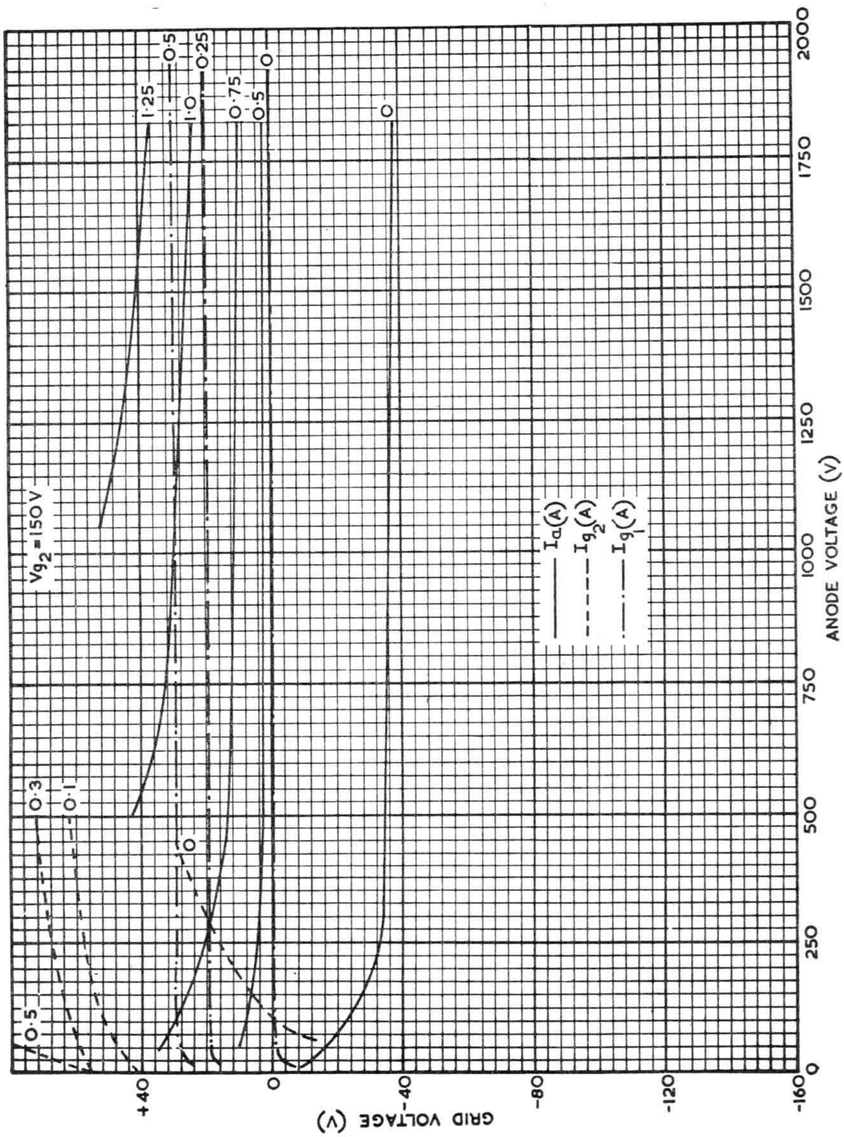
Codes: 4X150A (CV2519)
4X150D (CV3991)

CONTINUED

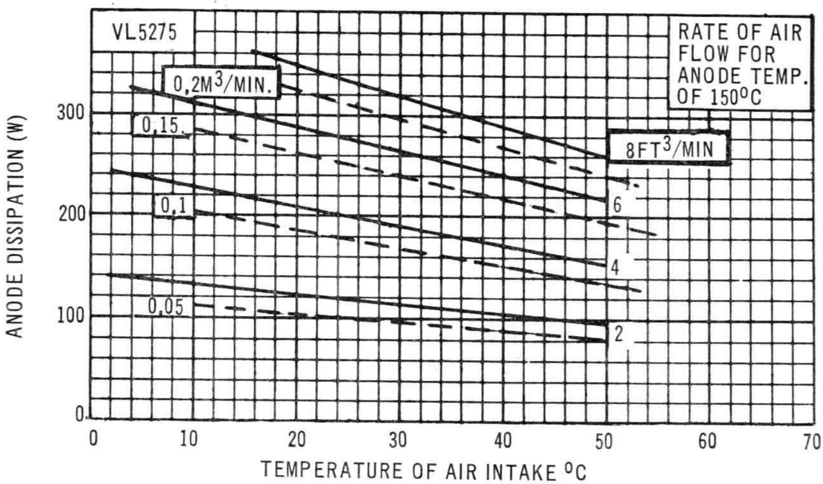
Fig. 4.—Constant Current Characteristics (V_{g2} = 150V)

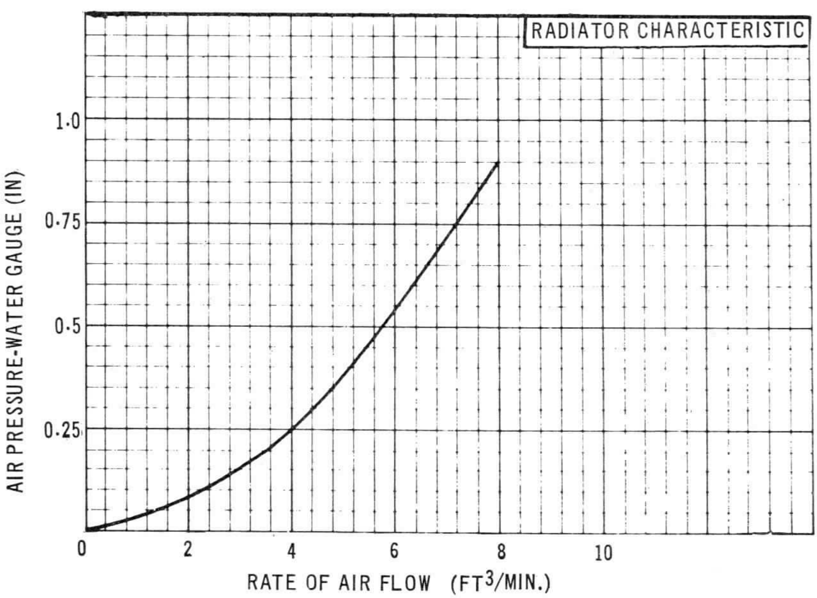


Codes: 4X150A (CV2519)
4X150D (CV3991)

CONTINUED

Fig. 5.—Forced Air Cooling Characteristics



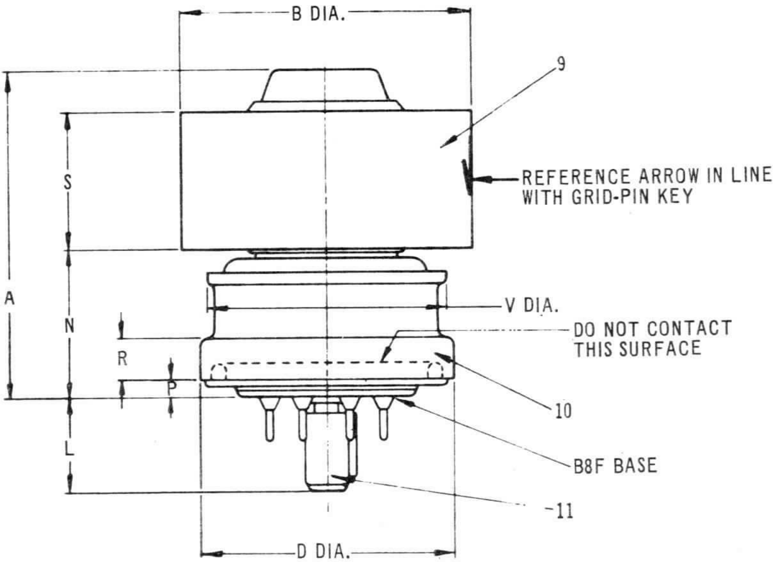


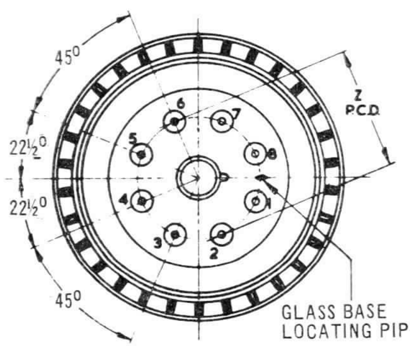
STC

Codes: 4X150A (CV2519)
4X150D (CV3991)

CONTINUED

Fig. 6.—4X150A and 4X150D Outline





BASING ARRANGEMENT	
PIN No.	ELECTRODE
1	GRID 2
2	CATHODE
3	HEATER
4	CATHODE
5 *	INTERNAL CONN.
6	CATHODE
7	HEATER
8	CATHODE

CONTACT	ELECTRODE
9	ANODE
10	GRID 2
11	GRID 1

DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	47.0 MAX.	1.850 MAX.	P	2.03 NOM.	0.080 NOM.
B	41.28 ± 0.38	1.625 ± 0.015	R	4.75 MIN.	0.187 MIN.
D	36.20 ± 0.20	1.425 ± 0.008	S	19.05 ± 1.02	0.750 ± 0.040
L	13.56 ± 0.51	0.534 ± 0.020	V	35.71 MAX.	1.406 MAX.
N	19.81 ± 0.76	0.780 ± 0.030	Z	17.46 NOM.	0.687 NOM.

NOTE:- BASIC DIMENSIONS ARE INCHES
* DENOTES:- DO NOT USE FOR EXTERNAL CONNECTION

SPECIAL VALVES

Forced-Air-Cooled
U.H.F. Power Tetrodes

Codes: 4X250B (CV2487)
4CX250B (CV6137)

These tetrodes are for use as power amplifiers or oscillators at frequencies up to 500 MHz. A useful power output of 300 watts may be obtained from a single valve operating in a coaxial cavity at 400 MHz.

The 4X250B has a part-ceramic envelope: type 4CX250B has a ceramic envelope and valve base.

The two valves are directly equivalent to the American 4X250B and 4CX250B and are unilaterally changeable with the 4X150A type.

CATHODE

Indirectly heated, oxide coated		
Heater voltage (Note 1)	6	V
Nominal current (Note 1)	2·6	A
Minimum cathode heating time	30	sec

NOTE 1.—See APPLICATION NOTES section

CHARACTERISTICS

Mutual conductance	Measured at $V_a = 500V : V_{g2} = 250V$ $I_a = 200mA$	12	mA/V
Screen grid μ		5	

DIRECT INTERELECTRODE CAPACITANCES

Input (nom.)	16·5	pF
Output (nom.)	4·5	pF
Anode to grid (max.)	0·06	pF

MECHANICAL DATA

Dimensions	As shown in Figures 6 and 7			
Base	B8F (Note 2)			
Mounting position	Unrestricted			
Net weight				
4X250B		4·5 oz	120	g
4CX250B		5 oz	140	g

NOTE 2.—In order to achieve the required degree of cooling of the base seals it is recommended that a socket of the air-flow type be used. Suitable sockets which include also a "built-in" screen grid decoupling capacitor are:

Socket Code	*Manufacturer*	*Capacitor*
VH88/802	Ediswan	3 000 to 3 600 pF
4X150A/4 000	Eimac	2 500 to 3 000 pF

COOLING REQUIREMENTS

Forced-air-cooling of the anode core and seal and of the base seals is required. Cooling characteristics are given in Figure 5.

Typically, for an anode dissipation of 250W:

Volume of air, at 20°C, required	3·8 ft³/min	0,1	m³/min
At a water gauge pressure of	0·3 inch	8	mm
Maximum permissible temperature of anode seal and core		250	°C
Maximum permissible temperature of base seals			
4X250B		175	°C
4CX250B		250	°C

May 1967

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C O M P O N E N T S G R O U P

STC

Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS AB_1. LINEAR R.F. POWER AMPLIFIER

Maximum Ratings

Maximum direct anode voltage	2 000	V
Maximum direct screen grid voltage	400	V
Maximum direct anode current	250	mA
Maximum anode dissipation	250	W
Maximum screen grid dissipation	12	W
Maximum control grid dissipation	2	W

Typical Operating Conditions

Direct anode voltage	1 000	1 500	2 000	V
Direct screen grid voltage	350	350	350	V
Direct control grid voltage, approx. (Note 3)	−50	−50	−50	V
Direct anode current (zero signal)	100	100	100	mA
Direct anode current (maximum single-tone signal)	250	250	250	mA
Direct screen current (maximum single-tone signal)	25	20	15	mA
Power output (maximum single-tone signal)	125	225	325	W
Direct anode current (maximum two-tone signal)	175	175	175	mA
Direct screen current (maximum two-tone signal)	15	12	9	mA
Peak envelope power (maximum two-tone signal)	125	225	325	W
Peak r.f. grid voltage (Note 4)	50	50	50	V
3rd order intermodulation distortion products (Note 5)	−31	−31	−30	dB
5th order intermodulation distortion products	−45	−50	−50	dB

NOTE 3.—Adjust grid voltage to obtain specified zero-signal anode current.

NOTE 4.—The peak r.f. control grid voltage is the same under both single-tone and two-tone maximum conditions; the level of the single tone being reduced by 6 dB when the second tone is added. The second tone is then set to the same level as the first.

NOTE 5.—Intermodulation distortion products are measured with respect to either tone.

Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

CLASS AB_1 A.F. AMPLIFIER OR MODULATOR (For balanced 2-valve operation)

Maximum Ratings (per valve)

Maximum direct anode voltage	2 000	V
Maximum direct anode current	250	mA
Maximum direct anode dissipation	250	W
Maximum direct screen grid voltage	400	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid dissipation	2	W

Typical Operating Conditions

Direct anode voltage	1 000	1 500	2 000	V
Direct screen grid voltage	350	350	350	V
Direct control grid voltage (Note 6)	−50	−50	−50	V
Total direct anode current, zero signal	200	200	200	mA
Total direct anode current, maximum signal	500	500	500	mA
Total direct screen grid current, maximum signal	50	40	30	mA
Peak a.f. signal (grid to grid) voltage	100	100	100	V
Effective load resistance anode to anode	3 260	5 760	8 260	Ω
Power output (approx.) maximum signal	250	450	650	W

NOTE 6.—Adjust grid voltage to obtain specified zero signal anode current.

CLASS C R.F. POWER AMPLIFIER. Anode subject to modulation
(Carrier conditions for use with 100 per cent modulation)

Maximum Ratings

Maximum direct anode voltage	1 600	V
Maximum direct anode current	200	mA
Maximum direct anode dissipation	165	W
Maximum direct screen grid voltage	300	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid voltage	−250	V
Maximum direct control grid dissipation	2	W
Maximum frequency for above ratings	500	MHz

Typical Operating Conditions up to 175 MHz

Direct anode voltage	500	1 000	1 500	V
Direct screen grid voltage	250	250	250	V
Direct control grid voltage	−100	−100	−100	V
Direct anode current	200	200	200	mA
Direct screen grid current	45	35	25	mA
Direct control grid current, approx.	22	19	17	mA
Peak r.f. control grid voltage	124	122	121	V
Control grid drive power, approx.	2·7	2·3	2·1	W
Useful power output, approx.	75	160	250	W

STC

Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

CLASS C. R.F. POWER AMPLIFIER OR OSCILLATOR. UNMODULATED

Maximum Ratings

Maximum direct anode voltage	2 000	V
Maximum direct anode current	250	mA
Maximum direct anode dissipation	250	W
Maximum direct screen grid voltage	300	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid voltage	−250	V
Maximum direct control grid dissipation	2	W
Maximum frequency for above ratings	500	MHz

Typical Operating Conditions

At frequencies up to 175 MHz					
Direct anode voltage	500	1 000	1 500	2 000	V
Direct screen grid voltage	250	250	250	250	V
Direct control grid voltage	−90	−90	−90	−90	V
Direct anode current	250	250	250	250	mA
Direct screen grid current	45	35	30	25	mA
Direct control grid current, approx.	32	28	28	27	mA
Peak r.f. control grid voltage	118	116	116	115	V
Control grid drive power, approx.	3·6	3·2	3·2	2·8	W
Useful power output, approx.	85	195	300	400	W

At 500 MHz in a coaxial cavity

Direct anode voltage	1 500	2 000	V
Direct screen grid voltage	300	300	V
Direct control grid voltage, approx.	−90	−90	V
Direct anode current	250	250	mA
Direct screen grid current	5	5	mA
Direct control grid current	5	4	mA
Control grid drive power, approx.	30	35	W
Useful power output, approx.	180	260	W

APPLICATION NOTES

At frequencies up to 300 MHz, the heater should be operated at the rated value of 6 volts.

At frequencies above 300 MHz, back-heating of the cathode occurs and must be compensated for by a reduction in heater voltage to obtain increased life.

The figures given below apply to straight-through amplifier operation.

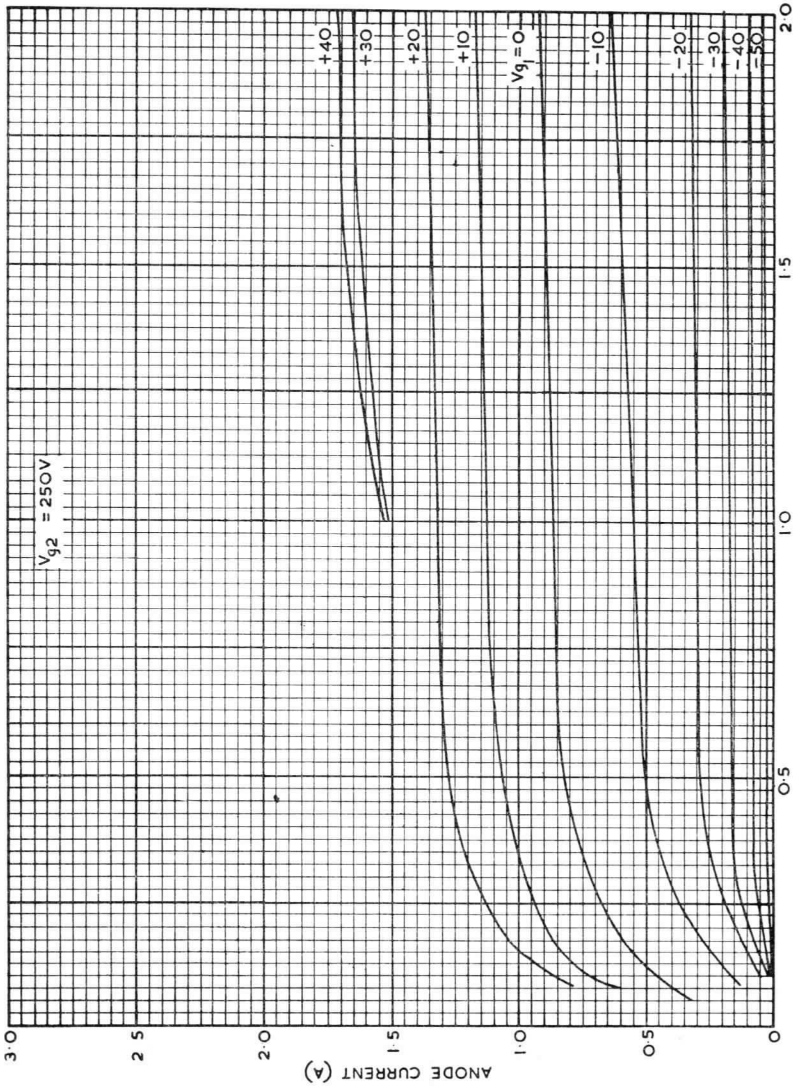
Frequency (MHz)	Heater Voltage (V)
Up to 300	6
301 to 400	5·75
401 to 500	5·5

Full applications information is contained in booklet MS/123 which is available on request to the address given at the foot of page 1.

Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

Figure 1.—Anode Characteristics (V_{g_2} = 250V)

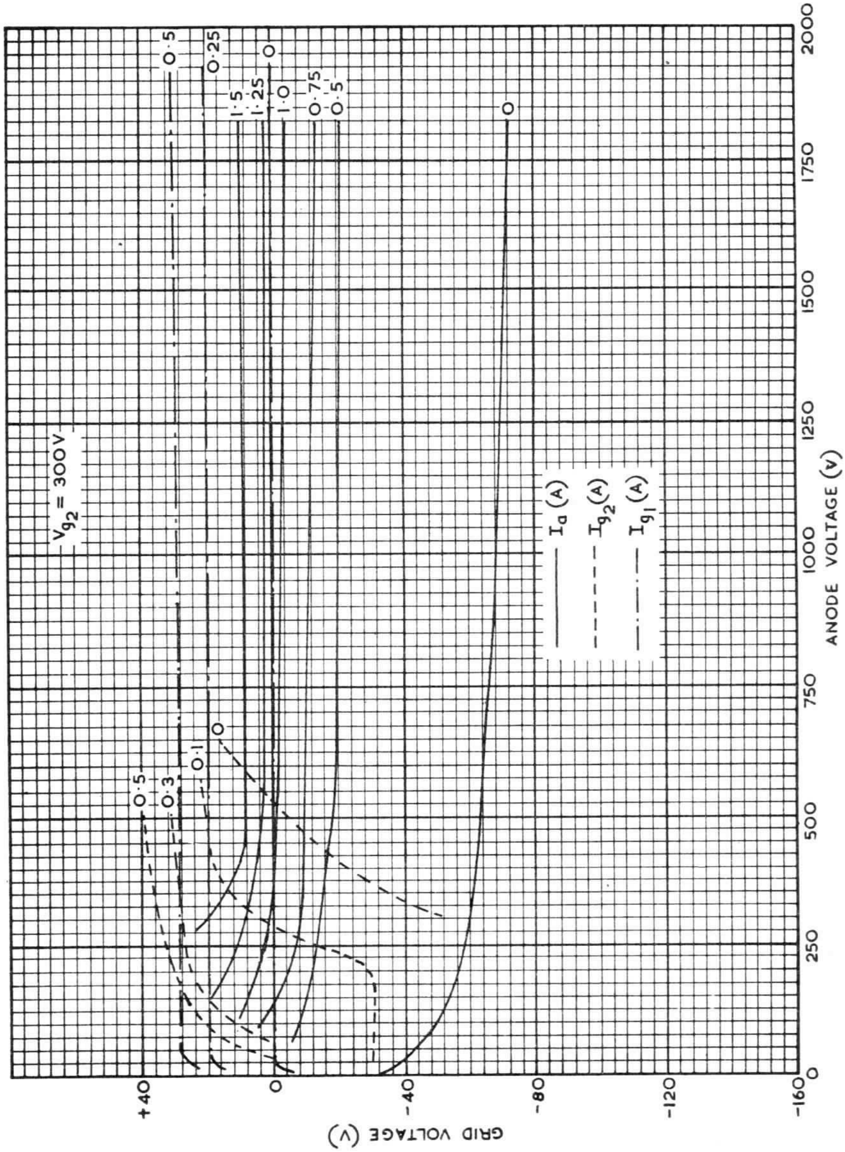


STC

Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

Fig. 2.—Constant Current Characteristics (V_{g2} = 300V)



May 1967

Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

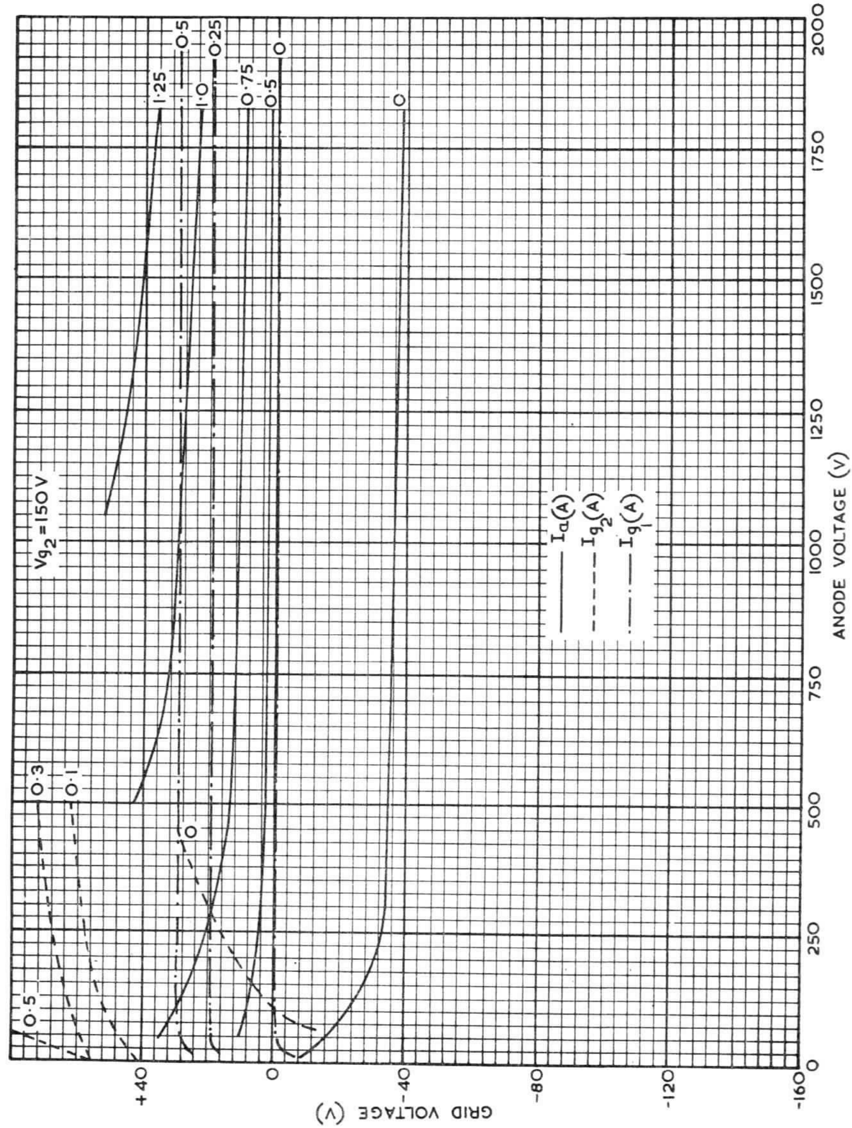
Fig. 3.—Constant Current Characteristics (V_{g2} = 250V)

STC

Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

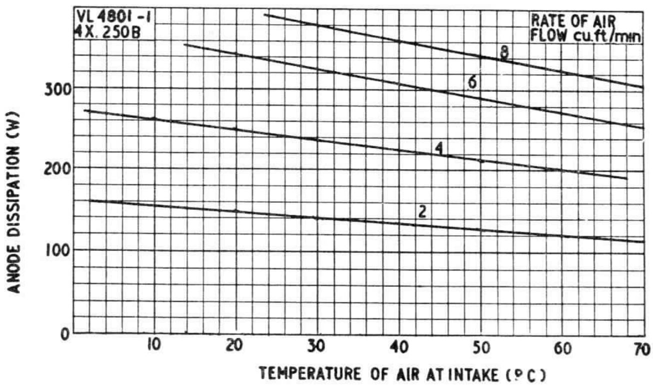
Fig. 4.—Constant Current Characteristics (V_{g_2} = 150V)

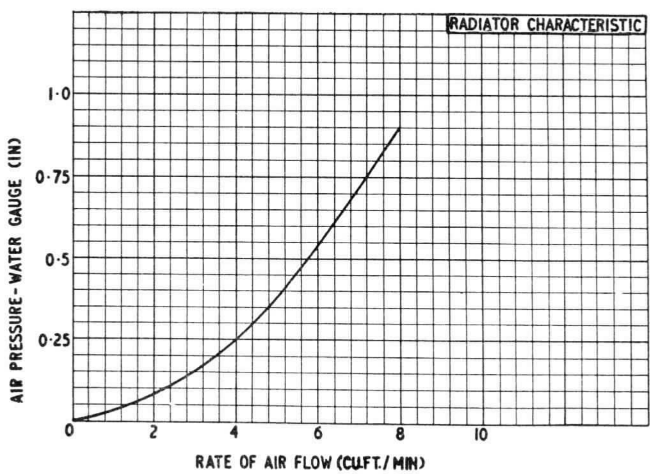


Codes: 4X250B (CV2487)
4CX250B (CV6137)

CONTINUED

Fig. 5.—Forced Air Cooling Characteristics

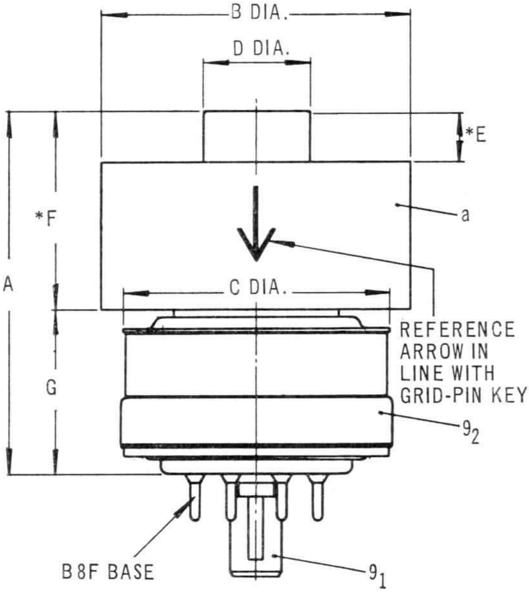




Code: 4X250B (CV2487)

CONTINUED

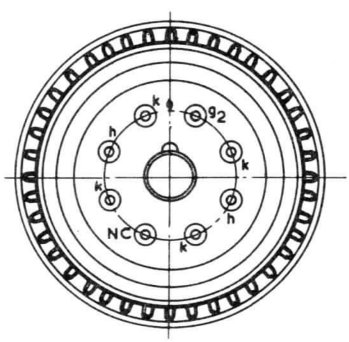
Fig. 6.—4X250B Outline

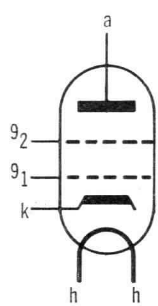


DIM	INCHES	MILLIMETRES
A	1.810 MIN.	45,97 MIN.
	1.910 MAX.	48,51 MAX.
B	1.610 MIN.	40,89 MIN.
	1.640 MAX.	41,66 MAX.
C	1.406 MAX.	35,71 MAX.
D	.559 MIN.	14,20 MIN.
	.573 MAX.	14,55 MAX.
E	.240 MIN.	6,10 MIN.
	.280 MAX.	7,11 MAX.
F	.710 MIN.	18,03 MIN.
	.790 MAX.	20,07 MAX.
G	.750 MIN.	19,05 MIN.
	.810 MAX.	20,57 MAX.

BASIC DIMENSIONS ARE INCHES

* DENOTES: CONTACT LENGTH

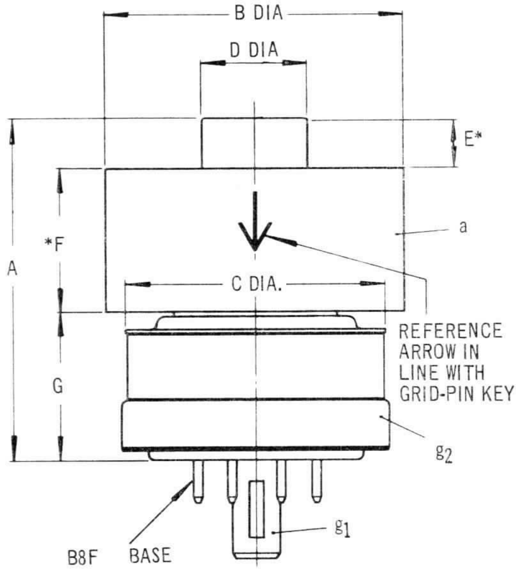




Code: 4CX250B (CV6137)

CONTINUED

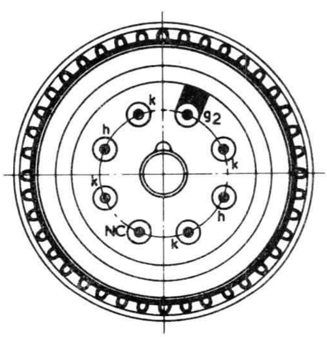
Fig. 7.—4CX250B Outline

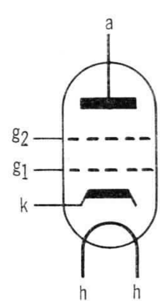


DIM.	INCHES		MILLIMETRES	
A	1·810	MIN.	45,97	MIN.
	1·910	MAX.	48,51	MAX.
B	1·610	MIN.	40,89	MIN.
	1·640	MAX.	41,66	MAX.
C	1·406	MAX.	35,71	MAX.
D	.559	MIN.	14,20	MIN.
	.573	MAX.	14,55	MAX.
E	·240	MIN.	6,10	MIN.
	·280	MAX.	7,11	MAX.
F	·710	MIN.	18,03	MIN.
	·790	MAX.	20,07	MAX.
G	·750	MIN.	19,05	MIN.
	·810	MAX.	20,57	MAX.

BASIC DIMENSIONS ARE INCHES

* DENOTES: CONTACT LENGTH





SPECIAL VALVES

Forced-Air-Cooled V.H.F. Tetrode

Codes: 7007
4JC/201S

These valves have a ceramic-metal envelope and are designed to give an anode dissipation of 12kW and to operate at frequencies up to 220 Mc/s at full ratings. They have identical electrical and physical characteristics except that the 4JC/201S has thicker filament pins than the 7007.

CATHODE

	Min.	Nom.	Max.	
Thoriated tungsten filament				
Filament voltage			5	V
Filament current	175	180	185	A
Filament cold resistance			0·0036	Ω
Peak usable emission		30		A

CHARACTERISTICS

Amplification factor, screen to control grid ($V_a = 2kV$, $V_{g2} = 1kV$, $I_a = 2A$)	10	
Mutual conductance ($V_a = 5{\cdot}8kV$, $V_{g2} = 1{\cdot}2kV$, $V_{g1} = -55V$)	>17	mA/V

DIRECT INTERELECTRODE CAPACITANCES*

	Min.	Nom.	Max.	
Control grid to anode	0·4	0·5	0·6	pF
Control grid to filament	40	45	48	pF
Anode to filament, maximum	0·07	0·11	0·13	pF
Control grid to screen grid	55	60	65	pF
Screen grid to anode	18	20	23	pF

*Measured with 12 inch square metal plate fixed to screen grid terminal.

AIR-COOLING REQUIREMENTS

For an anode dissipation of	10	12	kW
Volume of air required on anode, minimum	350	550	ft^3/min
	9,9	15,6	m^3/min
At a water pressure of	3	7	in
	76,2	177,8	mm
Volume of air required on seals, minimum	100	100	ft^3/min
	2,8	2,8	m^3/min
Maximum ambient temperature of air		50	°C
Maximum envelope temperature		180	°C

June 1965

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4230
LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Codes: 7007
4JC/201S

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Voltages are referred to cathode unless otherwise stated)

Class B. R.F. Power Amplifier. Television Service

Maximum Ratings

Maximum direct anode voltage	7·5	kV
Maximum direct screen grid voltage	2	kV
Maximum direct anode current	4	A
Maximum anode input	24	kW
Maximum screen grid input	400	W
Maximum anode dissipation	12	kW
Maximum control grid dissipation	300	W

Typical Operating Conditions (Grid-Drive Circuit)

Direct anode voltage	5·85	kV
Direct screen grid voltage	1	kV
Direct control grid voltage	−120	V
Peak r.f. control grid voltage		
100% level	400	V
75% level	300	V
30% level	120	V
Mean direct anode current		
100% level	3·2	A
75% level	2·4	A
30% level	1	A
Mean direct screen grid current, approx.		
75% level	110	mA
Mean direct control grid current, approx.		
100% level	220	mA
75% level	90	mA
30% level	0	mA
Driving power, approx.		
100% level	100	W
75% level	30	W
30% level	0	W
Output power, approx.		
100% level	12	kW
75% level	6·8	kW
30% level	1·08	kW

Codes: 7007
4JC/201S

CONTINUED

Typical Operating Conditions (Cathode-Drive Circuit)

Direct anode to control grid voltage	6	kV
Direct screen grid to control grid voltage	700	V
Direct cathode to control grid voltage	45	V
Peak r.f. cathode to control grid voltage		
100% level	390	V
75% level	290	V
30% level	115	V
Direct anode current		
100% level	3·8	A
75% level	2·8	A
30% level	1·1	A
Direct screen grid current, approx.		
75% level	140	mA
Direct control grid current, approx.		
100% level	300	mA
75% level	140	mA
30% level	30	mA
Driving power, approx.		
100% level	1·2	kW
75% level	700	W
30% level	100	W
Output power, approx.		
100% level	12	kW
75% level	6·8	kW
30% level	1	kW

STC

Codes: 7007
4JC/201S

CONTINUED

Class AB. Linear R.F. Power Amplifier. Single-Sideband Suppressed

Carrier Service

Maximum Ratings

Maximum direct anode voltage	7·5	kV
Maximum direct screen grid voltage	2	kV
Maximum direct anode current, maximum signal	2·8	A
Maximum anode input, maximum signal	20	kW
Maximum screen grid input, maximum signal	400	W
Maximum anode dissipation	12	kW

Typical Operating Conditions (Single-Tone Modulation)

Direct anode voltage	6·5	7·5	kV
Direct screen grid voltage	1	0·8	kV
Direct control grid voltage	—130	—100	V
Direct anode current, zero signal	200	200	mA
Direct screen grid current, zero signal	0	0	mA
Direct anode current, maximum signal	2·7	2·3	A
Direct screen grid current, maximum signal, approx.	230	140	mA
Direct control grid current, max. signal, approx.	140	160	mA
Peak r.f. control grid voltage, max. signal	355	330	V
Driving power, maximum signal, approx.	40	50	W
Anode power output, maximum signal, approx.	11	11	kW

Codes: 7007
4JC/201S

CONTINUED

Class C Telephony. R.F. Power Amplifier. Anode Modulated.
(Carrier conditions per valve for use with 100% modulation)

Maximum Ratings

Maximum direct anode voltage	5	kV
Maximum direct screen grid voltage	2	kV
Maximum direct control grid voltage	−1	kV
Maximum direct anode current	2	A
Maximum direct control grid current	600	mA
Maximum anode input	10	kW
Maximum anode dissipation	8	kW

Typical Operating Conditons (Grid-Drive Circuit)

Direct anode voltage	4·8	kV
Direct screen grid voltage	800	V
Direct control grid voltage	−300	V
Peak r.f. grid voltage	550	V
Direct anode current	1·8	A
Direct screen grid current, approx.	160	mA
Direct control grid current	180	mA
Driving power, approx.	100	W
Output power, approx.	6	kW

STC

Codes: 7007
4JC/201S

CONTINUED

Class C. R.F. Power Amplifier

(Key-down conditions per valve without amplitude modulation)

Maximum Ratings

Maximum direct anode voltage	7·5	kV
Maximum direct screen grid voltage	2	kV
Maximum direct control grid voltage	−1	kV
Maximum direct anode current	3	A
Maximum direct control grid current	600	mA
Maximum anode input	20	kW
Maximum screen grid input	400	W
Maximum anode dissipation	12	kW

Typical Operating Conditions (Grid-Drive Circuit)

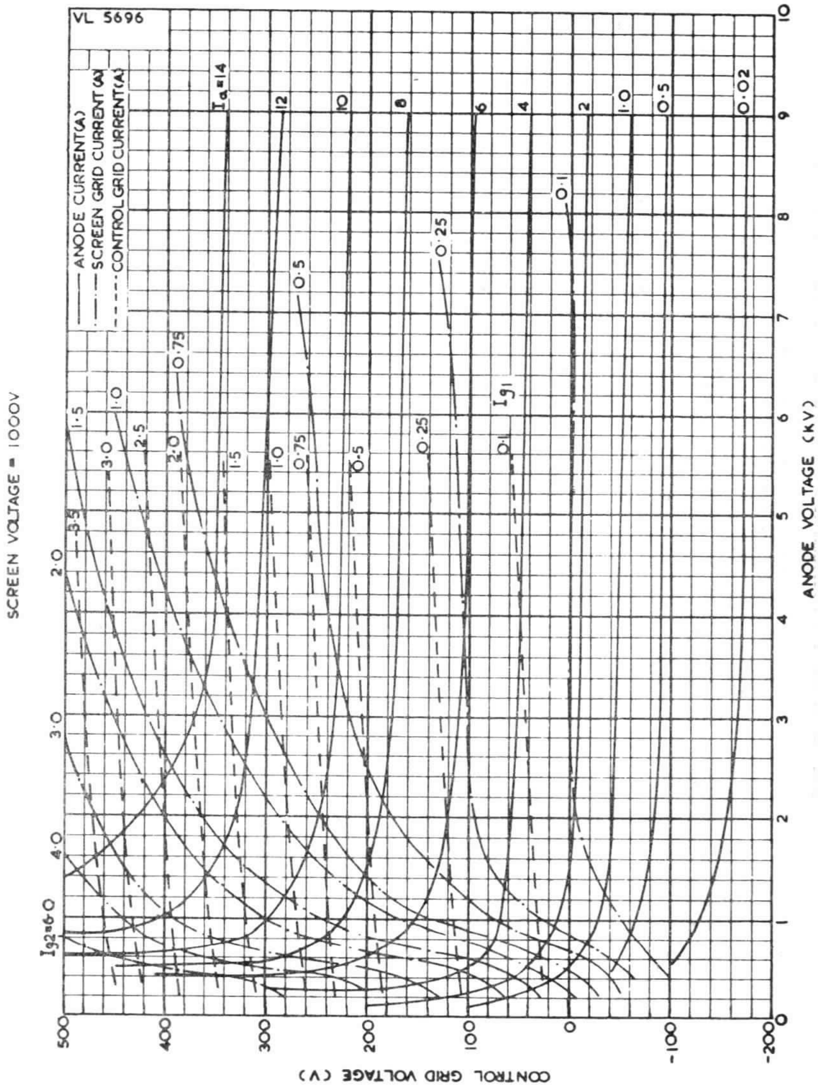
Direct anode voltage	7	kV
Direct screen grid voltage	1	kV
Direct control grid voltage	−300	V
Peak r.f. control grid voltage	570	V
Direct anode current	2·6	A
Direct screen grid current	200	mA
Direct control grid current	150	mA
Driving power, approx.	80	W
Output power, approx.	12	kW

Typical Operating Conditions (Cathode-Drive Circuit)

Direct anode to control grid voltage	6	kV
Direct screen grid to control grid voltage	700	V
Direct cathode to control grid voltage	140	V
Peak r.f. cathode to control grid voltage	340	V
Direct anode current	2	A
Direct screen grid current, approx.	125	mA
Direct control grid current, approx.	75	mA
Driving power, approx.	600	W
Output power, approx.	6	kW

Codes: 7007
4JC/201S
CONTINUED

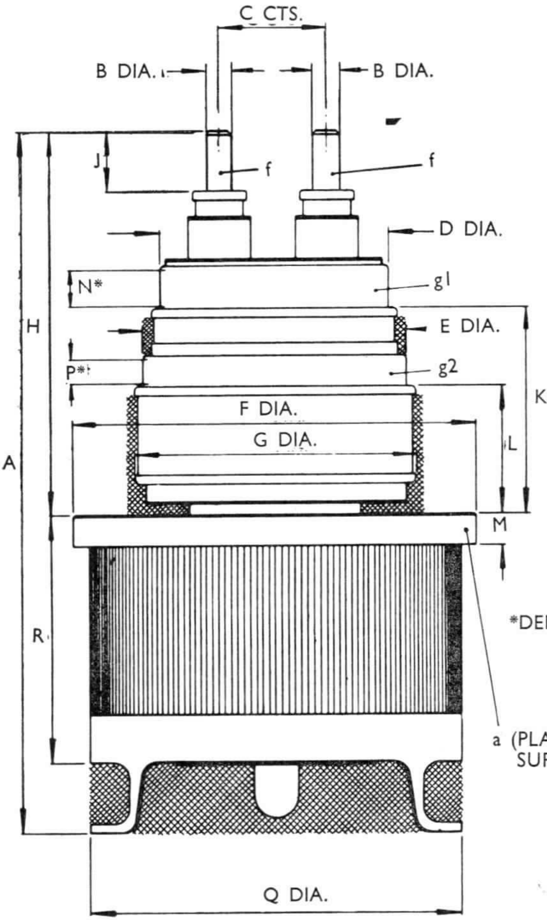
Typical Constant Current Characteristics
(V_f = 5A, V_{g_2} = 1kV)



Code: 7007

CONTINUED

7007 Outline

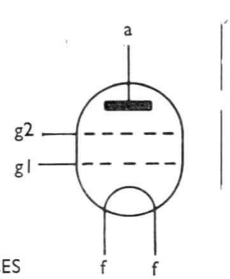


DIM	INCHES	MILLIMETRES
A	11 5/8 MAX.	295,3 MAX.
B	0·437±0·007	11,10±0,18
C	1·710±0·030	43,43±0,76
D	3·685±0·020	93,60±0,51
E	4·246±0·020	107,85±0,51
F	6·360±0·020	161,54±0,64
G	4 9/16 MAX.	115,9 MAX.
H	6 3/32±5/32	154,8 ±4,0
J	13/16 MIN.	20,6 MIN.
K	3 9/32±3/32	83,3 ±2,4
L	2 ±3/64	50,8 ±1,2
M	7/16 MIN.	11,1 MIN.
N	11/32 MIN.	8,7 MIN.
P	9/32 MIN.	7,1 MIN.
Q	6 ±3/32	152,4 ±2,4
R	4 3/32 MAX.	104,0 MAX.

BASIC DIMS. ARE INCHES

*DENOTES:—
TERMINAL CONTACT SURFACE

a (PLATE TERMINAL CONTACT SURFACE.)



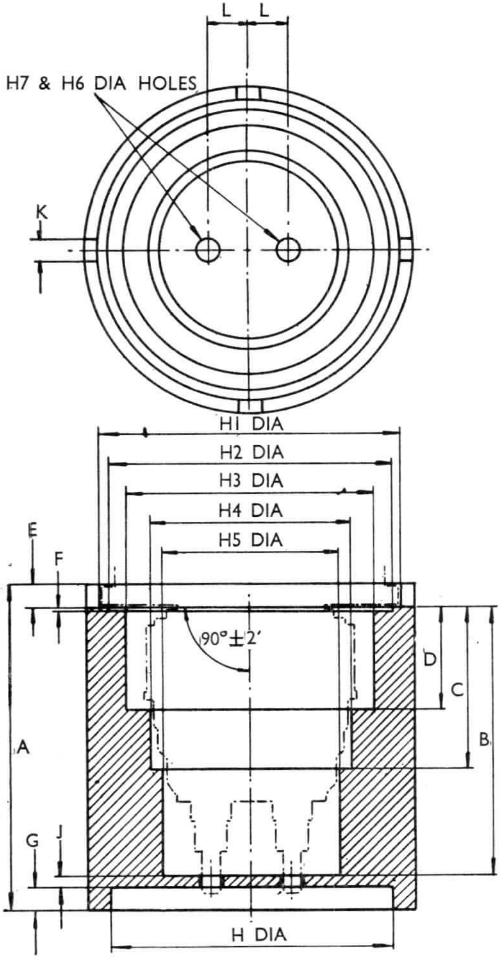
NOTE:—CROSS HATCHED AREAS INDICATE REGIONS TO BE CLEAR OF CONTACT & CIRCUIT COMPONENTS

NOTE:—CONCENTRICITY OF GRID CONTACT SURFACES & PARALLELISM OF FILAMENT PINS WILL BE IN ACCORDANCE WITH GAUGE & GAUGING PROCEDURE AS STIPULATED ON DRG 4JC/201E.3.3.SHT.

Code: 7007

CONTINUED

7007 Gauge Outline 3·3 Sheet



DIM	INCHES	MILLIMETRES
A	7 MIN.	177,8 MIN.
B	5·656±0·001	143,66±0,03
C	3·453±0·001	87,70±0,03
D	2·140±0·001	54,36±0,03
E	0·562±0·001	14,28±0,03
F	0·070±0·010	1,78±0,25
G	0·500 MIN.	12,70 MIN.
H	6·000±0·060	152,40±1,52
H1	6·420±0·001	163,07±0,03
H2	6·050±0·001	153,67±0,03
H3	5·250±0·001	133,35±0,03
H4	4·280±0·001	108,71±0,03
H5	3·782±0·001	96,06±0,03
H6 H7	0·500±0·001	12,70±0,03
J	0·250±0·001	6,35±0,03
K	0·500±0·010	12,70±0,25
L	0·855±0.001	21,72±0,03

BASIC DIMS. IN INCHES

NOTE: The five cylindrical holes H_1, H_2, H_3, H_4 and H_5 have axes coincident within 0·001″. The holes H_6 and H_7 have axes parallel to the axes of H_1, H_2, H_3, H_4 and H_5 within $0° \pm 2′$.

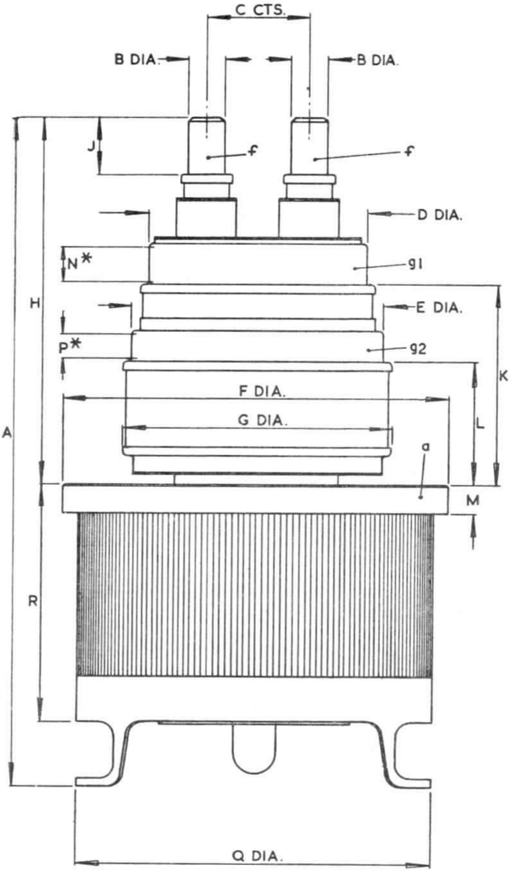
PROCEDURE NOTE: With the cylindrical surfaces of the plate terminal, grid No. 2 terminal, grid No. 1 terminal, and filament terminals clean, smooth and free of burrs, the tube will enter a gauge as shown above. Proper entry of the tube in the gauge is obtained when the plate terminal is entirely engaged by hole H_1 and will seat on the shoulder between H_1 and H_2. The plane surface of this shoulder is at right angles to the axes of the holes within $0° \pm 2′$. Seating is determined by failure of a 0·020 thickness gauge to enter more than 1/16″ between shoulder surface and plate terminal. Slots are provided to permit this measurement.

STC

Code: 4JC/201S

CONTINUED

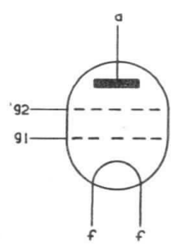
4JC/201S Outline



DIM.	INCHES	MILLIMETRES
A	11 11/16 MAX.	297,0 MAX.
B	0·625 ± 0·002	15,88 ± 0,05
C	1·710 ± 0·030	43,43 ± 0,76
D	3·685 ± 0·020	93,60 ± 0,51
E	4·246 ± 0·020	107,85 ± 0,51
F	6·360 ± 0·020	161,54 ± 0,64
G	4 9/16 MAX.	115,9 MAX.
H	6 5/32 ± 5/32	156,4 ± 4,0
J	7/8 MIN.	22,2 MIN.
K	3 9/32 ± 3/32	83,3 ± 2,4
L	2 ± 3/64	50,8 ± 1,2
M	7/16 MIN.	11,1 MIN.
N	11/32 MIN.	8,7 MIN.
P	9/32 MIN.	7,1 MIN.
Q	6 ± 3/32	152,4 ± 2,4
R	4 3/32 MAX.	104,0 MAX.

BASIC DIMS. ARE INCHES

* DENOTES:-
TERMINAL CONTACT SURFACE



STC

SPECIAL VALVES

Forced-Air-Cooled
High Power Tetrode

Codes: 4JC/300J
4JC/301J
4JC/302J

These valves have a ceramic envelope and are designed for operation up to 30 MHz at full ratings and to at least 50 MHz at reduced ratings. They have common electrical characteristics but the 4JC/301J and 4JC/302J are mechanical variants of the 4JC/300J, as shown in the outline drawings.

CATHODE

Thoriated tungsten filament		
Filament voltage	8	V
Filament current, nominal	300	A
Maximum usable emission	75	A

CHARACTERISTICS

Inner amplification factor	5·4	
Mutual conductance (at $V_{g1} = 0$, $V_{g2} = 1{\cdot}2\text{kV}$)	100	mA/V

DIRECT INTERELECTRODE CAPACITANCES

Input	300	pF
Output	32	pF
Anode to grid 1	1·5	pF

MECHANICAL DATA

Dimensions — As shown in outline drawing
Mounting position — Vertical, anode downwards

Filament and grid connector rings are available separately under the following codes:

CN–2A Filament connector, smaller
CN–2B Filament connector, larger
CN–2C Grid connector, plain
CN–2D Grid 2 connector fitted with corona ring to match corona ring fitted on anode.

