

**STC****4H/160M  
4HC/160M****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)

Nominal current (Note 1)

Minimum cathode heating time

6	V
2.6	A
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 $\mu$			

**DIRECT INTERELECTRODE CAPACITANCES**

Input (nom.)

Output (nom.)

Anode to grid (max.)

16.5	pF
4.5	pF
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 ft <sup>3</sup> /min	0.1	m <sup>3</sup> /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

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**Standard Telephones and Cables Limited**

Valve Division, Brixham Road, Paignton, Devon

Telephone: Paignton 50762 Telex: 4230

London Sales Office, Telephone: Footscray 3333 Telex: 21836

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**MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS**

CLASS AB<sub>1</sub>. 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.

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CLASS AB<sub>1</sub> 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

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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.

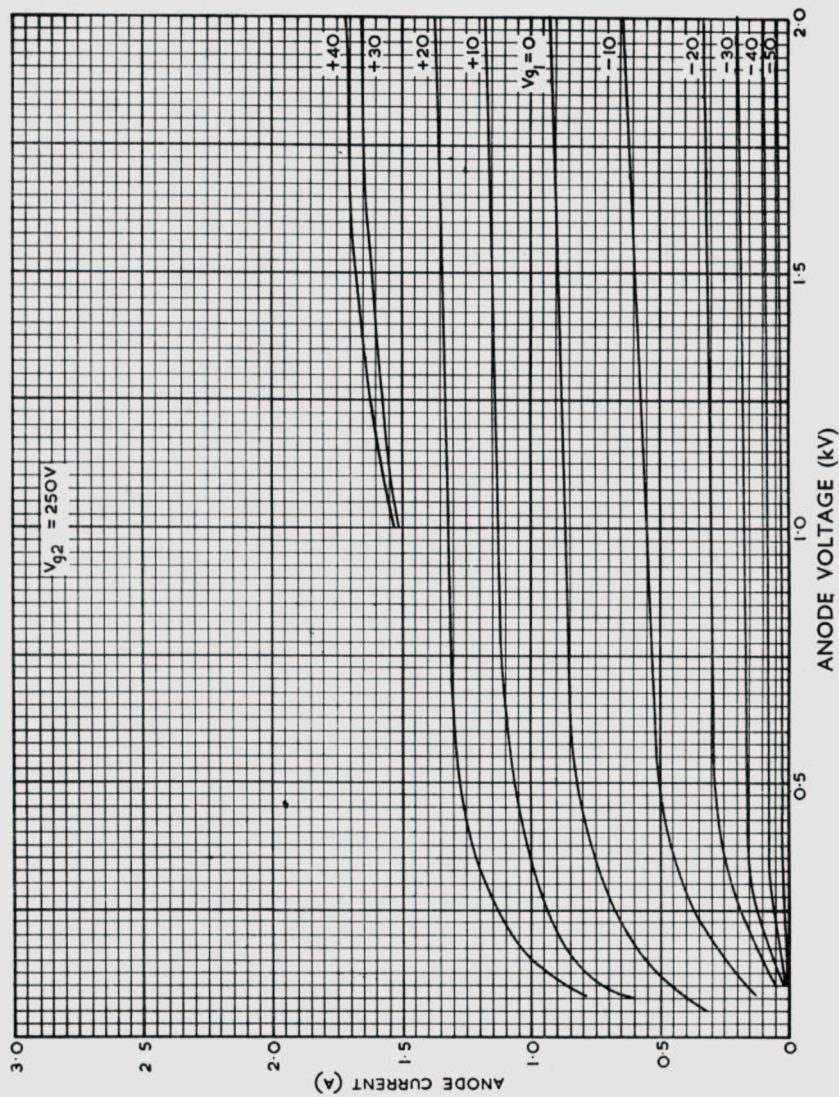
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Figure 1.—Anode Characteristics ( $V_{g_2} = 250V$ )