COOLING REQUIREMENTS

For an anode dissipation of	20	25	30	kW
Volume of air required at anode	700	800	1 050	ft³/min
	19,8	22,7	29,7	m³/min
At a water pressure of	2·7	3·6	6·2	in
	68,6	91,4	157,5	mm
Maximum seal temperature			225	°C
Maximum anode core temperature			250	°C

May 1967

Standard Telephones and Cables Limited
Valve Division, Brixham Road, Paignton, Devon
Telephone: Paignton 50762 Telex: 4230
London Sales Office, Telephone: Footscray 3333 Telex: 21836
C O M P O N E N T S G R O U P

Codes: 4JC/300J 4JC/301J 4JC/302J

STC

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS AB_1. LINEAR R.F. POWER AMPLIFIER

Maximum Ratings

Maximum direct anode voltage	14	kV
Maximum direct screen voltage	2·5	kV
Maximum anode dissipation	30	kW
Maximum screen dissipation	1·2	kW
Maximum grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

Typical Operating Conditions

Direct anode voltage	10	kV
Direct screen grid voltage	1·5	kV
Direct control grid voltage (Note 1)	−230	V
Direct anode current (zero signal)	1	A
Direct anode current (maximum single-tone signal)	5·1	A
Direct screen grid current (maximum single-tone signal)	0·25	A
Power output (maximum single-tone signal)	32·5	kW
Direct anode current (maximum two-tone signal)	3·3	A
Direct screen grid current (maximum two-tone signal)	0·125	A
Peak envelope power (maximum two-tone signal)	32·5	kW
Peak r.f. control grid voltage (Note 2)	230	V
3rd order intermodulation distortion products (Note 3)	−40	dB
5th order intermodulation distortion products	−46	dB

NOTE 1.—Adjust control grid voltage to give specified zero signal anode current.

NOTE 2.—The peak r.f. control grid voltage is the same for both single-tone and two-tone maximum conditions: the level of the single tone being reduced by 6 dB when the second tone is added. The second tone is then set to the same level as the first.

NOTE 3.—Intermodulation distortion products are measured with respect to either tone.

CLASS C. AMPLIFIER. ANODE AND SCREEN MODULATED

(Carrier conditions for use with 100 per cent modulation)

Maximum Ratings

Maximum direct anode voltage	11	kV
Maximum direct screen grid voltage	2	kV
Maximum anode dissipation	20	kW
Maximum screen grid dissipation	800	W
Maximum control grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

Typical Operating Conditions

Direct anode voltage	10	10	kV
Direct screen grid voltage	1·5	1·5	kV
Direct control grid voltage	−690	−770	V
Direct anode current	5·7	6·7	A
Direct screen grid current	0·34	0·5	A
Direct control grid current	80	100	mA
Peak r.f. control grid voltage	860	1 010	V
Drive power	70	105	W
Anode dissipation	15	17	kW
Screen grid dissipation	510	740	W
Control grid dissipation	14	25	W
Efficiency	74	75	%
Power output	42	50	kW
Power into load at 85% transfer efficiency	36	42	kW

CLASS C. AMPLIFIER. UNMODULATED

Maximum Ratings

Maximum direct anode voltage	14	kV
Maximum direct screen grid voltage	2·5	kV
Maximum anode dissipation	30	kW
Maximum screen grid dissipation	1·2	kW
Maximum control grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

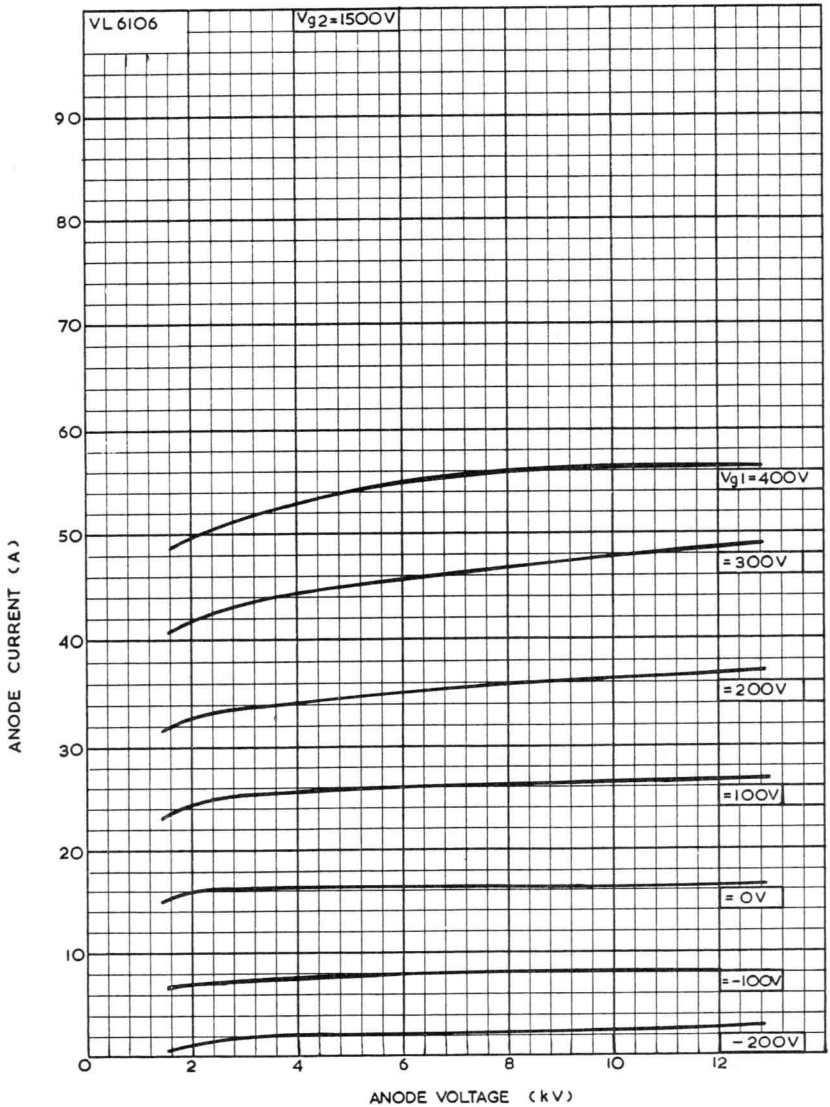
Typical Operating Conditions

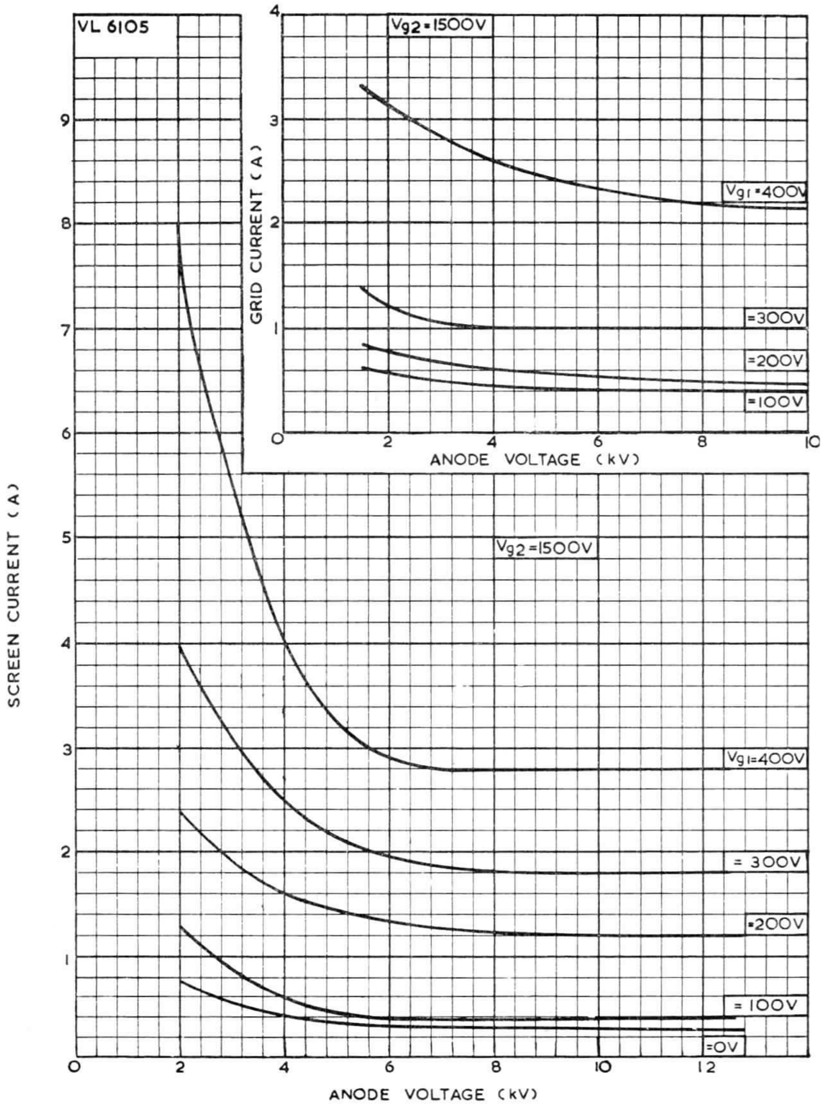
Direct anode voltage	13	10	kV
Direct screen grid voltage	2	1·5	kV
Direct control grid voltage	−655	−574	V
Direct anode current	10·1	10·1	A
Direct screen grid current	0·5	0·75	A
Direct control grid current	0·09	0·3	A
Peak r.f. grid voltage	905	924	V
Control grid drive power	83	276	W
Anode dissipation	30	30	kW
Power output	100	71	kW
Power into load at 85% transfer efficiency	85	61	kW

Codes: 4JC/300J 4JC/301J 4JC/302J

STC

CONTINUED

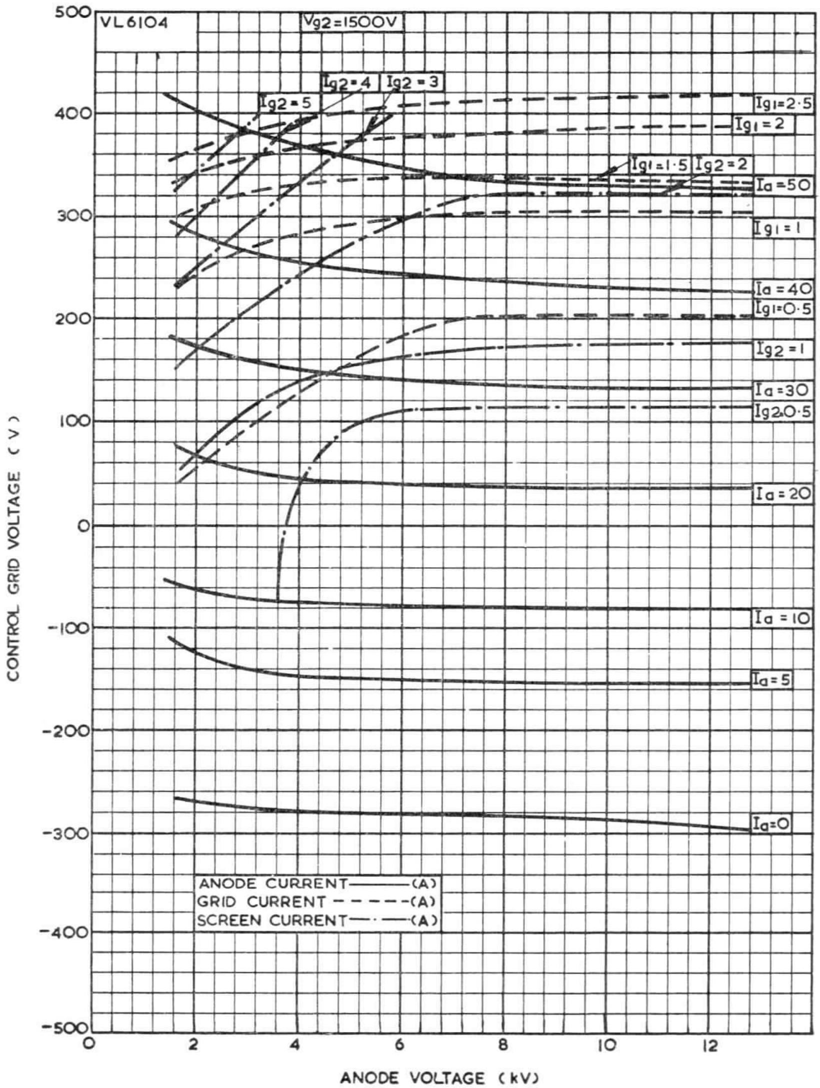


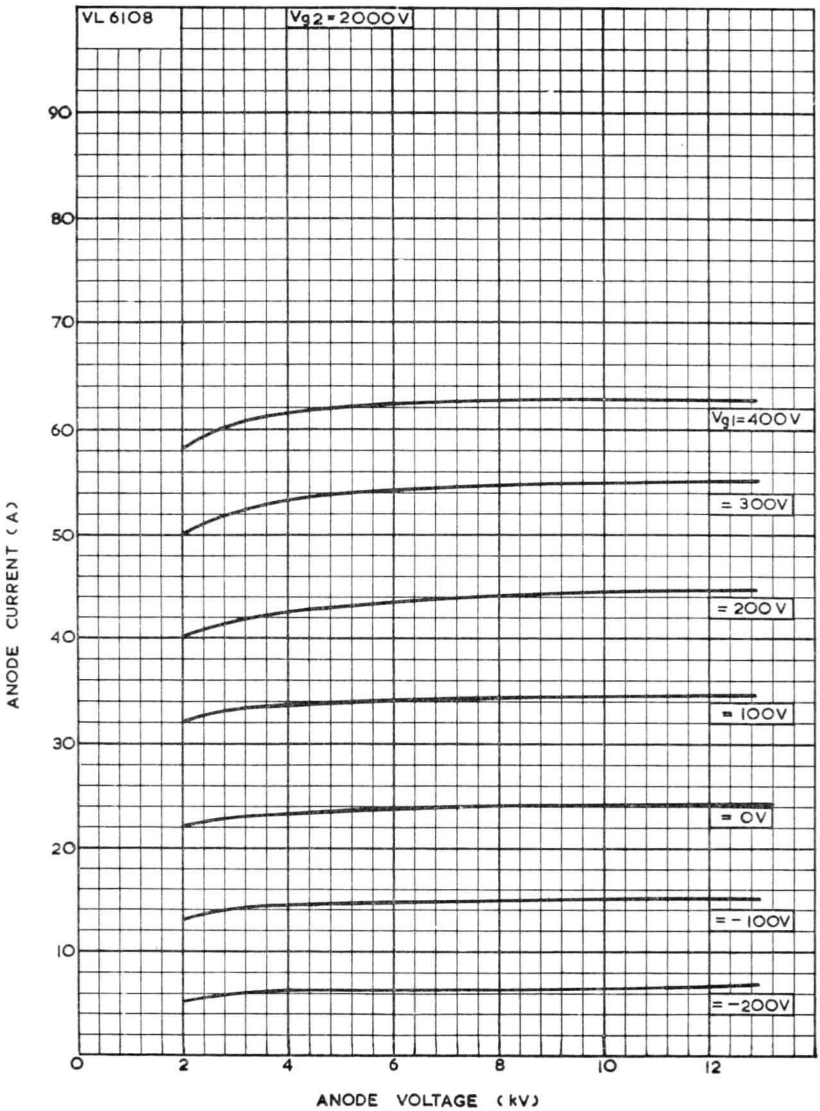

VL 6105
Vg2 = 1500V
GRID CURRENT (A)
ANODE VOLTAGE (kV)
Vg1 = 400V
= 300V
= 200V
= 100V
Vg2 = 1500V
SCREEN CURRENT (A)
ANODE VOLTAGE (kV)
Vg1 = 400V
= 300V
= 200V
= 100V
= 0V

Codes: 4JC/300J 4JC/301J 4JC/302J

STC

CONTINUED

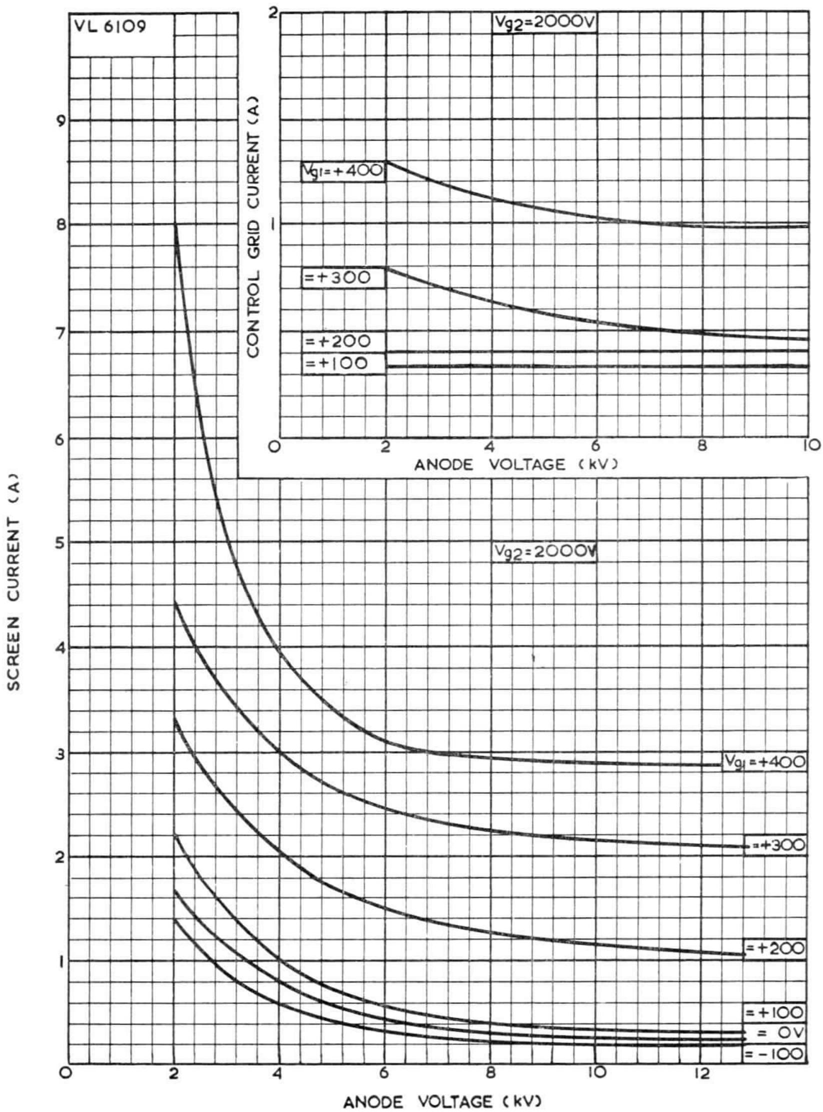


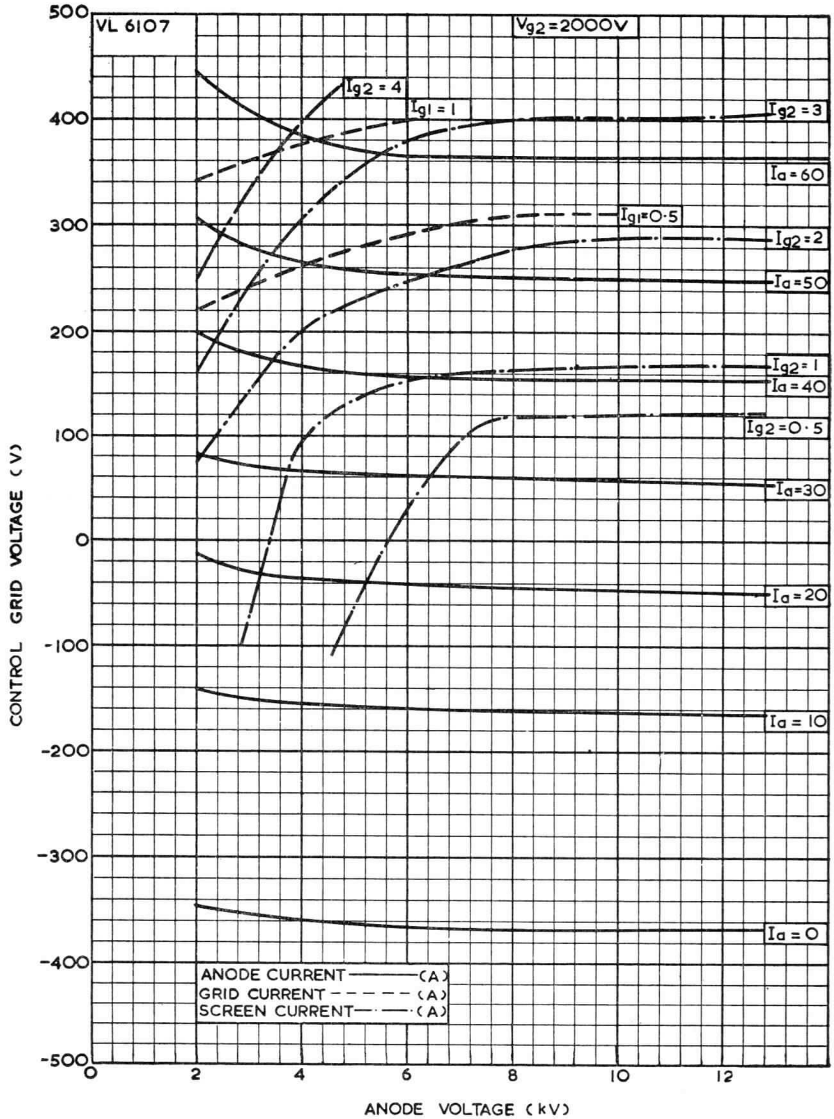

VL 6108
Vg2 = 2000V
Vg1=400V
= 300V
= 200V
= 100V
= 0V
= − 100V
= −200V
ANODE CURRENT (A)
ANODE VOLTAGE (kV)
0
2
4
6
8
10
12
10
20
30
40
50
60
70
80
90

Codes: 4JC/300J
4JC/301J
4JC/302J

CONTINUED

STC

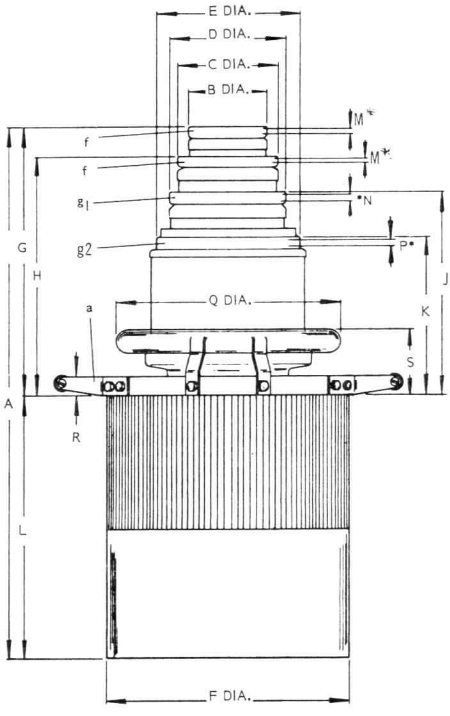



VL 6107
V_{g2} = 2000V
I_{g2} = 4
I_{g1} = 1
I_{g2} = 3
I_a = 60
I_{g1} = 0·5
I_{g2} = 2
I_a = 50
I_{g2} = 1
I_a = 40
I_{g2} = 0·5
I_a = 30
I_a = 20
I_a = 10
I_a = 0
ANODE CURRENT (A)
GRID CURRENT (A)
SCREEN CURRENT (A)
500
400
300
200
100
0
-100
-200
-300
-400
-500
0
2
4
6
8
10
12
CONTROL GRID VOLTAGE (V)
ANODE VOLTAGE (kV)

Code: 4JC/300J

CONTINUED

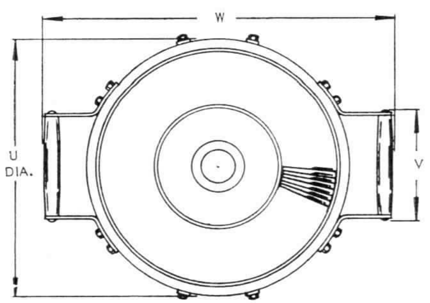
4JC/300J Outline

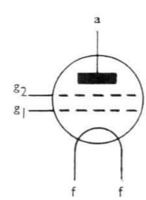


DIM.	INCHES	MILLIMETRES
A	21.1/8 MAX.	536,6 MAX.
B	3.065 ± 0.007	77,85 ± 0,18
C	3.940 ± 0.007	100,08 ± 0,18
D	4·521 ± 0·007	114,83 ± 0,18
E	5·660 ± 0·007	143,76 ± 0,18
F	9½ ± 1/16	241,3 ± 1,6
G	10.3/8 ±5/16	263,5 ± 7,9
H	9.9/32 ± 1/4	235,7 ± 6,4
J	7.15/16±3/16	201,6 ± 4,8
K	6.9/32 ± 3/32	159,5 ± 2,4
L	10.5/16 ± 1/16	261,9 ± 1,6
M	3/16 MIN. 5/16 MAX.	4,8 MIN. 7,9 MAX.
N	1/4 MIN. 3/8 MAX.	6,4 MIN. 9,5 MAX.
P	5/16 MIN. 3/8 MAX.	7,9 MIN. 9,5 MAX.
Q	8.13/16 MAX.	223,8 MAX.
R	3/4 ± 1/32	19,1 ± 0,8
S	2½ MAX.	63,5 MAX.
U	10¼ ± 1/32	260,4 ± 0,8
V	4.7/16 MAX.	112,7 MAX.
W	13¾ MAX.	349,3 MAX.

BASIC DIMS. ARE INCHES

• DENOTES:- CONTACT LENGTH

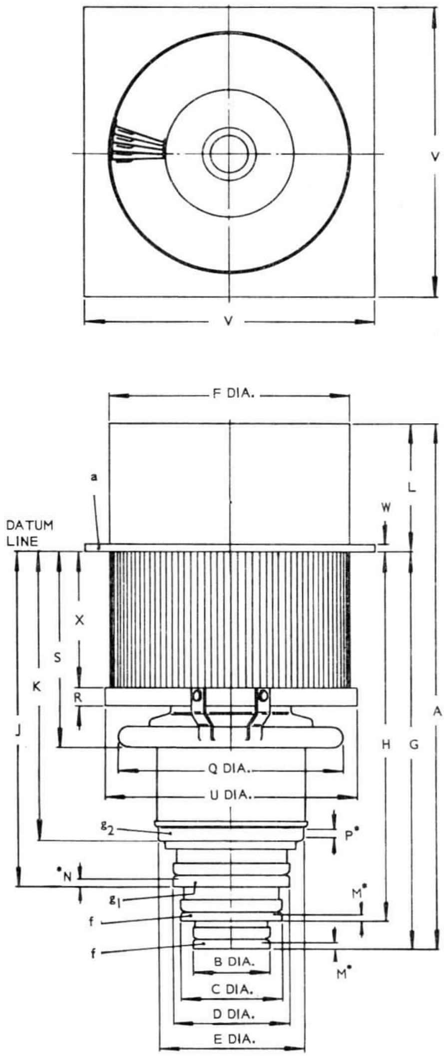




Code: 4JC/301J

CONTINUED

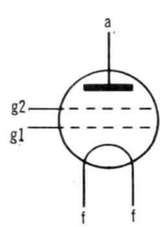
4JC/301J Outline



DIM.	INCHES	MILLIMETRES
A	21.1/16 MAX.	535,0 MAX.
B	3·065 ± 0·007	77,85 ± 0,18
C	3·940 ± 0·007	100,08 ± 0,18
D	4·521 ± 0·007	114,83 ± 0,18
E	5·660 ± 0·007	143,76 ± 0,18
F	9½ ± 1/16	241,3 ± 1,6
G	15.5/8 ± 5/16	396,9 ± 7,9
H	14.17/32 ± 1/4	369,1 ± 6,4
J	13.3/16 ± 3/16	335,0 ± 4,8
K	11.17/32 ± 3/32	292,9 ± 2,4
L	5.1/16 ± 1/16	128,6 ± 1,6
M	3/16 MIN. 5/16 MAX.	4,8 MIN. 8,0 MAX.
N	1/4 MIN. 3/8 MAX.	6,4 MIN. 9,5 MAX.
P	5/16 MIN. 3/8 MAX.	7,9 MIN. 9,5 MAX.
Q	8.13/16 MAX.	223,8 MAX.
R	3/4 ± 1/32	19,1 ± 0,8
S	7¾ MAX.	196,9 MAX.
U	10¼ ± 1/32	260,4 ± 0,8
V	11½ ± 1/32	292,1 ± 0,8
W	¼ ± 1/64	6,4 ± 0,4
X	5¼ ± 1/32	133,4 ± 0,8

BASIC DIMENSIONS ARE INCHES

* DENOTES: CONTACT LENGTH

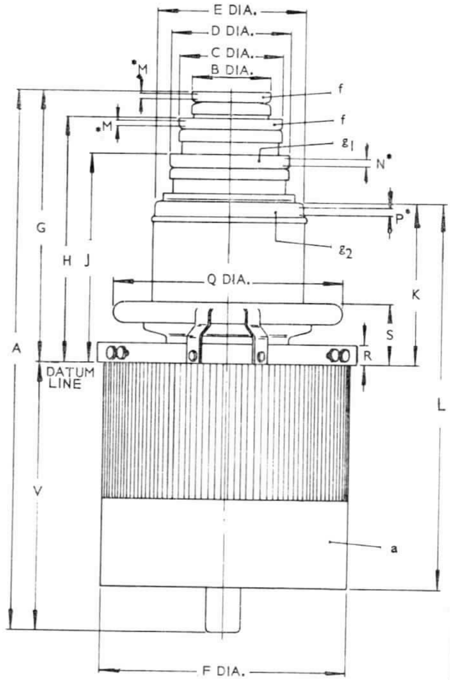


STC

Code: 4JC/302J

CONTINUED

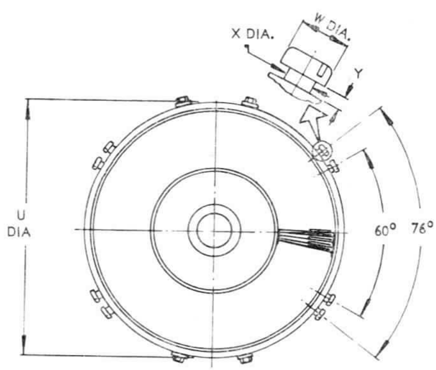
4JC/302J Outline

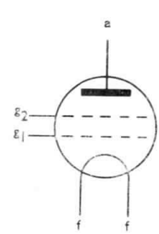


DIM.	INCHES	MILLIMETRES
A	20.15/16 MAX.	531,8 MAX.
B	3·065 ± 0·007	77,85 ± 0,18
C	3·940 ± 0·007	100,08 ± 0,18
D	4·521 ± 0·007	114,83 ± 0,18
E	5·660 ± 0·007	143,76 ± 0,18
F	9½ ± 1/16	241,3 ± 1,6
G	10.3/8 ± 5/16	263,5 ± 7,9
H	9.9/32 ± 1/4	235,7 ± 6,4
J	7.15/16 ± 3/16	201,6 ± 4,8
K	6.9/32 ± 3/32	159,5 ± 2,4
L	14½ ± 1/16	368,3 ± 1,6
M	3/16 MIN. 5/16 MAX.	4,8 MIN. 8,0 MAX.
N	1/4 MIN. 3/8 MAX.	6,4 MIN. 9,5 MAX.
P	5/16 MIN. 3/8 MAX.	7,9 MIN. 9,5 MAX.
Q	8.13/16 MAX.	223,8 MAX.
R	3/4 ± 1/32	19,1 ± 0,8
S	2½ MAX.	63,5 MAX.
U	10¼ ± 1/32	260,4 ± 0,8
V	10.3/16 ± 1/16	258,8 ± 1,6
W	½ ± 1/64	12,7 ± 0,4
X	0·281 ± 0·007	7,14 ± 0,18
Y	0·125 ± 0·007	3,18 ± 0,18

BASIC DIMENSIONS ARE INCHES

* DENOTES CONTACT LENGTH





STC VALVES

PROVISIONAL DATA

Conduction Cooled U.H.F. Power Tetrode

Code: 4KC/160M

The type 4KC/160M is a compact conduction-cooled power tetrode, electrically similar to the 4CX250B (4HC/160M), with an external anode and a metal-ceramic envelope. It is suitable for operating frequencies up to 500 MHz.

CATHODE

Indirectly-heated, oxide coated		
Heater voltage (Note 1)	6	V
Heater current, nominal (Note 1)	2·6	A
Minimum cathode heating time	30	s

NOTE 1.—See Application Notes section, page 4

CHARACTERISTICS

Screen grid amplification factor (μ)	$\left\{ \begin{array}{c} \text{Measured at} \\ V_{g2} = 300, I_{g2} = 50\text{mA} \\ \text{with anode floating} \end{array} \right\}$	5·2

DIRECT INTERELECTRODE CAPACITANCES

Input, nominal	16·5	pF
Output, nominal	4·5	pF
Output, with HS10A insulating block	7·5	pF
Anode to grid, maximum	0·03	pF

MECHANICAL DATA

Dimensions	As shown in Figure 5			
Base	B8F			
Mounting position	Unrestricted			
Net weight, approx.		10·5 oz	297,7	g
Thermal resistance, seal to thermal contact area			0·03	°C/W
Thermal contact area		1·125 in²	7,2	cm²

COOLING REQUIREMENTS

Sufficient cooling must be provided to the base, anode and screen-grid seals to prevent their temperatures exceeding the maximum permissible rating of 250°C (Note 2). Arrangements must be made to provide adequate heat transfer paths from all thermal contact areas.

Flat thermal contact areas are provided on the sides of the anode to facilitate bolting to a suitable heat sink. If it is necessary to electrically insulate the anode from the heat sink, a beryllia insulator should be used: an approved beryllia insulating block is available under code HS10A, an outline drawing of which is shown in Figure 6.

The valve socket should be of a type incorporating a bypassing capacitor and eight fingers which bear on the screened grid ring of the valve. The heat from this ring can then be conducted to the equipment chassis and, if necessary, the chassis can be connected to an additional heat sink. Before the valve socket is attached to the chassis, it should be allowed to float whilst the valve is inserted and the anode connected.

Standard Telephones and Cables Limited

Valve Division, Brixham Road, Paignton, Devon

Telephone: Paignton 50762 Telex: 4230

London Sales Office, Telephone: Footscray 3333 Telex: 21836

COMPONENTS GROUP

Code: 4KC/160M

CONTINUED

It is essential to provide a good thermal connection to the valve grid spigot. Commercial type sockets do not always do this. The grid spigot is provided with a hole designed to accept a bifurcated pin fitted to the valve holder. A small heat radiating plate is then attached to the base of the pin.

All joints which have to make thermal connection should be coated with heat sink compound before assembly.

NOTE 2.—A convenient method of measuring temperature is to use temperature sensitive paints such as those manufactured under the trade name 'TEMPILAQ' by the Tempil Corporation U.S.A.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS AB_1. LINEAR R.F. POWER AMPLIFIER

Maximum Ratings

Maximum direct anode voltage	2 000	V
Maximum direct screen grid voltage	400	V
Maximum direct anode current	250	mA
Maximum anode dissipation	250	W
Maximum screen grid dissipation	12	W
Maximum control grid dissipation	2	W

Typical Operating Conditions

Direct anode voltage	1 000	1 500	2 000	V
Direct screen grid voltage	350	350	350	V
Direct control grid voltage, approx. (Note 3)	−50	−50	−50	V
Direct anode current (zero signal)	100	100	100	mA
Direct anode current (maximum single-tone signal)	250	250	250	mA
Direct screen current (maximum single-tone signal)	25	20	15	mA
Power output (maximum single-tone signal)	125	225	325	W
Direct anode current (maximum two-tone signal)	175	175	175	mA
Direct screen current (maximum two-tone signal)	15	12	9	mA
Peak envelope power (maximum two-tone signal)	125	225	325	W
Peak r.f. grid voltage (Note 4)	50	50	50	V
3rd order intermodulation distortion products (Note 5)	−31	−31	−30	dB
5th order intermodulation distortion products	−45	−50	−50	dB

NOTE 3.—Adjust grid voltage to obtain specified zero-signal anode current.

NOTE 4.—The peak r.f. control grid voltage is the same under both single-tone and two-tone maximum conditions; the level of the single tone being reduced by 6 dB when the second tone is added. The second tone is then set to the same level as the first.

NOTE 5.—Intermodulation distortion products are measured with respect to either tone.

Code: 4KC/160M

CONTINUED

CLASS AB_1 A.F. AMPLIFIER OR MODULATOR (For balanced 2-valve operation)

Maximum Ratings (per valve)

Maximum direct anode voltage	2 000	V
Maximum direct anode current	250	mA
Maximum direct anode dissipation	250	W
Maximum direct screen grid voltage	400	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid dissipation	2	W

Typical Operating Conditions

Direct anode voltage	1 000	1 500	2 000	
Direct screen grid voltage	350	350	350	V
Direct control grid voltage (Note 6)	−50	−50	−50	V
Total direct anode current, zero signal	200	200	200	mA
Total direct anode current, maximum signal	500	500	500	mA
Total direct screen grid current, maximum signal	50	40	30	mA
Peak a.f. signal (grid to grid) voltage	100	100	100	V
Effective load resistance anode to anode	3 260	5 760	8 260	Ω
Power output (approx.) maximum signal	250	450	650	W

NOTE 6.—Adjust grid voltage to obtain specified zero signal anode current.

CLASS C R.F. POWER AMPLIFIER. Anode subject to modulation
(Carrier conditions for use with 100 per cent modulation)

Maximum Ratings

Maximum direct anode voltage	1 500	V
Maximum direct anode current	200	mA
Maximum direct anode dissipation	165	W
Maximum direct screen grid voltage	300	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid voltage	−250	V
Maximum direct control grid dissipation	2	W
Maximum frequency for above ratings	500	MHz

Typical Operating Conditions up to 175 MHz

Direct anode voltage	500	1 000	1 500	V
Direct screen grid voltage	250	250	250	V
Direct control grid voltage	−100	−100	−100	V
Direct anode current	200	200	200	mA
Direct screen grid current	45	35	25	mA
Direct control grid current, approx.	22	19	17	mA
Peak r.f. control grid voltage	124	122	121	V
Control grid drive power, approx.	2·7	2·3	2·1	W
Useful power output, approx.	75	160	250	W

Code: 4KC/160M

CONTINUED

CLASS C. R.F. POWER AMPLIFIER OR OSCILLATOR. UNMODULATED

Maximum Ratings

Maximum direct anode voltage	2 000	V
Maximum direct anode current	250	mA
Maximum direct anode dissipation	250	W
Maximum direct screen grid voltage	300	V
Maximum direct screen grid dissipation	12	W
Maximum direct control grid voltage	−250	V
Maximum direct control grid dissipation	2	W
Maximum frequency for above ratings	500	MHz

Typical Operating Conditions

At frequencies up to 175 MHz

Direct anode voltage	500	1 000	1 500	2 000	V
Direct screen grid voltage	250	250	250	250	V
Direct control grid voltage	−90	−90	−90	−90	V
Direct anode current	250	250	250	250	mA
Direct screen grid current	45	35	30	25	mA
Direct control grid current, approx.	32	28	28	27	mA
Peak r.f. control grid voltage	118	116	116	115	V
Control grid drive power, approx.	3·6	3·2	3·2	2·8	W
Useful power output, approx.	85	195	300	400	W

At 500 MHz in a coaxial cavity

Direct anode voltage	1 500	2 000	V
Direct screen grid voltage	300	300	V
Direct control grid voltage, approx.	−90	−90	V
Direct anode current	250	250	mA
Direct screen grid current	5	5	mA
Direct control grid current	5	4	mA
Control grid drive power, approx.	30	35	W
Useful power output, approx.	180	260	W

APPLICATION NOTES

At frequencies up to 300MHz, the 4KC/160M heater should be operated at the rated value of 6 volts.

At frequencies above 300MHz, back-heating of the cathode occurs and must be compensated for by a reduction in heater voltage to obtain increased life.

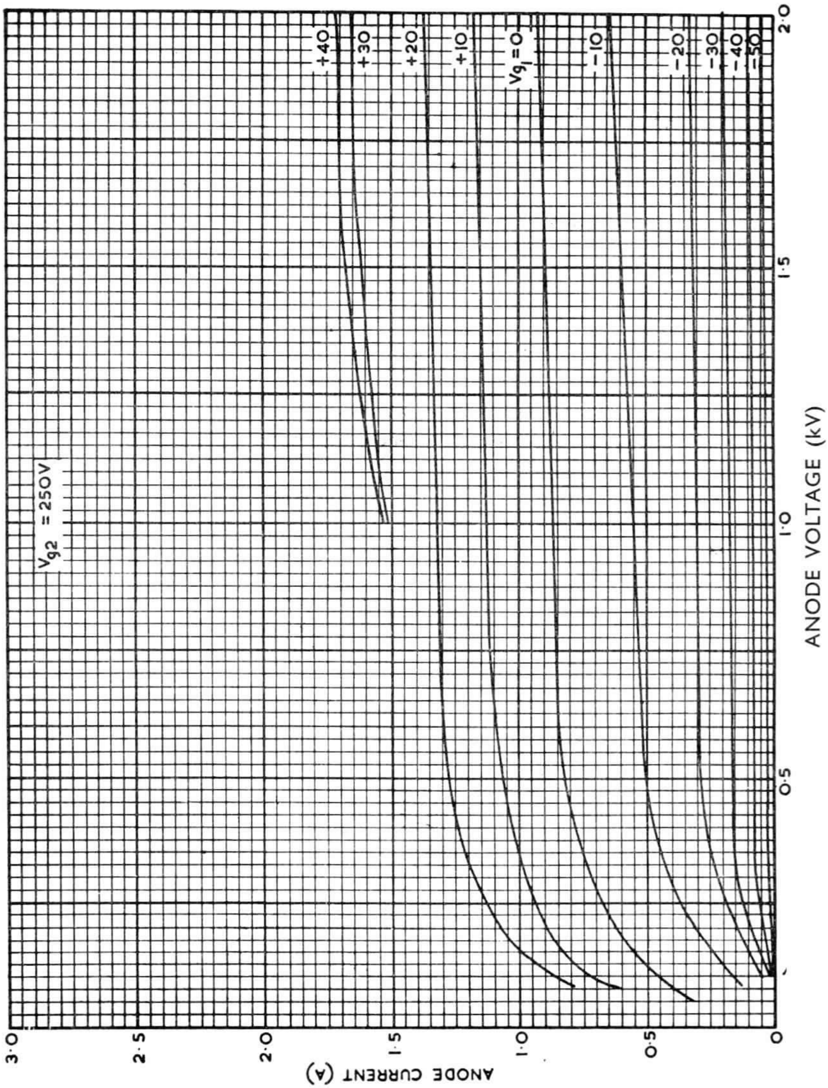
The figures given below apply to straight-through amplifier operation.

Frequency (MHz)	Heater Voltage (V)
Up to 300	6
301 to 400	5·75
401 to 500	5·5

Code: 4KC/160M

CONTINUED

Figure 1. Anode Characteristics (V_{g_2} = 250 V)



Code: 4KC/160M

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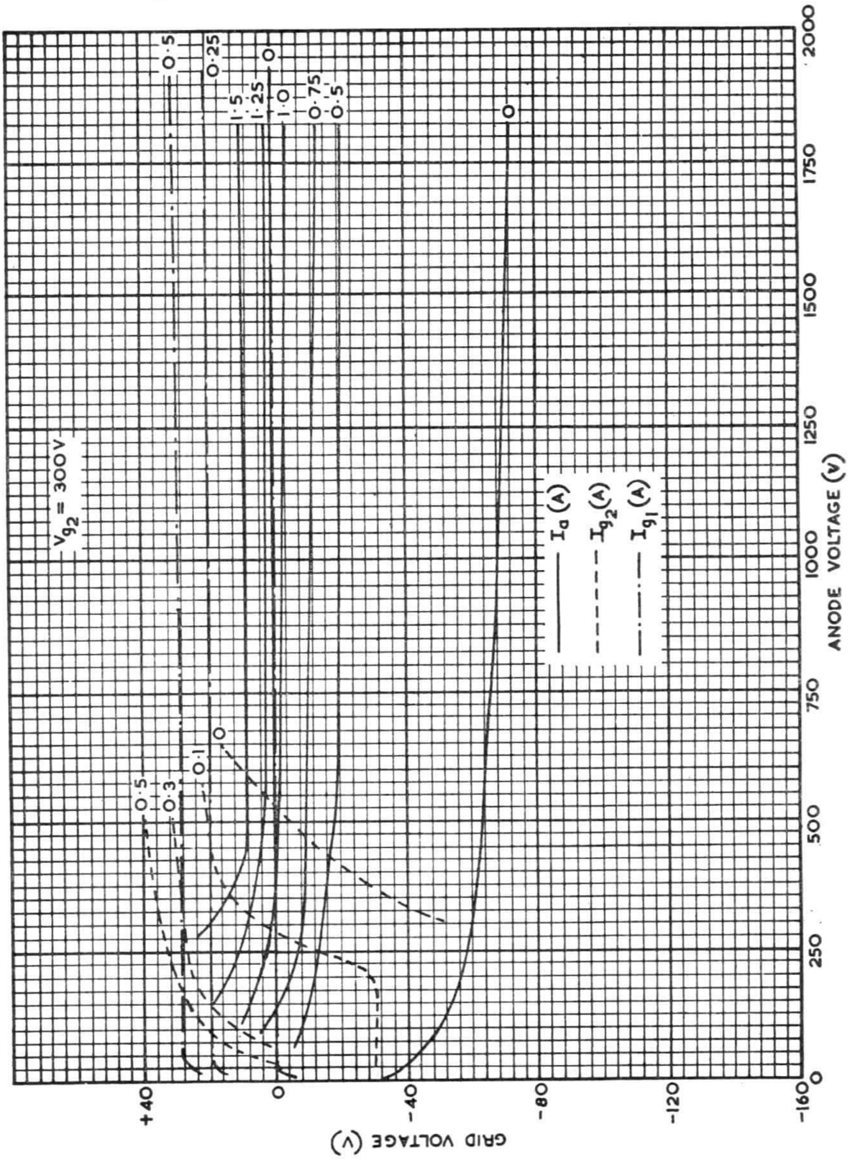
Figure 2. Constant Current Characteristics (V_{g2} = 300 V)



Code: 4KC/160M

CONTINUED

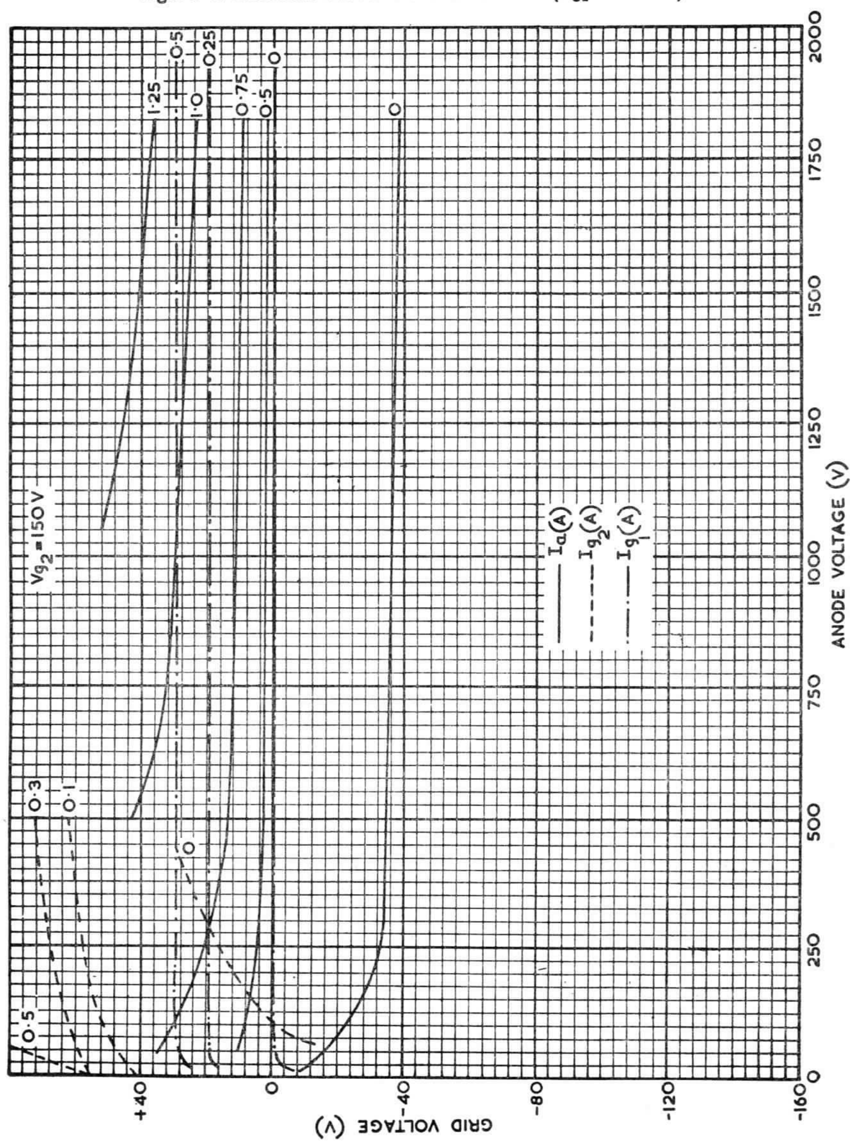
Figure 3. Constant Current Characteristics: $V_{g2} = 250$ V

STC

Code: 4KC/160M

CONTINUED

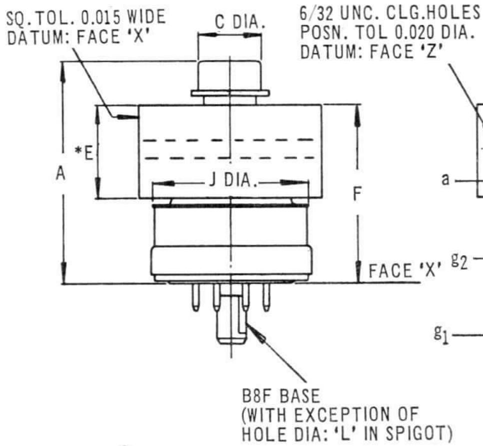
Figure 4. Constant Current Characteristics (V_{g_2} = 150 V)

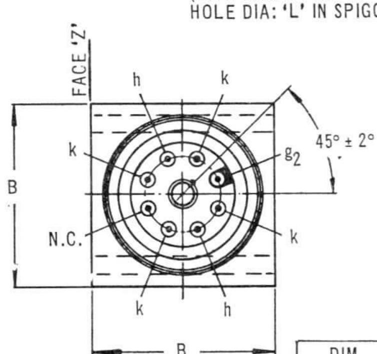


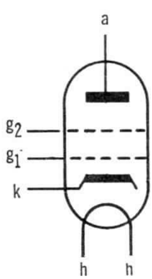
Code: 4KC/160M

CONTINUED

Fig. 5.—4KC/160M Outline







DIM.	MILLIMETRES	INCHES
A	49,53 MAX.	1.950 MAX.
B	41,28 ± 0,08	1.625 ± 0.003
C	14,38 ± 0,18	0.566 ± 0.007
D	31,75 T.P.	1.250 T.P.
E	20,57 ± 0,38	0.810 ± 0.015
F	40,13 MAX.	1.580 MAX.
G	29,08 T.P.	1.145 T.P.
H	7,24 ± 0,18	0.285 ± 0.007
J	36,56 MAX.	1.400 MAX.
K	7,92 ± 0,51	0·312 ± 0·020
L	3,99 ± 0.13	0.157 ± 0.005

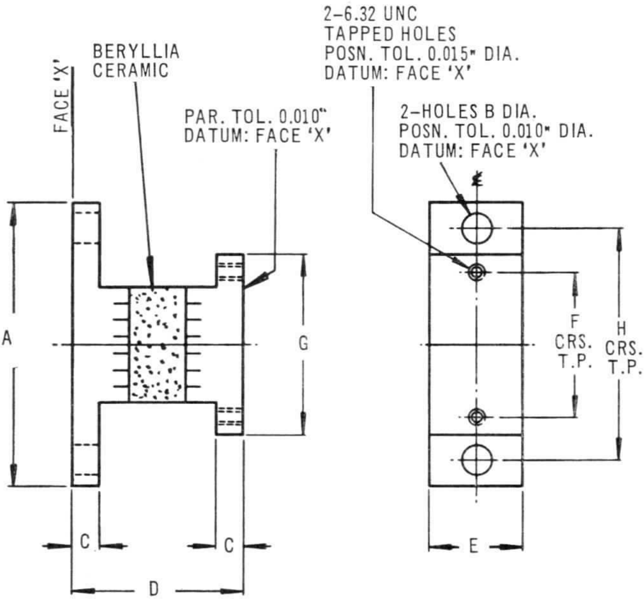
TOLERANCES TO BS 308. 1964

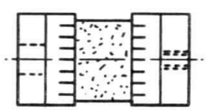
* DENOTES: CONTACT AREA

BASIC DIMENSIONS ARE INCHES

Code: BERYLLIA INSULATING BLOCK HS 10A

Fig. 6.—HS10A Outline





DIM.	MILLIMETRES		INCHES	
A	63,5	MAX.	$2\frac{1}{2}$	MAX.
B	6.73	± 0,13	0.265	± 0.005
C	6,4	± 0,4	$\frac{1}{4}$	± 1/64
D	38,1	± 0,64	1.500	± 0.025
E	20,6	± 0,8	$\frac{13}{16}$	± $\frac{1}{32}$
F	31,75	T.P.	1.250	T.P.
G	41.3	± 0,8	$1\frac{5}{8}$	± $\frac{1}{32}$
H	50.8	T.P.	2.000	T.P.

BASIC DIMS. ARE INCHES

TOLERANCES TO BS 308. 1964

SPECIAL VALVES

Water-Cooled
High Power Tetrode

Code: 4QC/300J

The 4QC/300J has a ceramic-metal envelope and is designed for operation up to 30MHz at full ratings and to at least 50 MHz at reduced ratings.

Vapour-cooled and forced-air-cooled versions of this valve are available under codes 4ZC/300J and 4JC/300J respectively.

CATHODE

Thoriated tungsten filament		
Filament voltage	8	V
Filament current, nominal	300	A
Maximum usable emission	75	A

CHARACTERISTICS

Inner amplification factor	5·4	
Mutual conductance (at $V_{g1} = 0$, $V_{g2} = 1{\cdot}2$kV)	100	mA/V

DIRECT INTERELECTRODE CAPACITANCES

Input	300	pF
Output	32	pF
Anode to grid 1	1·5	pF

MECHANICAL DATA

Dimensions	As shown in Figure 8
Mounting position	Vertical, anode downwards
Water jacket	Type JK115A, as shown in Figure 9

Filament and grid connector rings are available separately under the following codes:

CN–2A	Filament connector, smaller
CN–2B	Filament connector, larger
CN–2C	Grid 1 connector, plain
CN–2D	Grid 2 connector with corona ring to match corona ring fitted to anode

COOLING REQUIREMENTS

The anode must be cooled by an adequate water flow through the water jacket (see Figure 7). Typically, for an anode dissipation of 40kW:

Water flow required	15 gal/min	68,2 l/min
At a water pressure drop of	4·5 lb/in²	0,32 kg/cm²

Forced-air-cooling of grid and filament seals and ceramic envelope is needed to limit their temperature to below a maximum permissible value of 225°C. It is recommended that an air flow of 75 ft³/min (2,2 m³/min) be directed downwards over the filament and grid 1 seals from a suitable orifice. An additional 25 ft³/min (0,7 m³/min) should be directed over the grid 2 seal and the envelope by means of the grid 2 corona ring (code CN–2D) which is provided with distributed air holes and a suitablee hose connection.

Standard Telephones and Cables Limited
Valve Division, Brixham Road, Paignton, Devon
Telephone: Paignton 50762 Telex: 4230
London Sales Office, Telephone: Footscray 3333 Telex: 21836
C O M P O N E N T S G R O U P

STC

Code: 4QC/300J

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS AB_1. LINEAR R.F. POWER AMPLIFIER

Maximum Ratings

Maximum direct anode voltage	14	kV
Maximum direct screen voltage	2·5	kV
Maximum anode dissipation	40	kW
Maximum screen dissipation	1·2	kW
Maximum grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

Typical Operating Conditions

Direct anode voltage	10	12	kV
Direct screen grid voltage	1·5	2	kV
Direct control grid voltage (Note 1)	−230	−310	V
Direct anode current (zero signal)	1	1·5	A
Direct anode current (maximum single-tone signal)	5·1	6·8	A
Direct screen grid current (maximum single-tone signal)	0·25	0·425	A
Power output (maximum single-tone signal)	32·5	51·5	kW
Direct anode current (maximum two-tone signal)	3·3	4·45	A
Direet screen grid current (maximum two-tone signal)	0·125	0·21	A
Peak envelope power (maximum two-tone signal)	32·5	51·5	kW
Peak r.f. control grid voltage (Note 2)	230	310	V
3rd order intermodulation distortion products (Note 3)	−40	−40	dB
5th order intermodulation distortion products	−46	−46	dB

NOTE 1.—Adjust control grid voltage to obtain specified zero signal anode current.

NOTE 2.—The peak r.f. control grid voltage is the same under both single-tone and two-tone maximum conditions; the level of the single tone being reduced by 6dB when the second tone is added. The second tone is then set to the same level as the first.

NOTE 3.—Intermodulation distortion products are measured with respect to either tone.

Code: 4QC/300J

CONTINUED

CLASS C. AMPLIFIER. ANODE AND SCREEN MODULATED

(Carrier conditions for use with 100 per cent modulation)

Maximum Ratings

Maximum direct anode voltage	11	kV
Maximum direct screen grid voltage	2	kV
Maximum anode dissipation	27	kW
Maximum screen grid dissipation	800	W
Maximum control grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

Typical Operating Conditions

Direct anode voltage	10	10	kV
Direct screen grid voltage	1·5	1·5	kV
Direct control grid voltage	−690	−770	V
Direct anode current	5·7	6·7	A
Direct screen grid current	0·34	0·5	A
Direct control grid current	80	100	mA
Peak r.f. grid voltage	860	1 010	V
Drive power	70	105	W
Anode dissipation	15	17	kW
Screen grid dissipation	510	750	W
Control grid dissipation	14	25	W
Efficiency	74	75	%
Power output	42	50	kW
Power into load at 85% transfer efficiency	36	42	kW

CLASS C. AMPLIFIER. UNMODULATED

Maximum Ratings

Maximum direct anode voltage	14	kV
Maximum direct screen grid voltage	2·5	kV
Maximum anode dissipation	40	kW
Maximum screen grid dissipation	1·2	kW
Maximum control grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

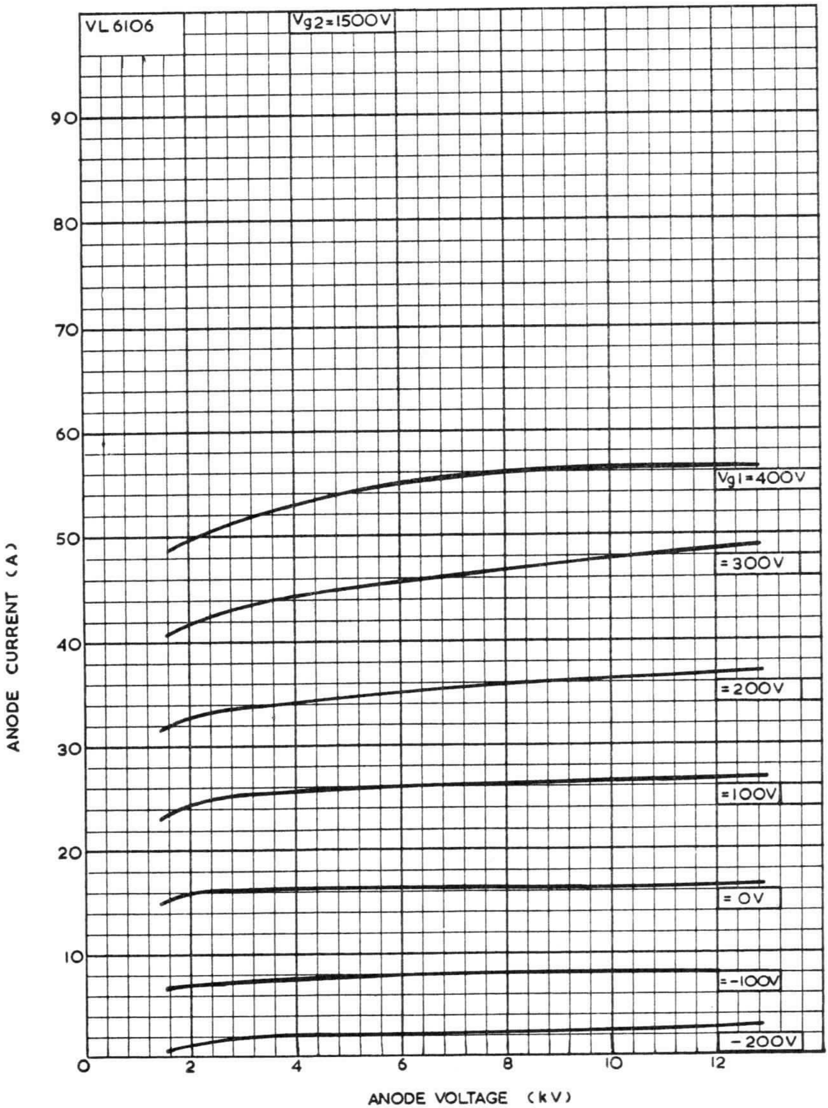
Typical Operating Conditions

Direct anode voltage	13	10	kV
Direct screen grid voltage	2	1·5	kV
Direct control grid voltage	−655	−574	V
Direct anode current	10·1	10·1	A
Direct screen grid current	0·5	0·75	A
Direct control grid current	0·09	0·3	A
Peak r.f. grid voltage	905	924	V
Control grid drive power	83	276	W
Anode dissipation	30	30	kW
Power output	100	71	kW
Power into load at 85% transfer efficiency	85	61	kW

Code: 4QC/300J

CONTINUED

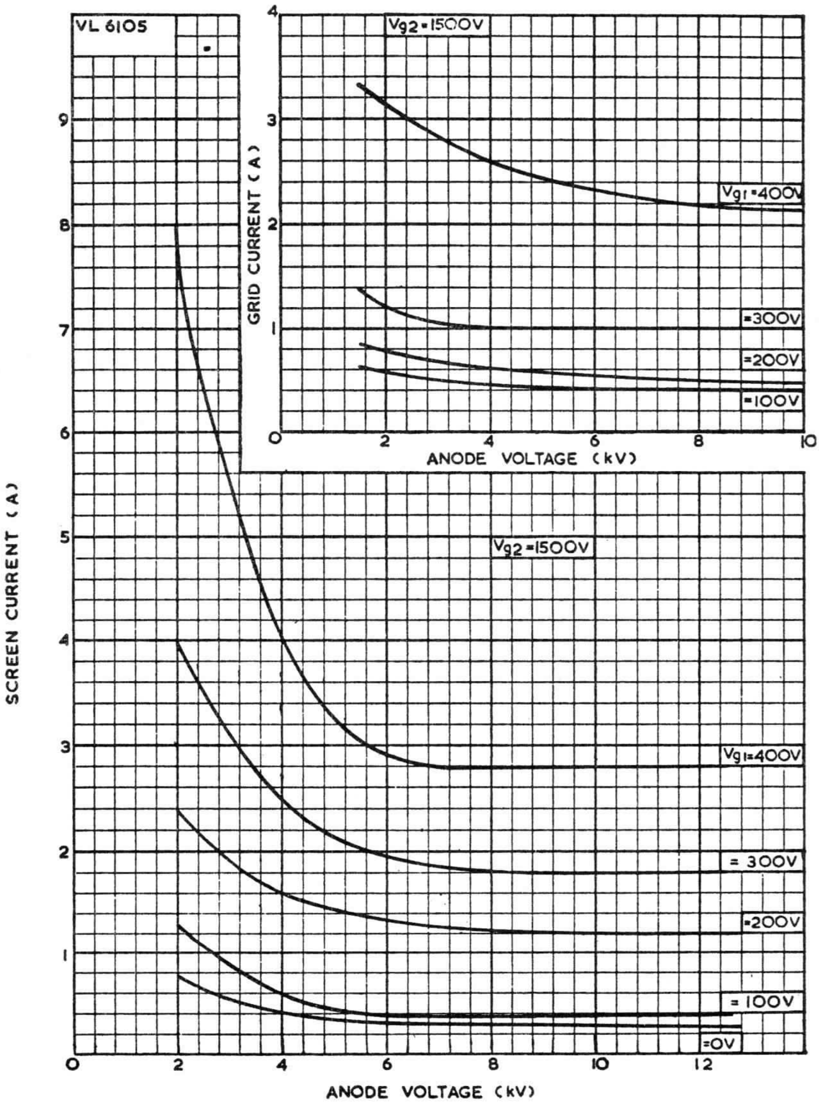
Fig. 1.—Anode Current versus Anode Voltage



Code: 4QC/300J

CONTINUED

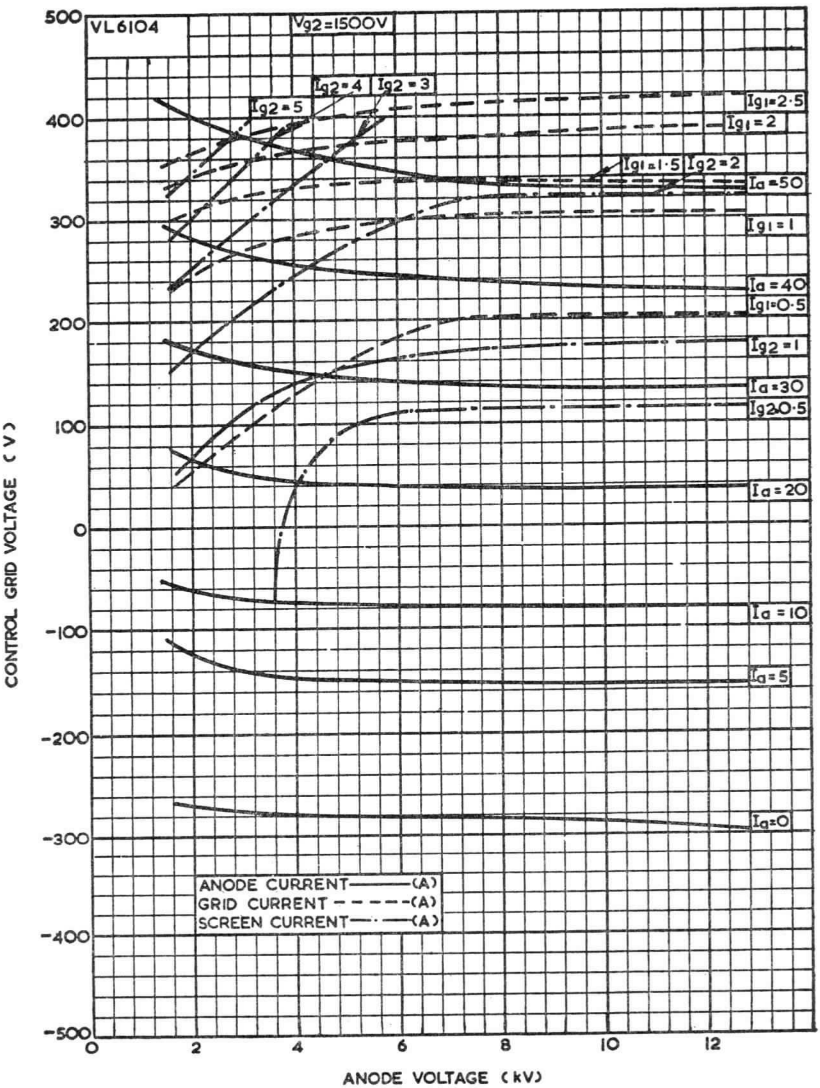
Fig. 2.—Screen Current versus Anode Voltage



Code: 4QC/300J

CONTINUED

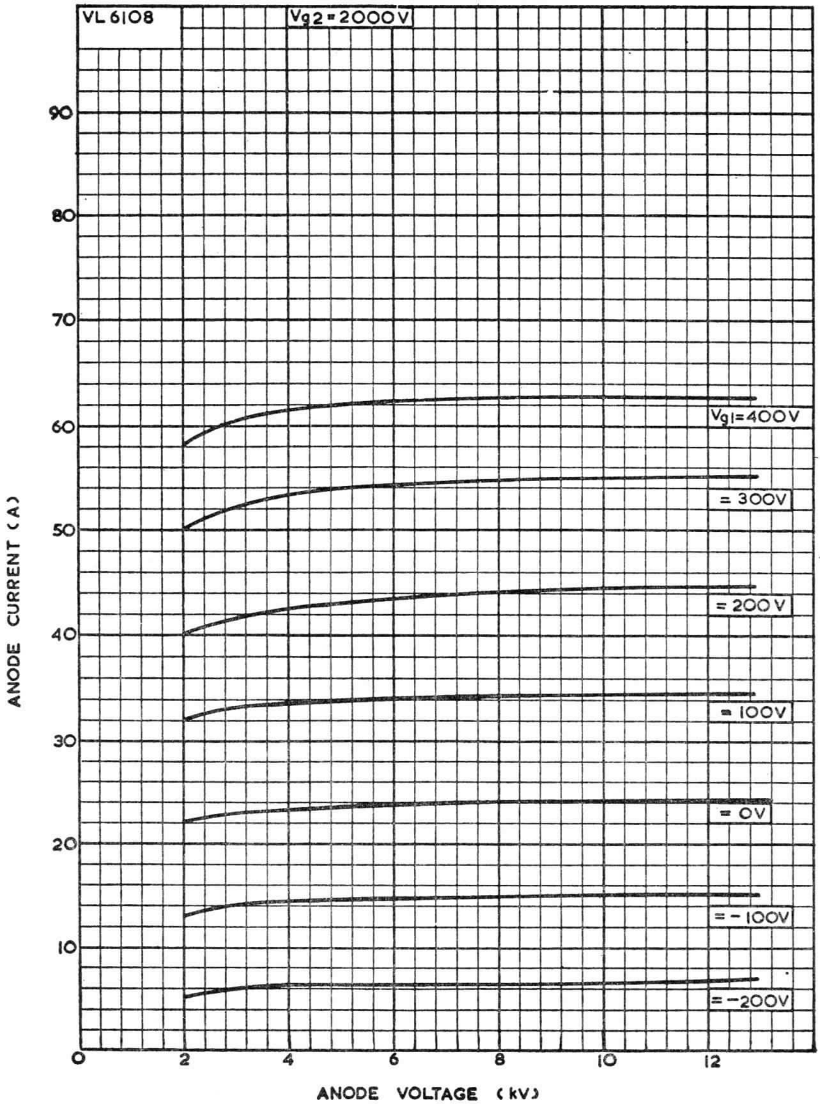
Fig. 3.—Control Grid Voltage versus Anode Voltage



Code: 4QC/300J

CONTINUED

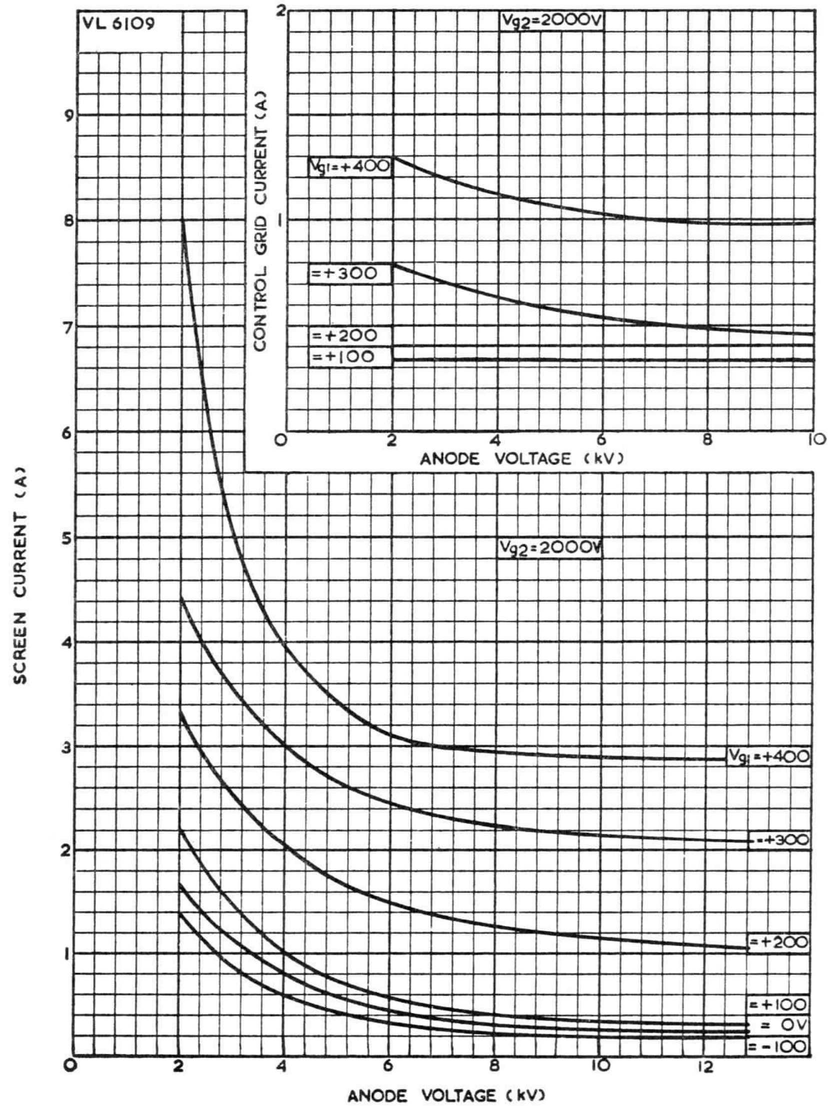
Fig. 4.—Anode Current versus Anode Voltage



Code: 4QC/300J

CONTINUED

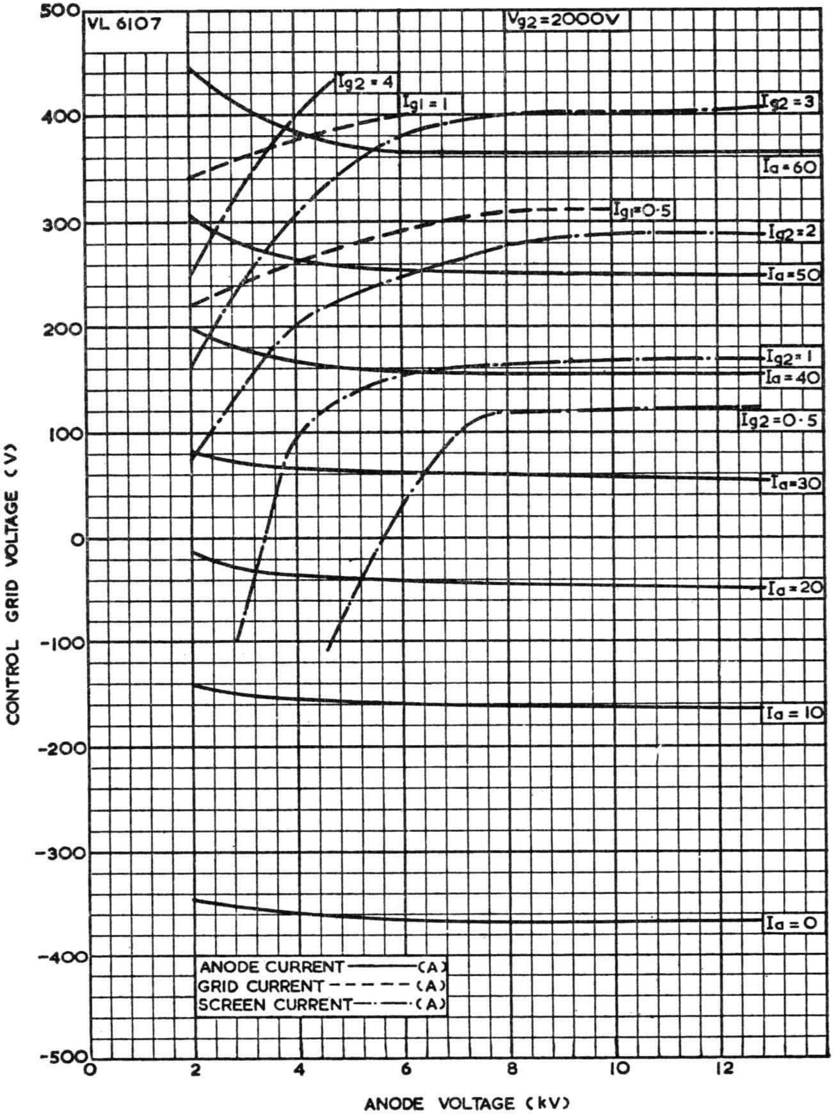
Fig. 5.—Screen Current and Control Grid Current versus Anode Voltage



Code: 4QC/300J

CONTINUED

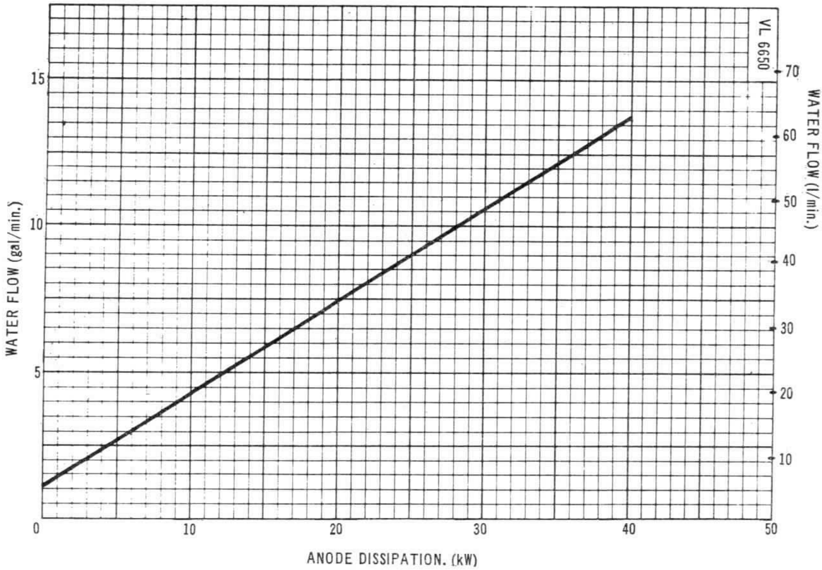
Fig. 6.—Control Grid Voltage versus Anode Voltage

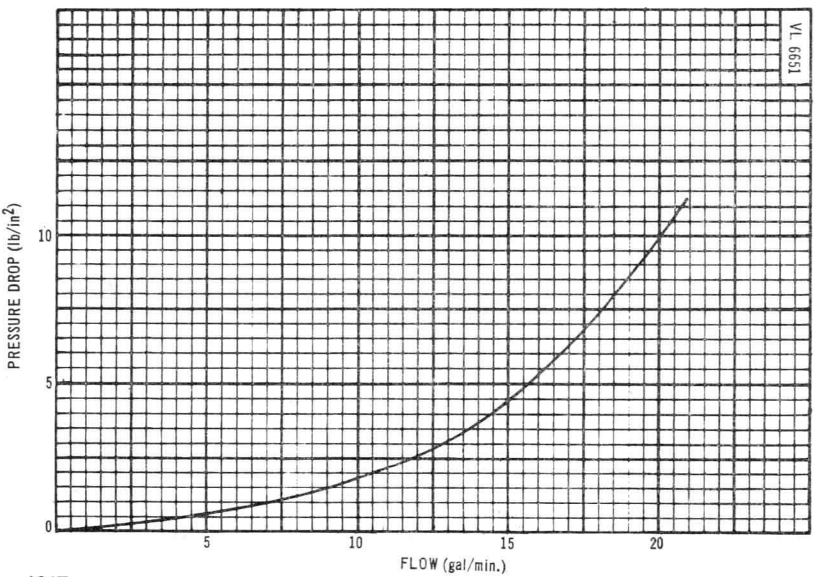


Code: 4QC/300J

CONTINUED

Fig. 7.—Cooling Characteristics

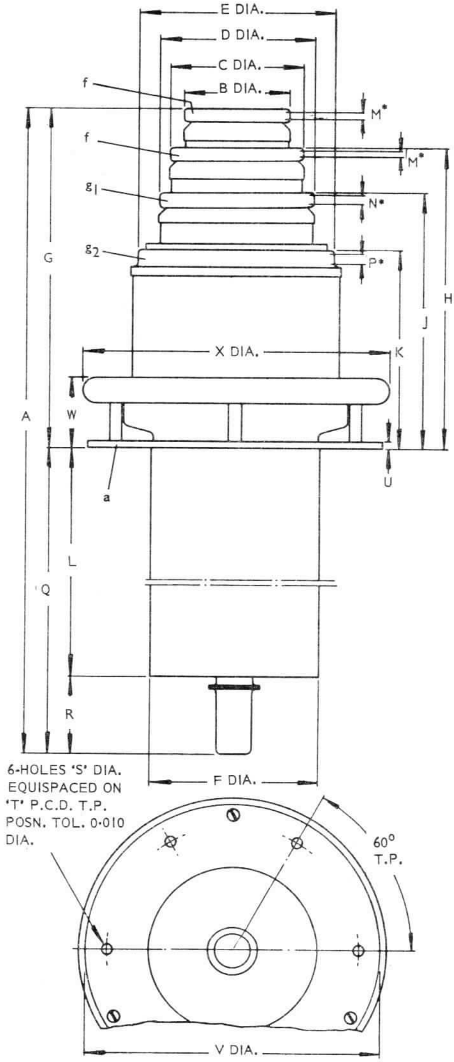




Code: 4QC/300J

CONTINUED

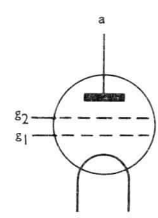
Fig. 8.—4QC/300J Outline



DIM.	INCHES	MILLIMETRES
A	20.15/16 MAX.	531,8 MAX.
B	3·065 ± 0·007	77,85 ± 0,18
C	3·940 ± 0·007	100,08 ± 0,18
D	4·521 ± 0·007	114,83 ± 0,18
E	5·660 ± 0·007	143,76 ± 0,18
F	4.15/16 MAX.	125,4 MAX.
G	9.13/16 ± 5/16	249,2 ± 7,9
H	8.23/32 ± 1/4	221,5 ± 6,4
J	7.3/8 ± 3/16	187,3 ± 4,8
K	5.23/32 ± 3/32	145,3 ± 2,4
L	8.7/16 ± 1/32	214,3 ± 0,8
M	3/16 MIN. 5/16 MAX.	4,8 MIN. 8,0 MAX.
N	1/4 MIN. 3/8 MAX.	6,4 MIN. 9,5 MAX.
P	5/16 MIN. 3/8 MAX.	7,9 MIN. 9,5 MAX.
Q	10.23/32 ± 3/32	272,3 ± 2,4
R	2.9/32 NOM.	57,9 NOM.
S	0·330 ± 0·007	8,38 ± 0,18
T	7·250 NOM.	184,15 NOM.
U	3/16 ± 1/64	4,8 ± 0,4
V	8½ ± 1/32	215,9 ± 0,8
W	1.7/8 MAX.	47,6 MAX.
X	8.13/16 MAX.	223,8 MAX.

BASIC DIMENSIONS ARE INCHES

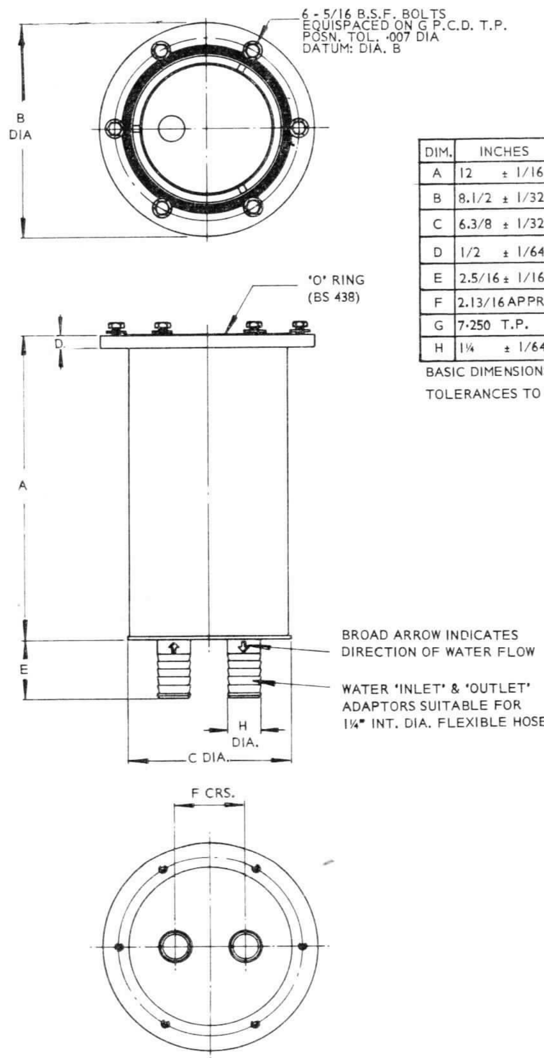
* DENOTES: CONTACT LENGTH TOLERANCES TO BS 308 1964



STC

Water Jacket
Code: JK115A

Fig. 9.—JK115A Outline



DIM.	INCHES	MILLIMETRES
A	12 ± 1/16	304,8 ± 1,6
B	8.1/2 ± 1/32	215,9 ± 0,8
C	6.3/8 ± 1/32	161,9 ± 0,8
D	1/2 ± 1/64	12,7 ± 0,4
E	2.5/16 ± 1/16	58,7 ± 1,6
F	2.13/16 APPROX.	71,4 APPROX.
G	7·250 T.P.	184,15 T.P.
H	1¼ ± 1/64	31,8 ± 0,4

BASIC DIMENSIONS ARE INCHES

TOLERANCES TO BS 308. 1964

SPECIAL VALVES

Vapour-Cooled

High Power Tetrode

Code: 4ZC/300J

The 4ZC/300J has a ceramic-metal envelope and is designed for operation up to 30MHz at full ratings and to at least 50MHz at reduced ratings.

Forced-air-cooled and water-cooled versions of this valve are available under codes 4JC/300J and 4QC/300J respectively.

CATHODE

Thoriated tungsten filament		
Filament voltage	8	V
Filament current, nominal	300	A
Maximum usable emission	75	A

CHARACTERISTICS

Inner amplification factor	5·4	
Mutual conductance (at $V_{g1} = 0$, $V_{g2} = 1{\cdot}2$kV)	100	mA/V

DIRECT INTERELECTRODE CAPACITANCES

Input	300	pF
Output	32	pF
Anode to grid 1	1·5	pF

MECHANICAL DATA

Dimensions, Connection detail: As shown in outline drawing

Mounting position: Vertical, anode downwards

Filament and grid connector rings are available separately under the following codes:—

- CN-2A Filament connector, smaller
- CN-2B Filament connector, larger
- CN-2C Grid 1 connector, plain
- CN-2E Grid 2 connector with corona ring (to match ring on boiler B115A)

Standard Telephones and Cables Limited
Valve Division, Brixham Road, Paignton, Devon
Telephone: Paignton 50762 Telex: 4230
London Sales Office, Telephone: Footscray 3333
C O M P O N E N T S G R O U P

Code: 4ZC/300J

CONTINUED

COOLING REQUIREMENTS

The anode is cooled by vaporisation of water in an approved boiler. Either a water-cooled or an air-cooled condenser may be used. Technical advice on the cooling installation is available on request to the manufacturer.

Boiler code B115A

For maximum anode dissipation

Water flow required to a water-cooled condenser	5 gal/min	22,7	1/min
Air flow required to an air-cooled condenser	1 000 ft³/min	28,3	m³/min

Forced-air-cooling of grid and filament seals and ceramic envelope is needed to limit their temperature to below a maximum of 225°C. It is recommended that an air flow of 75 ft³/min (2,2 m³/min) be directed downwards over the filament and grid 1 seals from a suitable orifice. An additional 25 ft³/min (0,7 m³/min) should be directed over the grid 2 seal and the envelope by means of the grid 2 corona ring (code CN–2E) which is provided with distributed air holes and a suitable hose connection.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS AB_1. LINEAR R.F. POWER AMPLIFIER

Maximum Ratings

Maximum direct anode voltage	14	kV
Maximum direct screen voltage	2·5	kV
Maximum anode dissipation	40	kW
Maximum screen dissipation	1·2	kW
Maximum grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

Typical Operating Conditions

Direct anode voltage	10	12	kV
Direct screen grid voltage	1·5	2	kV
Direct control grid voltage (Note 1)	−230	−310	V
Direct anode current (zero signal)	1	1·5	A
Direct anode current (maximum single-tone signal)	5·1	6·8	A
Direct screen grid current (maximum single-tone signal)	0·25	0·425	A
Power output (maximum single-tone signal)	32·5	51·5	kW
Direct anode current (maximum two-tone signal)	3·3	4·45	A
Direct screen grid current (maximum two-tone signal)	0·125	0·21	A
Peak envelope power (maximum two-tone signal)	32·5	51·5	kW
Peak r.f. control grid voltage (Note 2)	230	310	V
3rd order intermodulation distortion products (Note 3)	−40	−40	dB
5th order intermodulation distortion products	−46	−46	dB

NOTE 1.—Adjust control grid voltage to obtain specified zero signal anode current.

NOTE 2.—The peak r.f. control grid voltage is the same under both single-tone and two-tone maximum conditions; the level of the single tone being reduced by 6dB when the second tone is added. The second tone is then set to the same level as the first.

NOTE 3.—Intermodulation distortion products are measured with respect to either tone.

Code: 4ZC/300J

CONTINUED

CLASS C. AMPLIFIER. Anode and Screen Modulated

(Carrier conditions for use with 100 per cent modulation)

Maximum Ratings

Maximum direct anode voltage	11	kV
Maximum direct screen grid voltage	2	kV
Maximum anode dissipation	27	kW
Maximum screen grid dissipation	800	W
Maximum control grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

Typical Operating Conditions

Direct anode voltage	10	10	kV
Direct screen grid voltage	1·5	1·5	kV
Direct control grid voltage	−690	−770	V
Direct anode current	5·7	6·7	A
Direct screen grid current	0·34	0·5	A
Direct control grid current	80	100	mA
Peak r.f. grid voltage	860	1 010	V
Drive power	70	105	W
Anode dissipation	15	17	kW
Screen grid dissipation	510	750	W
Control grid dissipation	14	25	W
Efficiency	74	75	%
Power output	42	50	kW
Power into load at 85 per cent transfer efficiency	36	42	kW

CLASS C. AMPLIFIER. UNMODULATED

Maximum Ratings

Maximum direct anode voltage	14	kV
Maximum direct screen grid voltage	2·5	kV
Maximum anode dissipation	40	kW
Maximum screen grid dissipation	1·2	kW
Maximum control grid dissipation	300	W
Maximum frequency for above ratings	30	MHz

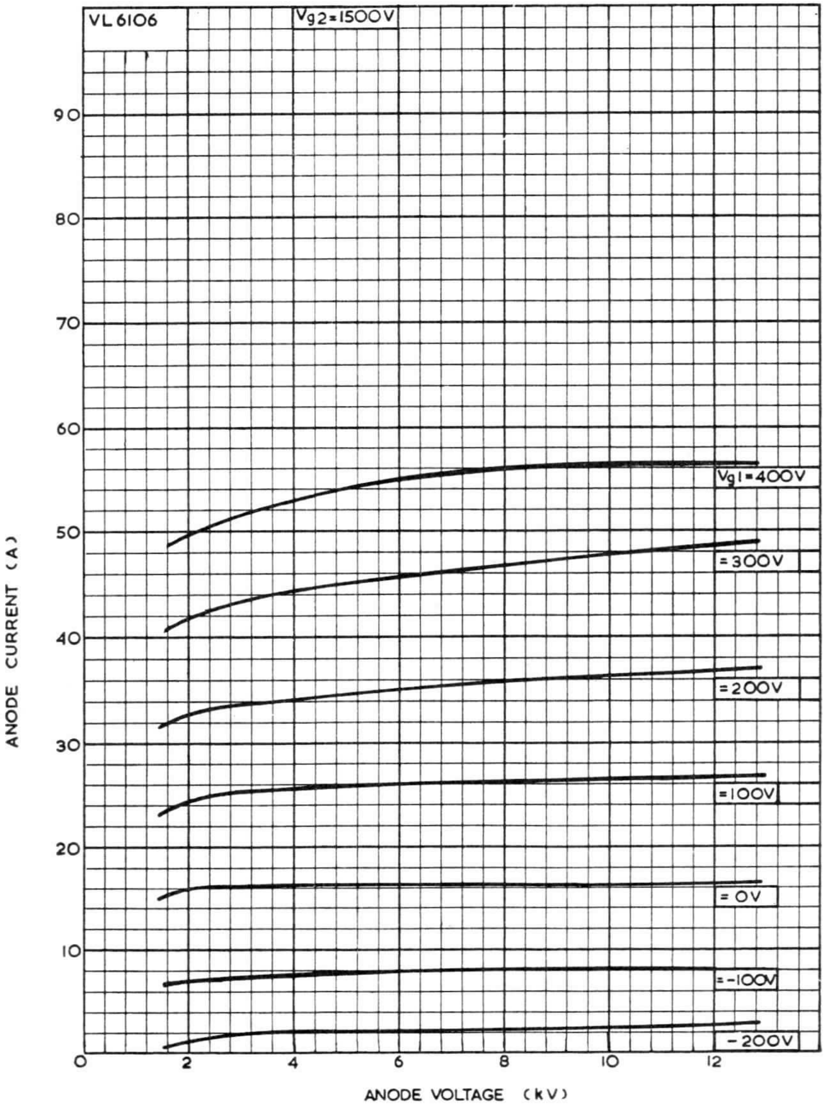
Typical Operating Conditions

Direct anode voltage	13	10	kV
Direct screen grid voltage	2	1·5	kV
Direct control grid voltage	−655	−574	V
Direct anode current	10·1	10·1	A
Direct screen grid current	0·5	0·75	A
Direct control grid current	0·09	0·3	A
Peak r.f. grid voltage	905	924	V
Control grid drive power	83	276	W
Anode dissipation	30	30	kW
Power output	100	71	kW
Power into load at 85 per cent transfer efficiency	85	61	kW

STC

Code: 4ZC/300J

CONTINUED



Code: 4ZC/300J

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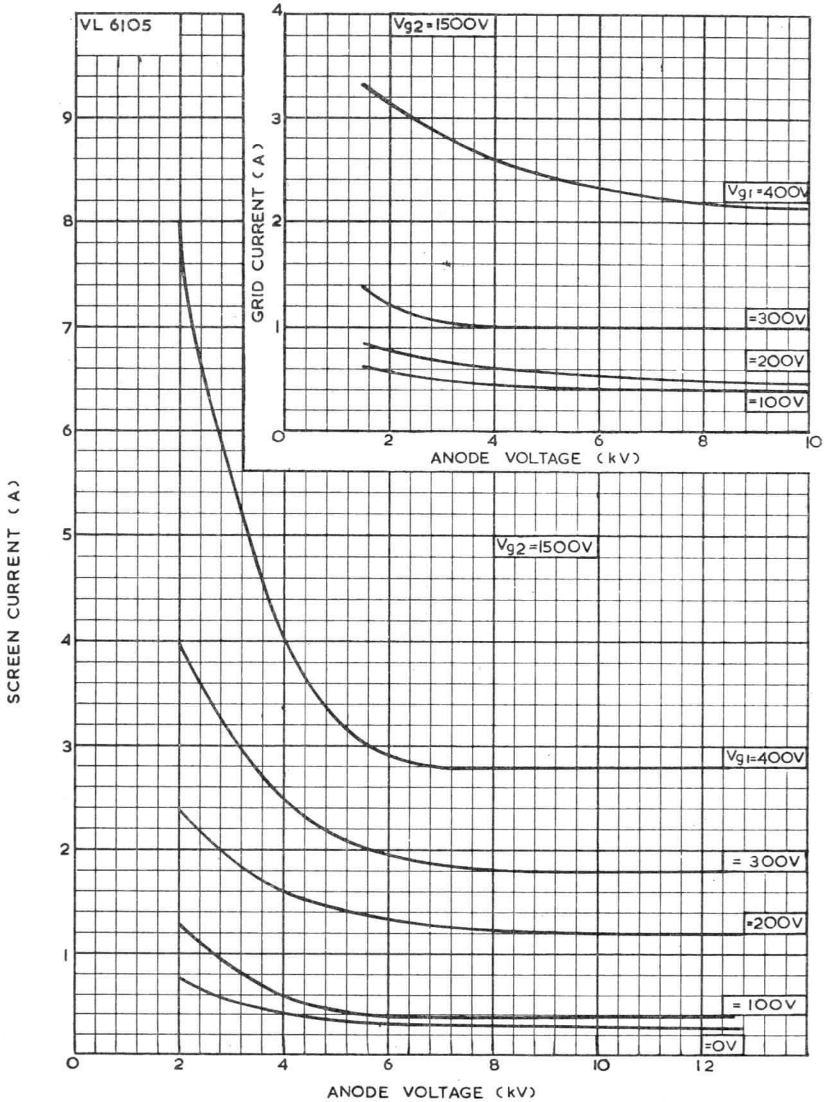

Code: 4ZC/300J

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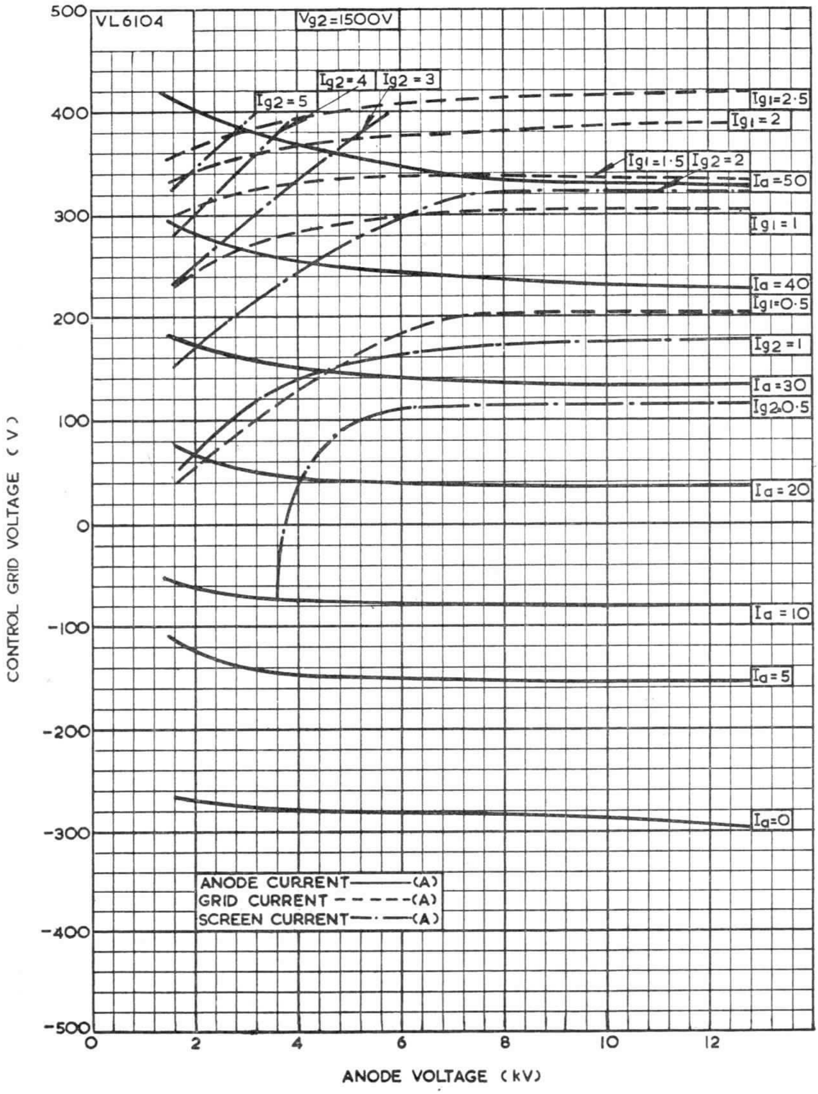

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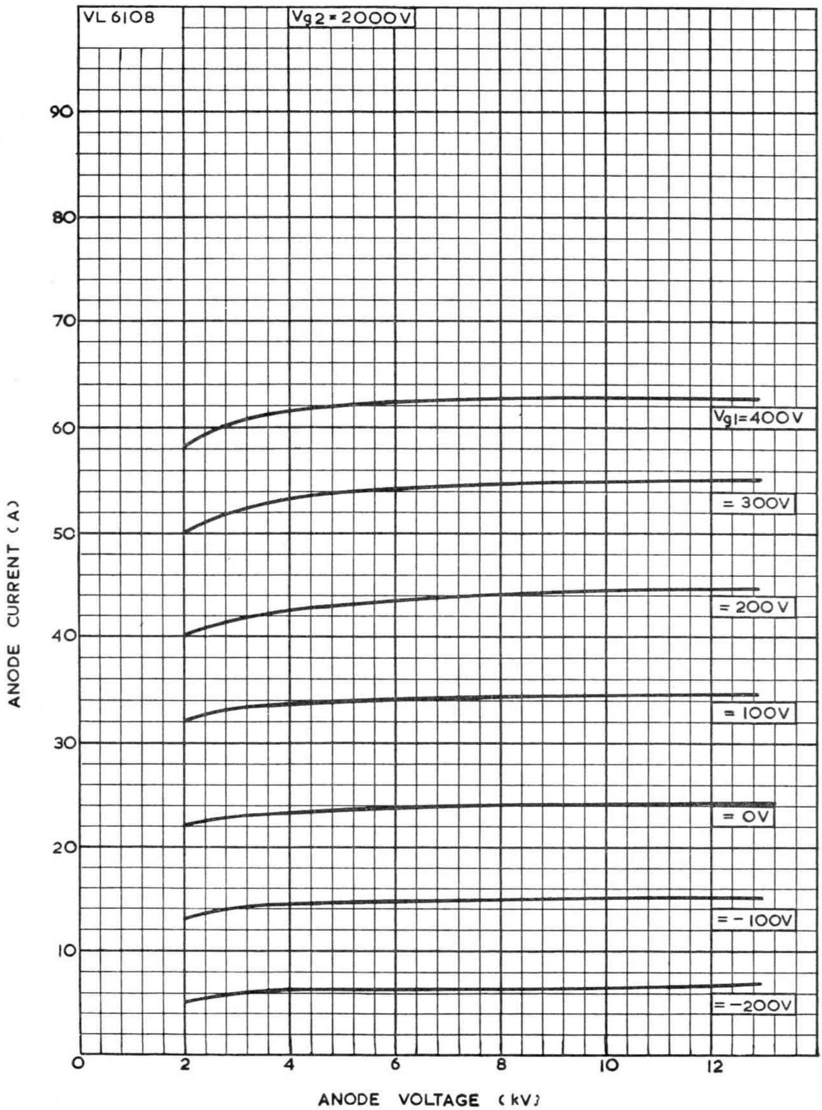

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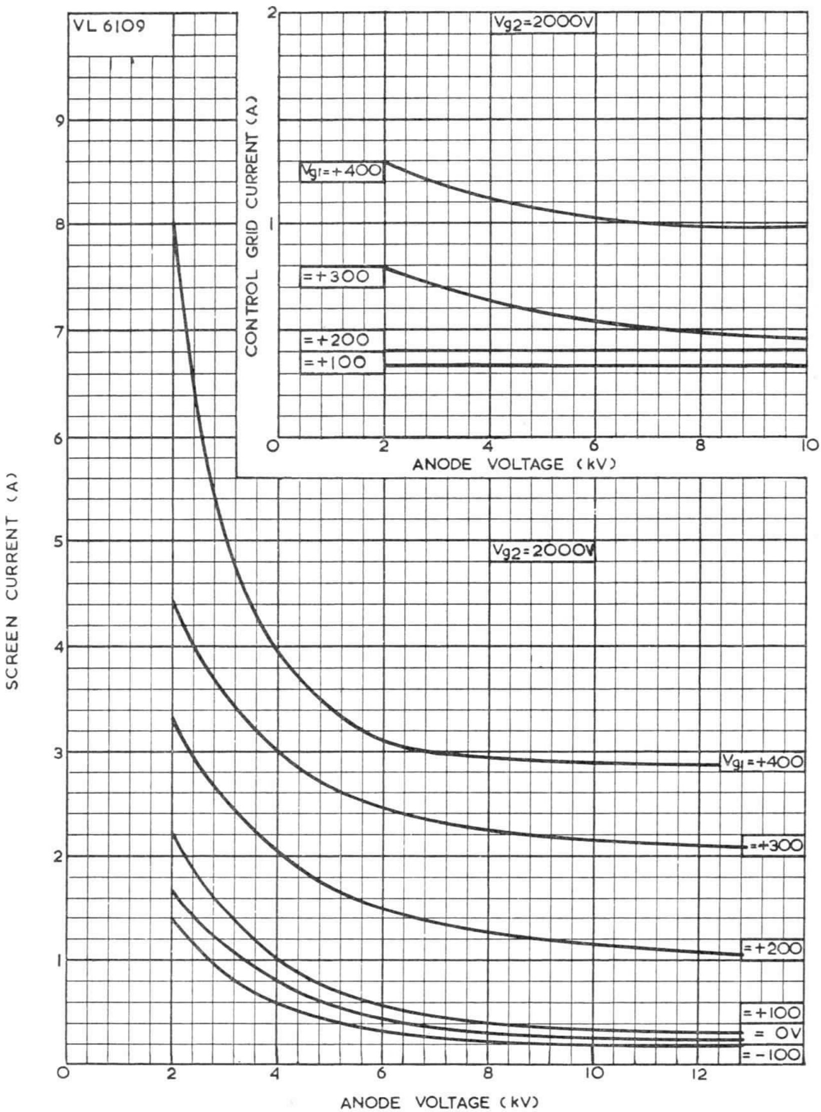

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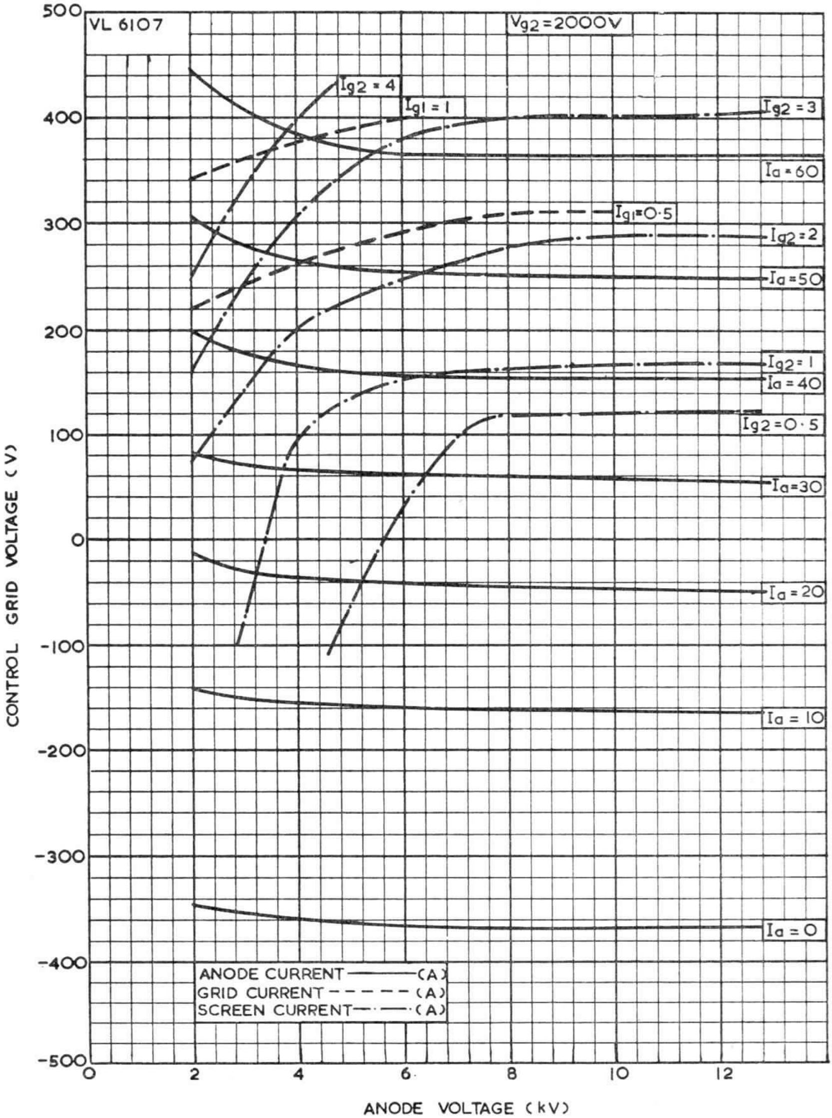
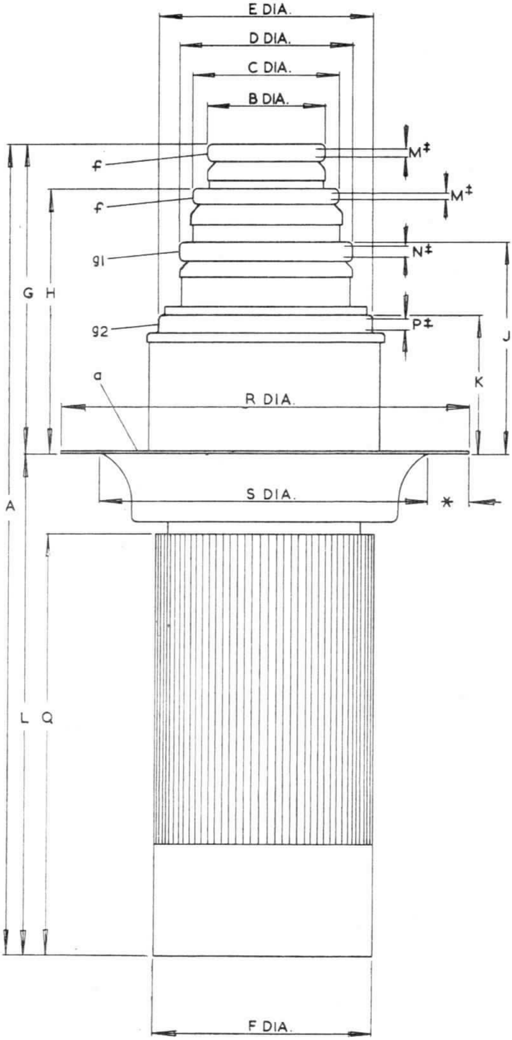


Code: 4ZC/300J

CONTINUED

4ZC/300J Outline

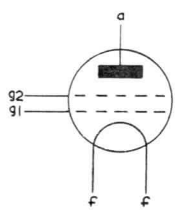


DIM.	INCHES		MILLIMETRES	
A	21 1/8	MAX.	536,6	MAX.
B	3·065 ± 0·007		77,85 ± 0,18	
C	3·940 ± 0·007		100,08 ± 0,18	
D	4·521 ± 0·007		114,83 ± 0,18	
E	5·660 ± 0·007		143,76 ± 0,18	
F	5 11/16	MAX.	144,5	MAX.
G	7 25/32 ± 11/32		197,6 ± 8,7	
H	6 11/16 ± 9/32		169,9 ± 7,1	
J	5 11/32 ± 7/32		135,7 ± 5,6	
K	3 11/16 ± 1/8		93,7 ± 3,2	
L	12 29/32 ± 3/32		327,8 ± 2,4	
M	3/16	MIN	4,7	MIN
	5/16	MAX.	7,9	MAX.
N	1/4	MIN.	6,3	MIN.
	3/8	MAX.	9,5	MAX.
P	5/16	MIN.	7,9	MIN.
	3/8	MAX.	9,5	MAX.
Q	10 15/16	MAX.	277,8	MAX.
R	10 3/8 ± 1/32		263,5 ± 0,8	
S	8 15/32	MAX.	215,1	MAX.