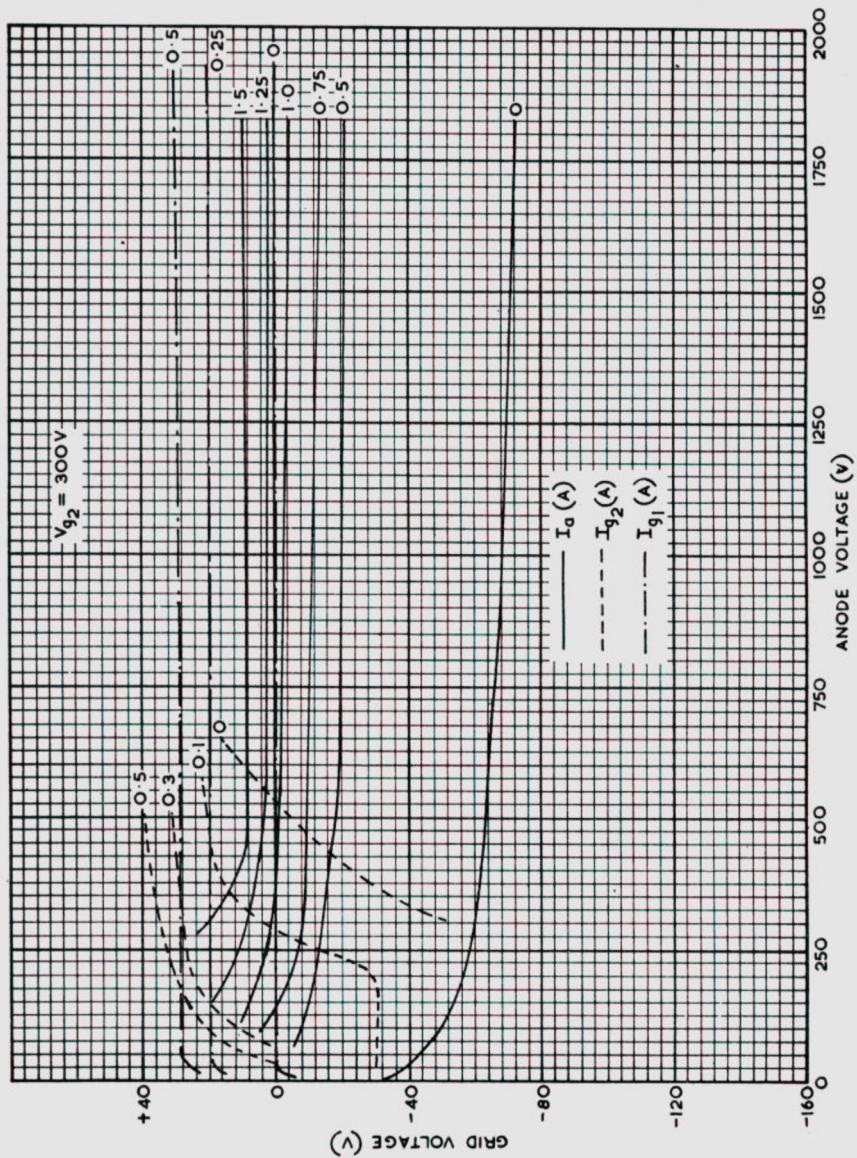
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Fig. 2.—Constant Current Characteristics ( $V_{g_2} = 300V$ )



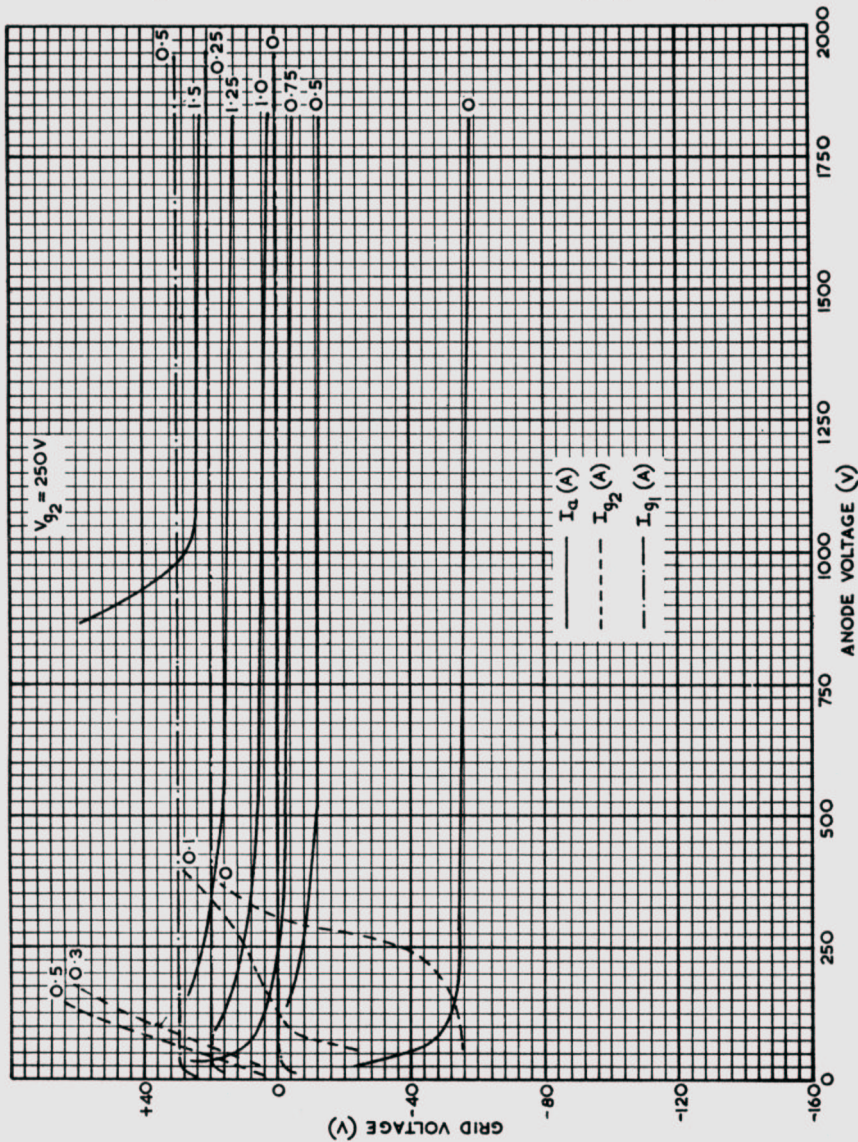
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Fig. 3.—Constant Current Characteristics ( $V_{g2} = 250V$ )



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