BASIC DIMS. ARE INCHES

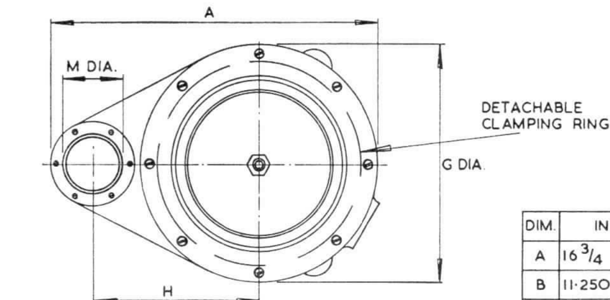
‡ DENOTES:- CONTACT LENGTH

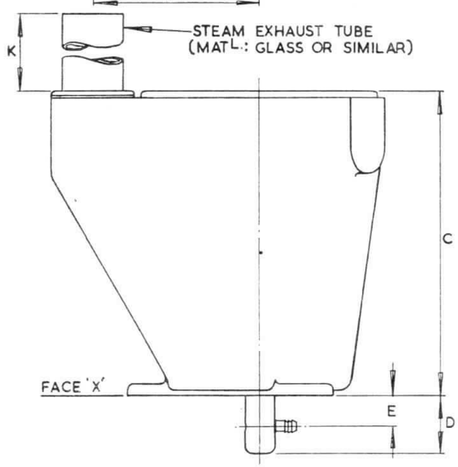
* DENOTES:- SURFACE OF FLANGE WILL BE FLAT OVER THIS AREA



BOILER
(For Use With External Condenser)
Code: B115A

B115A Outline

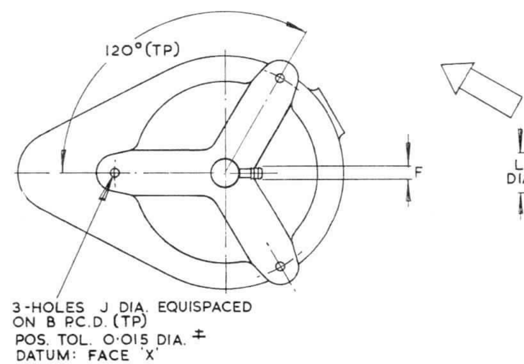


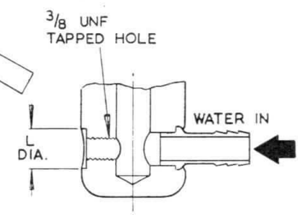


DIM.	INCHES		MILLIMETRES	
A	16 3/4	MAX.	425,5	MAX.
B	11·250	NOM.	285,75	NOM.
C	15 7/16	MAX.	392,1	MAX.
D	2 1/2	MAX.	63,5	MAX.
E	1 1/2 ± 1/16		38,1 ± 1,6	
F	19/32 ± 1/64		15,1 ± 0,4	
G	12 1/8	MAX.	308,0	MAX.
H	8 3/8 ± 1/16		212,7 ± 1,6	
J	13/32 ± 1/64		10,3 ± 0,4	
K	29	MIN.	736,6	MIN.
L	11/16 ± 1/64		17,5 ± 0,4	
M	3 1/32 ± 1/16		77,0 ± 1,5	

BASIC DIMS. ARE INCHES

± DENOTES:- TOLERANCE TO BS 308 CLAUSE 19





ENLARGED SECTION OF TARGET HOUSING & NOZZLE FOR 1/2" INT. DIA. HOSE

BEAM TETRODES & PENTODES

Beam Tetrodes and Pentodes

Index

Radiation-Cooled

Reference	Code	Cathode	Vf V	Screen Grid μ	gm mA/V	Max. Va V	Max. pa W	Max. Frequency Full Ratings MHz
5A/180M	5A/180M	IH	6·3	50	32	350	6	–
5A/201K	6F33	IH	6·3	38	4·35	250	2·5	–
5A/204D	11E2	IH	6·3	–	–	12500	5	–
5A/206K	5A/206K	IH	6·3	33	8·4	300	4·5	–
5A/210K	6F17	IH	6·3	10	4	200	3·5	–
5B/102D	11E14	IH	6·3	–	16·5	2000	6	–
5B/103B	11E3	IH	4·2	–	–	12·5	10	–
5B/104D	5B/104D	IH	24	4·5	3	200	10	–
5B/152D	3D21A	IH	6·3	–	5·5	3500	15	–
5B/254M&G	5B/254M&G	IH	6·3	9	6	600	25	60
5B/255M	5B/255M	IH	6·3	9	6	600	25	60
5B/256M	5B/256M	IH	19	9	6	600	25	60
5B/257M	5B/257M	IH	12	9	6	600	25	60
5B/258M	5B/258M	IH	19	9	6	600	25	60
5B/351D	12E1	IH	6·3	–	14	800	35	–
5B/354D	12E14	IH	6·3	5·3	14	800	35	–
5B/355D	12E1C	IH	6·3	5·3	14	800	35	–
5B/700A	828	TTF	10	6·5	2·7	1250	70	30
5B/900A	13E1	IH	26 or 13	–	35	800	90	–
5B/901A	13E12	IH	26 or 13	–	25	800	90	–
5C/100A	813	TTF	10	8·5	3·75	2000	100	30
5J/180E*	5J/180E	TTF	9	4	5·75	6000	3500	30

*Forced-air-cooled.

SPECIAL VALVES

Stable Long-Life Pentode

Code: 5A/162D

A very stable and long-life pentode with platinum-cored oxide-coated cathode giving substantially zero interface resistance: wire terminations extend through the base pins and top cap and permit direct soldering into the circuit if required.

This valve has been designed for low voltage operation and is suitable for logmetric amplifier applications.

CATHODE

Indirectly-heated, oxide-coated platinum core		
Heater voltage	5.5	V
Nominal current	265	mA

CHARACTERISTICS

Screen grid μ	Measured at V_a 90 V V_{g_2} 60 V I_a 6 mA	19	
Mutual conductance		6	mA/V

DIRECT INTERELECTRODE CAPACITANCES

Input	8.0	pF
Output	5.5	pF
Anode to grid	0.02	pF

June 1961

COMPONENTS GROUP

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, W.C.2

VALVE DIVISION, FOOTSCRAY, KENT Telephone: Footscray 3333

SPECIAL VALVES

Stable Long-Life Pentode

Code: 5A/162D

MECHANICAL DATA

Maximum overall length (less leads)	3.976 in	101	mm
Maximum seated height	3.425 in	87	mm
Maximum diameter	1.311 in	33,3	mm
Base	Small wafer octal with metal sleeve; tinned leads for wiring into circuit		
Top cap	CT1 with tinned lead for wiring into circuit		
Bulb	T9 with metallising		
Net weight		40	g

MAXIMUM RATINGS

Maximum direct anode voltage	120	V
Maximum direct anode dissipation	0.6	W
Maximum direct screen voltage	90	V
Maximum direct screen dissipation	0.15	W

TYPICAL OPERATION CONDITIONS AS A CONVENTIONAL AMPLIFIER

Direct anode voltage	40	90	V
Direct screen grid voltage	40	60	V
Direct suppressor grid voltage	0	+15	V
Anode current	3	6	mA
Screen current	0.77	1.6	mA
Direct grid voltage (approx.)	−1.5	−2.1	V
Mutual conductance	4.5	6	mA/V
Anode impedance	200	300	kΩ

TYPICAL LOGMETRIC AMPLIFIER APPLICATION

Direct anode voltage	10	V
Direct screen grid voltage	10	V
Anode current	10^{-5}	A
Range of measurement of grid current	10^{-12} to 10^{-6}	A

The action of a logmetric amplifier may be deduced by considering a diode working in the retarding field region.

Under such conditions the current I is given by

$$I = Ae^{V/T} \quad \ldots \quad (1)$$

where V is the anode potential (neglecting contact potential), T is the temperature of the cathode, and A is a constant involving geometry of the diode and the emission properties of the cathode.

SPECIAL VALVES

Stable Long-Life Pentode

Code: 5A/162D

From equation (1)

$$\log I = K_1 V + \text{constant} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Thus a measurement of the voltage across the diode becomes a measure of the logarithm of the current.

In order to avoid the complications attendant on measurement of the voltage in the high impedance circuit one may substitute for the diode the control grid and cathode of a pentode, operating at low anode and screen voltages and therefore at a low anode current. The change in control grid voltage can then be compensated by an appropriate change in screen grid voltage, so that the anode current remains constant. Thus:

$$\log I_{g1} = K_2 V_{g2} + \text{constant}$$

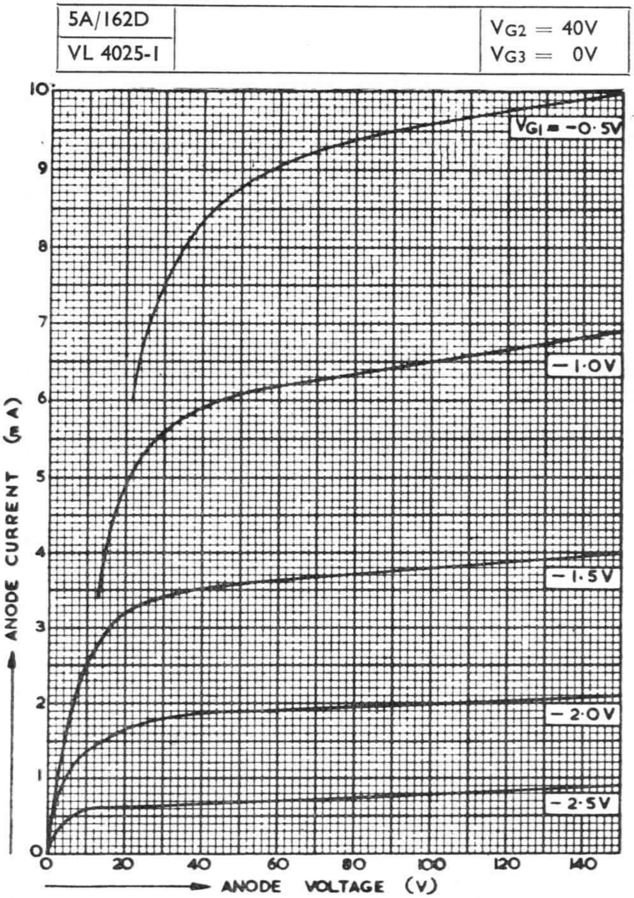
This equation will apply over substantially the whole range between $I_{g1} = I_a$ and the non-linear region resulting from residual grid current.

It should be noted that the retarding field current depends on the temperature of the cathode and on the work function of the current collector (in the present case, the control grid).

SPECIAL VALVES

Stable Long-Life Pentode

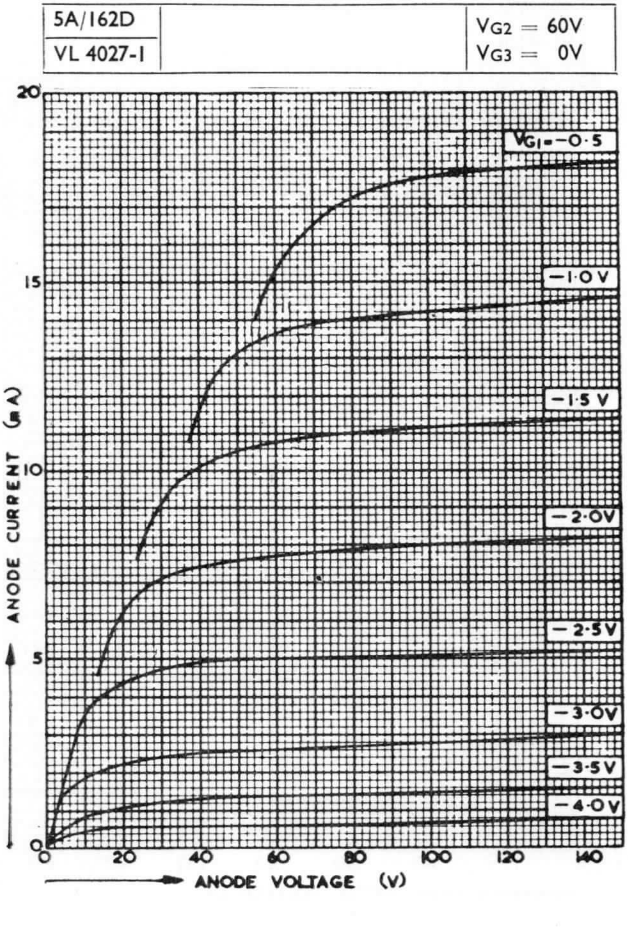
Code: 5A/162D



SPECIAL VALVES

Stable Long-Life Pentode

Code: 5A/162D

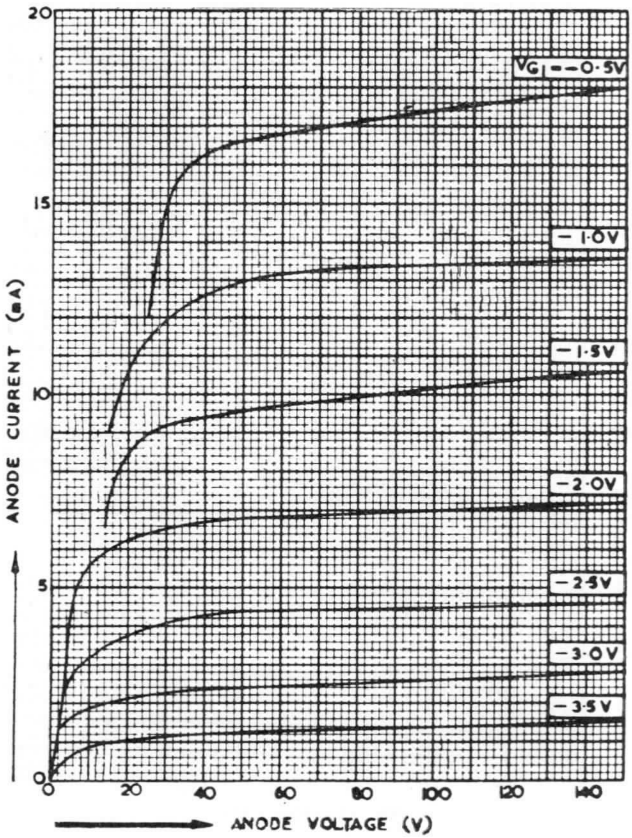


SPECIAL VALVES

Stable Long-Life Pentode

Code: 5A/162D

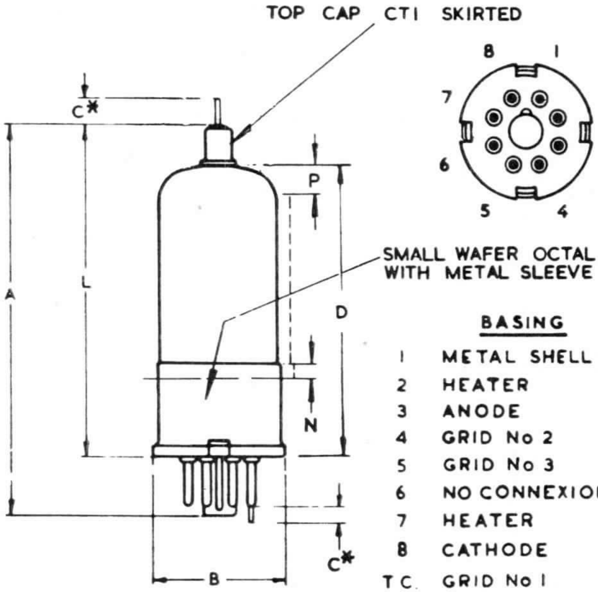
5A/162D		V_{G2} = 60V
VL 4026-1		V_{G3} = +15V



SPECIAL VALVES

Stable Long-Life Pentode

Code: 5A/162D



BASING

1	METAL SHELL BASE
2	HEATER
3	ANODE
4	GRID No 2
5	GRID No 3
6	NO CONNEXION
7	HEATER
8	CATHODE
T.C.	GRID No 1

* DENOTES:- WIRES WILL PROTRUDE FROM TOP CAP & ALL PINS EXCEPT No 6

---- DENOTES:- EXTENT OF METALLISING

DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	101 MAX. 94 MIN.	3.976 MAX. 3.700 MIN.	D	75,5 MAX. 68,5 MIN.	2.973 MAX. 2.696 MIN.
B	33,3 MAX. 31,7 MIN.	1.311 MAX. 1.248 MIN.	L	87 MAX. 80 MIN.	3.425 MAX. 3.150 MIN.
C	4,8 MAX. 3,2 MIN.	0.189 MAX. 0.126 MIN.	N	3 APP.	0.125 APP.
NOTE: BASIC FIGURES ARE MILLIMETRES			P	5	0.197

M

SPECIAL VALVES

High Slope Beam Tetrode

Code: 5A/180M

The 5A/180M is a beam power tetrode developed to meet the demand for a wide-band amplifier valve operating at high frequencies. With a very high figure of merit and almost twice the gain/bandwidth product of conventional high gain pentodes the 5A/180M is designed for use in any application where a wide-band amplifier is required e.g. radio links, carrier telephony, etc.

To ensure good electrical contact under all conditions the valve pins are gold-plated, and both the design and rigid control of manufacturing processes combine to make a very high quality valve with a long and trouble-free life.

CATHODE

Indirectly-heated, oxide-coated		
Heater voltage	6.3	V
Nominal current	0.45	A

CHARACTERISTICS

Mutual conductance	Measured at V_a 180V: V_{g_2} 150V I_a 26mA I_{g_2} 6mA approx.	32	mA/V
Screen grid μ		50	

DIRECT INTERELECTRODE CAPACITANCES

Input	16.0	pF
Output	5.0	pF
Anode to grid (max.)	0.05	pF
Heater to cathode	5.5	pF

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, W.C.2

VALVE DIVISION, FOOTSCRAY, KENT Telephone: Footscray 3333

SPECIAL VALVES

High Slope Beam Tetrode

Code: 5A/180M

DIMENSIONS

Maximum overall length	54.8	mm
Maximum seated height	41.3	mm
Maximum bulb diameter	30.2	mm
Base	B8G	
Net weight	25.5	g
	0.9	oz

MAXIMUM RATINGS

Maximum anode supply voltage ($I_a = 0$)	400	V
Maximum direct anode voltage	350	V
Maximum direct anode dissipation	6	W
Maximum screen supply voltage ($I_{g2} = 0$)	400	V
Maximum direct screen voltage	175	V
Maximum direct screen dissipation	1.6	W
Maximum grid voltage	0	V
Maximum direct cathode current	45	mA
Maximum control grid resistance (fixed bias)	0.1	MΩ
Maximum control grid resistance (auto bias)	0.25	MΩ

TYPICAL OPERATING CONDITIONS

*Direct anode voltage	180	V
Direct anode current	26	mA
*Direct screen voltage	150	V
Direct screen current	6	mA
†Direct grid supply voltage	+9	V
†Cathode resistor	315	Ω

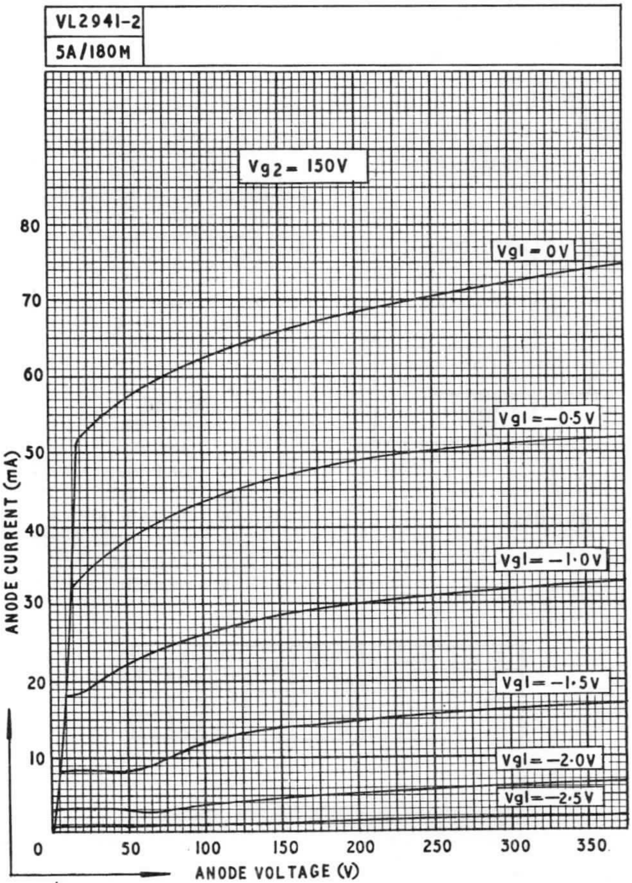
† It is recommended that the required grid bias be obtained in this manner. The actual voltage between grid and cathode is equal to the difference between the grid supply voltage and the voltage developed across the cathode resistor when cathode current is flowing.

* Referred to cathode.

SPECIAL VALVES

High Slope Beam Tetrode

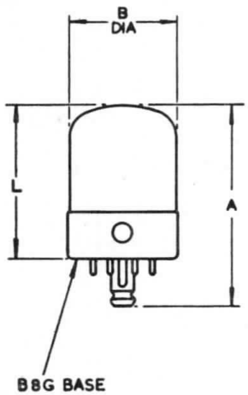
Code: 5A/180M

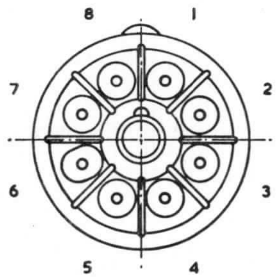


SPECIAL VALVES

High Slope Beam Tetrode

Code: 5A/180M





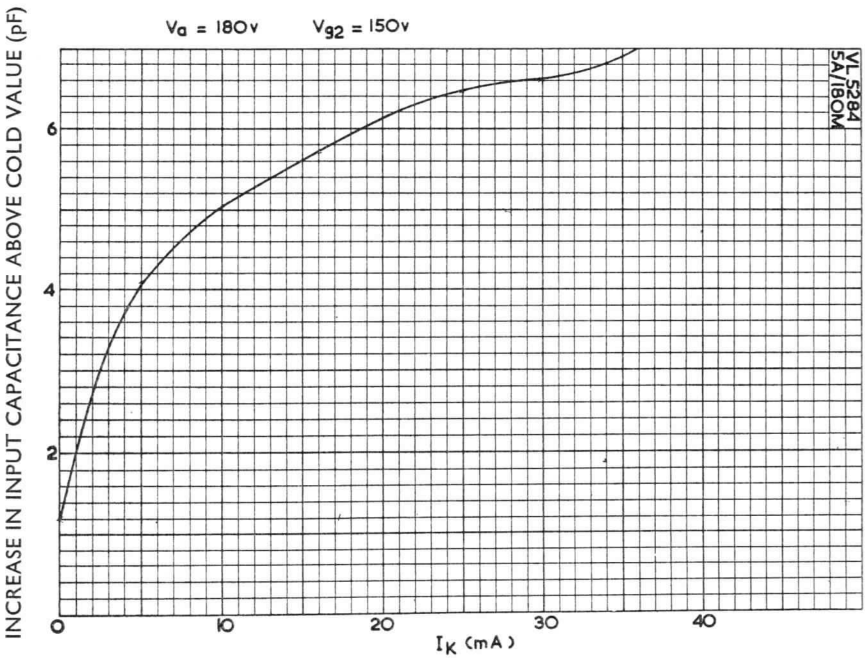
BASING

1 HEATER
2 ANODE
3 GRID No 2
4 CATHODE
5 BEAM PLATES & SHIELD.
6 GRID No I.
7 CATHODE
8 HEATER

DIM	MILLIMETRES	INCHES
A	54·8 MAX	$2\frac{5}{32}$ MAX
B	30·2 MAX	$1\frac{3}{16}$ MAX
L	41·3 MAX	$1\frac{5}{8}$ MAX

NOTE:-BASIC DIMENSIONS ARE INCHES

CHANGE OF INPUT CAPACITANCE WITH CATHODE CURRENT



M

SPECIAL VALVES

R.F. Pentode

Code: 6F33 (CV2209)

This miniature screened r.f. pentode has a short cut-off suppressor grid characteristic which makes it particularly suitable for use in modulator, variable reactance and timing circuits. A diode is tied to the suppressor grid to prevent "blocking" when that electrode is driven positive.

CATHODE

Indirectly heated, oxide coated

Heater voltage	6·3	V
Heater current	0·35	A

CHARACTERISTICS

Mutual conductance	$\left\{\begin{array}{l} V_a = 200V : V_{g2} = 100V \\ V_{g1} = -1{\cdot}5V, V_{g3} = 0V \end{array}\right\}$	4·4	mA/V
Inner amplification factor		38	

DIRECT INTERELECTRODE CAPACITANCES
(Measured with a close-fitting shield)

Control grid to earth	7·3	pF
Anode to earth	4·5	pF
Anode to control grid	0·01	pF
Suppressor grid to earth	10	pF

MECHANICAL DATA

Dimensions	As shown in outline drawing
Base	B7G
Mounting position	Unrestricted

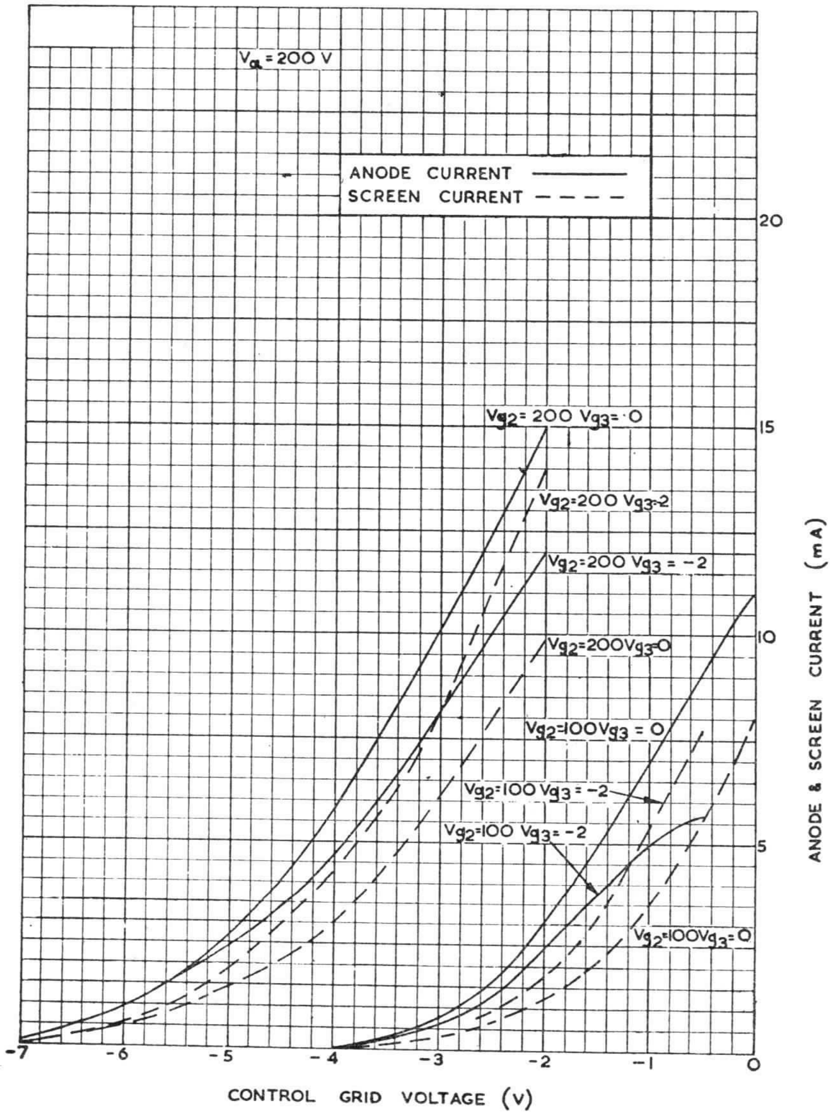
MAXIMUM RATINGS

Maximum anode dissipation	3·0	W
Maximum screen dissipation	1·5	W
Maximum anode voltage ($I_a = 0$)	550	V
Maximum anode voltage	300	V
Maximum screen voltage ($I_{g2} = 0$)	400	V
Maximum screen voltage	300	V
Maximum heater—cathode voltage	±150	V
Maximum bulb temperature	200	°C

Standard Telephones and Cables Limited
Valve Division, Brixham Road, Paignton, Devon
Telephone: Paignton 50762 Telex: 4230
London Sales Office, Telephone: Footscray 3333 Telex: 21836
C O M P O N E N T S G R O U P

Code: 6F33 (CV2209)

CONTINUED



Code: 6F33 (CV2209)

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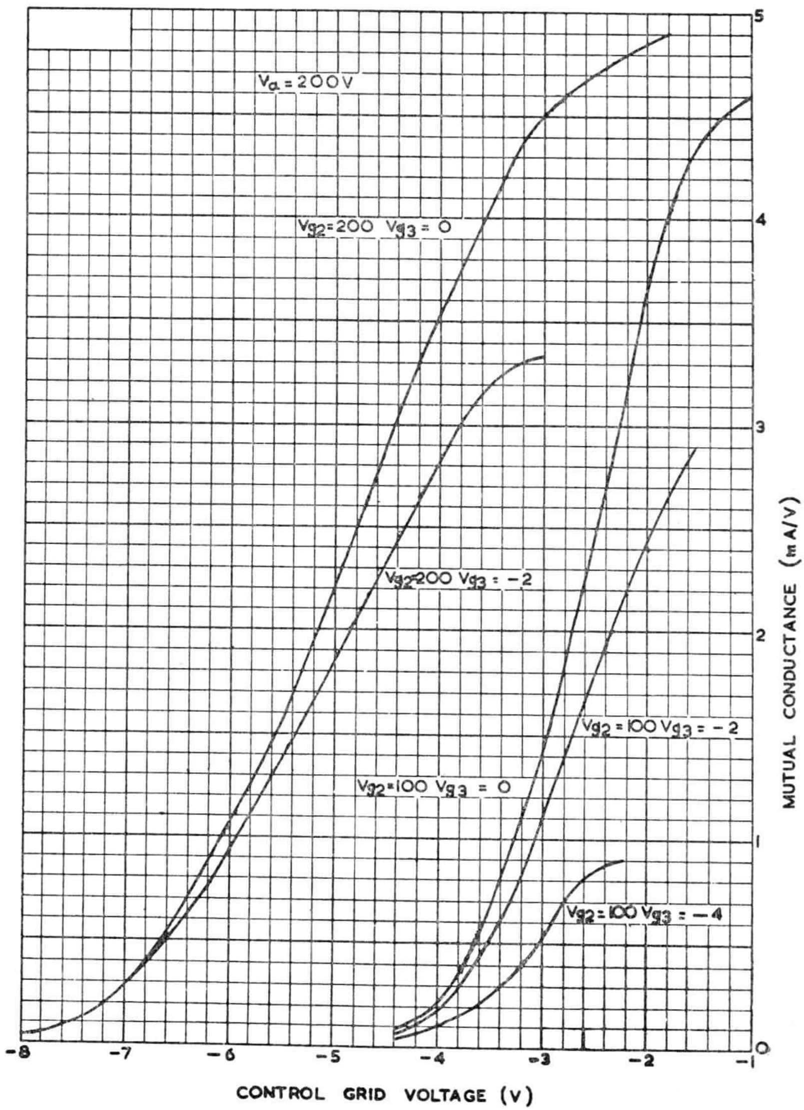

STC

Code: 6F33 (CV2209)

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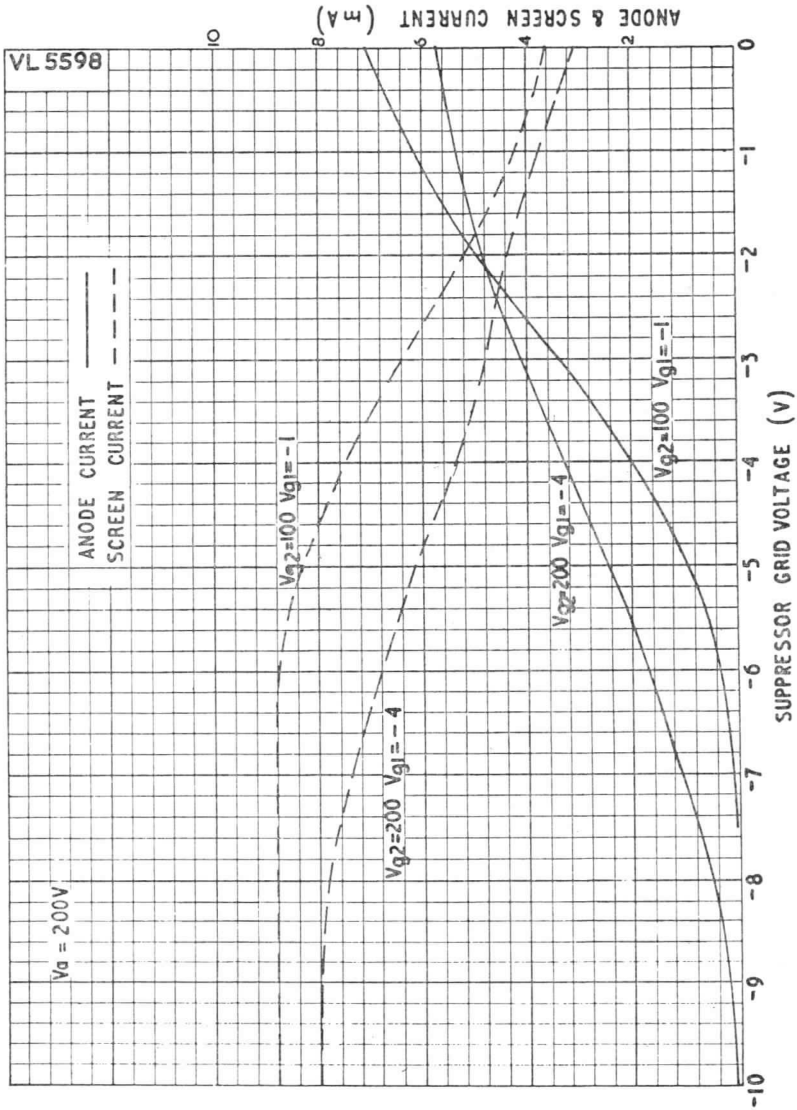

Code: 6F33 (CV2209)

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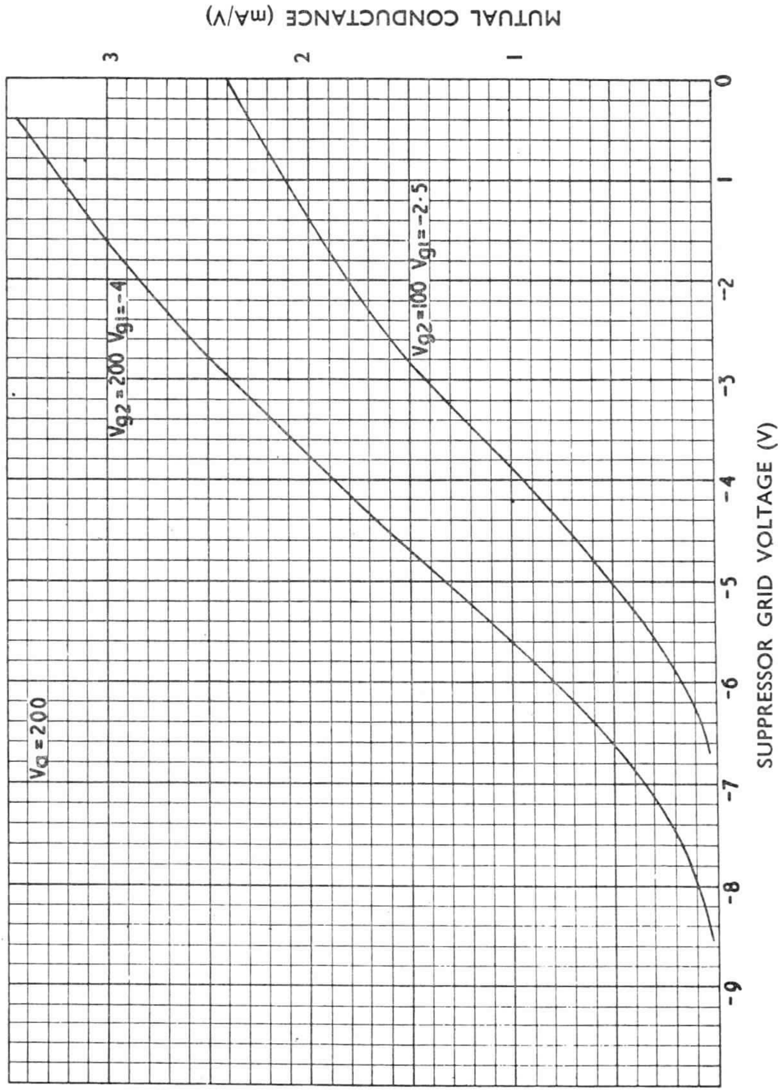
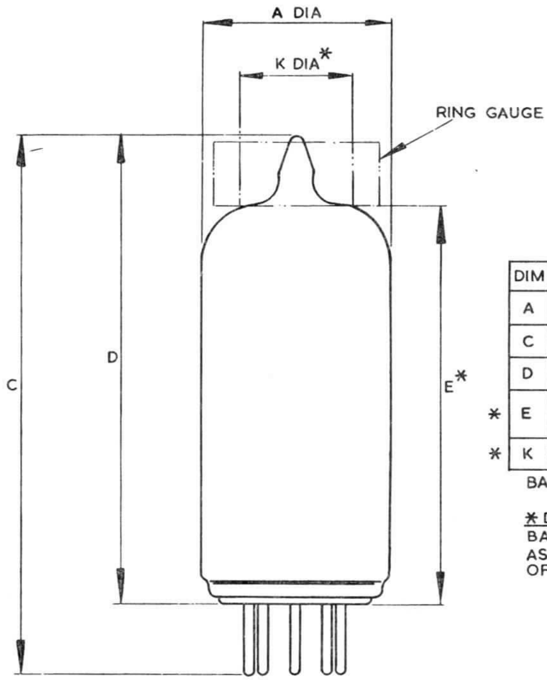


STC

Code: 6F33 (CV2209)

CONTINUED

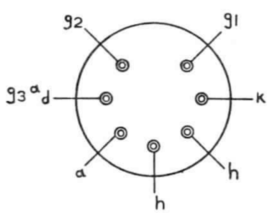
6F33 Outline



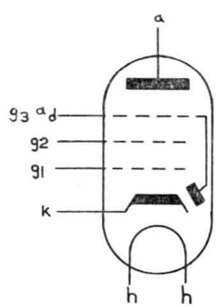
DIM	INCHES	MILLIMETRES
A	3/4 MAX.	19,0 MAX.
C	2 1/8 MAX.	54.01 MAX.
D	1 7/8 MAX.	47.5 MAX.
* E	1 13/32 MIN. 1 19/32 MAX.	35,5 MIN. 40,5 MAX.
* K	0·438 ± 0·001	11,13 ± 0,03

BASIC DIMS ARE IN INCHES.

* DENOTES MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



B7G BASE



M

PROVISIONAL DATA

Miniature R.F. Pentode

Code: 5A/206K (CV2243)

This valve is a high slope miniature screened pentode which is particularly suitable for wide-band amplifier service.

CATHODE

Indirectly heated, oxide coated		
Heater voltage	6·3	V
Heater current, nominal	0·35	A

CHARACTERISTICS

Measured at $V_a = 200V$: $V_{g2} = 115V$: $V_{g3} = 0$, $V_{g1} = -2V$

Mutual conductance	8·4	mA/V
Amplification factor (g_1 to g_2)	33	

DIRECT INTERELECTRODE CAPACITANCES

Input	8·7	pF
Output	4·5	pF
Anode to grid 1	0·01	pF

MECHANICAL DATA

Dimensions	As shown in outline drawing
Base	B9A
Mounting position	Unrestricted

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON — Tel.: Paignton 58685 — Telex: 4230

LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT — Tel.: Footscray 3333 — Telex: 21836

STC

Code: 5A/206K (CV2243)

CONTINUED

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Class A Amplifier

Maximum Ratings

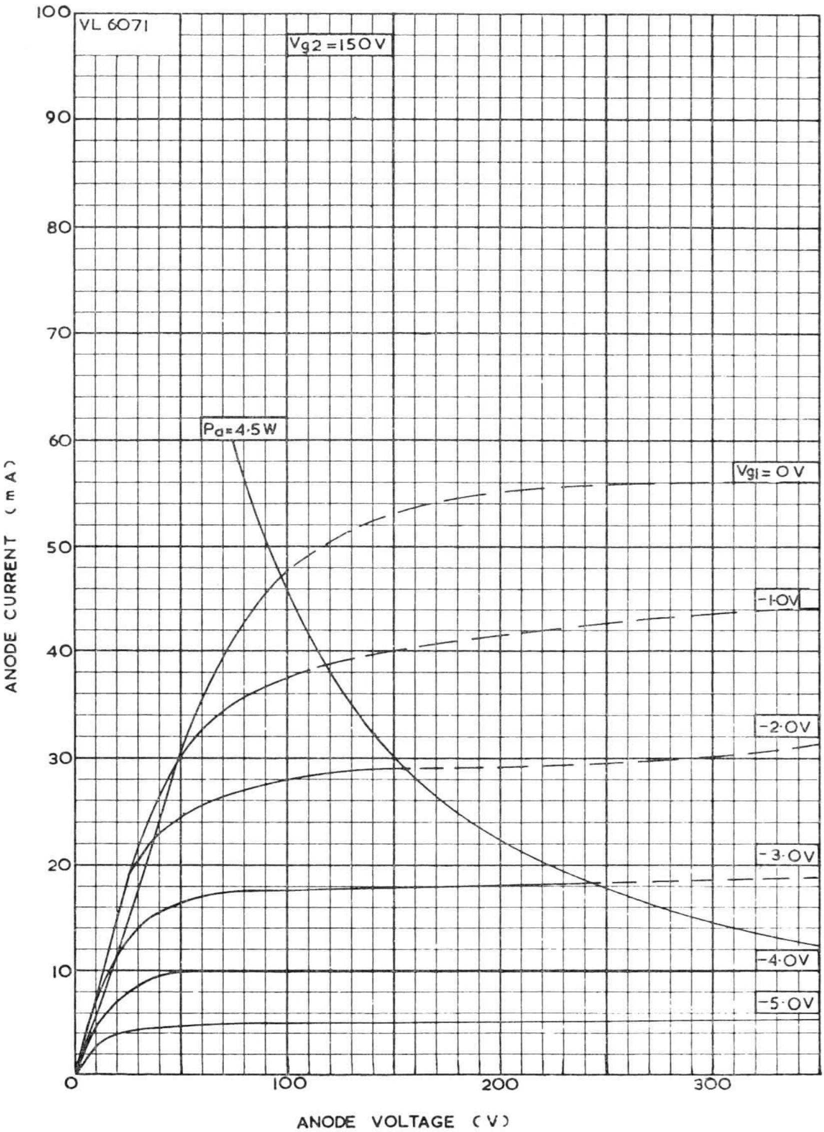
Maximum direct anode voltage	300	V
Maximum direct anode voltage ($I_a = 0$)	550	V
Maximum anode dissipation	4·5	W
Maximum direct screen voltage	300	V
Maximum direct screen voltage ($I_a = 0$)	450	V
Maximum screen dissipation	1·2	W
Maximum peak heater-cathode voltage (cathode positive)	150	V

Typical Operating Conditions

Direct anode voltage	300	300	V
Direct screen voltage	150	150	V
Direct suppressor voltage	0	0	V
Anode load resistor	5·6	10	k Ω
Direct grid voltage	−2·5	−3·5	V
Direct anode current	23	14	mA
Direct screen current	4	3	mA

Code: 5A/206K (CV2243)

CONTINUED



Code: 5A/206K (CV2243)

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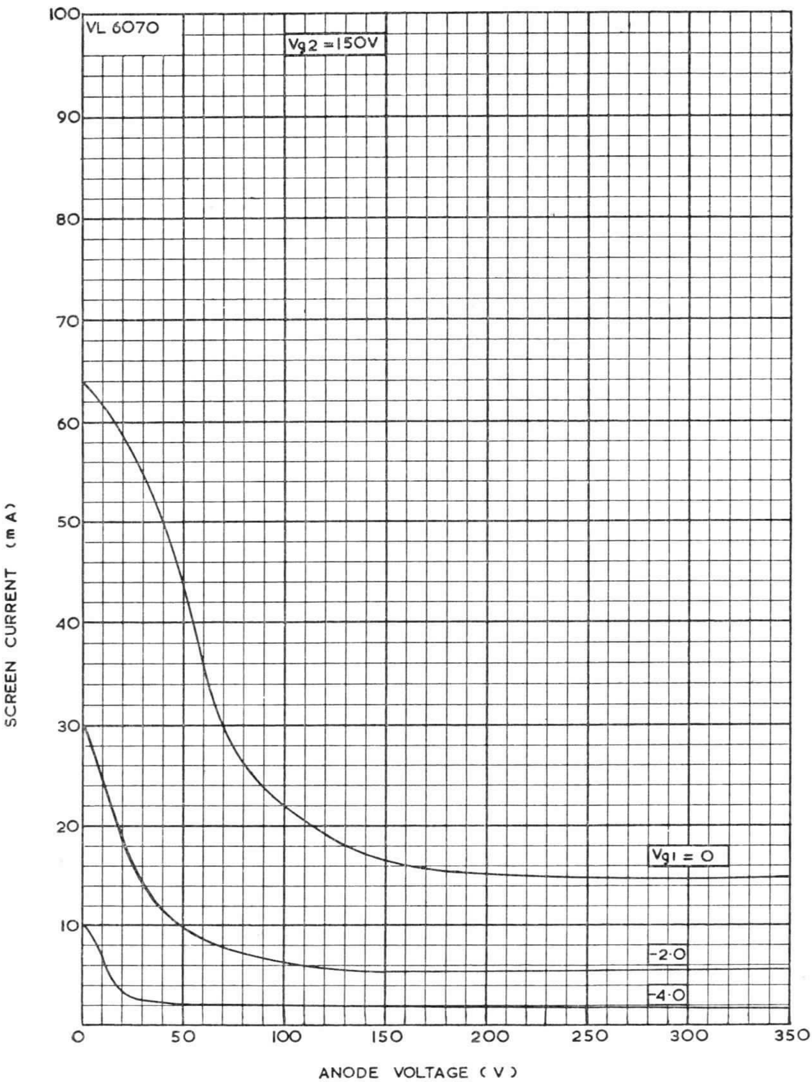

Code: 5A/206K (CV2243)

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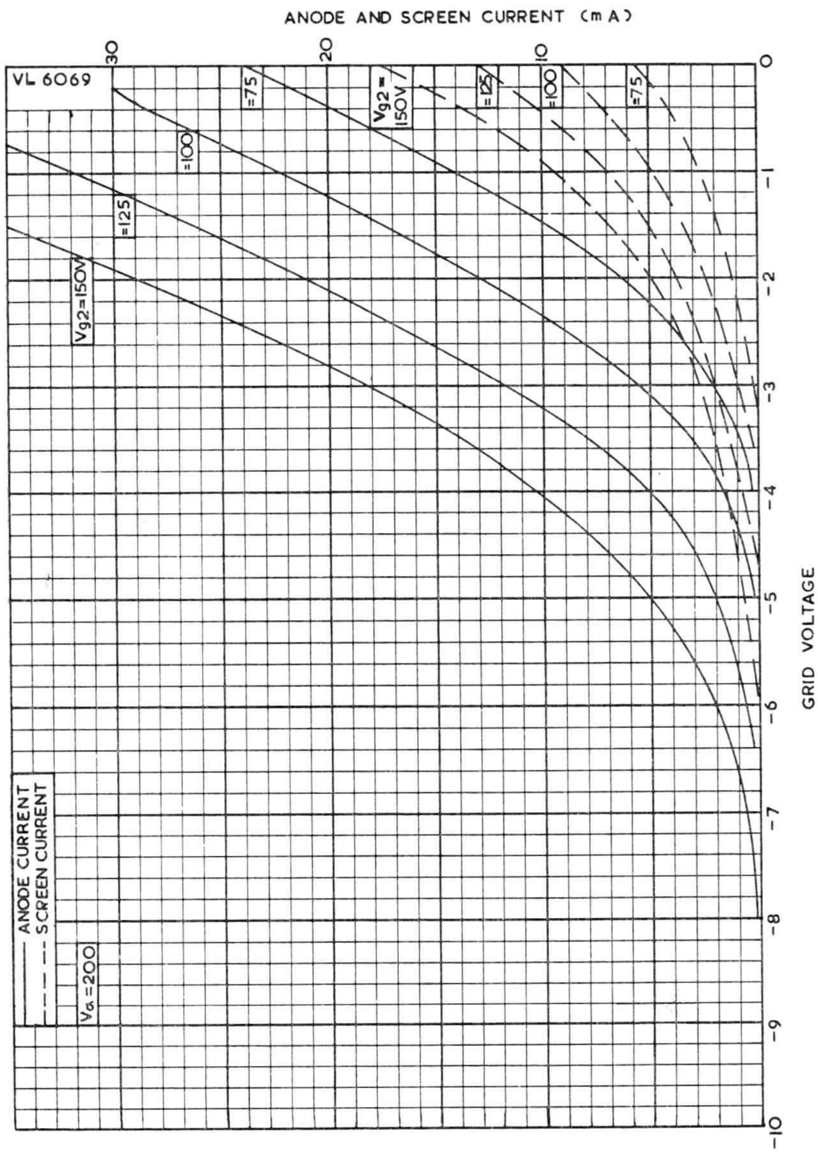

STC

Code: 5A/206K (CV2243)

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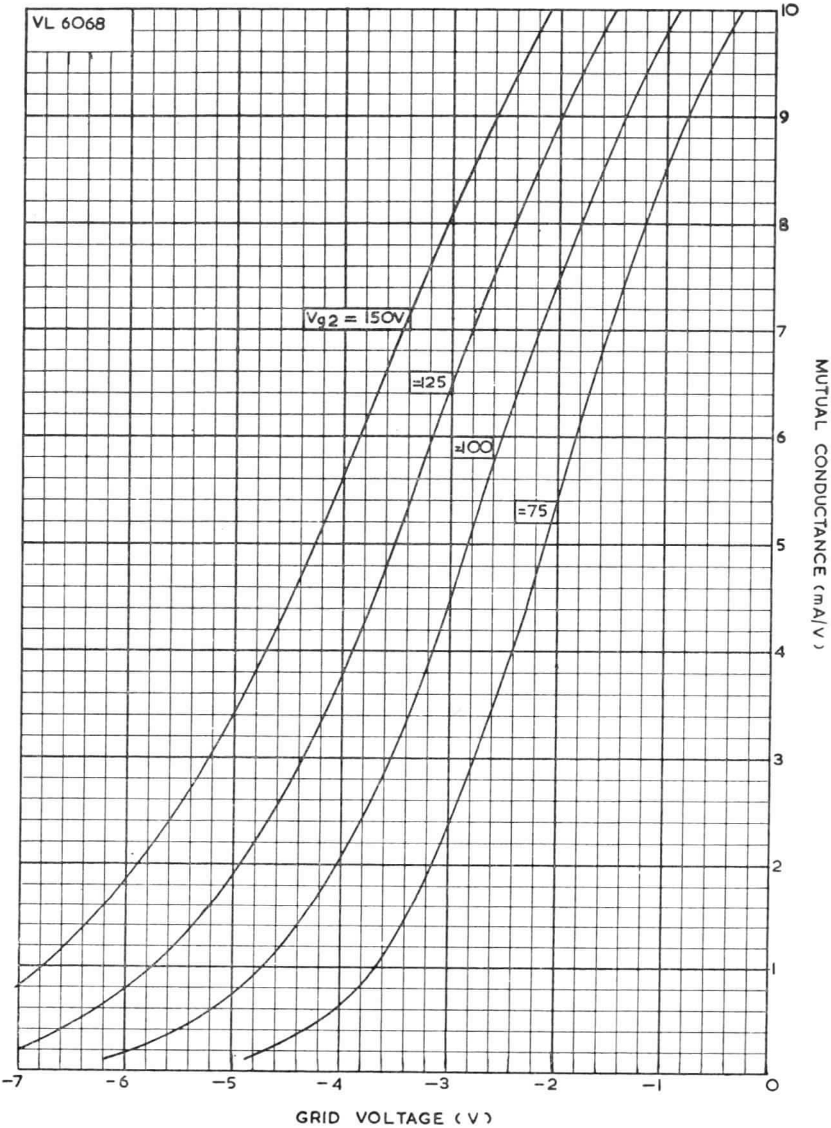
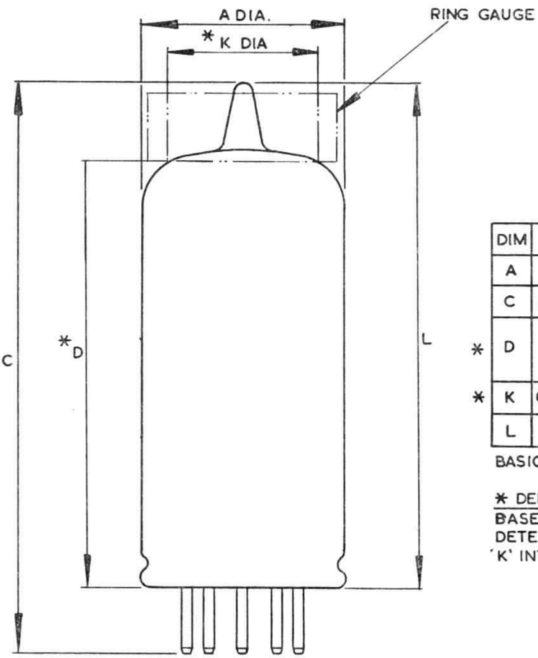


Code: 5A/206K (CV2243)

CONTINUED

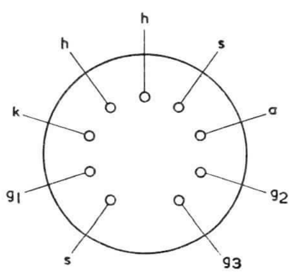
5A/206K Outline



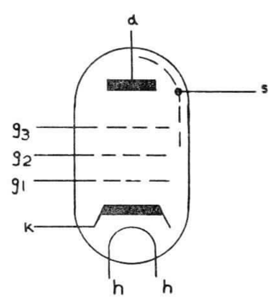
DIM	INCHES	MILLIMETRES
A	7/8 MAX.	22, 2 MAX.
C	2·24 MAX.	57, 0 MAX.
* D	1·48 MIN. 1·65 MAX.	37, 5 MIN. 42, 0 MAX.
* K	0·438±0·001	11, 13±0, 03
L	1·93 MAX.	49, 0 MAX.

BASIC DIMS ARE IN MILLIMETRES.

* DENOTES:- MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



B9A BASE



M

SPECIAL VALVES

Pulse Beam Tetrode

Code: 6F17 (CV416)

The 6F17 is intended for use in pulse and r.f. amplifiers.

CATHODE

Heater voltage	6·3	V
Heater current	0·3	A

CHARACTERISTICS

Mutual conductance (pulse condition)*	8·3	mA/V
Inner amplification factor	10	

*Measured at $V_a = V_{g2} = 250V$: $I_a \simeq 64mA$, $V_{g1} = -6{\cdot}25V$.

MAXIMUM RATINGS†

Maximum anode voltage	600	V
Maximum screen voltage	600	V
Maximum anode dissipation‡	3·5	W
Maximum screen dissipation	0·7	W

†Absolute values, not design centres.

‡If the valve is operated at full ratings in a can, the inside and outside of the can must be matt black.

DIRECT INTERELECTRODE CAPACITANCES§

Input	6·6	pF
Output	6	pF
Anode to control grid	0·03	pF

§Measured with a close fitting shield.

MECHANICAL DATA

Dimensions	As shown in outline drawing
Base	B7G
Mounting position	Unrestricted

Standard Telephones and Cables Limited

COMPONENTS GROUP

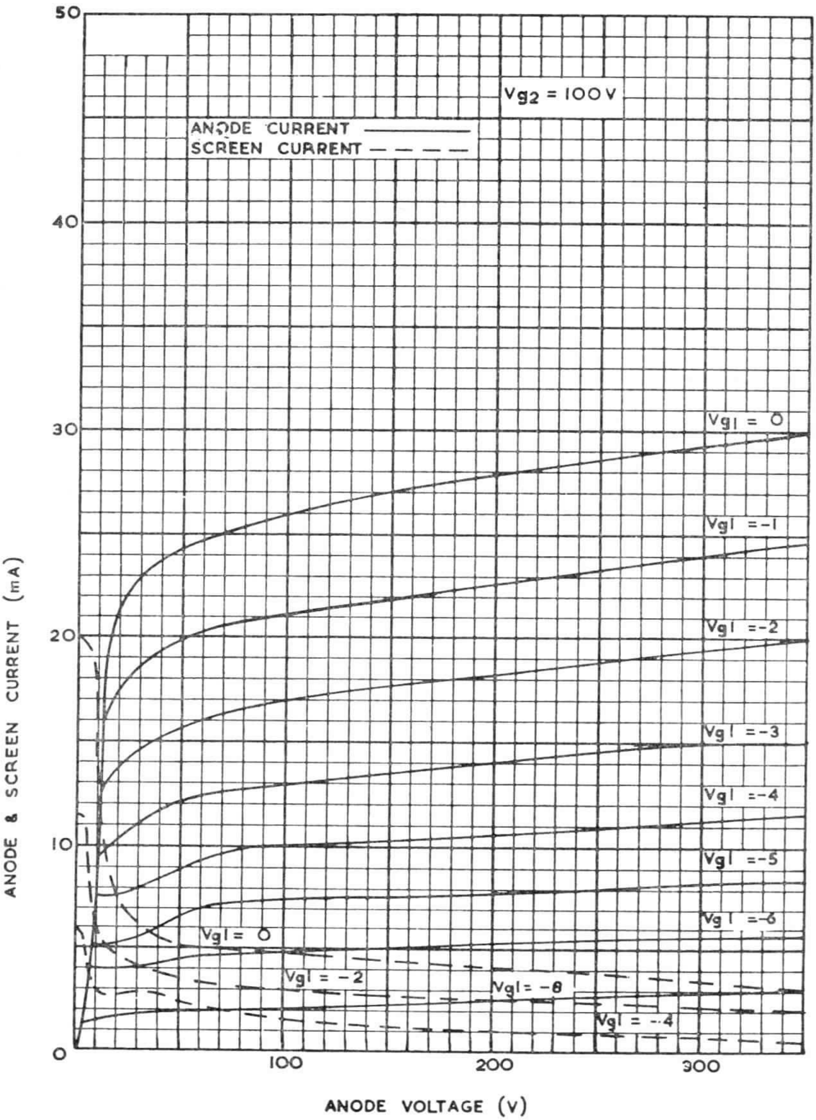
VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4230

LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Code: 6F17 (CV416)

CONTINUED



Code: 6F17 (CV416)

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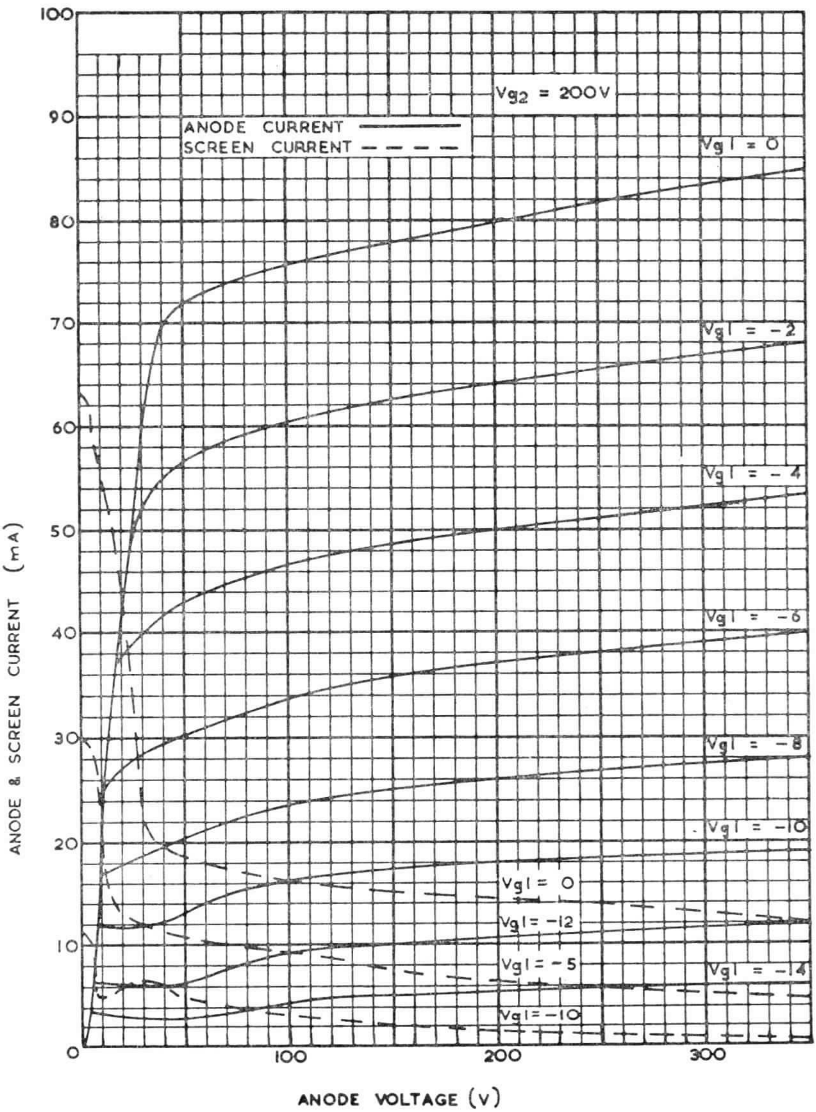

STC

Code: 6F17 (CV416)

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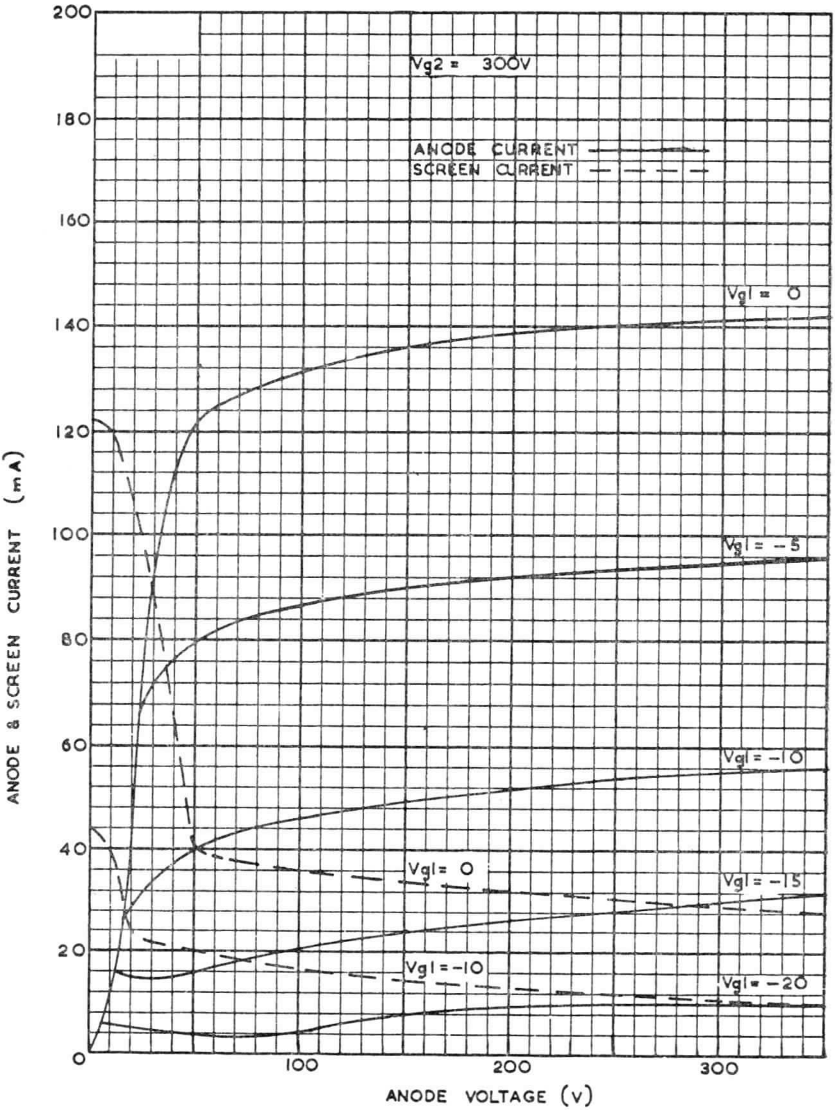

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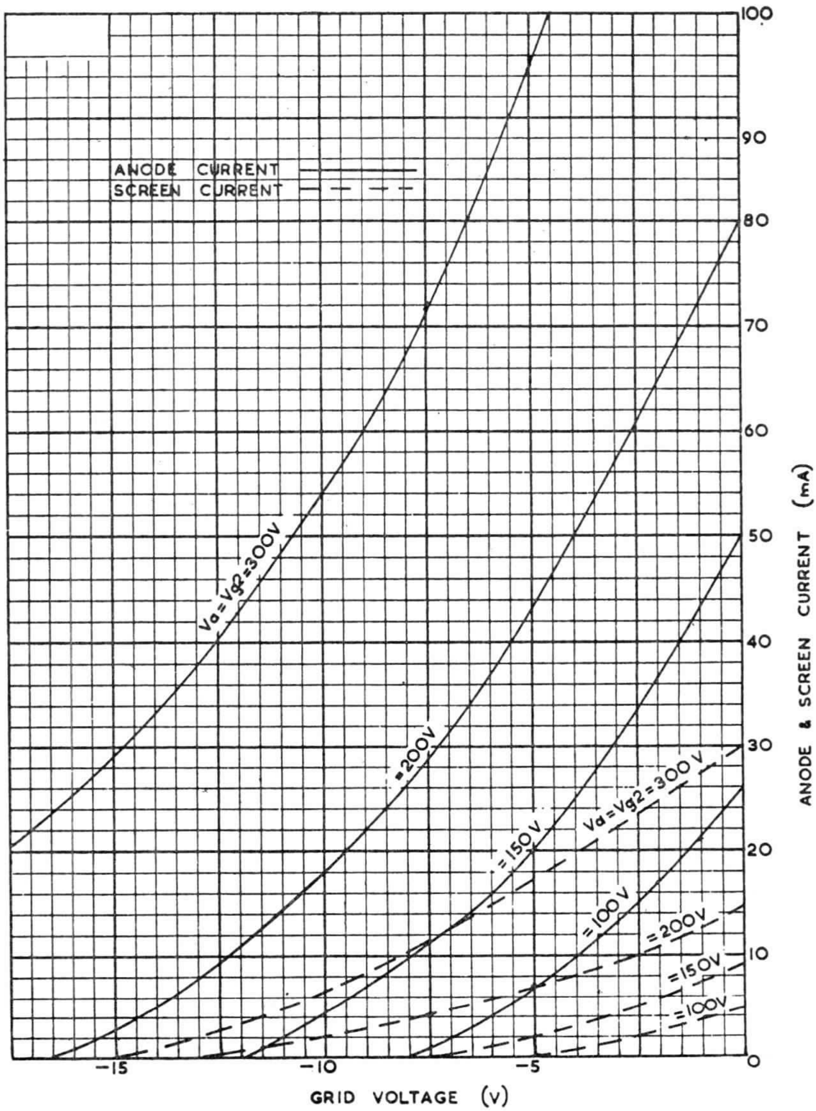

Code: 6F17 (CV416)

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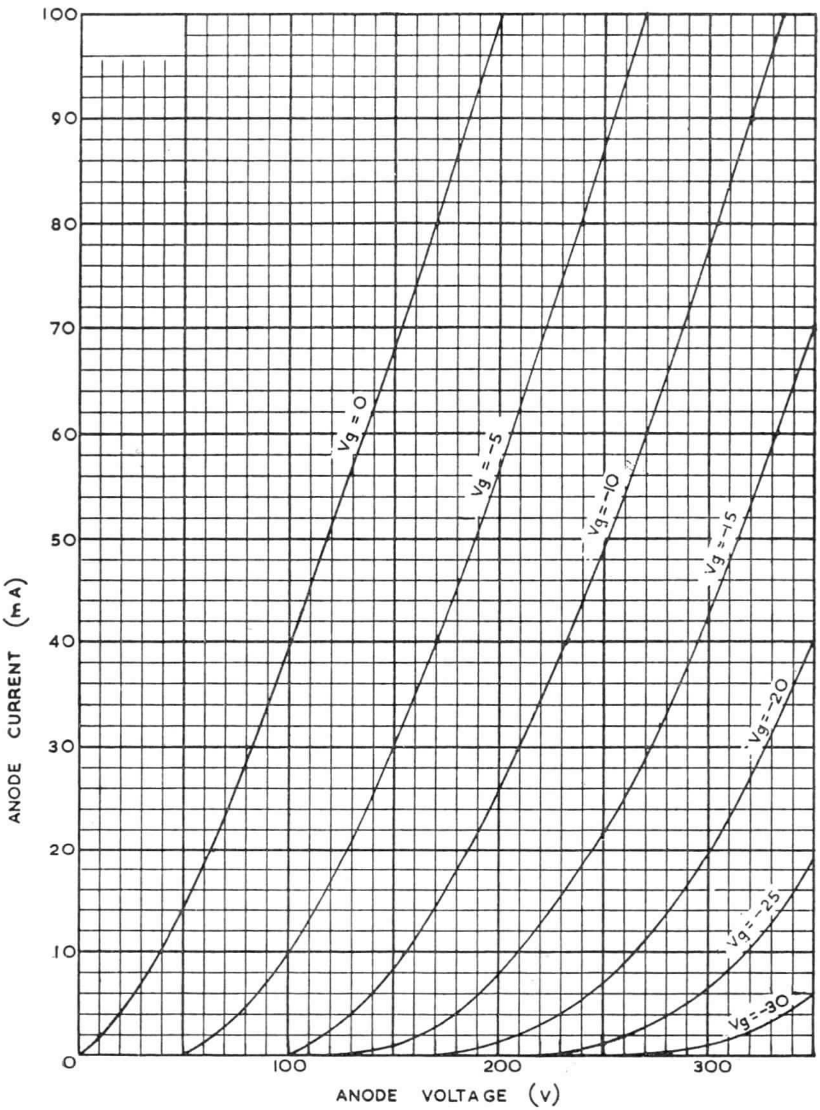
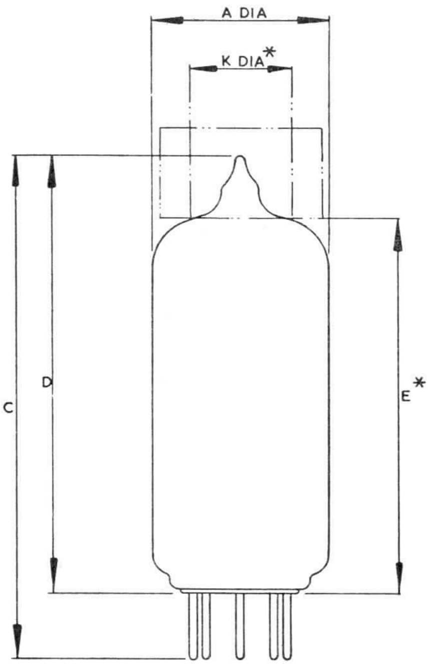
CONSTANT VOLTAGE CHARACTERISTICS—TRIODE CONNECTED



Code: 6F17 (CV416)

CONTINUED

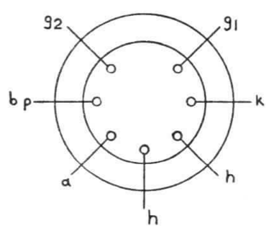
6F17 Outline



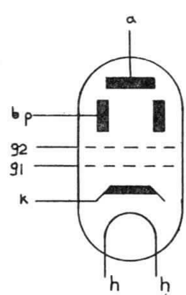
DIM	INCHES	MILLIMETRES
A	3/4 MAX.	19,0 MAX.
C	2 5/32 MAX.	54,5 MAX.
D	1 7/8 MAX.	47,5 MAX.
* E	1 13/32 MIN. 1 19/32 MAX.	35,5 MIN. 40,5 MAX.
* K	0·438 ± 0·001	11,13 ± 0,03

BASIC DIMS. ARE IN INCHES.

* DENOTES MEASURED FROM BASE SEAT TO BULB TOP LINE, AS DETERMINED BY RING GAUGE OF 'K' INT. DIA.



B7G BASE



M

SPECIAL VALVES

General Purpose Power Beam Tetrode

Code: 11E14 (CV5830)

This valve is suitable for power output in pulse modulator, series regulator and radar scanning applications.

CATHODE

Indirectly heated, oxide-coated		
Heater voltage	6·3	V
Heater current	1·2	A

CHARACTERISTICS

	$V_a = V_{g2}$	I_a		
Mutual conductance at	100 V	120 mA	16	mA/V
	250 V	48 mA	7·0	mA/V
Inner amplification factor	100 V	120 mA	6·0	
	250 V	48 mA	5·0	

DIRECT INTERELECTRODE CAPACITANCES

Anode to grid 1	0·2	pF
Input	19	pF
Output	11	pF

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251

LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Code: 11E14 (CV5830)

CONTINUED

MAXIMUM RATINGS

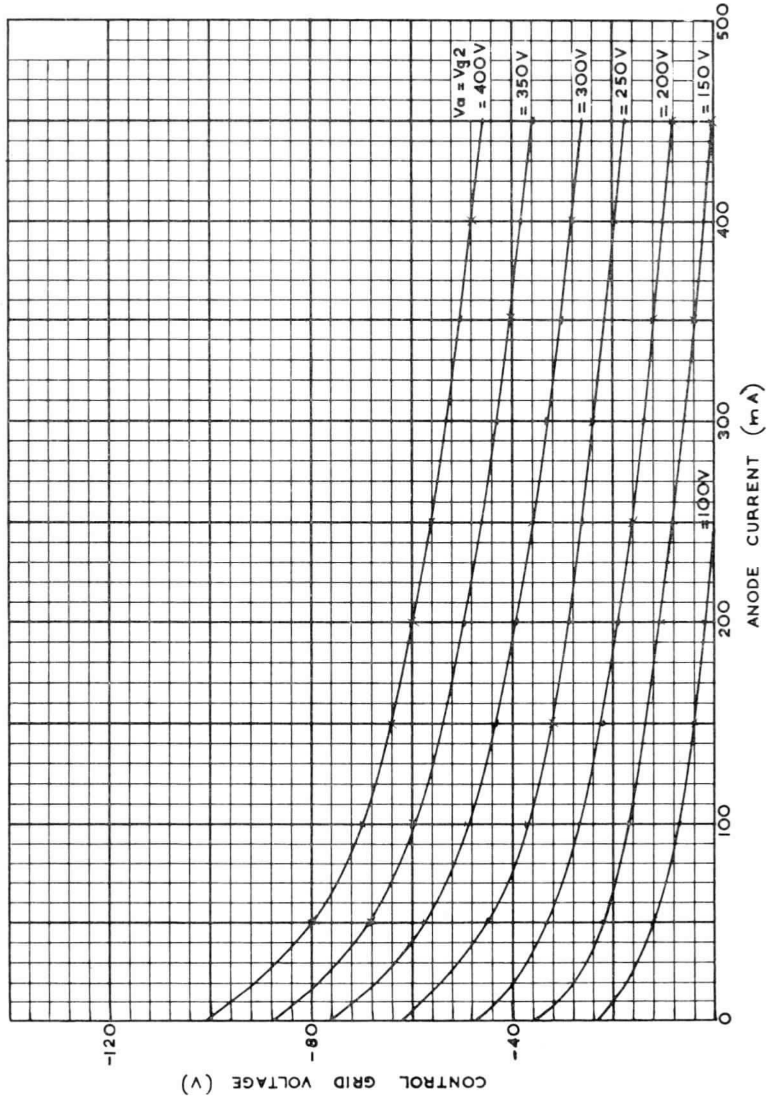
A. Low voltage regulation and scanning applications.
B. High voltage regulation.
C. Pulse modulation.

	A	B	C	
Anode supply voltage	1 000	4 000	—	V
Direct anode voltage	800	2 000	5 000*	V
Peak anode voltage	7 000	—	—	V
Anode dissipation	10	6·0	10	W
Screen supply voltage	500	550	—	V
Direct screen voltage	400	400	550	V
Screen dissipation	4·0	2·0	3·0	W
Direct cathode current	200	5·0	4·0	mA
Peak cathode current	—	—	4·0*	A
Maximum resistance grid 1 to cathode	500	—	500	kΩ
Maximum heater to cathode voltage	200	200	200	V

* Maximum pulse duration 1·0 μs, duty factor 0·001.

Code: 11E14 (CV5830)

CONTINUED



STC

Code: 11E14 (CV5830)

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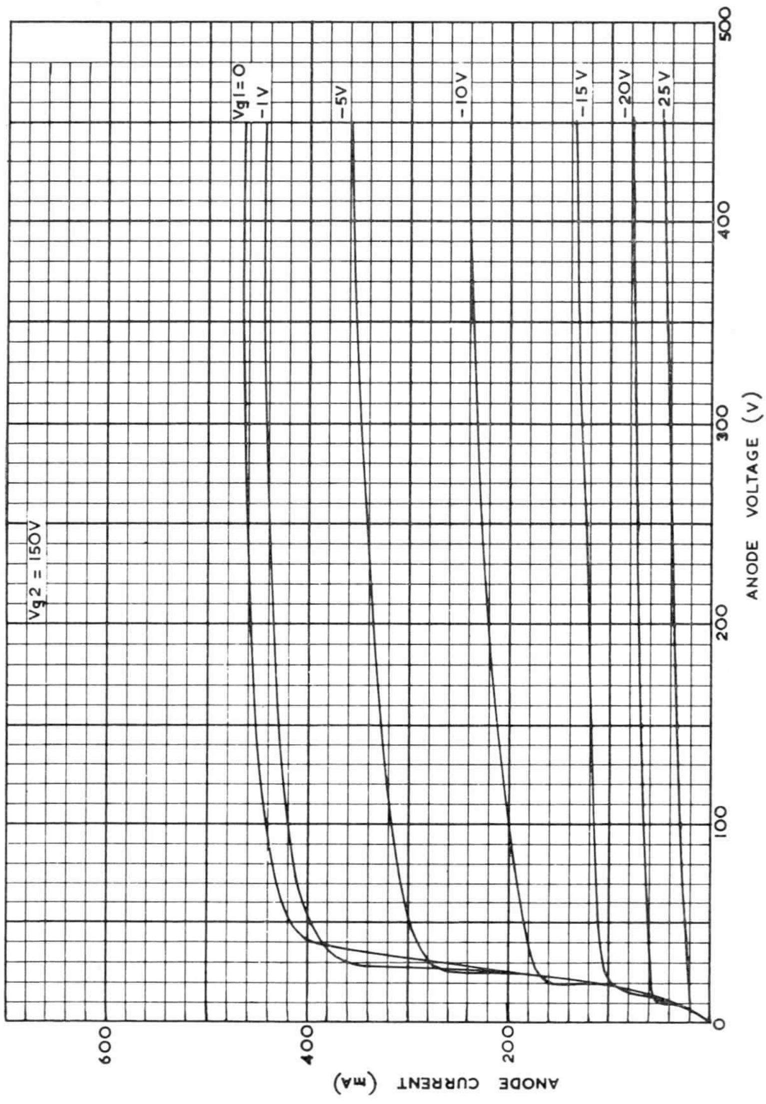

Code: 11E14 (CV5830)

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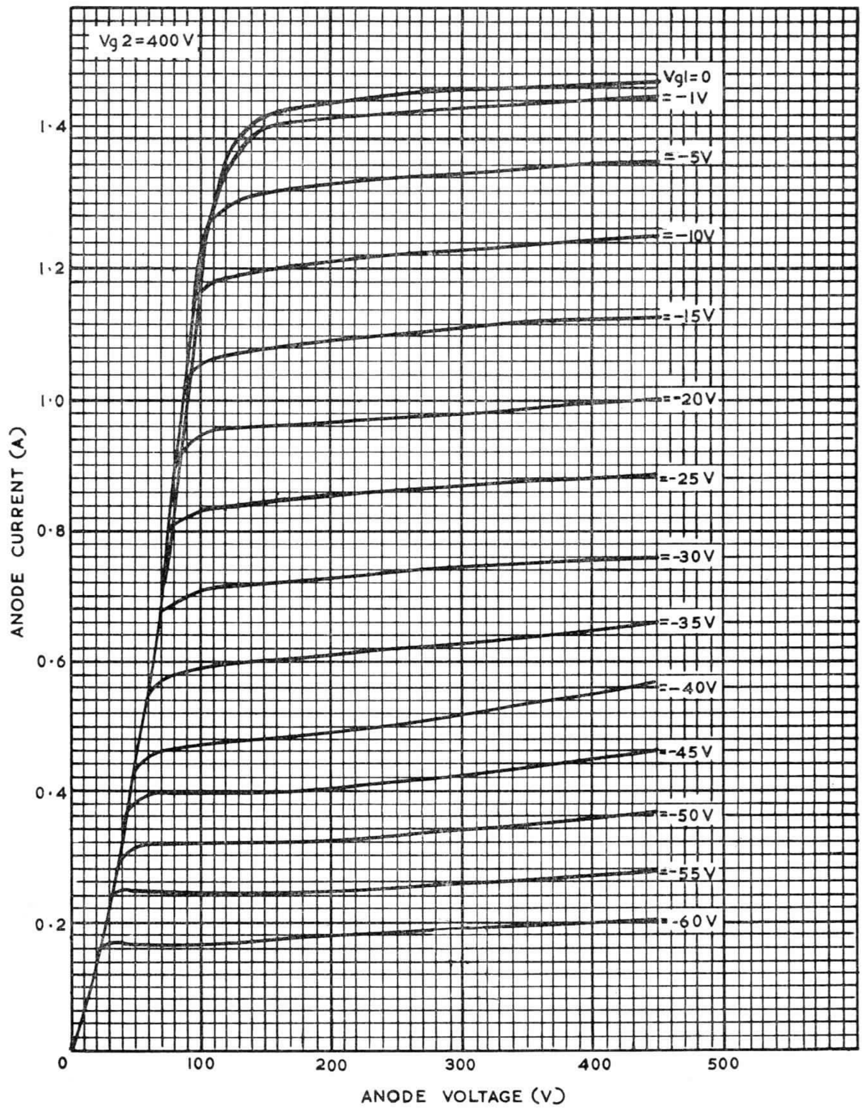

Code: 11E14 (CV5830)

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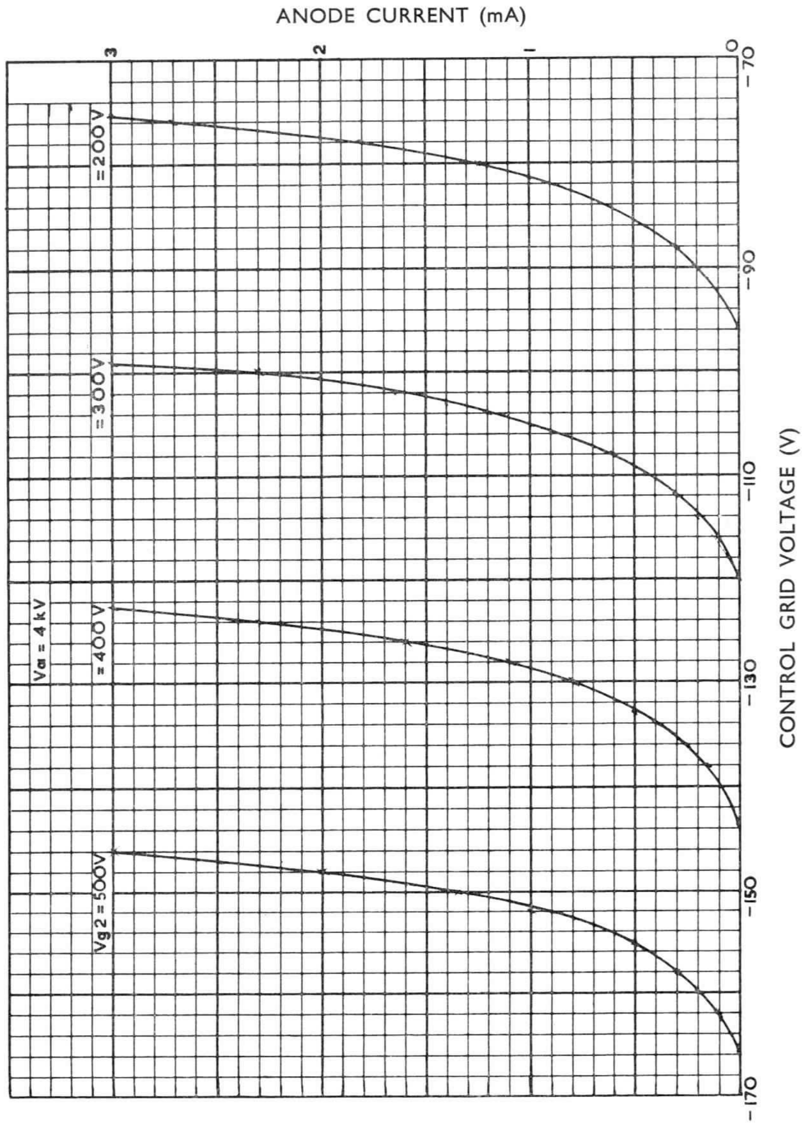

Code: 11E14 (CV5830)

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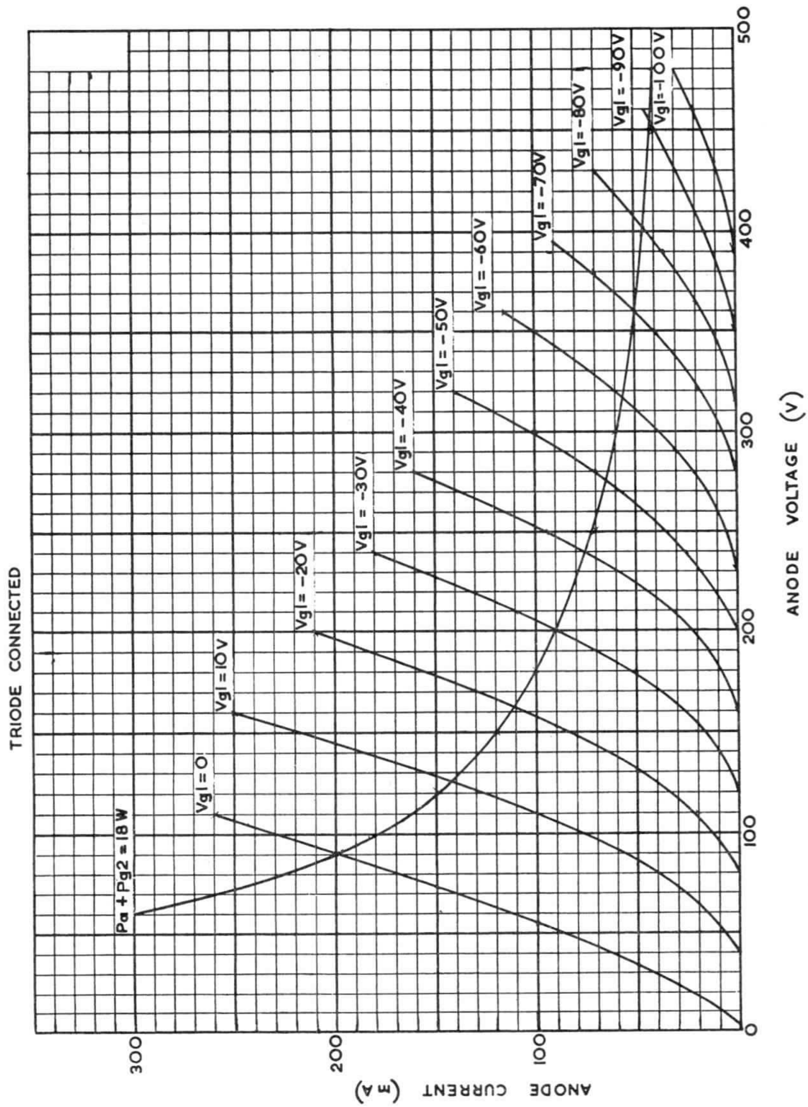
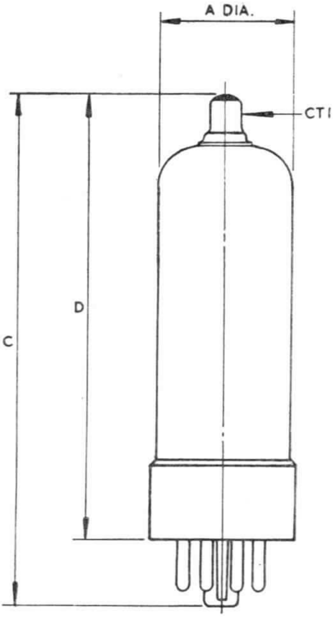


STC

Code: 11E14 (CV5830)

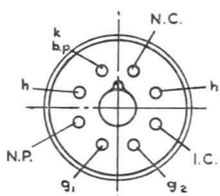
CONTINUED

11E14 Outline

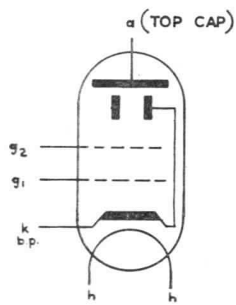


DIM.	INCHES	MILLIMETRES
A	1·180 MAX.	30 MAX.
C	4·450 MAX.	113 MAX.
D	3·900 MAX.	99 MAX.

BASIC DIMENSIONS ARE IN MILLIMETRES



SHORT INTERMEDIATE SHELL OCTAL BASE (7 PIN)



M

SPECIAL VALVES

Power Beam Tetrode

Code: 11E3 (CV73)

The 11E3 is intended for use as a break or series modulator with a short duration pulse input signal.

CATHODE

Indirectly heated, oxide coated		
Heater voltage	4·2	V
Heater current	2·5	A

CHARACTERISTICS

Mutual conductance	At $V_a = V_g2 = 200V$	7·5	mA/V
Inner amplification factor	$I_a = 40mA$	9·0	

DIRECT INTERELECTRODE CAPACITANCES

Anode to grid	0·26	pF
Input	20	pF
Output	7·5	pF

MECHANICAL DATA

Dimensions	As shown in outline drawing			
Mounting position	Vertical			
Net weight, approx.		2½ oz	70,9	g

Standard Telephones and Cables Limited
Valve Division, Brixham Road, Paignton, Devon
Telephone: Paignton 50762 Telex: 4230
London Sales Office, Telephone: Footscray 3333 Telex: 21836
COMPONENTS GROUP

Code: 11E3 (CV73)

CONTINUED

MAXIMUM RATINGS

Maximum direct anode voltage*	3·5	kV
Maximum peak anode voltage†	12·5	kV
Maximum screen voltage	700	V
Maximum control grid negative bias	−700	V
Maximum peak cathode current‡	3·5	A
Maximum anode dissipation	10	W
Maximum screen dissipation*	0·9	W
Maximum screen dissipation†	2·0	W
Maximum heater to cathode voltage	150	V

* When used as Series Modulator

† When used as Break Modulator

‡ Taken under pulse conditions of approximately 10μs duration and 400 : 1 minimum off-on ratio.

OPERATING NOTE

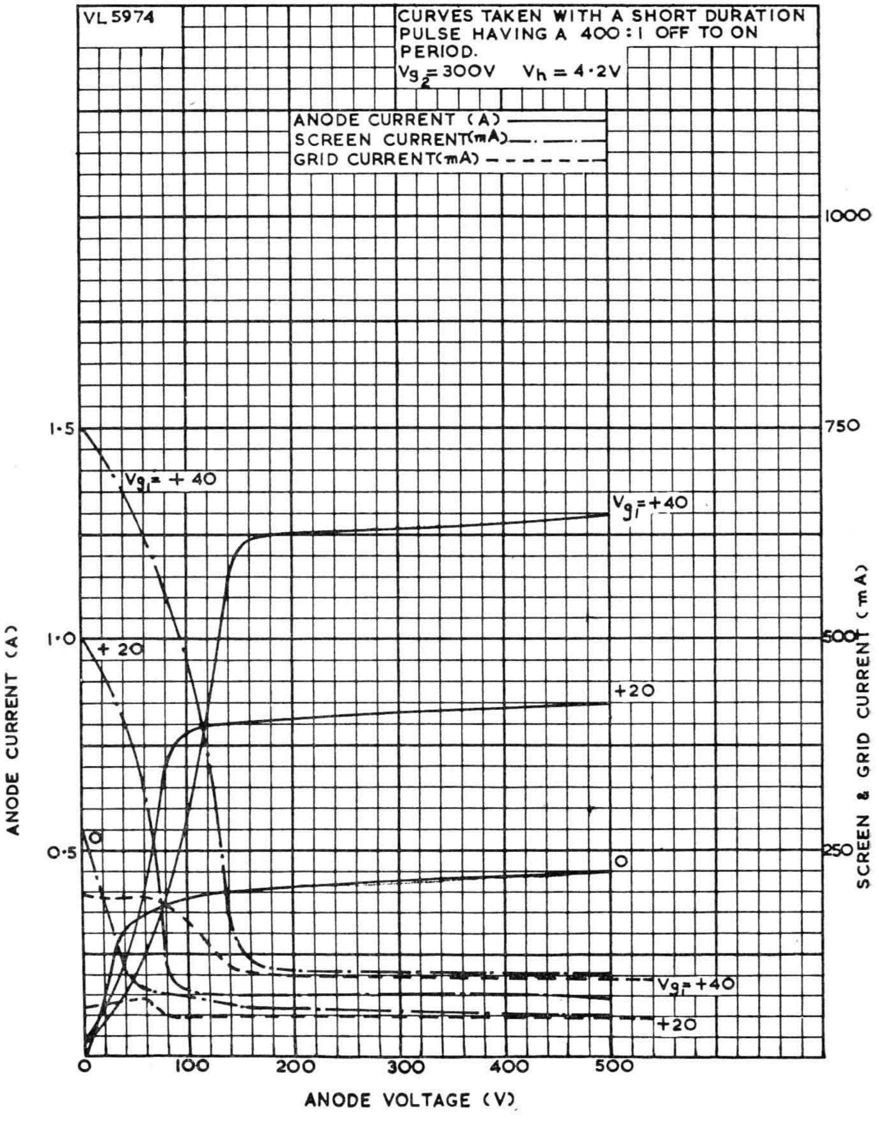
When the equipment is subjected to reduced atmospheric pressures, the peak voltage between the control grid and screen grid should not exceed 1 200V.

TYPICAL OPERATING CONDITIONS

	Series Modulator	Break Modulator	
Quiescent anode voltage	3 500	500	V
Screen voltage	500	500	V
Signal voltage, positive	50	25	V
Peak anode current	2·0	1·0	A
Knee voltage, approximately	200		V
Peak anode output voltage	3·3	10	kV
Peak grid current, approximately	0·12	0·25	A

Code: 11E3 (CV73)

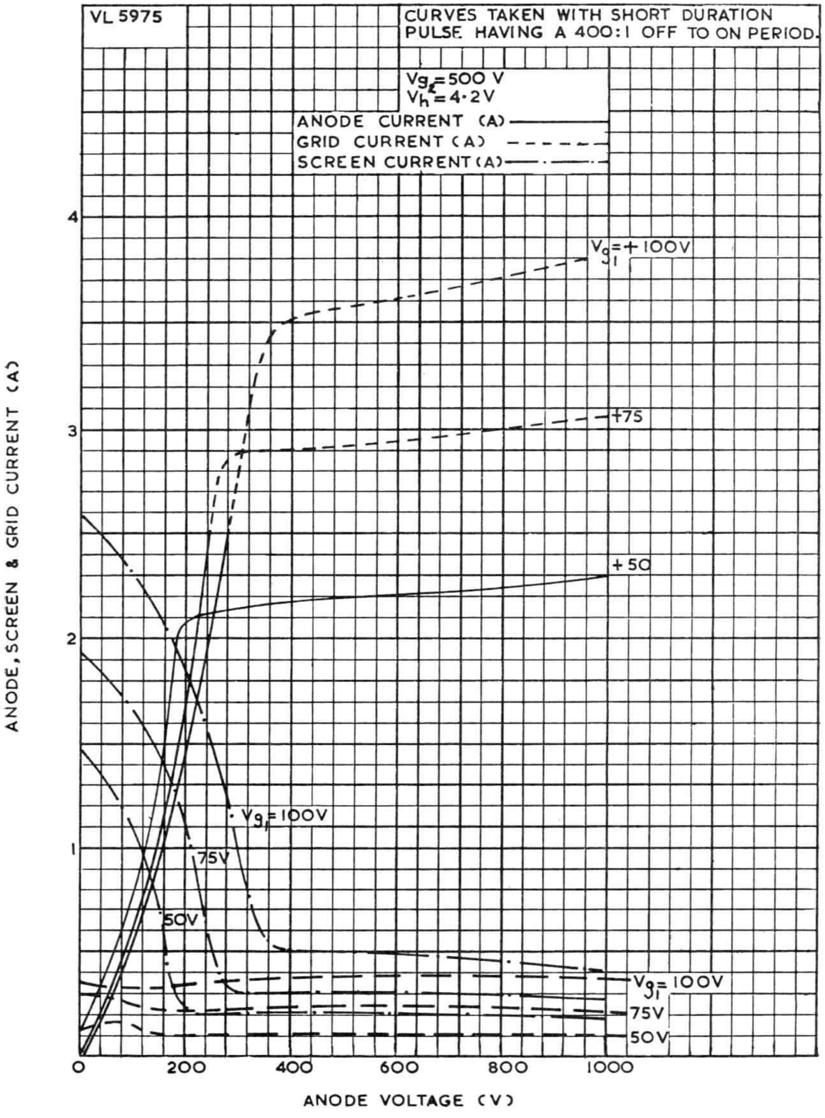
CONTINUED



STC

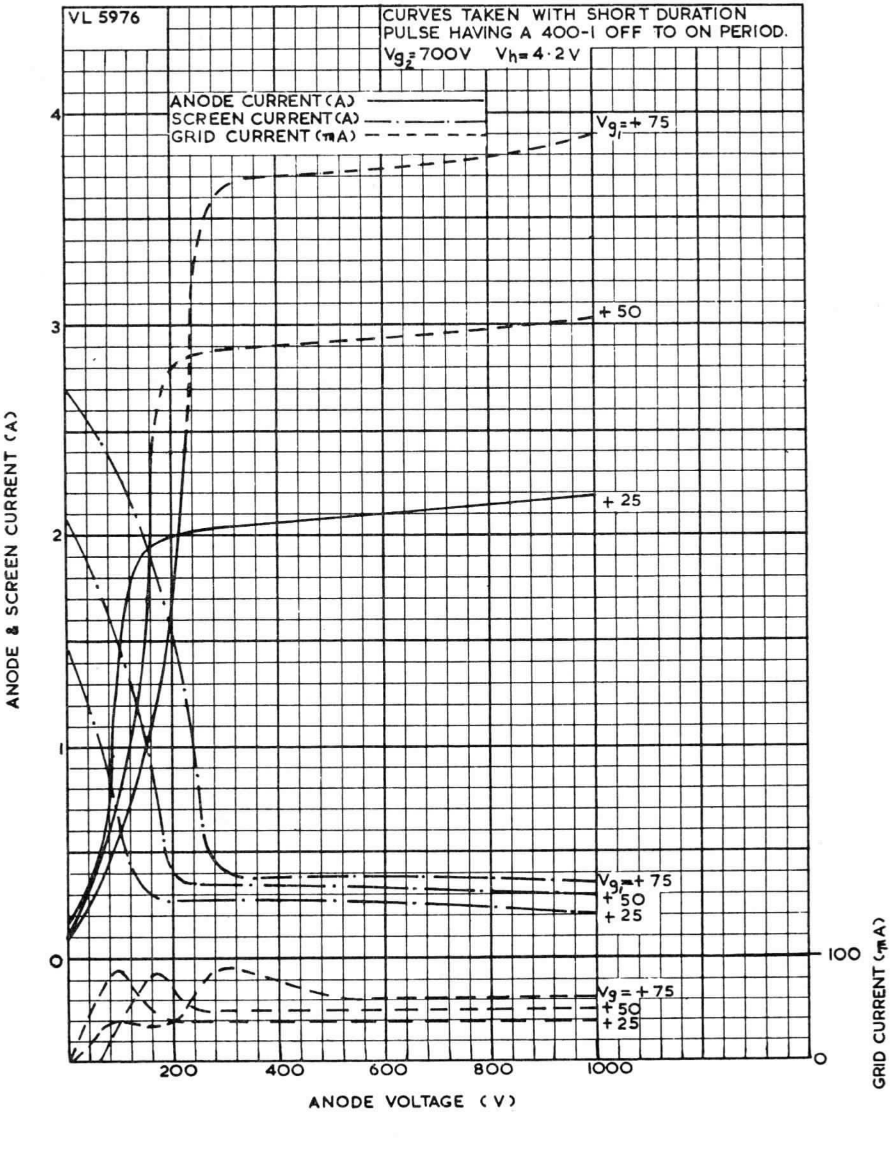
Code: 11E3 (CV73)

CONTINUED



Code: 11E3 (CV73)

CONTINUED



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Code: 11E3 (CV73)

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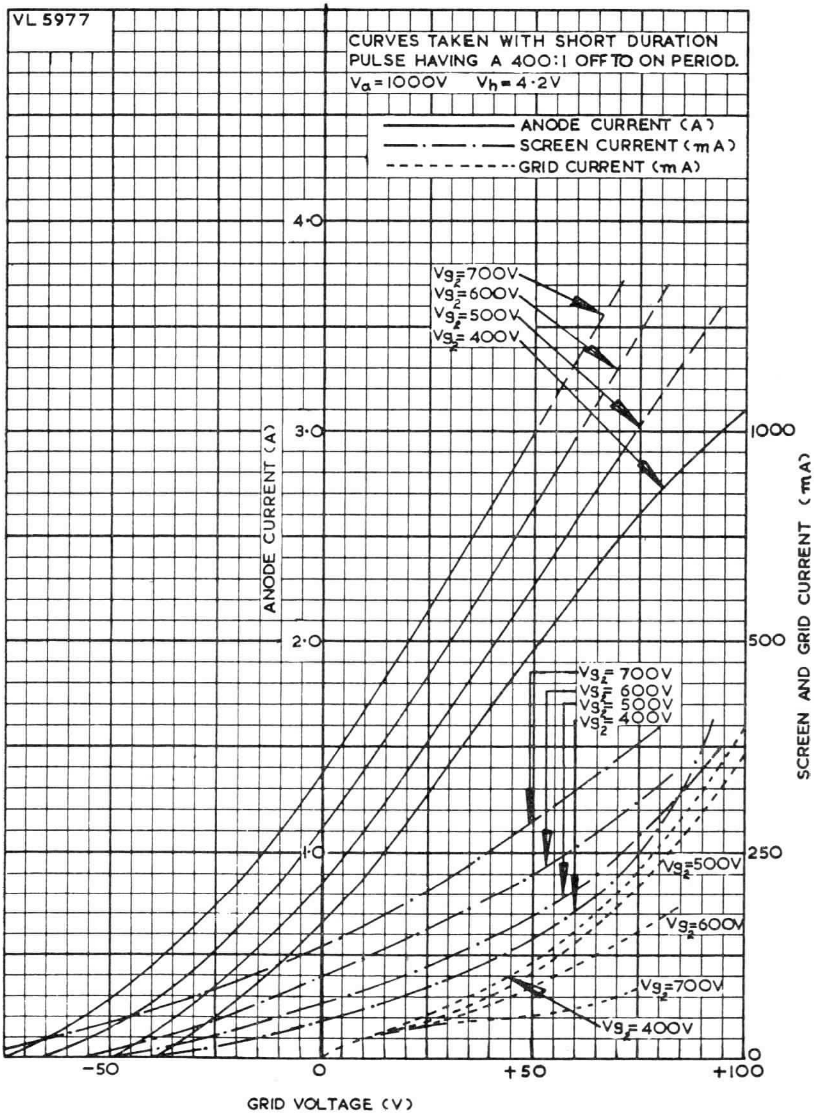
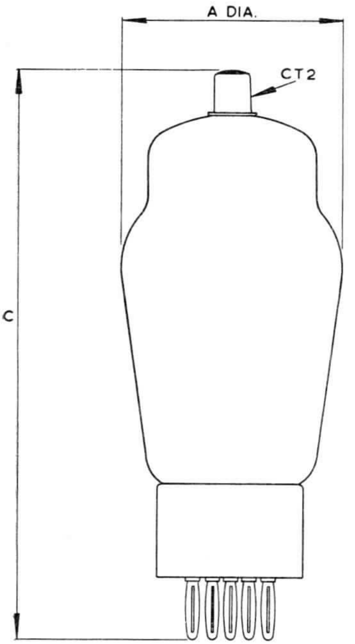


Code: 11E3 (CV73)

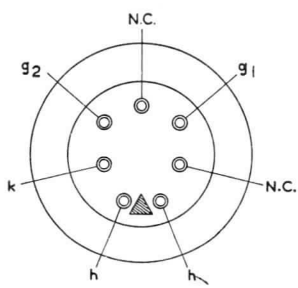
CONTINUED

11E3 Outline

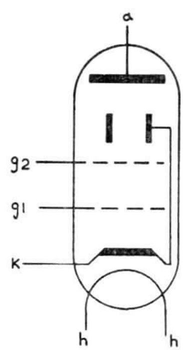


DIM	INCHES	MILLIMETRES
A	2·087 MIN.	53,0 MIN.
	2·165 MAX.	55,0 MAX.
C	5·157 MIN.	131,0 MIN.
	5·669 MAX.	144,0 MAX.

BASIC DIMS ARE MILLIMETRES.



BRITISH 7-PIN BASE



M

STC

SPECIAL VALVES

Beam Tetrode

Code: 5B/104D

This valve is suitable for low voltage instrumentation.

CATHODE

Indirectly-heated, oxide coated		
Heater voltage	24	V
Heater current, nominal	0·2	A

CHARACTERISTICS

Mutual conductance	At $V_a = V_{g2} = 24V$	3	mA/V
Screen grid amplification factor	$I_a = 3mA$	4·5	

DIRECT INTERELECTRODE CAPACITANCES

Input	15	pF
Output	10	pF
Control grid to anode	0·8	pF

MECHANICAL DATA

Dimensions	As shown in outline drawing
Base	10 – 7

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Maximum Ratings

Maximum direct anode voltage	200	V
Maximum direct anode current	50	mA
Maximum anode dissipation	10	W
Maximum direct screen voltage	110	V
Maximum screen dissipation	0·8	W

Typical Low-Voltage Application—Class A Amplifier

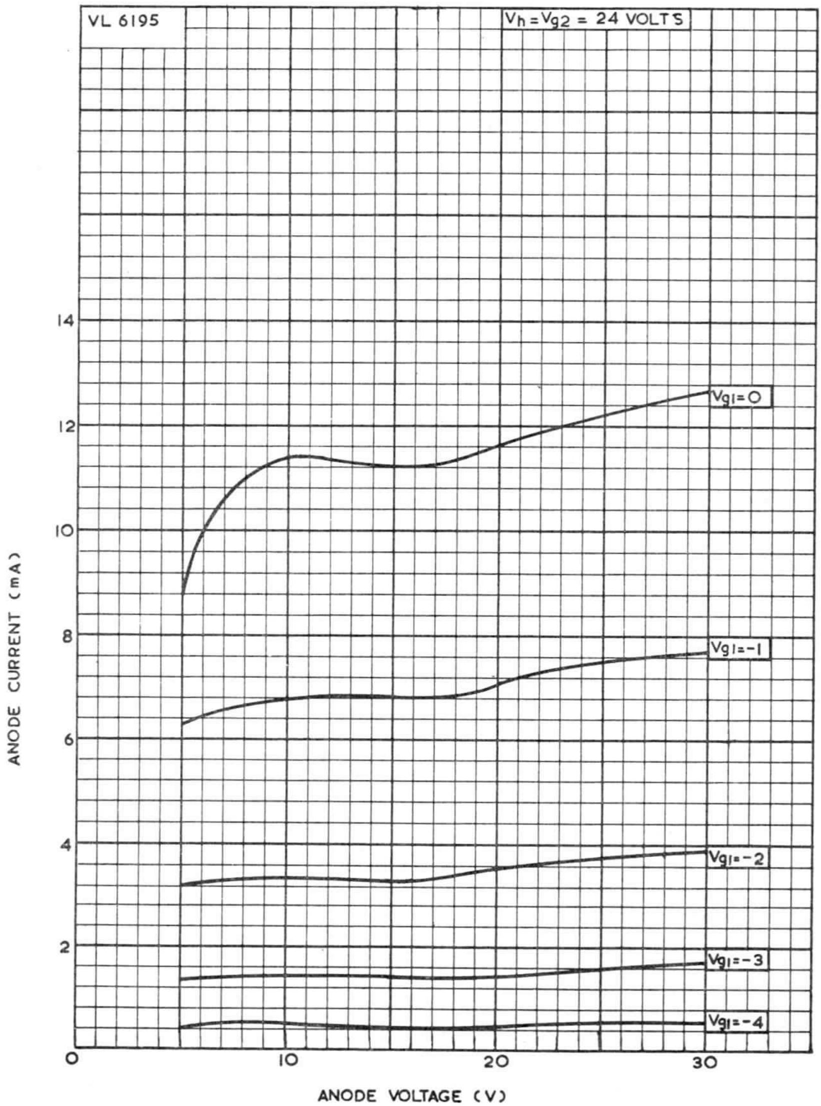
Direct anode voltage	24	V
Direct screen voltage	24	V
Grid bias	−2	V
Direct anode current	3	mA

Standard Telephones and Cables Limited
Valve Division, Brixham Road, Paignton, Devon
Telephone: Paignton 58685 Telex: 4230
London Sales Office, Telephone: Footscray 3333 Telex: 21836
C O M P O N E N T S G R O U P

STC

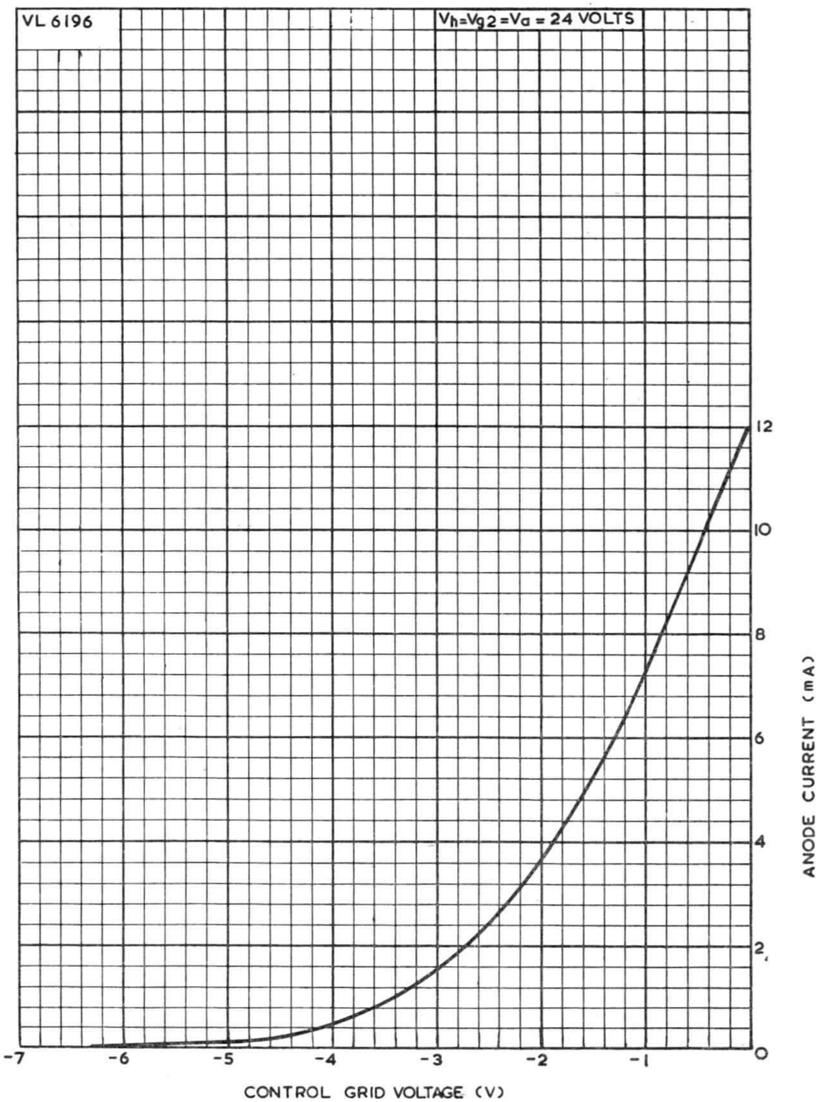
Code: 5B/104D

CONTINUED



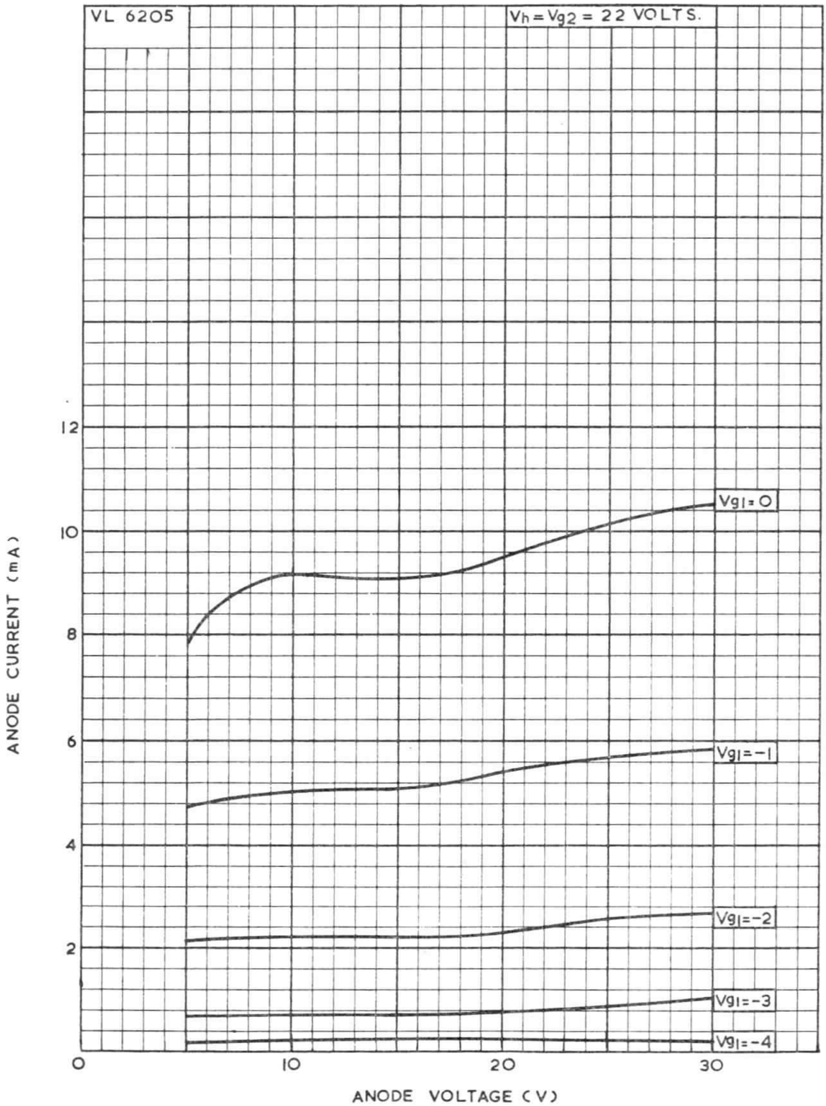
Code: 5B/104D

CONTINUED



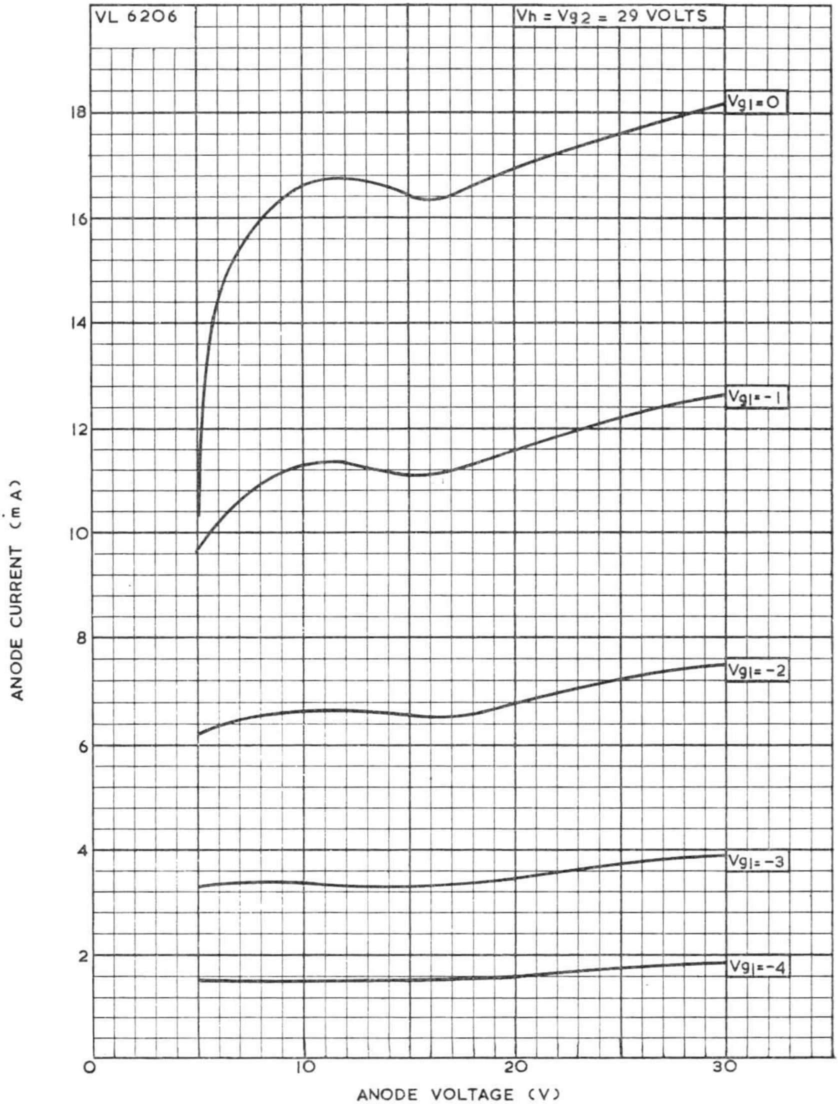
Code: 5B/104D

CONTINUED



Code: 5B/104D

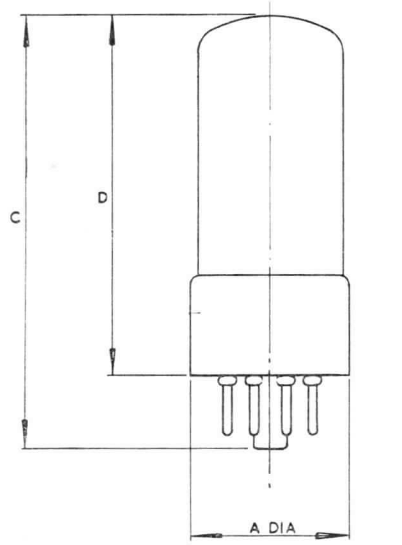
CONTINUED



Code: 5B/104D

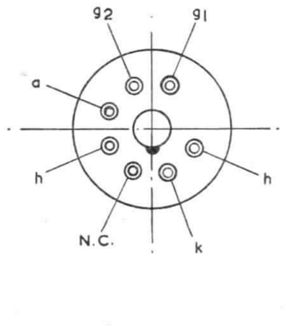
CONTINUED

5B/104D Outline

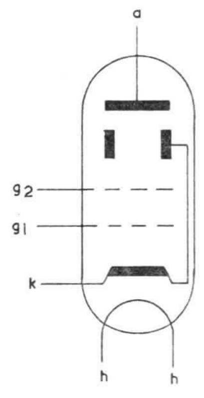


DIM	INCHES	MILLIMETRES
A	1 5/16 MAX.	33,3 MAX.
C	3 7/16 MAX.	87,3 MAX.
D	2 7/8 MAX.	73,0 MAX.

BASIC DIMENSIONS ARE INCHES.



INTERMEDIATE OCTAL BASE



SPECIAL VALVES

M

Beam Tetrode

Code: 3D21A (CV2659)

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 $\left\{\begin{array}{l}\text{Measured at } V_a \text{ 600 V} \\ V_{g_2} \text{ 300 V} : V_{g_1} -30 \text{ V}\end{array}\right\}$	5.5	mA/V

DIRECT INTERELECTRODE CAPACITANCES.

Input	19	pF
Output	10	pF
Anode to grid	1	pF

DIMENSIONS.

Maximum overall length	122.2	mm
Maximum seated height, approx.	104.8	mm
Maximum diameter	46	mm
Base	Medium shell octal	
Top cap	Skirted CT1	
Net weight	50	g

March 1959

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, W.C.2

VALVE DIVISION, FOOTSCRAY, KENT   Telephone: Footscray 3333

SPECIAL VALVES

Beam Tetrode

Code: 3D21A (CV2659)

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

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.

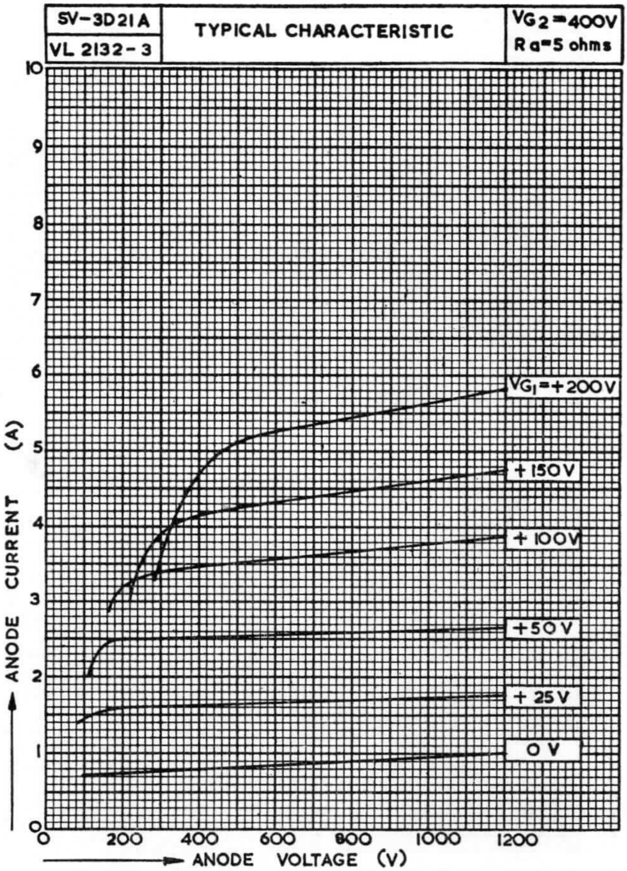
† Series resistance must be inserted in the power supply to limit the D.C. short circuit current to less than 0.5 ampere.

‡ Total pulse length in any 240 microsecond period must not exceed 12 microseconds.

SPECIAL VALVES

Beam Tetrode

Code: 3D21A (CV2659)

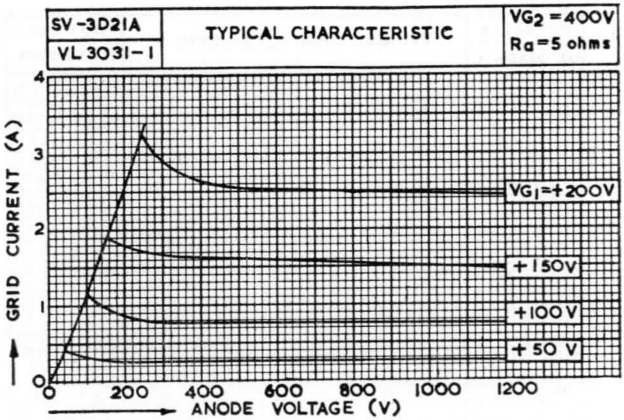


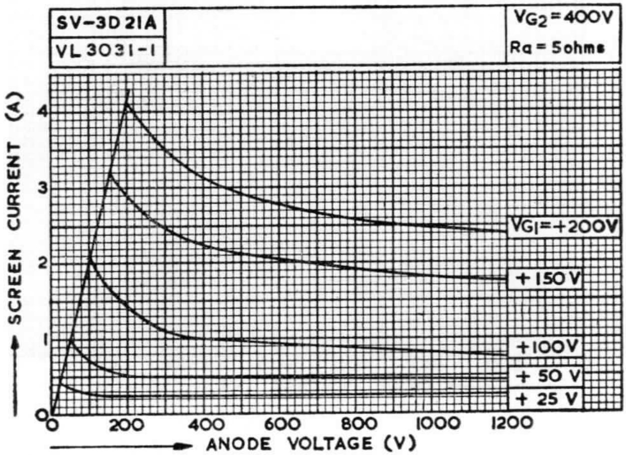
March 1959

SPECIAL VALVES

Beam Tetrode

Code: 3D21A (CV2659)

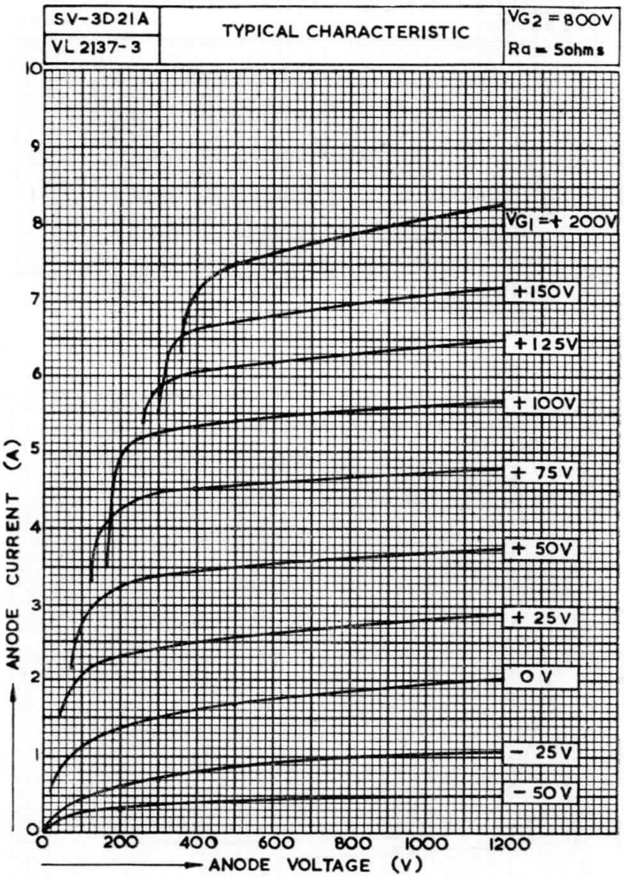




SPECIAL VALVES

Beam Tetrode

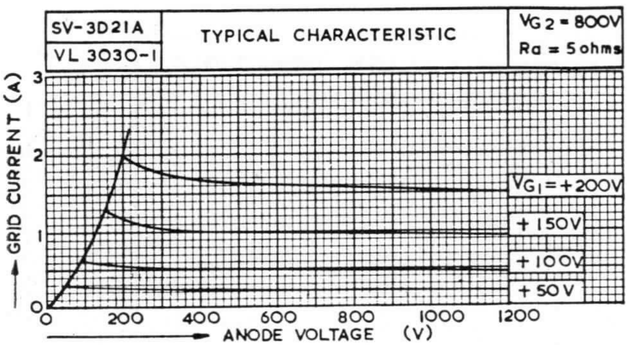
Code: 3D21A (CV2659)

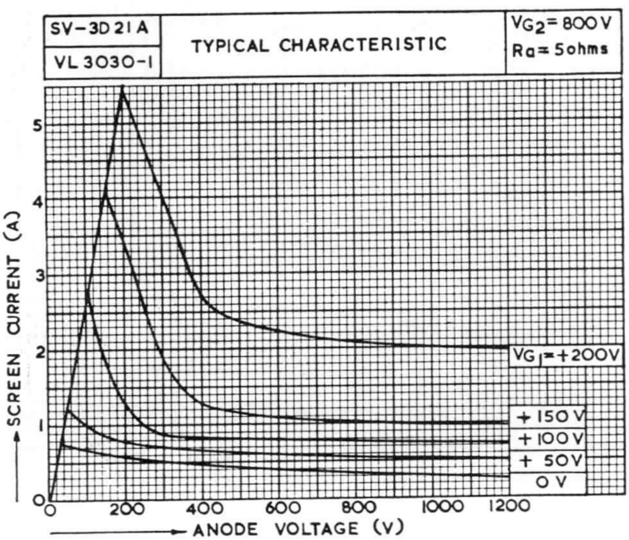


SPECIAL VALVES

Beam Tetrode

Code: 3D21A (CV2659)

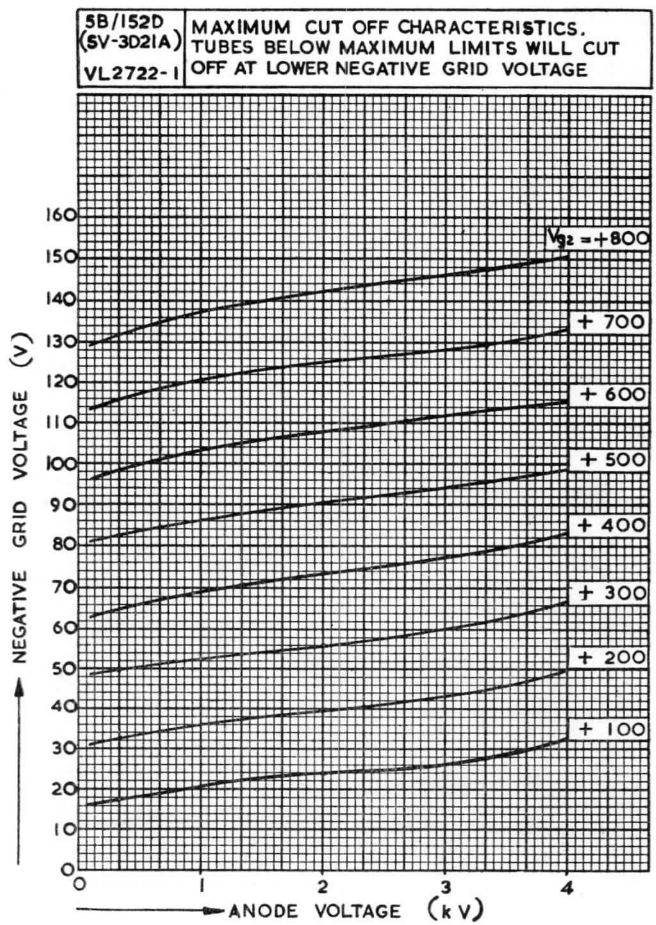




SPECIAL VALVES

Beam Tetrode

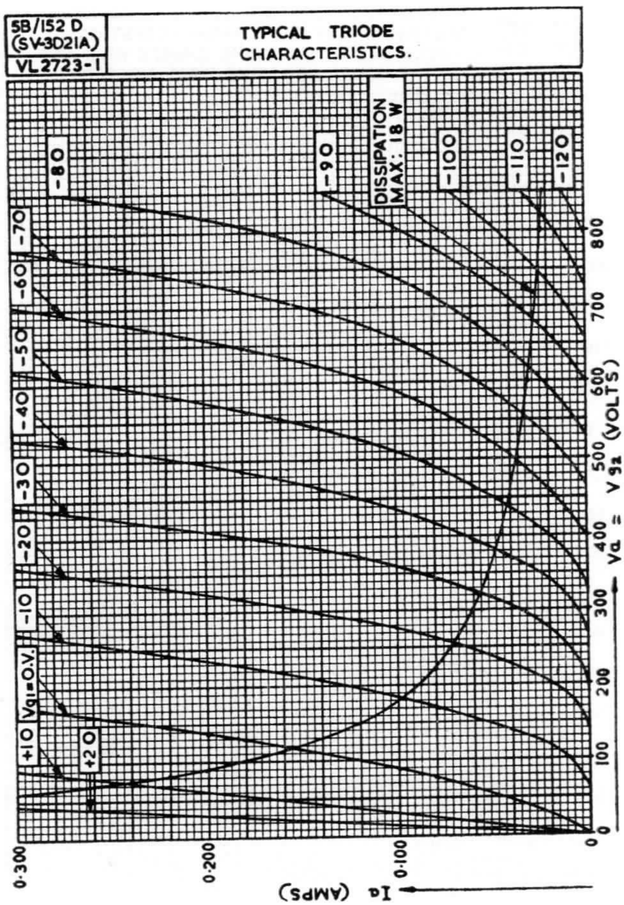
Code: 3D21A (CV2659)



SPECIAL VALVES

Beam Tetrode

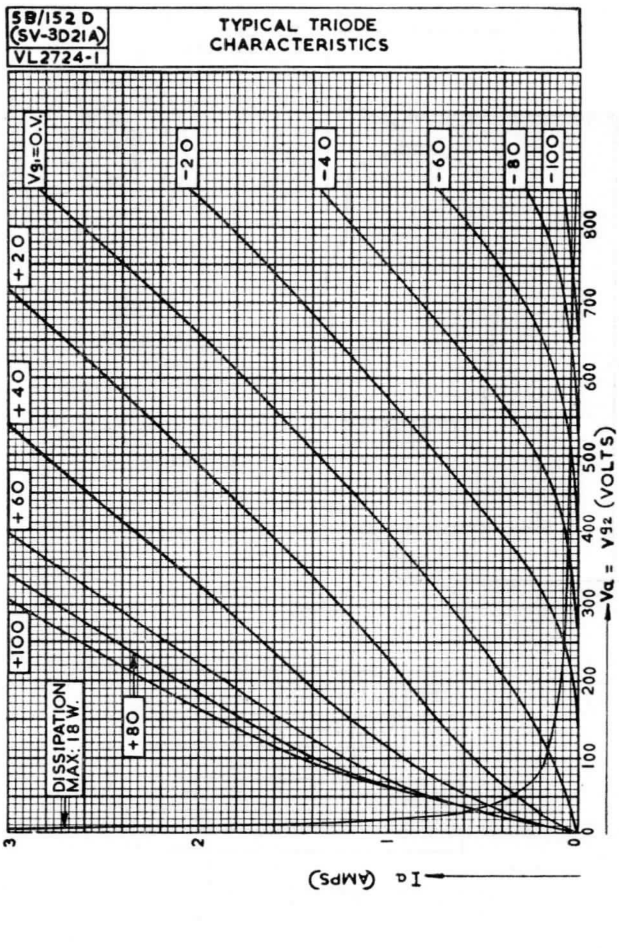
Code: 3D21A (CV2659)



SPECIAL VALVES

Beam Tetrode

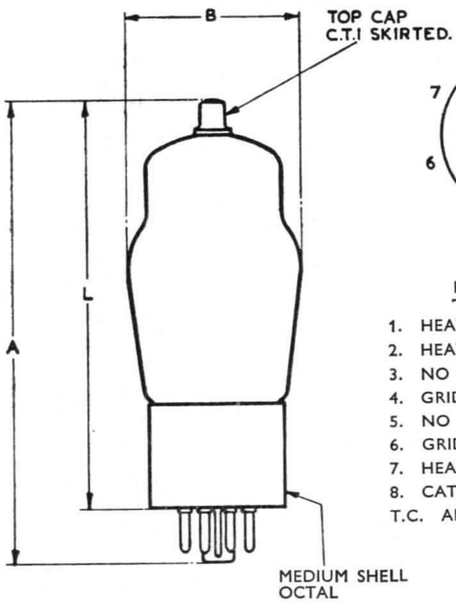
Code: 3D21A (CV2659)

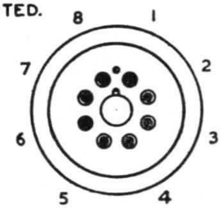


SPECIAL VALVES

Beam Tetrode

Code: 3D21A (CV2659)





BASING

1. HEATER (CT)
2. HEATER
3. NO CONNEXION
4. GRID NO. 2
5. NO CONNEXION
6. GRID NO. 1
7. HEATER
8. CATHODE

T.C. ANODE

DIM.	MILLIMETRES	INCHES
A	122.2 MAX.	$4\frac{13}{16}$ MAX.
	115.9 MIN.	$4\frac{9}{16}$ MIN.
B	46 MAX.	$1\frac{13}{16}$ MAX.
L	104.8 NOM.	$4\frac{1}{8}$ NOM.

NOTE.—BASIC DIMENSIONS ARE INCHES

SPECIAL VALVES

Beam-Power Amplifiers

Codes: 5B/254G
5B/254M (CV428)
5B/255M (CV391)
5B/256M (CV499)
5B/257M (CV2220)
5B/258M (CV2347)

These valves are indirectly heated, beam-power tetrodes electrically similar to the 5B/250A (807) type, and of reliable construction. The 5B/254G is identical to the 5B/254M but has flexible leads for wiring directly into the circuit.

For applications where the valve is to be used at either high altitudes or under anode modulated conditions, the use of the double-ended versions (5B/254G, 5B/254M and 5B/258M) is to be preferred because of insulation considerations at the valve base.

MECHANICAL DATA

Mounting Position

There are no restrictions on the mounting position of these valves but, as they may reach high temperatures according to the power dissipated, the equipment should be designed so that adequate ventilation is afforded to ensure safe bulb temperature under all conditions of use. Under no circumstances should the temperature of the hottest point of the bulb be allowed to exceed 250°C.

Net weight	40	g
	1.4	oz

COMPONENTS GROUP

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, W.C.2

VALVE DIVISION, FOOTSCRAY, KENT   Telephone: Footscray 3333

SPECIAL VALVES

Beam-Power Amplifiers

Codes: 5B/254G, 5B/254M (CV428), 5B/255M (CV391), 5B/256M (CV499), 5B/257M (CV2220), 5B/258M (CV2347)

ELECTRICAL DATA

CATHODE

Indirectly-heated, oxide-coated

	5B/254M	5B/254G	5B/255M	
Heater voltage	6.3	6.3	6.3	V
Heater current (nominal)	0.9	0.9	0.9	A
	5B/256M	**5B/257M**	**5B/258M**	
Heater voltage	19	12	19	V
Heater current (nominal)	0.3	0.47	0.3	A

DIRECT INTERELECTRODE CAPACITANCES

	5B/254M	5B/254G	5B/255M	
Input	13	10	12	pF
Output	7	8	8.5	pF
Anode to Grid 1	0.1	0.12	0.13	pF
	5B/256M	**5B/257M**	**5B/258M**	
Input	12	12	13	pF
Output	8.5	8.5	7	pF
Anode to Grid 1	0.13	0.13	0.1	pF

CHARACTERISTICS

Mutual conductance	Measured at $V_a = 300V : V_{g2} = 250V$, $I_a = 72$ mA	6	mA/V
Screen grid μ		9	

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

AUDIO FREQUENCY

Class AB_1. Power Amplifier or Modulator. Triode connected.
(For balanced two-valve operation.)

***Maximum Ratings* (*per valve*).**

Direct anode voltage	400	V
Direct average anode current	125	mA
Direct anode plus screen dissipation	25	W
Peak heater to cathode voltage, positive or negative	135	V

SPECIAL VALVES

Beam-Power Amplifiers

Codes: 5B/254G **5B/256M (CV499)**
5B/254M (CV428) **5B/257M (CV2220)**
5B/255M (CV391) **5B/258M (CV2347)**

Typical Operating Conditions (two valves).

Direct anode voltage	400	V
*Direct grid voltage	−45	V
Direct anode current, zero signal	64	mA
Direct anode current, max. signal	140	mA
Peak a.f. grid to grid voltage	90	V
Load resistor, anode to anode	3 000	Ω
Power output, two valves	15	W
Total harmonic distortion	3	%

Class AB_2. Power Amplifier or Modulator.
(For balanced two-valve operation.)

Maximum Ratings (per valve).

Direct anode voltage	600	V
Direct average anode current	120	mA
Direct anode dissipation	25	W
Direct screen voltage	300	V
Direct screen dissipation	4.5	W
Peak heater to cathode voltage, positive or negative	135	V

Typical Operating Conditions (two valves).

Direct anode voltage	500	600	V
Direct screen voltage	300	300	V
*Direct grid voltage	−30	−32	V
Direct anode current, zero signal	60	46	mA
Direct anode current, max. signal	240	200	mA
Direct screen current, zero signal	0.9	0.7	mA
Direct screen current, max. signal	16	12	mA
Peak a.f. grid to grid voltage	86	90	V
Load resistor, anode to anode	4 600	6 900	Ω
Power output, two valves	75	80	W

* The D.C. grid circuit resistance should not exceed 30 000 ohms when a fixed bias source is used. Cathode bias is not recommended.

RADIO FREQUENCY

Class B. Telephony. Modulated carrier applied to the grid.
(Carrier conditions per valve for use with 100% modulation.)

Maximum Ratings.

Direct anode voltage	600	V
Direct anode current	80	mA
Direct anode dissipation	25	W
Direct screen voltage	300	V
Direct screen dissipation	4.5	W
Peak heater to cathode voltage, positive or negative	135	V
Maximum frequency for above ratings	60	Mc/s
Maximum anode voltage for 125 Mc/s operation	450	V

SPECIAL VALVES

Beam-Power Amplifiers

Codes: 5B/254G — 5B/254M (CV428) — 5B/255M (CV391) — 5B/256M (CV499) — 5B/257M (CV2220) — 5B/258M (CV2347)

Typical Operating Conditions.

Direct anode voltage	500	600	V
Direct screen voltage	300	300	V
*Direct grid voltage	−40	−40	V
Direct anode current	70	62.5	mA
Direct screen current	4	4	mA
Peak r.f. grid voltage	40	36	V
Direct grid current	0	0	mA
†Grid driving power (approx.)	0.3	0.2	W
Power output	11	12.5	W

* The total effective grid circuit resistance should not exceed 30 000 ohms.

† At crest of a.f. cycle with 100% modulation.

Class C. Power Amplifier. Anode subject to modulation.

(Carrier conditions per valve for use with 100% modulation.)

Maximum Ratings.

Direct anode voltage	475	V
Direct anode current	83	mA
Direct anode dissipation	16.5	W
Direct screen voltage	300	V
Direct screen dissipation	3	W
Direct grid current	5	mA
Peak heater to cathode voltage, positive or negative	135	V
Maximum frequency for above ratings	60	Mc/s
Maximum direct anode voltage for 125 Mc/s operation	350	V

Typical Operating Conditions.

Direct anode voltage	400	475	V
†Direct screen voltage	250	250	V
†Screen series resistor	25	28	kΩ
*Direct grid voltage	−75	−85	V
Grid series resistor	21.4	21.2	kΩ
Direct anode current	80	83	mA
Direct screen current	6	8	mA
Peak r.f. grid voltage	95	108	V
§Direct grid current	3.5	4.0	mA
Grid drive power, approx.	0.3	0.4	W
Power output	22	28	W

Class C. Power Amplifier or Oscillator. Unmodulated.

Maximum Ratings.

Direct anode voltage	600	V
Direct anode current	100	mA
Direct anode dissipation	25	W
Direct screen voltage	300	V
Direct screen dissipation	4.5	W
Direct grid current	5.0	mA
Peak heater to cathode voltage, positive or negative	135	V
Maximum frequency for above ratings	60	Mc/s
Maximum direct anode voltage for 125 Mc/s operation	450	V

Typical Operating Conditions.

Direct anode voltage	500	600	V
⊙ Direct screen voltage	250	250	V
⊙ Screen series resistor	31	44	kΩ
*Direct grid voltage	−45	−45	V
Grid series resistor	11.2	11.2	kΩ
Direct anode current	100	100	mA
Direct screen current	8	8	mA
Peak r.f. grid voltage	65	65	V
§Direct grid current	4	4	mA
Grid drive power, approx.	0.3	0.3	W
Power output	32	40	W

* Obtained from the resistor of value shown, a cathode resistor, fixed supply or a combination of methods.

When the grid is driven positive and the valve operated at maximum ratings the total D.C. grid resistance should not exceed 30 000 ohms. For operation at less than maximum ratings the value may be increased to 100 000 ohms.

† Obtained from the modulated anode supply via a resistor of the value given, from a fixed supply via an a.f. choke, or, preferably, from a fixed supply via a separate winding on the modulation transformer.

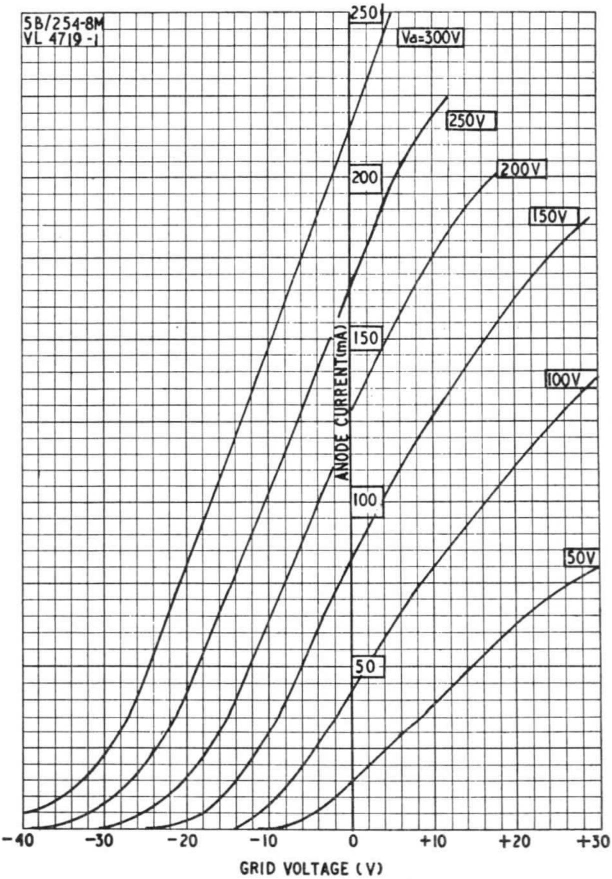
§ Subject to wide variation dependent upon the impedance of the load circuit.

⊙ Obtained from a separate source, from the anode voltage supply via a potential divider or through a series resistor of the value shown. A series screen resistor should be used only in a circuit in which the valve is not keyed.

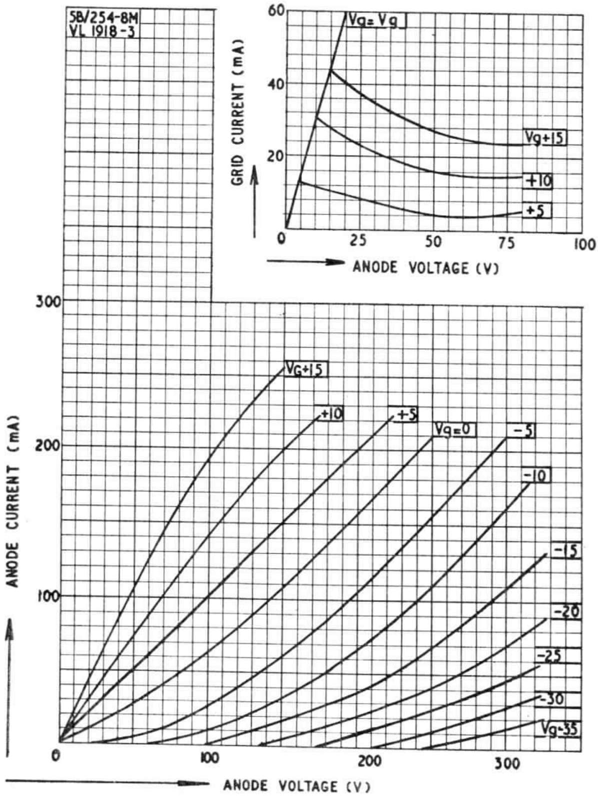
Codes: 5B/254G
5B/254M (CV428)
5B/255M (CV391)
5B/256M (CV499)
5B/257M (CV2220)
5B/258M (CV2347)

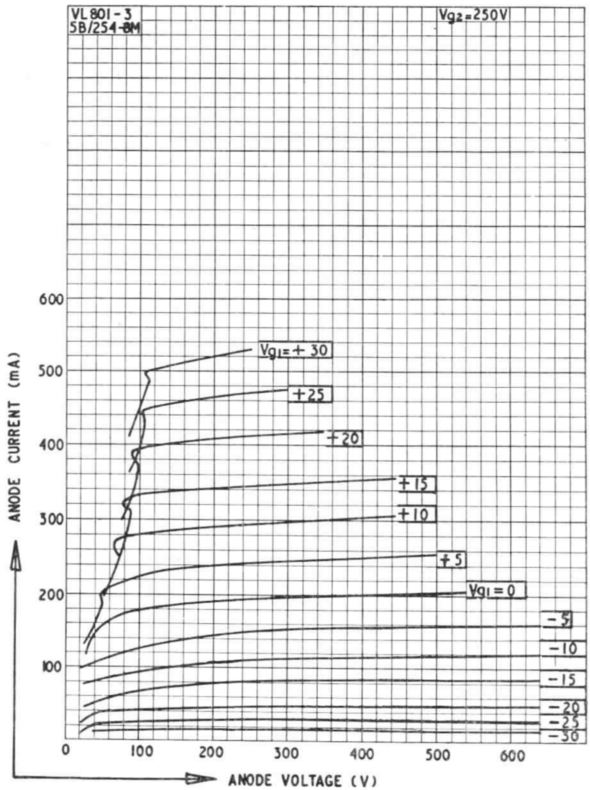
CONTINUED

MUTUAL CHARACTERISTIC—TRIODE CONNECTED



CONSTANT VOLTAGE CHARACTERISTIC—TRIODE CONNECTED

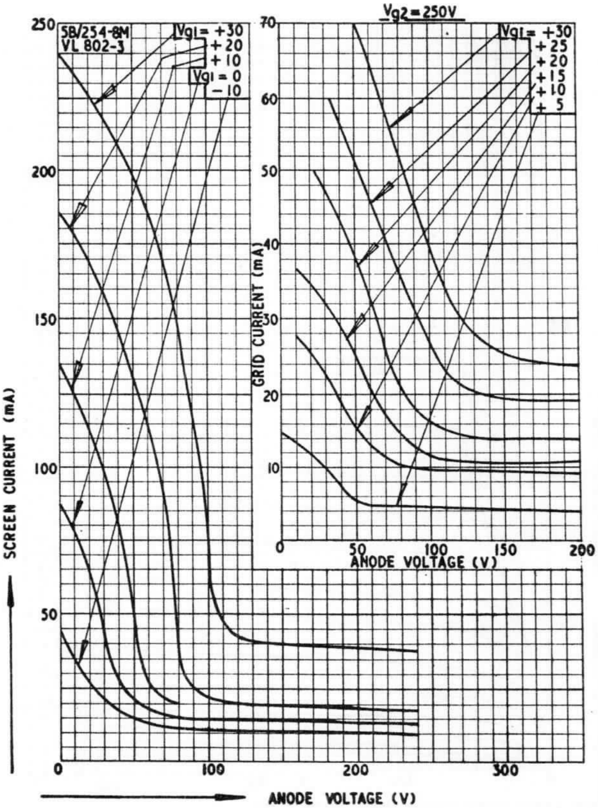



VL 801-3
5B/254-8M
Vg2=250V
600
500
400
300
200
100
0
ANODE CURRENT (mA)
Vg1=+30
+25
+20
+15
+10
+5
Vg1=0
-5
-10
-15
-20
-25
-30
100
200
300
400
500
600
ANODE VOLTAGE (V)

SPECIAL VALVES

Beam-Power Amplifiers

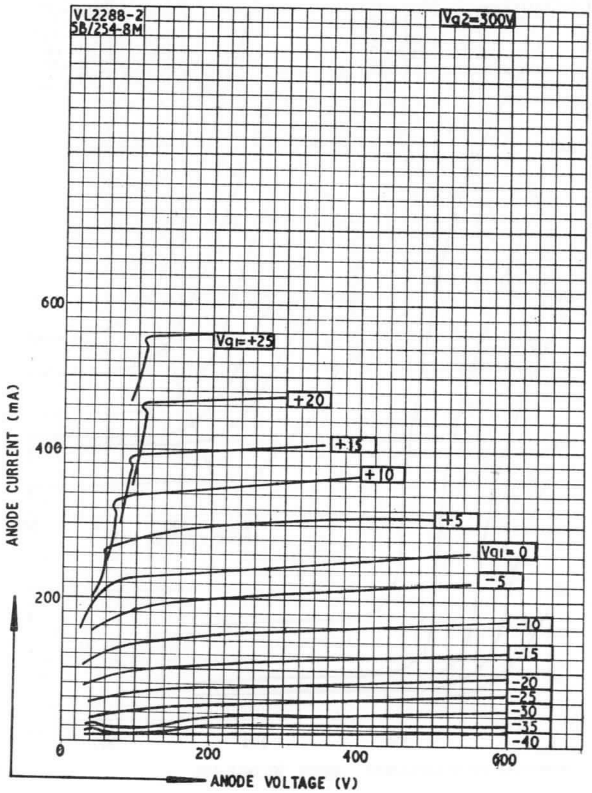
Codes: 5B/254G
5B/254M (CV428)
5B/255M (CV391)
5B/256M (CV499)
5B/257M (CV2220)
5B/258M (CV2347)



SPECIAL VALVES

Beam-Power Amplifiers

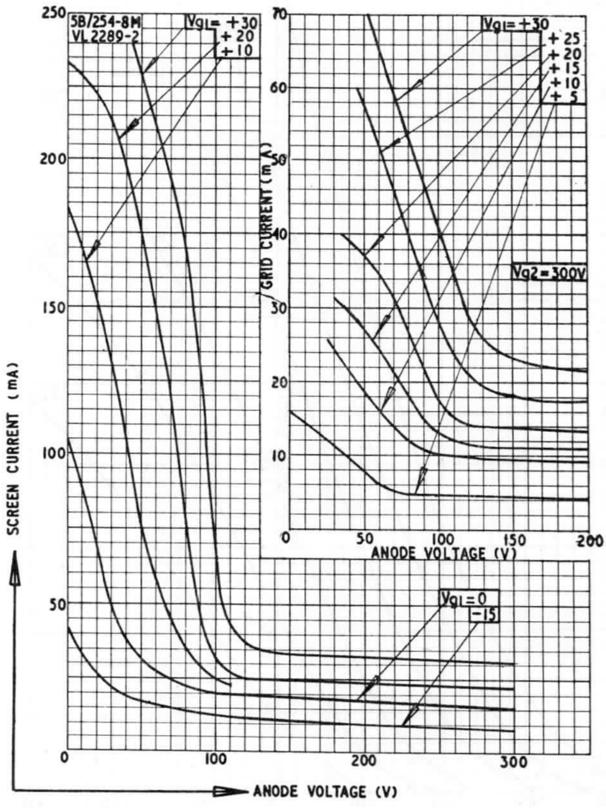
Codes: 5B/254G
5B/254M (CV428)
5B/255M (CV391)
5B/256M (CV499)
5B/257M (CV2220)
5B/258M (CV2347)



SPECIAL VALVES

Beam-Power Amplifiers

Codes: 5B/254G 5B/254M (CV428) 5B/255M (CV391) 5B/256M (CV499) 5B/257M (CV2220) 5B/258M (CV2347)

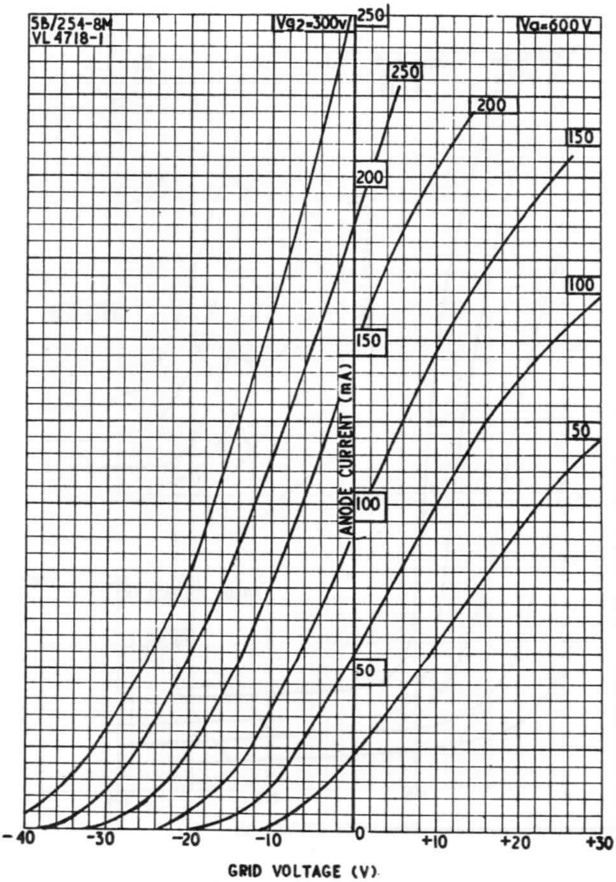


Ref.: 5B/254G
to
5B/258M

SPECIAL VALVES

Beam-Power Amplifiers

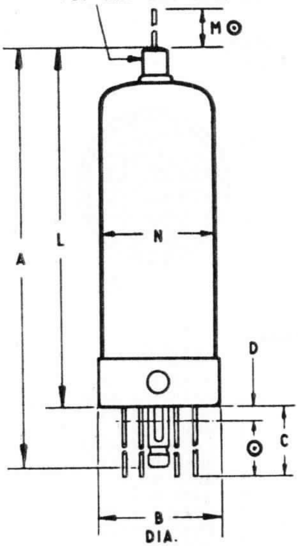
Codes: 5B/254G, 5B/254M (CV428), 5B/255M (CV391), 5B/256M (CV499), 5B/257M (CV2220), 5B/258M (CV2347)

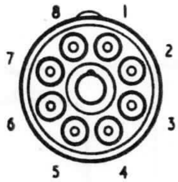


SPECIAL VALVES

Beam-Power Amplifiers

Code: 5B/254G





BASING

1. HEATER.
2. CATHODE & BEAM PLATES.
3. GRID No. 2.
4. CATHODE & BEAM PLATES.
5. GRID No. 1.
6. CATHODE & BEAM PLATES.
7. CATHODE & BEAM PLATES.
8. HEATER.

T.C. ANODE.

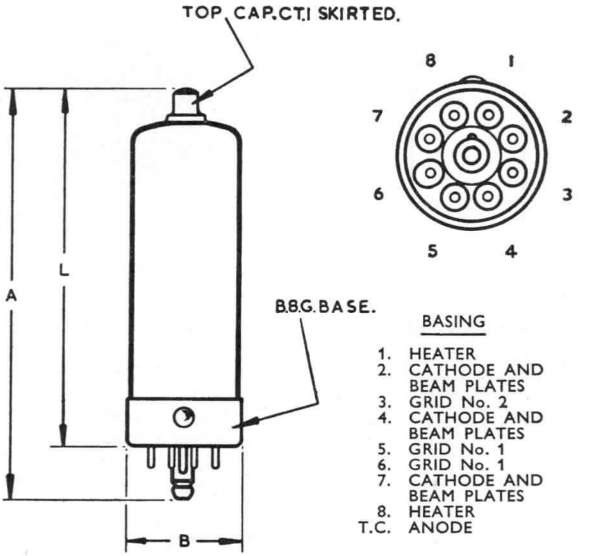
DIM.	MILLIMETRES.	INCHES.
A	105,6 MAX.	$4\frac{5}{32}$ MAX.
B	30,2 MAX.	$1\frac{3}{16}$ MAX.
C	50,8 MIN.	2 MIN.
D	3,2 NOM.	$\frac{1}{8}$ NOM.
L	92,1 MAX.	$3\frac{5}{8}$ MAX.
M	25,4 MIN.	1 MIN.
N	27,8 MIN.	1·095 MIN.
	29,2 MAX.	1·150 MAX.

⊙ DENOTES: LEADS TINNED OVER THIS PORTION.
NOTE:—BASIC FIGURES ARE INCHES.

SPECIAL VALVES

Beam-Power Amplifiers

Codes: 5B/254M (CV428)
5B/258M (CV2347)



BASING

1. HEATER
2. CATHODE AND BEAM PLATES
3. GRID No. 2
4. CATHODE AND BEAM PLATES
5. GRID No. 1
6. GRID No. 1
7. CATHODE AND BEAM PLATES
8. HEATER

T.C. ANODE

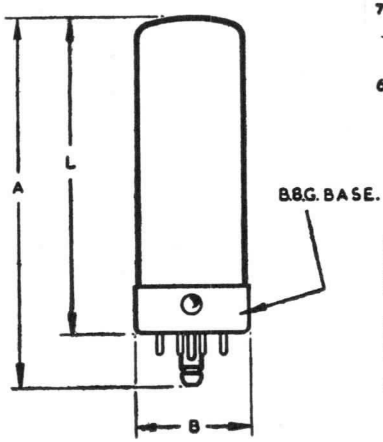
DIM.	MILLIMETRES	INCHES
A	105,6 MAX.	$4\frac{5}{32}$ MAX.
B	30,15 MAX.	$1\frac{3}{16}$ MAX.
L	92,1 MAX.	$3\frac{5}{8}$ MAX.

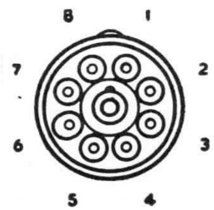
NOTE.—BASIC DIMENSIONS ARE INCHES

SPECIAL VALVES

Beam-Power Amplifiers

Codes: 5B/255M (CV391)
5B/256M (CV499)
5B/257M (CV2220)





BASING

1. HEATER
2. ANODE
3. GRID No. 2
4. CATHODE AND BEAM PLATES
5. GRID No. 1
6. GRID No. 1
7. CATHODE AND BEAM PLATES
8. HEATER

DIM.	MILLIMETRES	INCHES
A	92,9 MAX.	$3\frac{21}{32}$ MAX.
B	30,15 MAX.	$1\frac{3}{16}$ MAX.
L	69,9 MIN. 77,9 MAX.	$2\frac{3}{4}$ MIN. $3\frac{1}{16}$ MAX.

NOTE.—BASIC DIMENSIONS ARE INCHES

SPECIAL VALVES

M

Series Regulator Beam Tetrode

Code: 12E1 (CV345)

The 12E1 is intended for use as a series or shunt control valve in stabilised power supply units.

CATHODE

Indirectly heated, oxide coated		
Heater voltage	6·3	V
Heater current	1·6	A

CHARACTERISTICS

Mutual conductance	$V_a = V_{g2} = 150$ V	14	mA/V
Screen grid μ	$I_a = 200$ mA	5·3	

DIRECT INTERELECTRODE CAPACITANCES

Grid—earth	23	pF
Anode—earth	8·0	pF
Anode—grid	0·85	pF

MECHANICAL DATA

Base	I0–8
Mounting position	Vertical

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251

LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Code: 12E1 (CV345)

CONTINUED

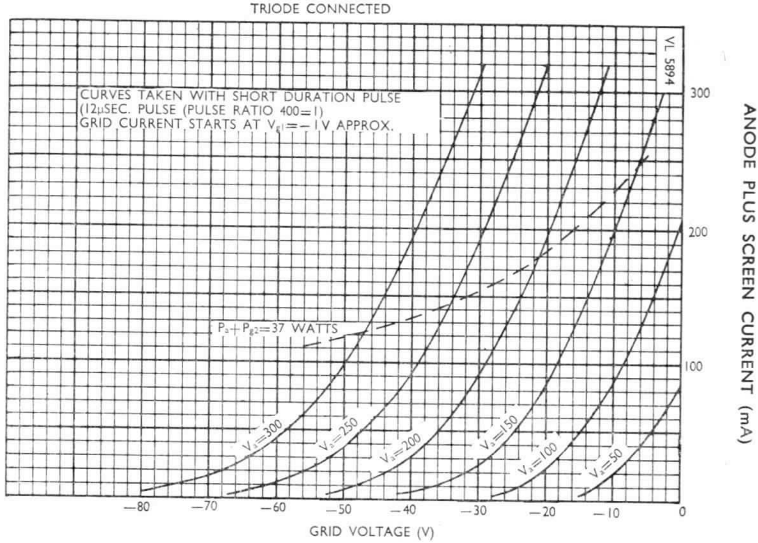
MAXIMUM RATINGS

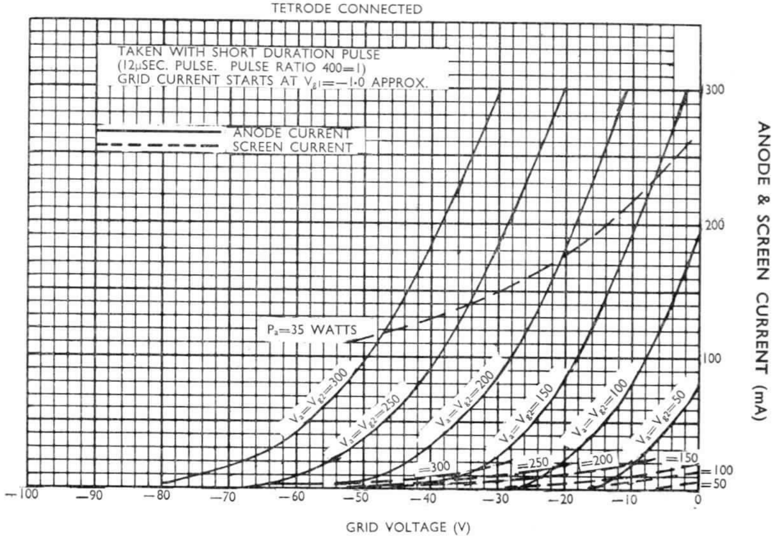
Maximum anode voltage	800	V
Maximum screen voltage	300	V
Maximum control grid voltage	—100	V
Maximum control grid to screen voltage	400	V
Maximum anode dissipation	35	W
Maximum screen dissipation	5·0	W
Maximum cathode current	300	mA
Maximum heater-cathode voltage d.c.* (heater negative)	300	V

* Provided the cathode is positive.

Code: 12E1 (CV345)

CONTINUED



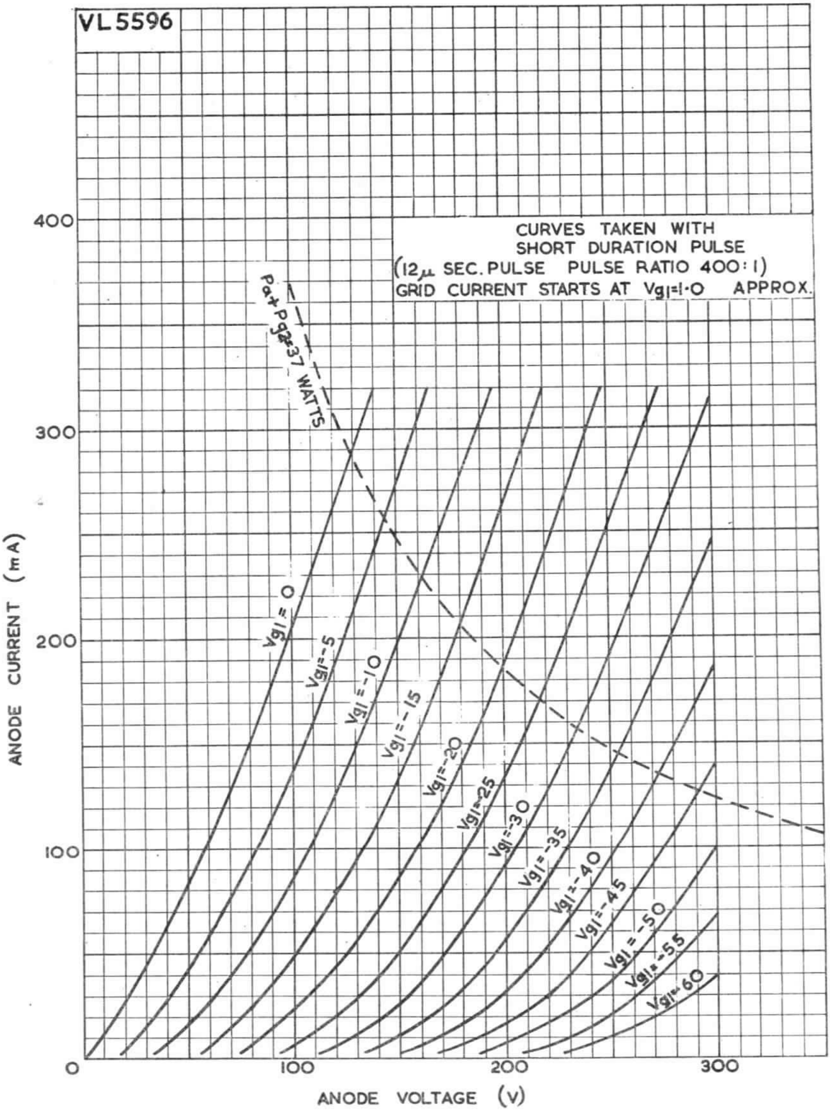


STC

Code: 12E1 (CV345)

CONTINUED

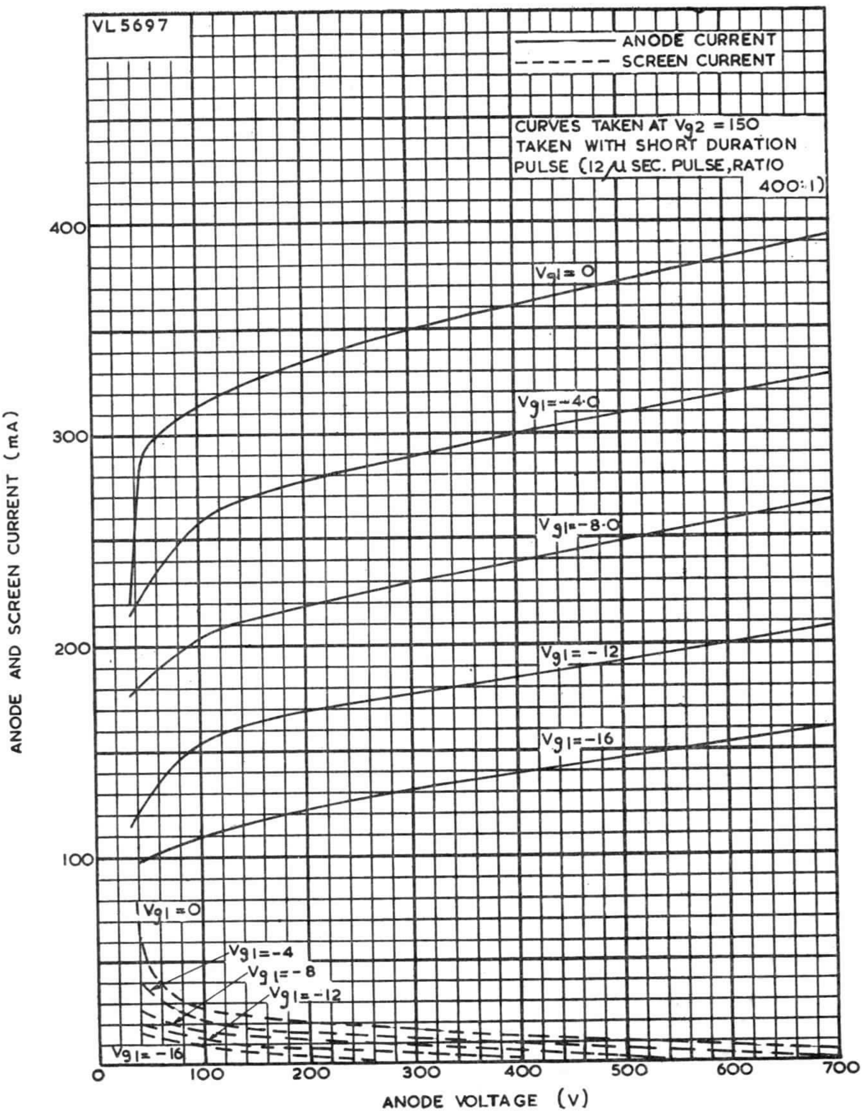
CONSTANT VOLTAGE CHARACTERISTICS—TRIODE CONNECTED



Code: 12E1 (CV345)

CONTINUED

CONSTANT VOLTAGE CHARACTERISTICS—TETRODE CONNECTED

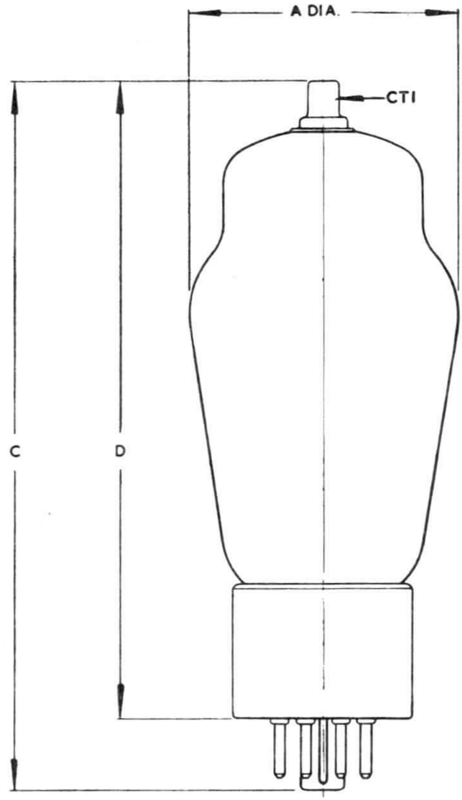


STC

Code: 12E1 (CV345)

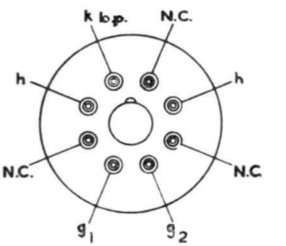
CONTINUED

12E1 OUTLINE

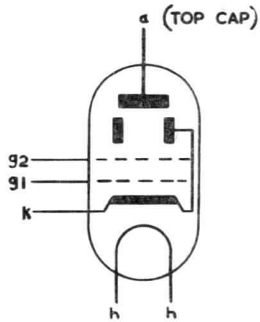


DIM.	INCHES	MILLIMETRES
A	$2\frac{3}{16}$ MAX.	55,6 MAX.
C	$5\frac{3}{4}$ MAX.	146,1 MAX.
D	5.200 MAX.	132,08 MAX.

BASIC DIMS. ARE INCHES



MEDIUM SHELL OCTAL BASE



SPECIAL VALVES

Series Regulator Beam Tetrodes

Codes: 12E14
12E1C

The 12E14 and 12E1C are intended for use as series or shunt control valves in stabilised power supply units. Type 12E1C is a plug-in replacement for type 12E1 or 12E1A and being of more modern design is a preferred type for new equipments.

CATHODE

Indirectly heated, oxide coated		
Heater voltage	6·3	V
Heater current	1·6	A

CHARACTERISTICS

Mutual conductance	$V_a = V_{g2} = 150$ V, $I_a = 200$ mA	14	mA/V
Screen grid μ		5·3	

DIRECT INTERELECTRODE CAPACITANCES

Grid—earth	23	pF
Anode—earth	8·0	pF
Anode—grid	0·85	pF

MECHANICAL DATA

Base	I0–8
Mounting position	Vertical

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251
LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Codes: 12E14
12E1C

CONTINUED

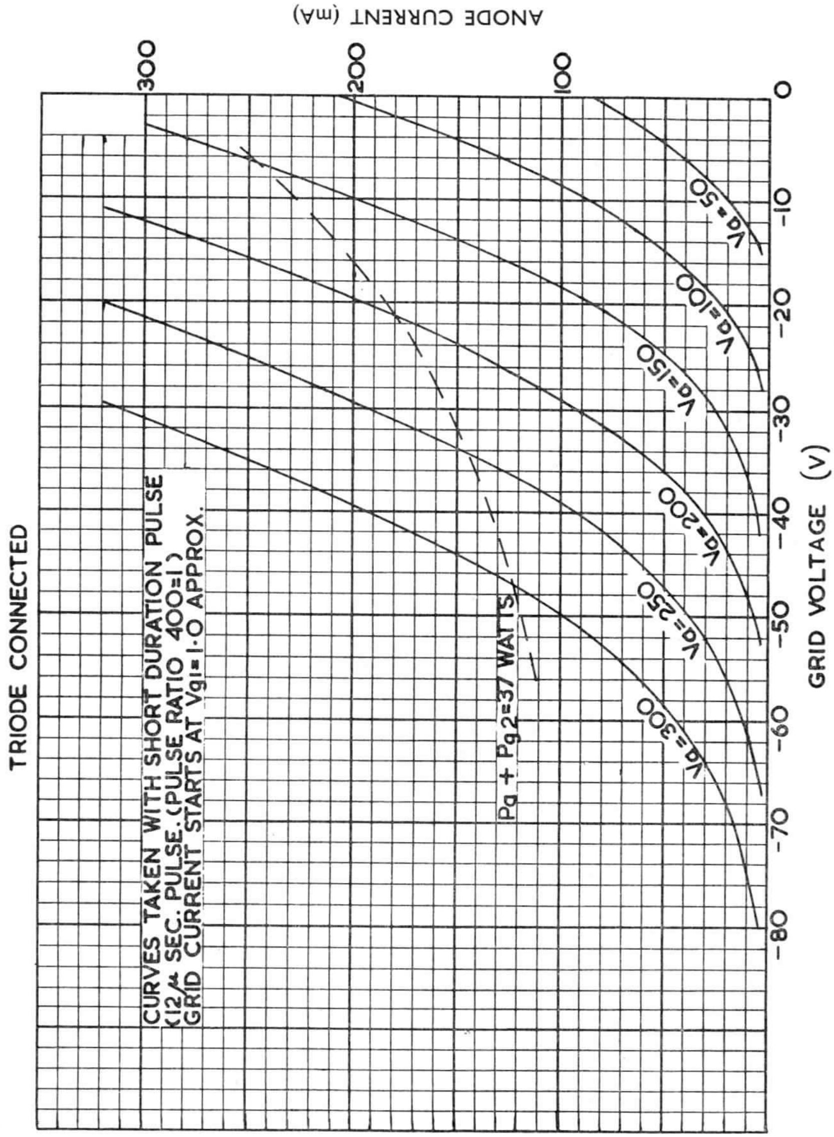
MAXIMUM RATINGS

Maximum anode voltage	800	V
Maximum screen voltage	300	V
Maximum control grid voltage	—100	V
Maximum control grid to screen voltage	400	V
Maximum anode dissipation	35	W
Maximum screen dissipation	5·0	W
Maximum cathode current	300	mA
Maximum heater-cathode voltage d.c.* (heater negative)	300	V

* Provided the cathode is positive.

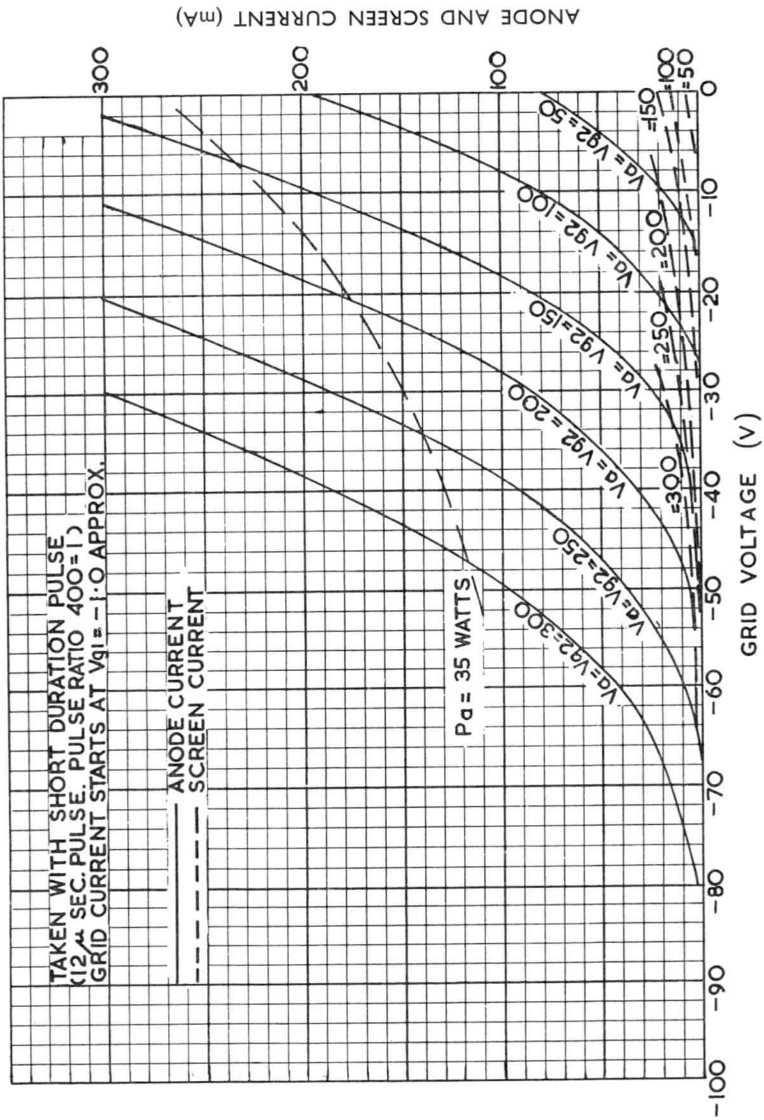
Codes: 12E14
12E1C

CONTINUED



Codes: 12E14
12E1C

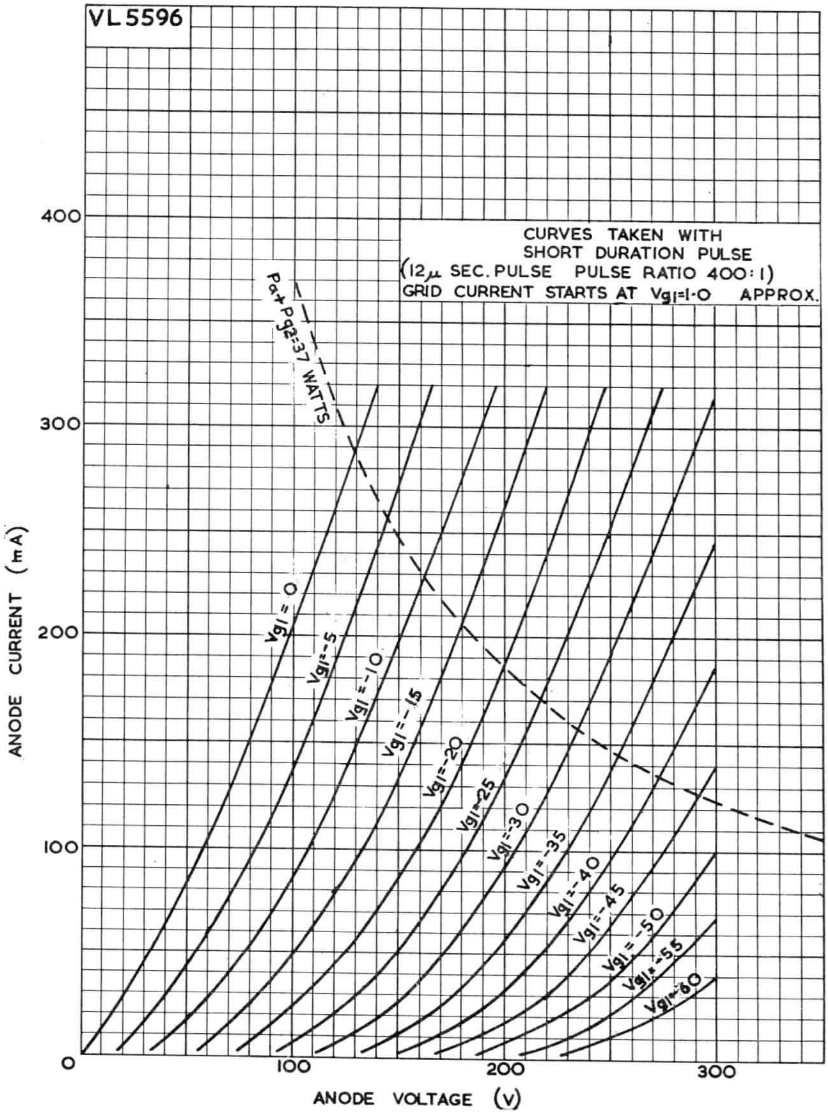
CONTINUED



Codes: 12E14
12E1C

CONTINUED

CONSTANT VOLTAGE CHARACTERISTICS—TRIODE CONNECTED

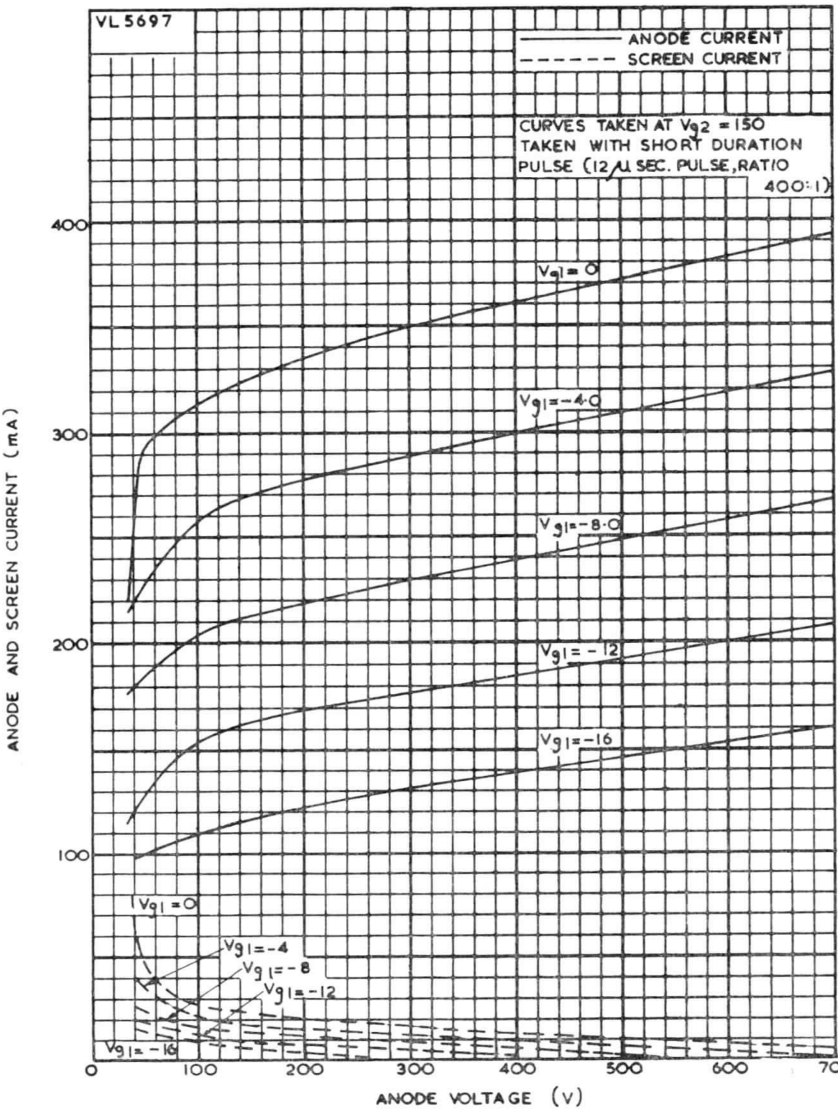


STC

Codes: 12E14
12E1C

CONTINUED

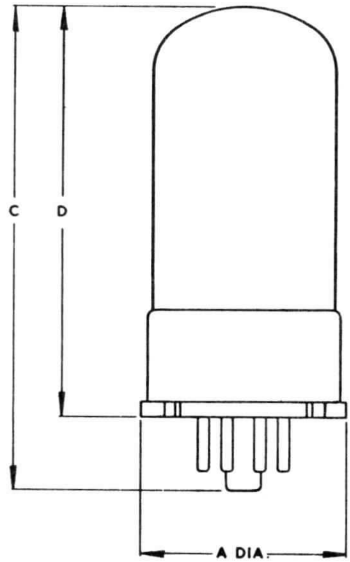
CONSTANT VOLTAGE CHARACTERISTICS—TETRODE CONNECTED



Code: 12E14

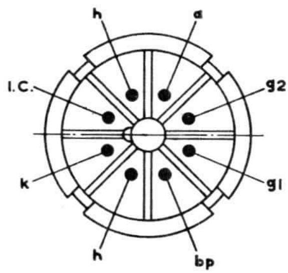
CONTINUED

12E14 Outline

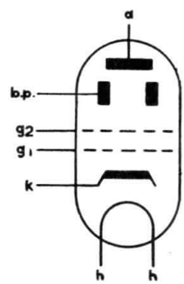


DIM.	INCHES	MILLIMETRES
A	$1\frac{23}{32}$ MAX.	43,7 MAX.
C	4·173 MAX.	106,0 MAX.
D	3·661 MAX.	93,0 MAX.

BASIC DIMS. ARE MILLIMETRES



INTERNATIONAL OCTAL BASE
(WITH METAL SLEEVE 8 PIN)

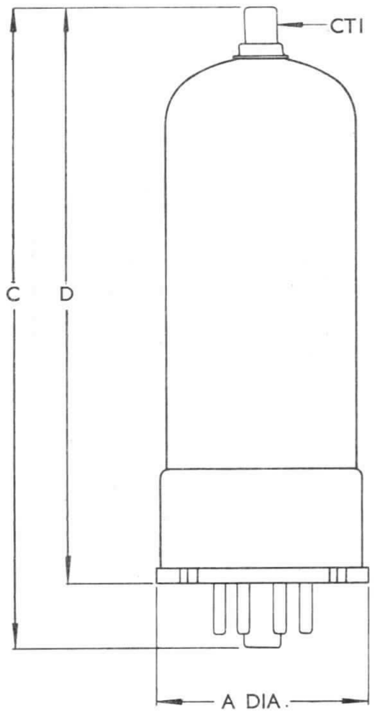


STC

Code: 12E1C

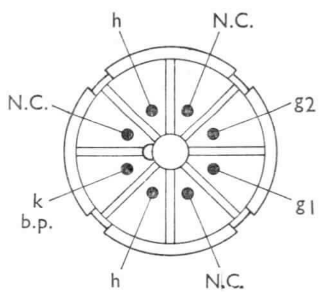
CONTINUED

12E1C Outline

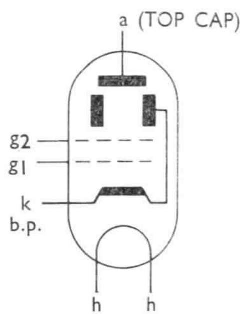


DIM	INCHES	MILLIMETRES
A	1 23/32 MAX.	43,7 MAX.
C	5 MAX.	127,0 MAX.
D	4 7/16 MAX.	112,7 MAX.
	4 1/4 MIN.	108,0 MIN.

BASIC DIMENSIONS ARE INCHES



INTERNATIONAL OCTAL BASE
(WITH METAL SLEEVE 8 PIN)



SPECIAL VALVES

M

R.F. Beam Power Amplifier

Code: 828 (CV631)

CATHODE.

Thoriated tungsten filament		
Filament voltage	10	V
Nominal current	3.25	A
Maximum usable emission	1.6	A

CHARACTERISTICS.

Mutual conductance	Measured at : V_a 1250 V, V_{g2} 400 V : V_{g3} 0 V : V_{g1} −25 V	2.7	mA/V
Screen grid μ		6.5	

DIRECT INTERELECTRODE CAPACITANCES.

Input	12	pF
Output	14	pF
Anode to grid	0.07	pF

DIMENSIONS.

Maximum overall length	195.4	mm
Maximum bulb diameter	52	mm
Maximum seated height	179.4	mm
Base	Ceramic with 5-pin American spacing	
Socket	4020B	
Net weight	185	g

NOTE.—It is recommended that this valve be operated in the vertical position. When operated horizontally the plane of the filament must be vertical.

Tentative data
March 1959

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, W.C.2

VALVE DIVISION, FOOTSCRAY, KENT Telephone: Footscray 3333

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 828 (CV631)

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS.

RADIO FREQUENCY.

Class B. Telephony. Modulated carrier applied to grid.
(Carrier conditions per valve for use with 100% modulation.)

Maximum Ratings.

Maximum direct anode voltage	1 250	V
Maximum direct anode current	100	mA
Maximum direct anode dissipation	70	W
Maximum direct screen voltage	400	V
Maximum direct screen dissipation	11	W
Maximum direct suppressor voltage	100	V
Maximum direct suppressor dissipation	4	W
Maximum frequency for above ratings	30	Mc/s

Typical Operating Conditions.

Direct anode voltage	1 250	V
Direct screen voltage	400	V
Direct suppressor voltage	75	V
Direct grid voltage	−50	V
Direct anode current	84	mA
Direct screen current	5	mA
Direct suppressor current	4	mA
*Direct grid current	0.3	mA
Peak r.f. grid voltage	52	V
Power output	35	W

Class C. Power Amplifier. Anode subject to modulation.
(Carrier conditions per valve for use with 100% modulation.)

Maximum Ratings.

Maximum direct anode voltage	1	kV
Maximum direct anode current	135	mA
Maximum direct anode dissipation	47	W
Maximum direct screen voltage	400	V
Maximum direct screen dissipation	11	W
Maximum direct suppressor voltage	100	V
Maximum direct suppressor dissipation	5	W
Maximum frequency for above ratings	30	Mc/s

Tentative data
March 1959

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 828 (CV631)

Typical Operating Conditions.

Direct anode voltage	1 000	V
Direct screen voltage	400	V
Direct suppressor voltage	75	V
Direct grid voltage	−140	V
Direct anode current	135	mA
Direct screen current	23	mA
Direct suppressor current	13	mA
*Direct grid current	10	mA
Peak r.f. grid voltage	230	V
Power output	100	W

Class C. Power Amplifier or Oscillator. Unmodulated.

Maximum Ratings.

Maximum direct anode voltage	1 250	V
Maximum direct anode current	160	mA
Maximum direct anode dissipation	70	W
Maximum direct screen voltage	400	V
Maximum direct screen dissipation	16	W
Maximum direct suppressor voltage	100	V
Maximum direct suppressor dissipation	5	W
Maximum direct grid current	15	mA
Maximum frequency for above ratings	30	Mc/s

Typical Operating Conditions.

Direct anode voltage	1 250	V
Direct screen voltage	400	V
Direct suppressor voltage	75	V
Direct grid voltage	−95	V
Direct anode current	160	mA
Direct screen current	35	mA
Direct suppressor current	22	mA
*Direct grid current	12	mA
Peak r.f. grid voltage	195	V
Power output	150	W

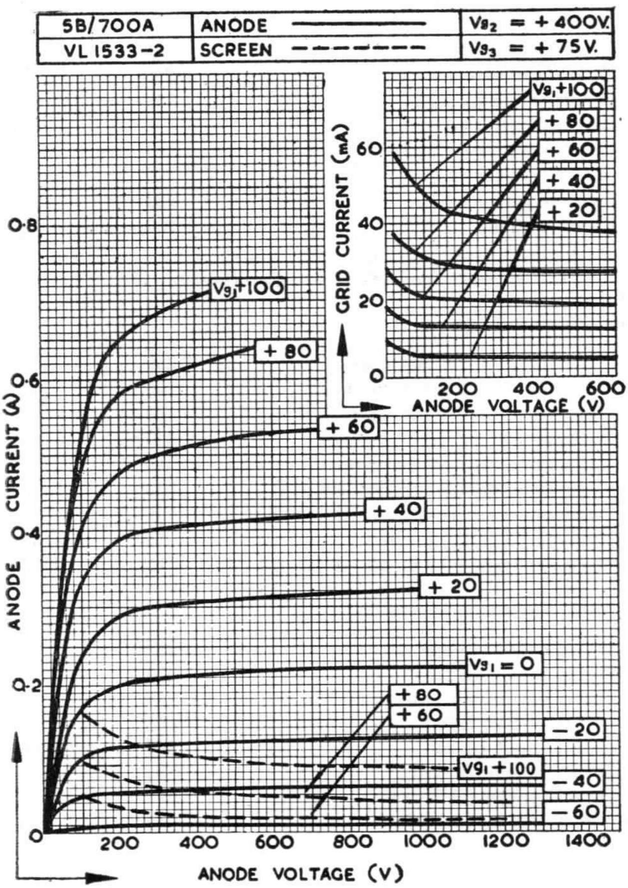
*Subject to wide variation dependent upon impedance of the load circuit.

Tentative data
March 1959

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 828 (CV631)

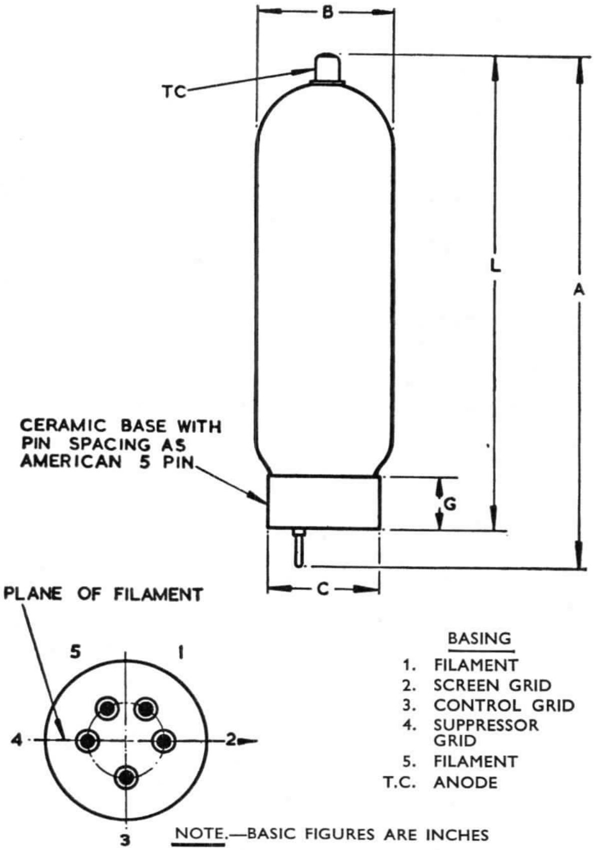


Tentative data
March 1959

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 828 (CV631)



BASING
1. FILAMENT
2. SCREEN GRID
3. CONTROL GRID
4. SUPPRESSOR GRID
5. FILAMENT

T.C. ANODE

NOTE.—BASIC FIGURES ARE INCHES

DIM.	MILLIMETRES	INCHES
A	189·0 ± 6·4	7 7/16 ± 1/4
B	52 MAX.	2 1/16 MAX.
L	173·0 ± 6·4	6 13/16 ± 1/4
C	41 NOM.	1 5/8 NOM.
G	19 NOM.	3/4 NOM.

Tentative data
March 1959

STC

SPECIAL VALVES

Series Regulator Beam Tetrode

Code: 13E1 (CV6045)

The 13E1 is an indirectly heated low-impedance beam tetrode with a centre-tapped heater. It is designed for d.c. control applications, servo mechanisms, etc., and is suitable for triode connection. The maximum anode dissipation is 90 watts.

CATHODE

Indirectly heated, oxide coated			
Heater voltage	26	13	V
Heater current	1·3	2·6	A

CHARACTERISTICS (TRIODE CONNECTED)

Mutual conductance*	35	mA/V
Amplification factor*	4·5	
Anode resistance*	130	Ω

* Measured at $V_a = V_{g2} = 150$ V, $I_a = 500$ mA.

DIRECT INTERELECTRODE CAPACITANCES

Control grid—earth	56	pF
Anode—earth	20·4	pF
Anode—control grid	1·3	pF

MECHANICAL DATA

Base		B7A	
Mounting position		Vertical	
Net weight	5 oz	156	gm

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251

LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

STC

Code: 13E1 (CV6045)

CONTINUED

MAXIMUM RATINGS

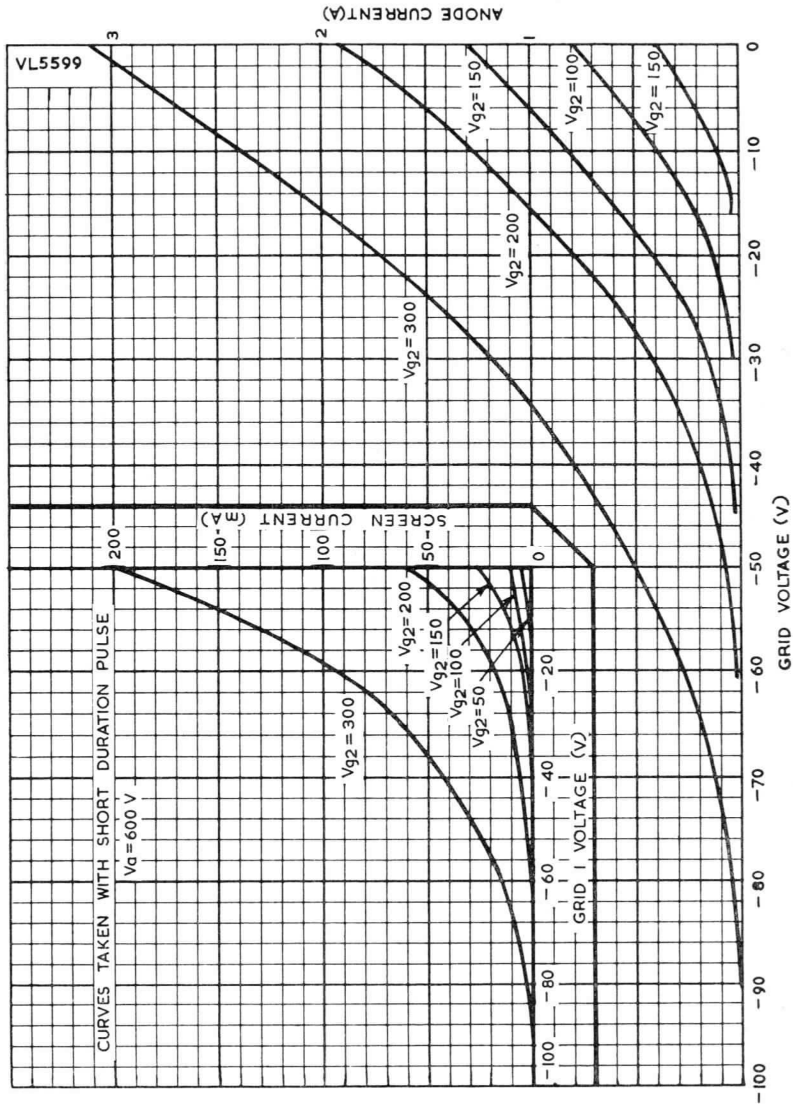
Maximum anode voltage	800	V	1 500 V†
Maximum screen grid voltage	300	V	
Maximum control grid voltage	−100	V	
Maximum anode dissipation	90	W	
Maximum screen dissipation	10	W	
Maximum anode plus screen dissipation (triode connected)	95	W	
Maximum control grid dissipation*	1·0	W	
Maximum cathode current	800	mA	5 000 V†
Maximum peak heater to cathode voltage d.c. (heater positive)	300	V	

* To avoid grid current, control grid must not become more positive than −1·0 V.

† Series pulse rating. For peak currents greater than 2·0 A the product of peak current and pulse duration in A/μs should not exceed 10. The valve should not operate for longer than 5·0 μs in any 100 μs period.

Code: 13E1 (CV6045)

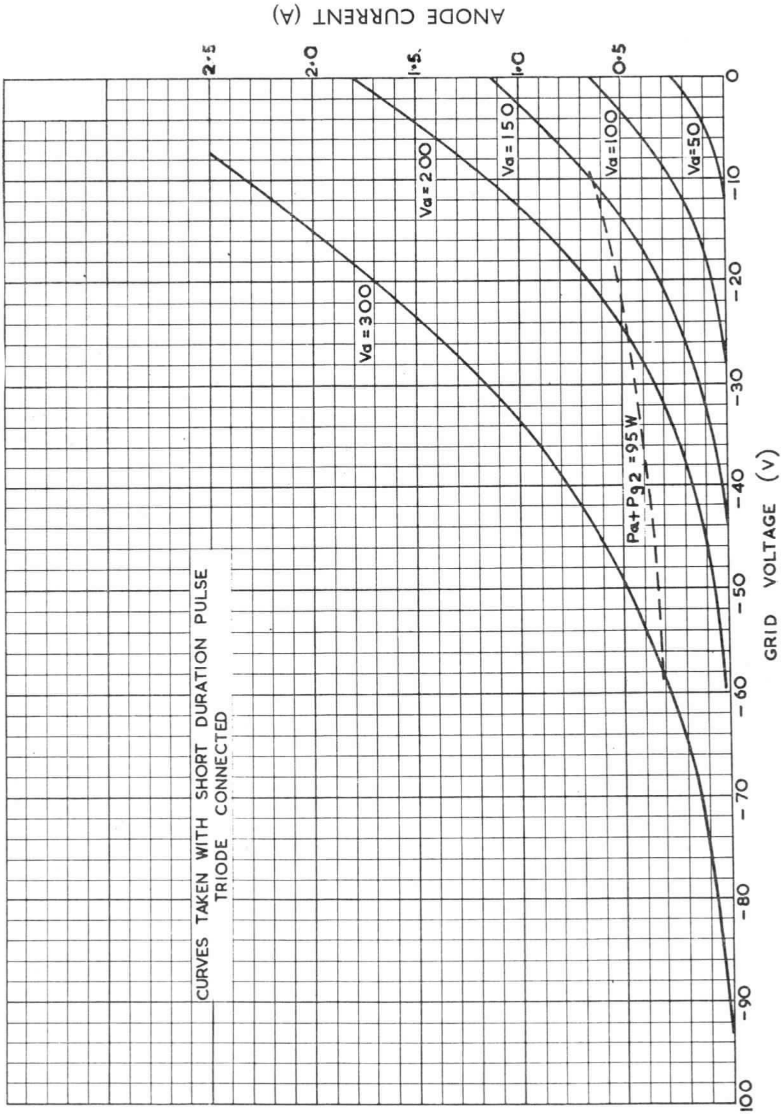
CONTINUED



STC

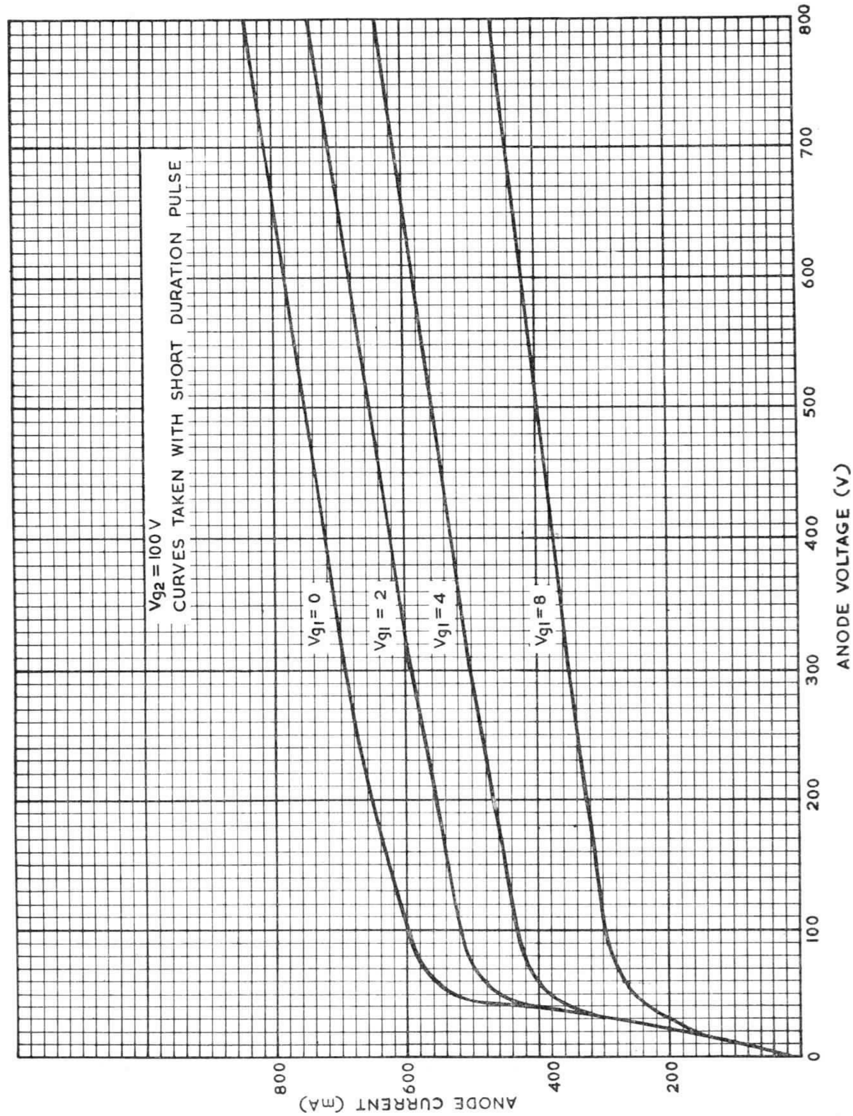
Code: 13E1 (CV6045)

CONTINUED



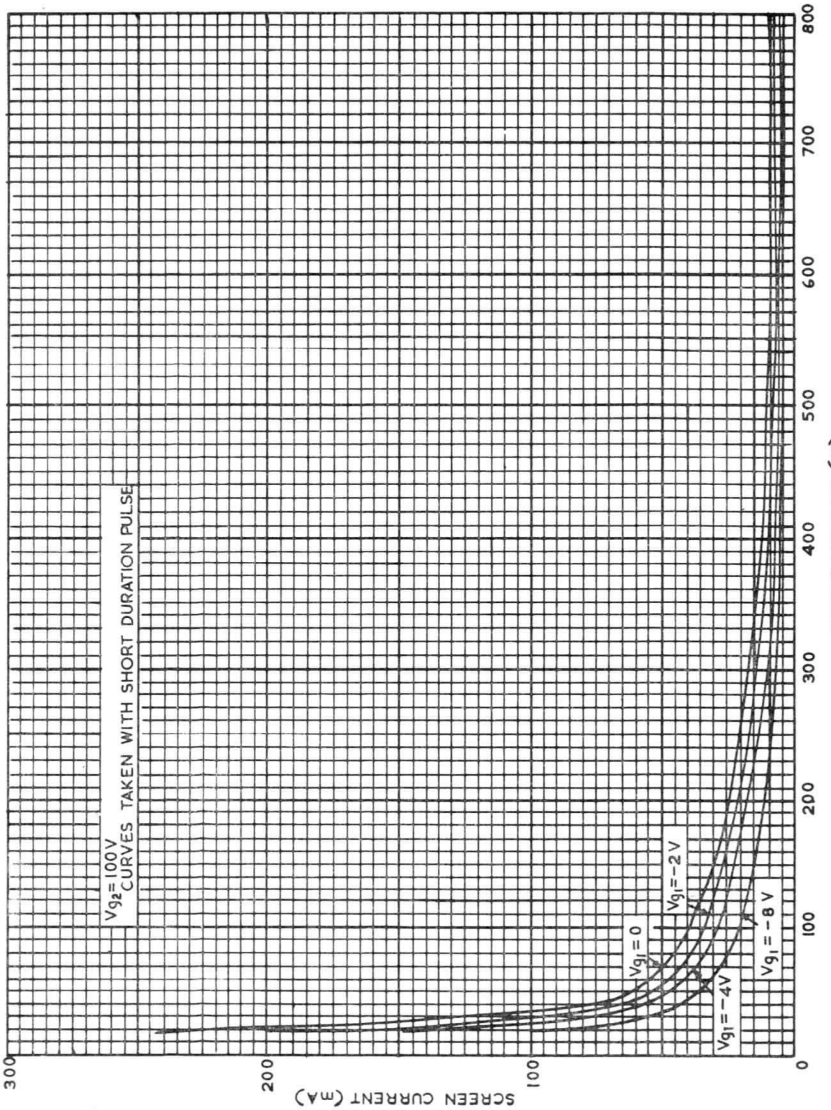
Code: 13E1 (CV6045)

CONTINUED



Code: 13E1 (CV6045)

CONTINUED



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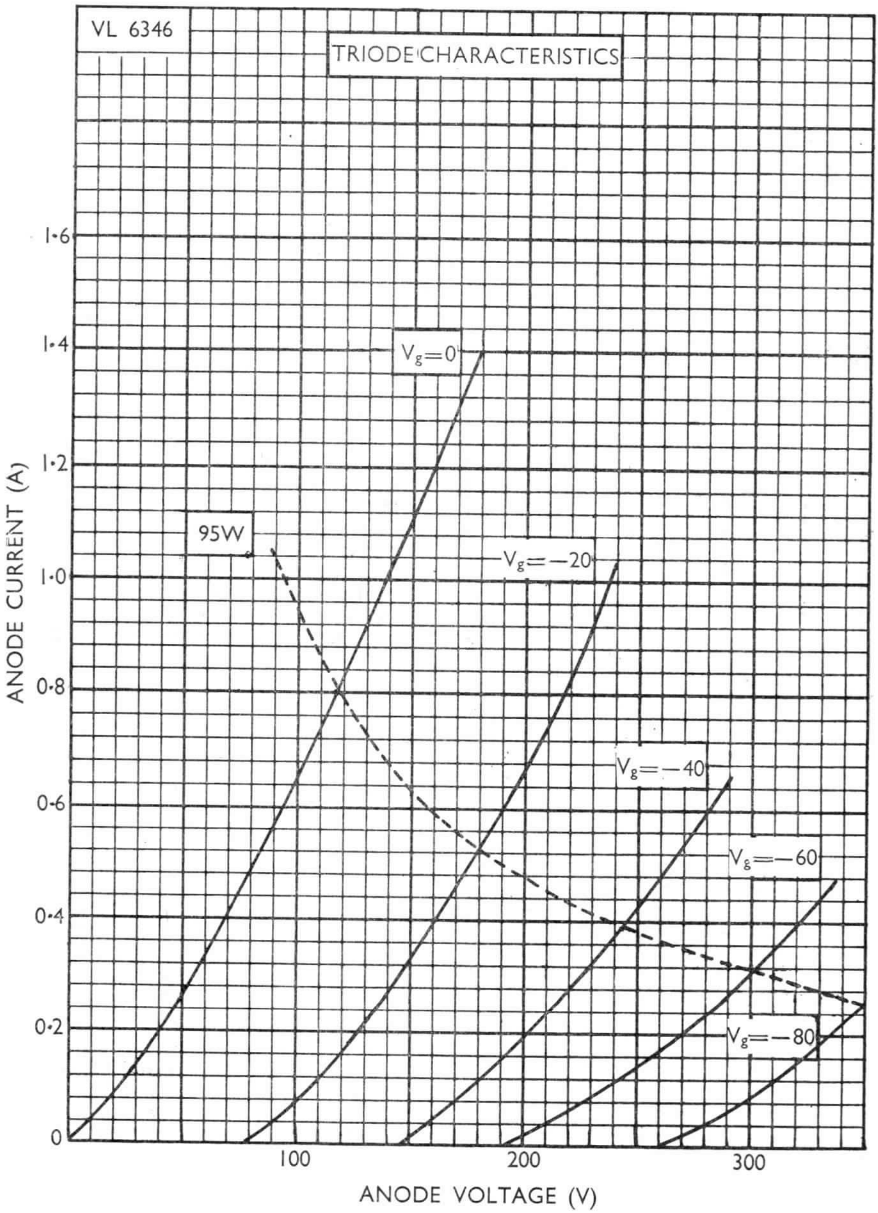
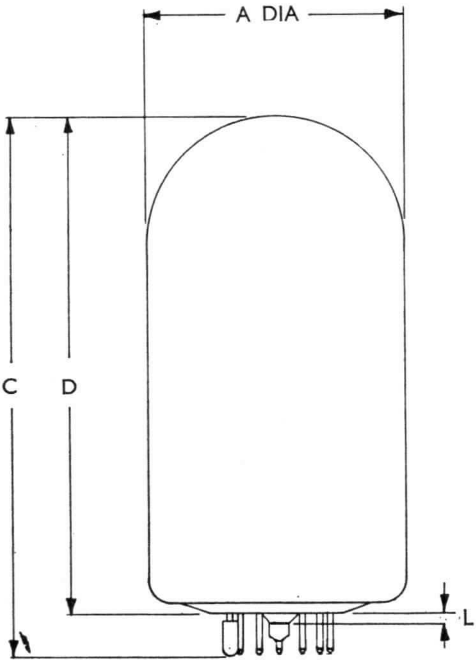


STC

Code: 13E1 (CV6045)

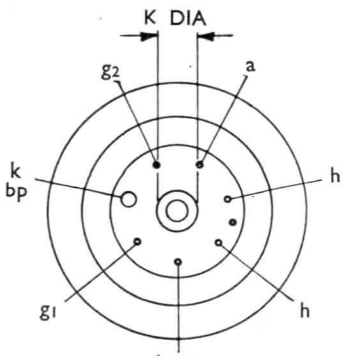
CONTINUED

13E1 Outline

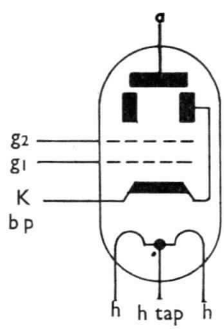


DIM.	INCHES	MILLIMETRES
A	2·480 MIN. 2·560 MAX.	63 MIN. 65 MAX.
C	5·078 MIN. 5·394 MAX.	129 MIN. 137 MAX.
D	5·039 MAX.	128 MAX.
K	0·489 MAX.	12,42 MAX.
L	0·125 MAX.	3,18 MAX.

BASIC DIMS. ARE MILLIMETRES



B7A BASE



STC

SPECIAL VALVES

Series Regulator
Beam Tetrode

Code: 13E12

The 13E12 is an indirectly heated, low-impedance beam tetrode with a centre-tapped heater. It is designed for d.c. control applications, servo-mechanisms, etc., and is suitable for triode connection. The maximum anode dissipation is 90 watts.

CATHODE

Indirectly heated, oxide-coated			
Heater voltage	26	13	V
Heater current	1·3	2·6	A

CHARACTERISTICS (TRIODE CONNECTED)

Mutual conductance*	25	mA/V
Amplification factor*	2·8	
Anode resistance*	110	Ω

* Measured at $V_a = V_{g2} = 150$ V, $I_a = 500$ mA.

DIRECT INTERELECTRODE CAPACITANCES

Control grid—earth	62	pF
Anode—earth	17	pF
Anode—control grid	1·0	pF

MECHANICAL DATA

Base		B7A	
Mounting position		Vertical	
Net weight, approximately	155,5 gm	5·0	oz

Standard Telephones and Cables Limited

COMPONENTS GROUP

VALVE DIVISION, PAIGNTON, DEVON Tel.: Paignton 58685 Telex: 4251

LONDON SALES OFFICE, FOOTSCRAY, SIDCUP, KENT Tel.: Footscray 3333 Telex: 21836

Code: 13E12

CONTINUED

MAXIMUM RATINGS

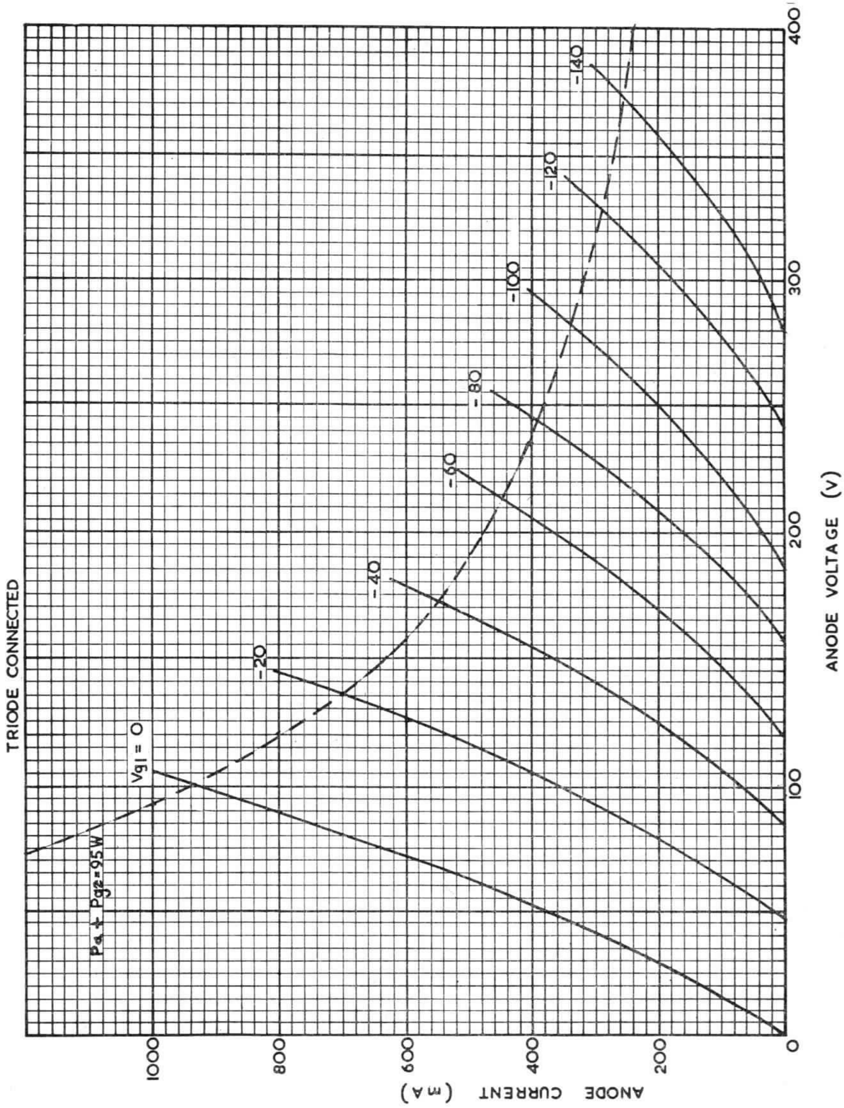
Maximum anode voltage	800	V	1 500	V†
Maximum screen grid voltage	300	V		
Maximum control grid voltage	—100	V		
Maximum anode dissipation	90	W		
Maximum screen dissipation	10	W		
Maximum anode plus screen dissipation (triode connected)	95	W		
Maximum control grid dissipation*	1·0	W		
Maximum cathode current	800	mA	5 000	V†
Maximum heater to cathode voltage d.c. (cathode positive)	300	V		

* To avoid grid current, control grid must not become more positive than —1·0 V.

† Series pulse rating. For peak currents greater than 2·0 A the product of peak current and pulse duration in A/μs should not exceed 10. The valve should not operate for longer than 5·0 μs in any 100 μs period.

Code: 13E12

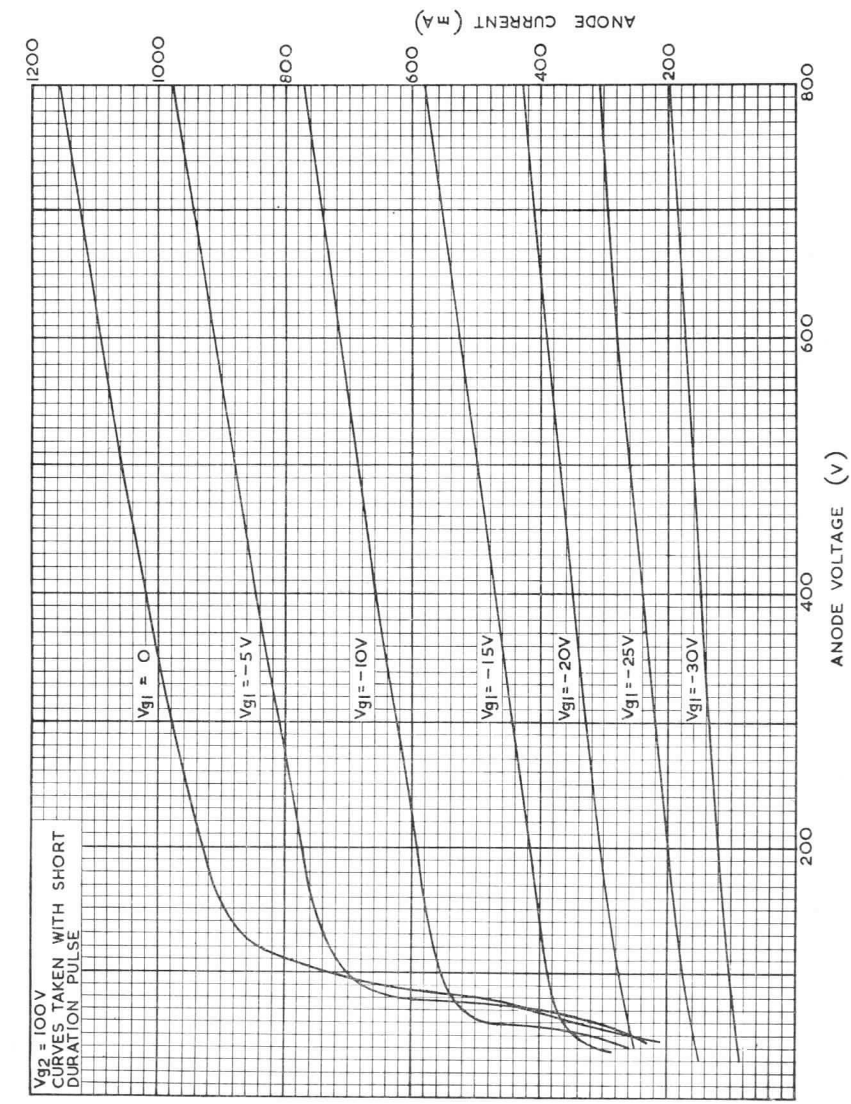
CONTINUED



STC

Code: 13E12

CONTINUED



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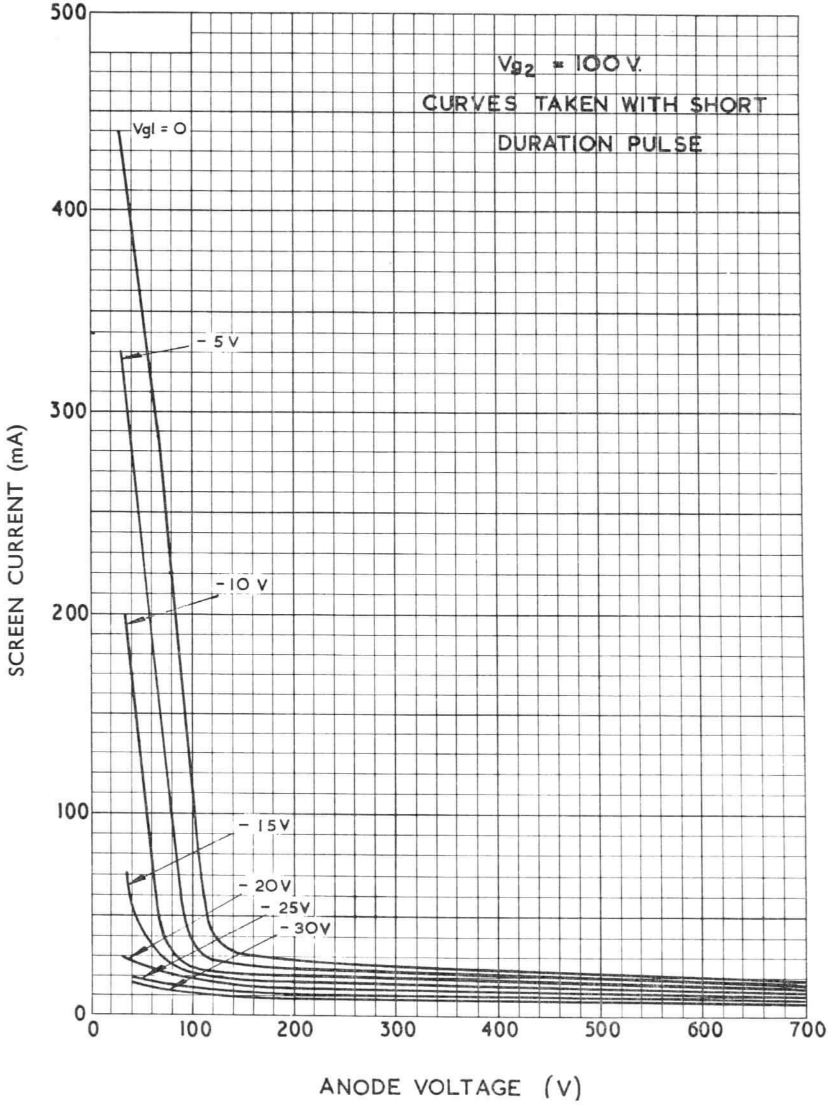

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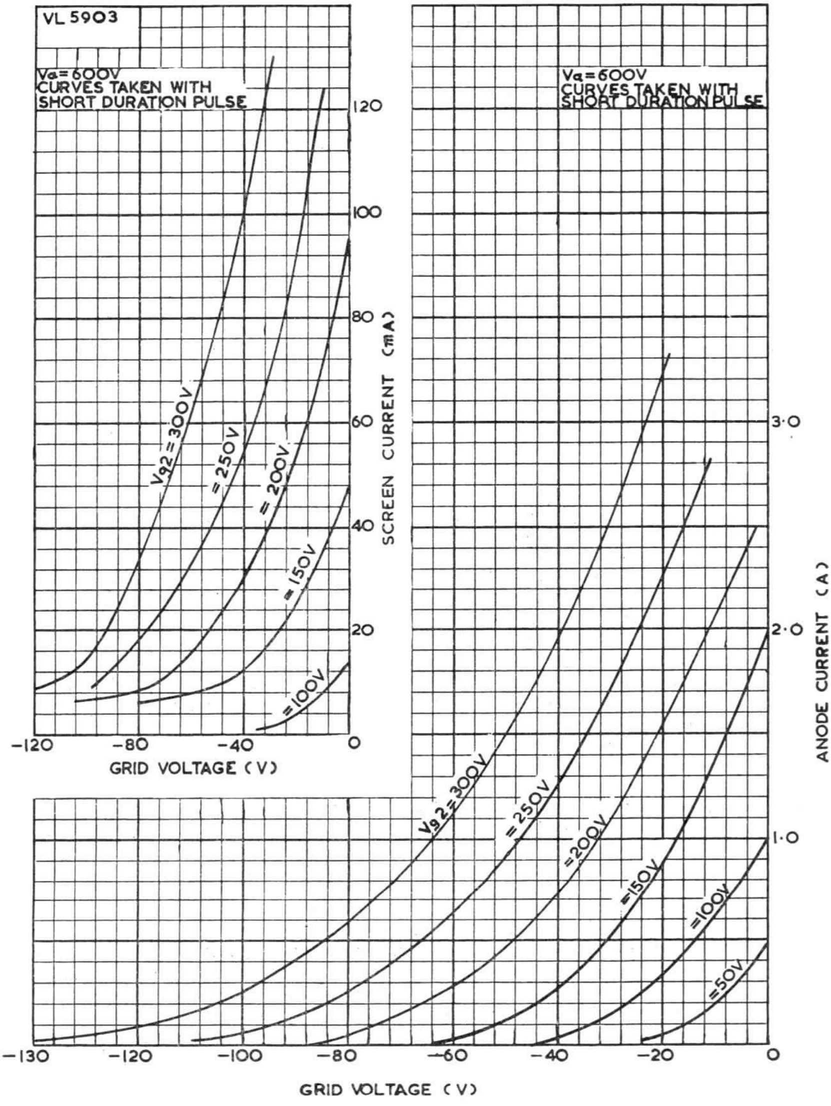
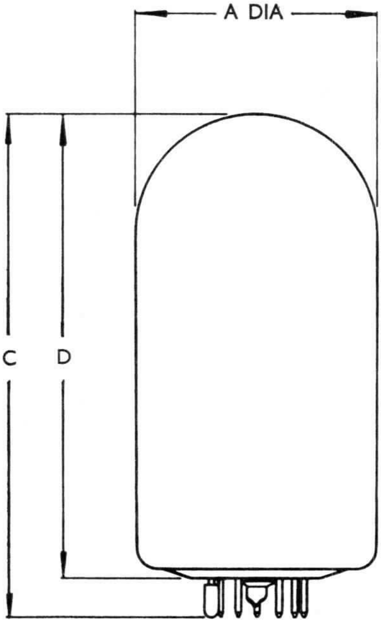


Code: 13E12

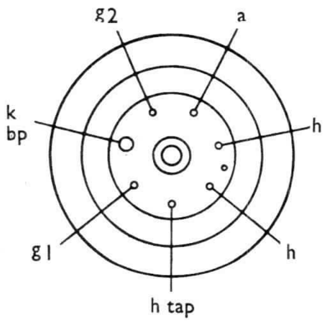
CONTINUED

13E12 Outline

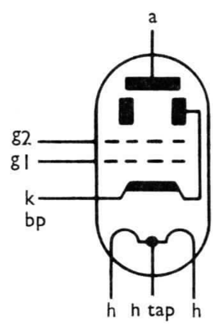


DIM	INCHES	MILLIMETRES
A	2·560 MAX.	65 MAX.
C	5·512 MAX.	140 MAX.
D	5·039 MAX.	128 MAX.

BASIC DIMS. ARE MILLIMETRES



B7A BASE



SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 813 (CV26)

The 813 is a beam power valve designed for use as a modulator, amplifier, and oscillator in radio transmitting service. Features are low drive requirement for full power output and high power sensitivity. It is equivalent to the U.S.A. Type 813.

CATHODE

Thoriated tungsten filament		
Filament voltage	10	V
Nominal current	5	A
Maximum usable emission	2.5	A

CHARACTERISTICS

Mutual conductance (Measured at V_a 2 kV : V_{g2} 400 V : I_a 50 mA)	3.75	mA/V
Screen grid μ ($V_a = V_{g2} =$ 400 V : I_a 50 mA)	8.5	

DIRECT INTERELECTRODE CAPACITANCES

Anode to grid	0.25	pF
Input	16.3	pF
Output	14	pF

MECHANICAL DATA

Maximum overall length	$7\frac{1}{2}$ in	190,5	mm
Maximum seated height	$6\frac{7}{8}$ in	174,7	mm
Maximum bulb diameter	$2\frac{9}{16}$ in	65,1	mm
Base		B7D	
Top cap		CT3	
Net weight		240	g
		8.4	oz

NOTE.—It is recommended that this valve be operated in the vertical position. When operated horizontally the plane of the filament must be vertical.

June 1961

COMPONENTS GROUP

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, W.C.2

VALVE DIVISION, FOOTSCRAY, KENT Telephone: Footscray 3333

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 813 (CV26)

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

AUDIO FREQUENCY

Class AB2. Power Amplifier or Modulator

Maximum Ratings

Maximum direct anode voltage	2.25	kV
*Maximum direct anode current	180	mA
Maximum direct anode dissipation	100	W
Maximum direct screen voltage	1.1	kV
Maximum direct screen dissipation	22	W

Typical Operating Conditions

(For balanced two-valve operation)

Direct anode voltage	2	2.25	kV
Direct screen voltage	750	750	V
Direct grid voltage	−90	−90	V
Direct anode current, zero signal	40	45	mA
Direct anode current, max. signal	315	315	mA
Direct screen current, zero signal	1.5	1.5	mA
Direct screen current, max. signal	58	58	mA
Peak a.f. grid to grid voltage	230	230	V
Load resistor, anode to anode	16	18.5	kΩ
Power output, 2 valves	455	515	W

RADIO FREQUENCY

Class B. Telephony. Modulated carrier applied to the grid

(Carrier conditions per valve for use with 100% modulation.)

Maximum Ratings

Maximum direct anode voltage	2.0	kV
Maximum direct anode current	100	mA
Maximum direct anode dissipation	100	W
Maximum direct screen voltage	400	V
Maximum direct screen dissipation	15	W
Maximum frequency for above ratings	30	Mc/s

*Averaged over any a.f. cycle of sine wave form.

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 813 (CV26)

Typical Operating Conditions

Direct anode voltage	1.5	2.0	kV
Direct screen voltage	400	400	V
Direct grid voltage	−60	−75	V
Direct anode current	100	75	mA
Direct screen current	4	3	mA
*Direct grid current	0	0	mA
Peak r.f. grid voltage	70	80	V
Power output	50	50	W

Class C. Power Amplifier. Anode subject to modulation
(Carrier conditions per valve for use with 100% modulation.)

Maximum Ratings

Maximum direct anode voltage	1.6	kV
Maximum direct anode current	150	mA
Maximum direct anode dissipation	67	W
Maximum direct screen voltage	400	V
Maximum direct screen dissipation	15	W
Maximum direct grid voltage	−300	V
Maximum direct grid current	25	mA
Maximum frequency for above ratings	30	Mc/s

Typical Operating Conditions

Direct anode voltage	1.25	1.6	kV
††Direct screen voltage	300	300	V
Direct grid voltage	−160	−160	V
Direct anode current	150	150	mA
Direct screen current	35	30	mA
†Direct grid current	13	12	mA
Peak r.f. grid voltage	250	250	V
Grid drive power	3	2.8	W
Power output	140	180	W

*Usually negligible.

†Subject to wide variation dependent upon the impedance of the load circuit.

††Obtained preferably from a separate source modulated with the anode supply or from the modulated anode supply via a series resistor.

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 813 (CV26)

Class C. Amplifier or Oscillator. Unmodulated

Maximum Ratings

Maximum direct anode voltage	2.0	kV
Maximum direct anode current	180	mA
Maximum direct anode dissipation	100	W
Maximum direct screen voltage	400	V
Maximum direct screen dissipation	22	W
Maximum direct grid voltage	−300	V
Maximum direct grid current	25	mA
Maximum frequency for above ratings	30	Mc/s

Typical Operating Conditions

Direct anode voltage	1.2	1.5	2.0	kV
Direct screen voltage	300	300	400	V
**Direct grid voltage	−75	−90	−120	V
Direct anode current	180	180	180	mA
Direct screen current	35	30	45	mA
*Direct grid current	12	12	10	mA
Peak r.f. grid voltage	160	175	205	V
Grid drive power	1.8	2.0	2.0	W
Power output	170	210	275	W

*Subject to wide variation dependent upon the impedance of the load circuit.

**Total effective grid circuit resistance should not exceed 30kΩ.

NOTE.—All grid bias values quoted are for A.C. filament supply operation.

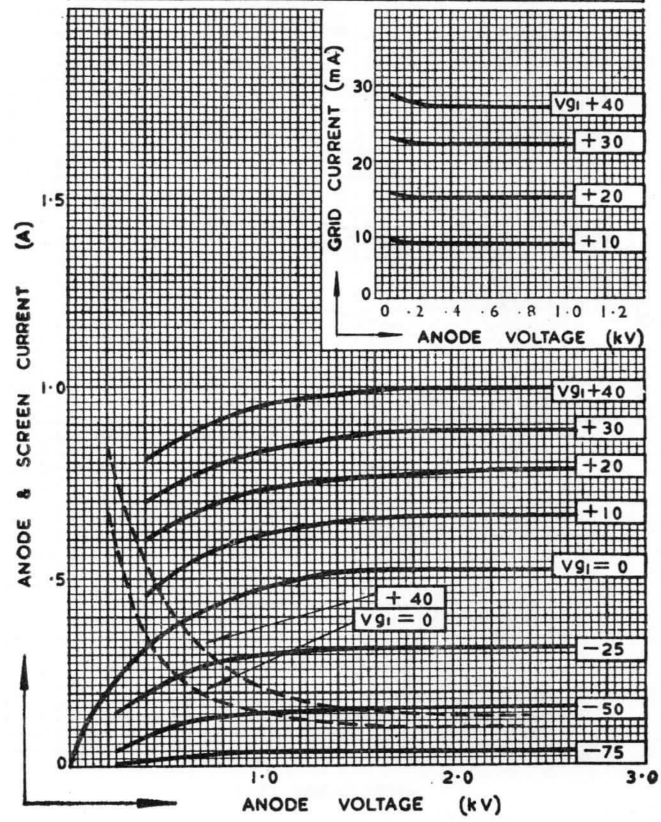
For all conditions quoted, the beam plates are tied to the filament supply centre tap.

SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 813 (CV26)

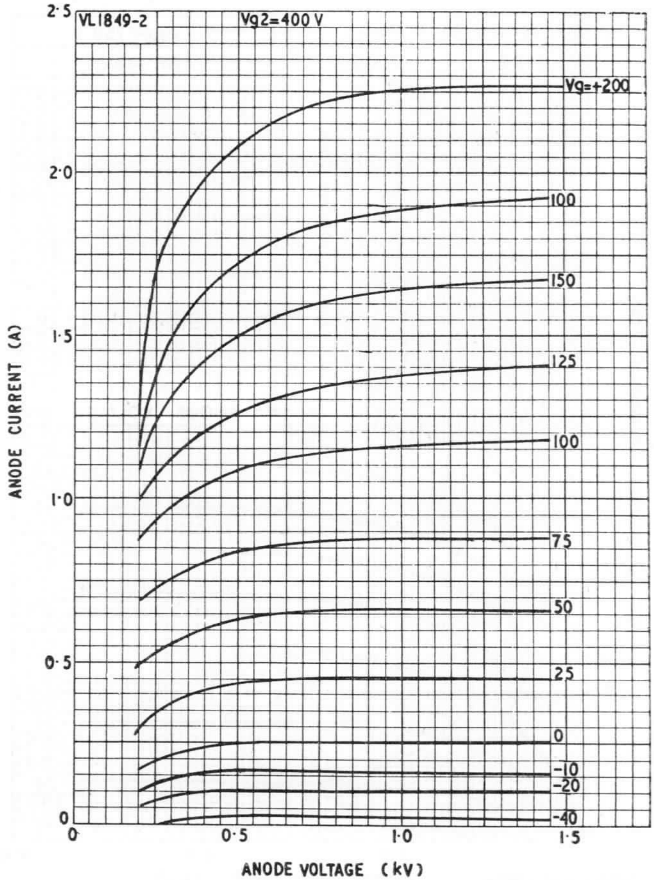
813 (5C/100A)	ANODE ————	V_{g_2} = 750 V
VL 1989	SCREEN – – – – – –	BP = 0 V



SPECIAL VALVES

R.F. Beam Power Amplifier

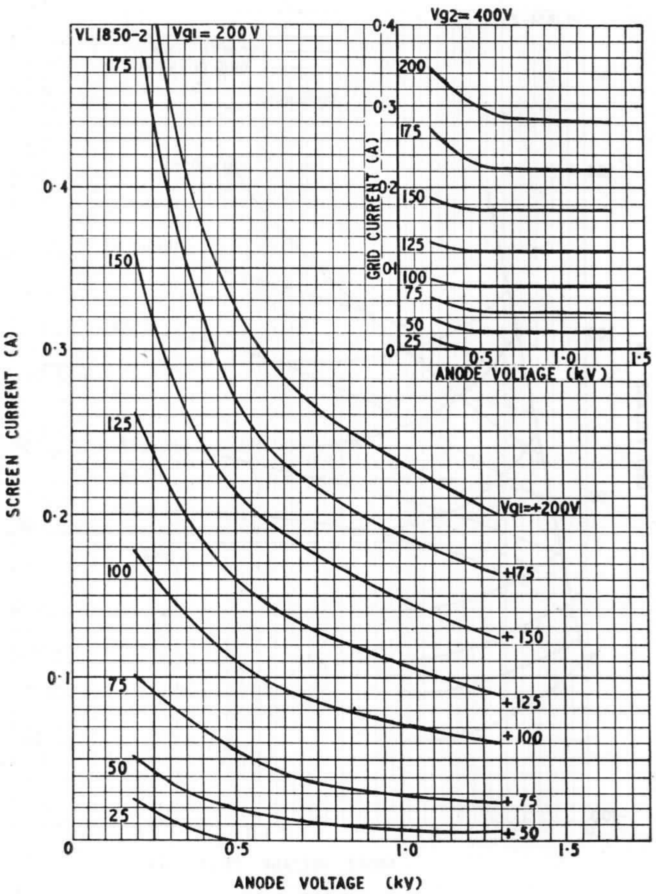
Code: 813 (CV26)



SPECIAL VALVES

R.F. Beam Power Amplifier

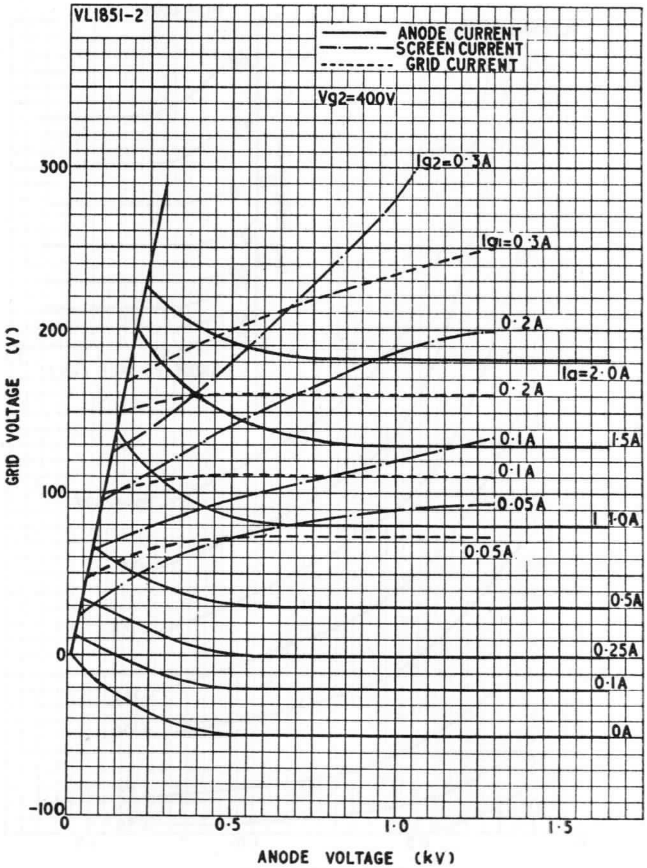
Code: 813 (CV26)



SPECIAL VALVES

R.F. Beam Power Amplifier

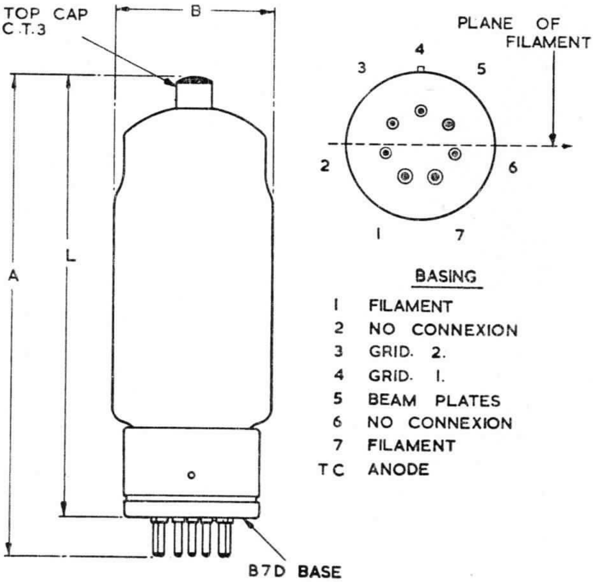
Code: 813 (CV26)



SPECIAL VALVES

R.F. Beam Power Amplifier

Code: 813 (CV26)



BASING

1 FILAMENT
2 NO CONNEXION
3 GRID. 2.
4 GRID. 1.
5 BEAM PLATES
6 NO CONNEXION
7 FILAMENT
TC ANODE

DIM:	MILLIMETRES	INCHES
A	184·1 ± 6·4	7 1/4 ± 1/4
B	65·1 MAX:	2 9/16 MAX:
L	168·3 ± 6·4	6 5/8 ± 1/4

NOTE:– BASIC FIGURES ARE INCHES

SPECIAL VALVES

Forced-Air-Cooled
R.F. Pentode

Code: 5J/180E (CV445)

CATHODE

Thoriated-tungsten filament		
Filament voltage	9	V
Nominal current	30	A
Filament cold resistance	0.04	Ω
Maximum usable emission	12	A
†Pirani test figure, approx. { Measured at 4A after 60 min }	0.21	V

CHARACTERISTICS

Mutual conductance { Measured at V_a 6 kV : V_{g2} 1.5 kV I_a 0.5 A }	5.75	mA/V
Screen grid μ	4	

DIRECT INTERELECTRODE CAPACITANCES

Input	35	pF
Output	16	pF
Anode to grid	0.9	pF

AIR COOLING REQUIRED

For an anode dissipation of	2.1	2.75	3.5	kW
Volume of air required through radiator	325	450	580	cu ft/min
	9	12,4	16	m^3/min
At a water pressure of	0.75	1.5	2.5	in
	1,9	3,8	6,4	cm

Maximum ambient temperature	45	°C
Maximum radiator core temperature	130	°C
Maximum anode, or lead, seal temperature	150	°C

MECHANICAL DATA

Nominal overall length	$8\frac{21}{32}$ in	220	mm
Maximum radiator diameter	$5\frac{7}{8}$ in	149,2	mm
Net weight		5,2	kg
		11.5	lb
Shipping weight, approx.		19,8	kg←
		44	lb←
Shipping dimensions		24×24×26	in←
		61×61×66	cm

† When Pirani tests are made, the figures quoted on the card received with the valves should be used and not the approximate values given above.

COMPONENTS GROUP

Standard Telephones and Cables Limited

Registered Office: Connaught House, Aldwych, W.C.2

VALVE DIVISION, FOOTSCRAY, KENT Telephone: Footscray 3333

SPECIAL VALVES

Forced-Air-Cooled
R.F. Pentode

Code: 5J/180E (CV445)

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

RADIO FREQUENCY

Class C Power Amplifier. Anode subject to modulation
(Carrier conditions per valve for use with 100% modulation.)

Maximum Ratings

Maximum direct anode voltage	4.8	kV
Maximum direct anode current	1.25	A
Maximum direct anode dissipation	2.35	kW
Maximum direct screen voltage	1.5	kV
Maximum direct screen current	165	mA
Maximum direct screen dissipation	100	W
Maximum direct grid dissipation	50	W
Maximum frequency for above ratings	30	Mc/s

Typical Operating Conditions

Direct anode voltage	4.5	kV
Direct screen voltage	1.5	kV
Direct grid voltage	−900	V
Direct anode current	1	A←
Direct screen current	20	mA←
*Direct grid current	25	mA
Peak r.f. grid voltage	1 050	V
Power output	2.9	kW

Class C Power Amplifier or Oscillator. Unmodulated

Maximum Ratings

Maximum direct anode voltage	6	kV
Maximum direct anode current	2.5	A
Maximum direct anode dissipation	3.5	kW
Maximum direct screen voltage	1.5	kV
Maximum direct screen current	250	mA
Maximum direct screen dissipation	150	W
Maximum direct grid dissipation	50	W
Maximum frequency for above ratings	30	Mc/s

Typical Operating Conditions

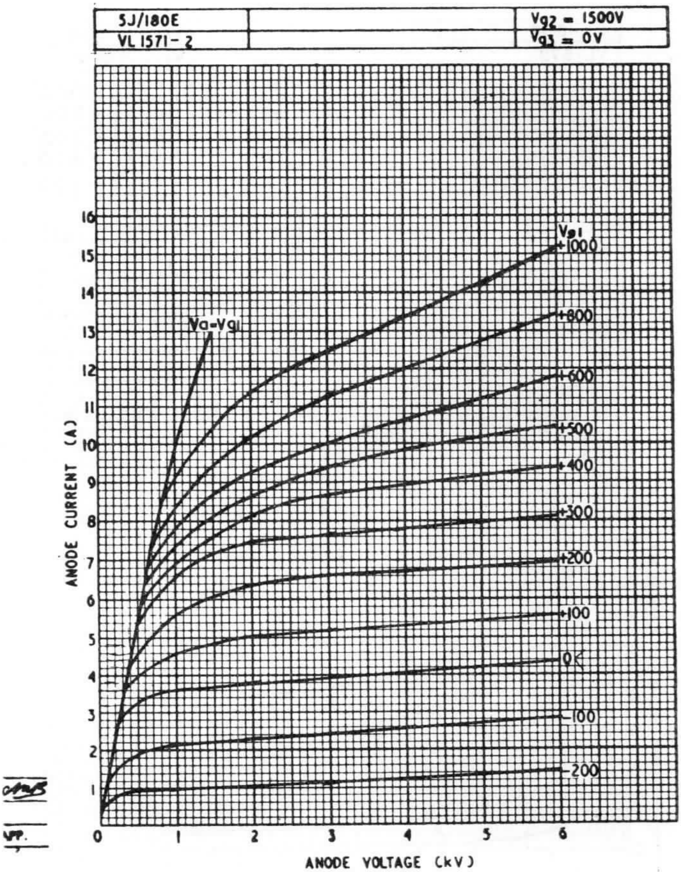
Direct anode voltage	6	kV←
Direct screen voltage	1.5	kV
Direct grid voltage	−715	V←
Direct anode current	1.4	A←
Direct screen current	30	mA←
*Direct grid current	45	mA←
Peak r.f. grid voltage	915	V←
Power output	5.75	kW←

*Subject to wide variation dependent upon impedance of the load circuit.

SPECIAL VALVES

Forced-Air-Cooled
R.F. Pentode

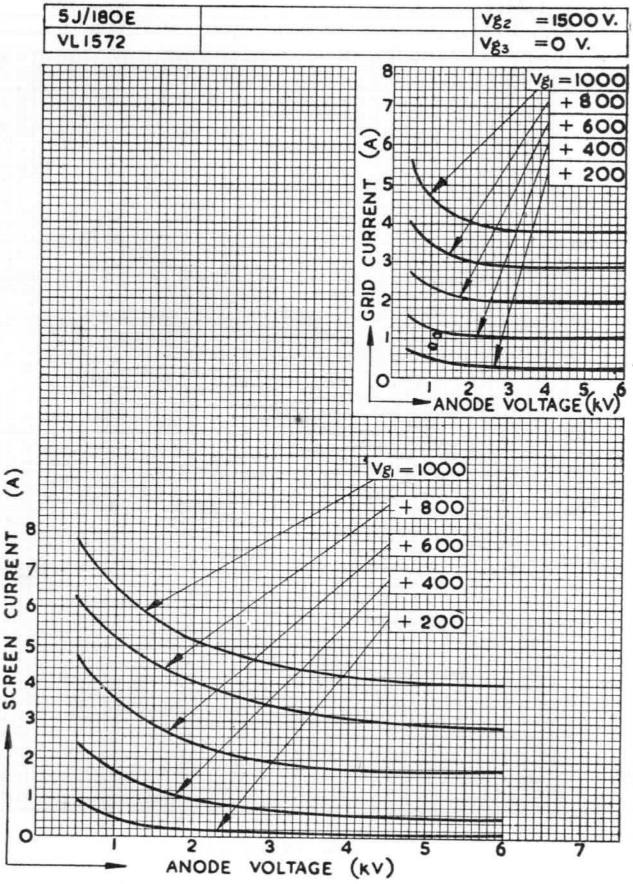
Code: 5J/180E (CV445)



SPECIAL VALVES

Forced-Air-Cooled
R.F. Pentode

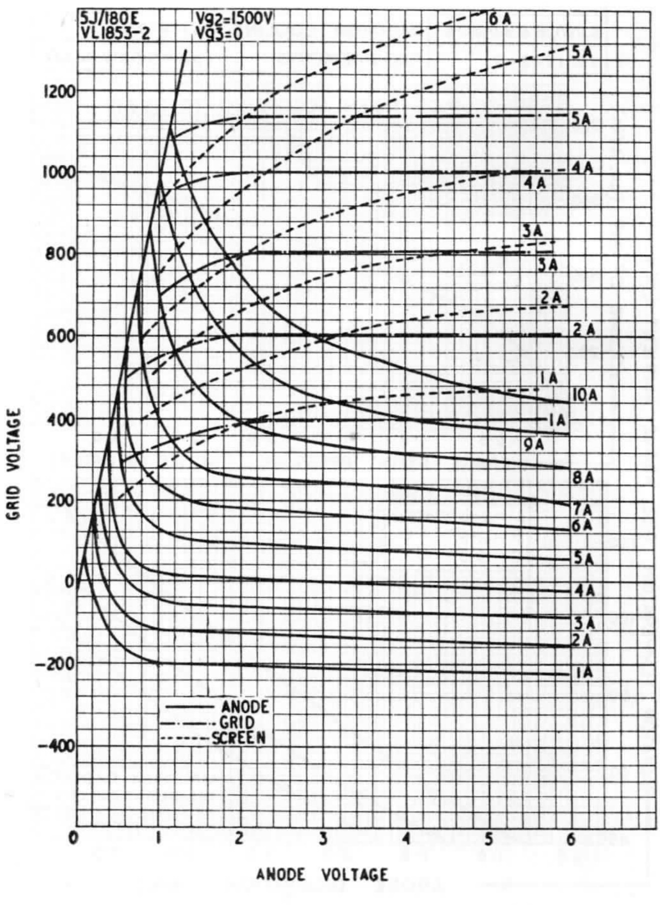
Code: 5J/180E (CV445)



SPECIAL VALVES

Forced-Air-Cooled
R.F. Pentode

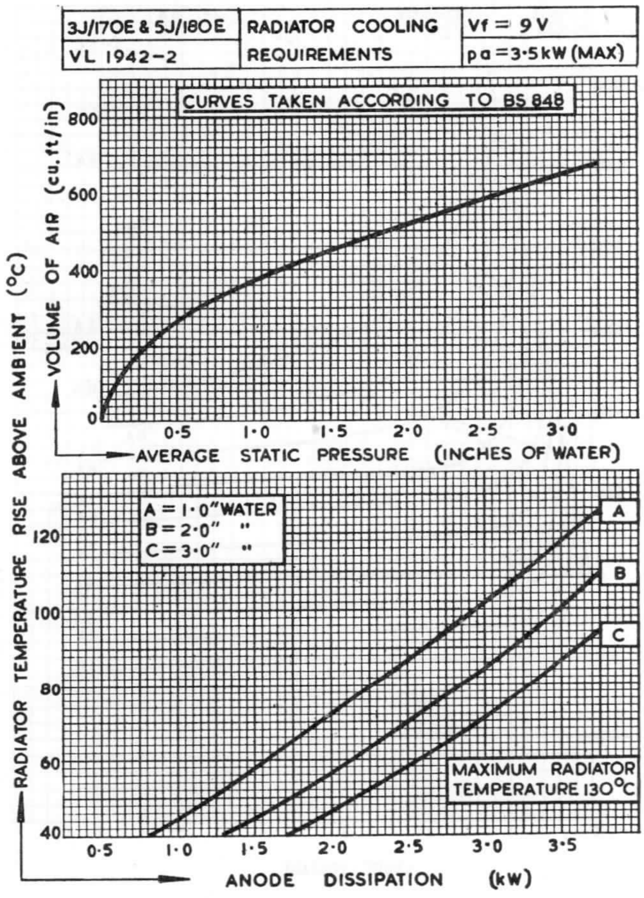
Code: 5J/180E (CV445)



SPECIAL VALVES

Forced-Air-Cooled
R.F. Pentode

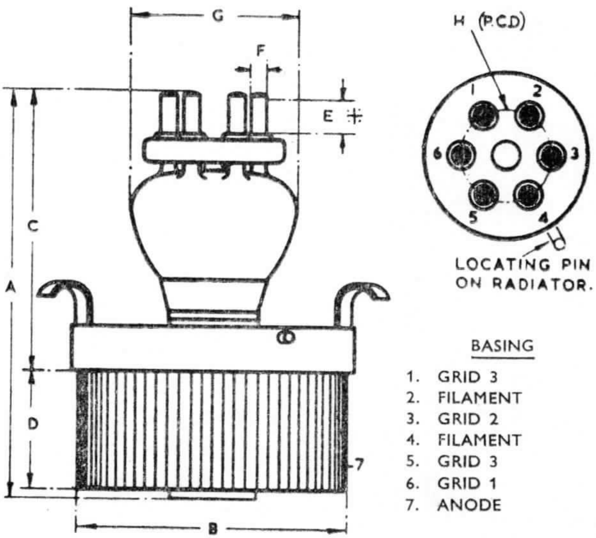
Code: 5J/180E (CV445)



SPECIAL VALVES

Forced-Air-Cooled
R.F. Pentode

Code: 5J/180E (CV445)



BASING

1. GRID 3
2. FILAMENT
3. GRID 2
4. FILAMENT
5. GRID 3
6. GRID 1
7. ANODE

DIM.	MILLIMETRES	INCHES
A	220 NOM.	$8\frac{21}{32}$ NOM.
B	147.6 ± 1.6	$5\frac{13}{16} \pm \frac{1}{16}$
C	154 ± 3.2	$6\frac{1}{16} \pm \frac{1}{8}$
D	63.5 NOM.	$2\frac{1}{2}$ NOM.
E*	21 MIN.	$\frac{13}{16}$ MIN.
F	9.53 ± 0.05	0.375 ± 0.002
G	92 MAX.	$3\frac{5}{8}$ MAX.
H	49.2 ± 0.8	$1\frac{15}{16} \pm \frac{1}{32}$

BASIC FIGURES ARE INCHES
* DENOTES: CONTACT LENGTH