

SPECIAL VALVES

Water-Cooled Industrial Triode
with Integral Water Jacket

Code: 3R/187E

This valve is electrically identical to 3J/187E but, for anode cooling, a helical copper tube has been fixed around the anode to obviate the need for a separate water jacket. This arrangement provides efficient cooling with economy in water consumption.

CATHODE

Thoriated tungsten filament		
Filament voltage	5	V
Filament current, nominal	78	A
Maximum usable emission	10	A

It is recommended that some resistance or reactance be introduced into the filament supply to limit the surge peak current to about two and a half times the normal r.m.s. working value. This impedance may be short-circuited if desired as soon as the surge has decayed.

CHARACTERISTICS

Amplification factor	{ at $V_a = 2kV$; $I_a = 0.25A$ }	12	
Mutual conductance		22	mA/V

DIRECT INTERELECTRODE CAPACITANCES

Grid to anode	29	pF
Grid to filament	54	pF
Anode to filament	1.5	pF

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3R/187E—1

Standard Telephones and Cables Limited

Valve Division, Brixham Road, Paignton, Devon

Telephone: Paignton 50762 Telex: 4230

London Sales Office, Telephone: 01-300 3333

Telex: 21836

C O M P O N E N T S

G R O U P

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COOLING REQUIREMENTS

For details of cooling requirements see Figure 3.

It is important to observe the correct connection of water inlet and outlet.

Maximum temperature of outflowing water 70 °C

Forced-air-cooling of the grid and filament seals is required to limit their temperature to below the maximum permissible value of 180°C.

An air flow of 50 ft³/min (1.42 m³/min) directed vertically downwards on to the seals is sufficient to meet these requirements.

MECHANICAL DATA

Dimensions As shown in Figure 4

Mounting position Vertical, anode downwards

Accessories

The following approved items are supplied separately under the codes indicated:

214-LVA-001A Filament connector, smaller

214-LVA-001B Filament connector, larger

214-LVA-001C Grid connector

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

Class C. Industrial Heating R.F. Oscillator

Maximum Ratings

Maximum direct anode voltage (peak value of direct voltage plus ripple)	5.5	6.5	kV
Maximum direct anode current	2	2	A
Maximum direct anode dissipation (continuous)	3	3	kW
Maximum direct grid dissipation (continuous)	200	200	W
Maximum direct grid current (Note 1)	500	500	mA
Maximum negative grid bias	-1 500	-1 500	V
Maximum frequency for the above ratings	120	100	MHz

Note 1.—This figure is given for guidance. Grid dissipation is absolute rating.

Typical Operating Conditions

Direct anode voltage	5	6	6.5	kV
Direct grid voltage	-560	-650	-720	V
Direct anode current	1.6	1.5	1.8	A
Peak r.f. grid voltage	760	890	970	V
Direct grid current (Note 2)	100 (140)	130 (190)	150 (200)	mA
Grid dissipation (Note 2)	25	55	55	W
Grid resistor	5.6	5	4.8	kΩ
Power input	8	9	11.7	kW
Output power (oscillator)	5.4	6.9	8.9	kW
Power into load at 85 per cent transfer efficiency	4.6	5.8	7.5	kW

Note 2.—Subject to wide variation dependent upon the impedance of the load circuit. The values of current shown in brackets are typical of off-load conditions but are given for guidance only: practical figures are dependent upon compensatory devices in the grid circuit.

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Class B. A.F. Power Amplifier or Modulator
(for balanced two-valve operation)

MAXIMUM RATINGS

Maximum direct anode voltage	6	kV
Maximum direct anode current	2	A
Maximum direct anode dissipation (intermittent)	5	kW
Maximum direct anode dissipation (continuous)	4	kW
Maximum direct grid dissipation (continuous)	200	W
Maximum direct grid voltage	—1 500	V

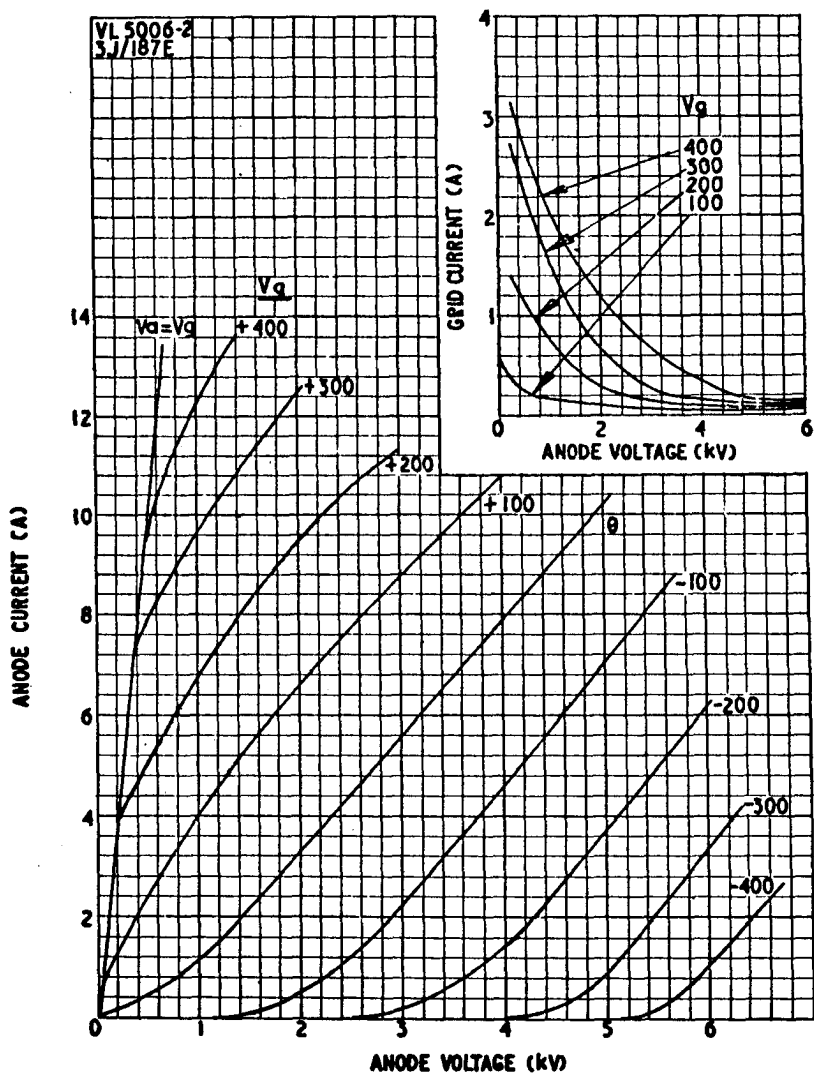
TYPICAL OPERATING CONDITIONS

Direct anode voltage	5	kV
Direct grid voltage	—350	V
Direct anode current (zero signal)	0.2	A
Direct anode current (maximum signal)	1.9	A
Load resistor, anode to anode	2.7	kΩ
Peak a.f. grid to grid voltage	1 040	V
Grid drive power, approximately	85	W
Direct grid current	80	mA
Direct grid dissipation	14	W
Output power	12	kW

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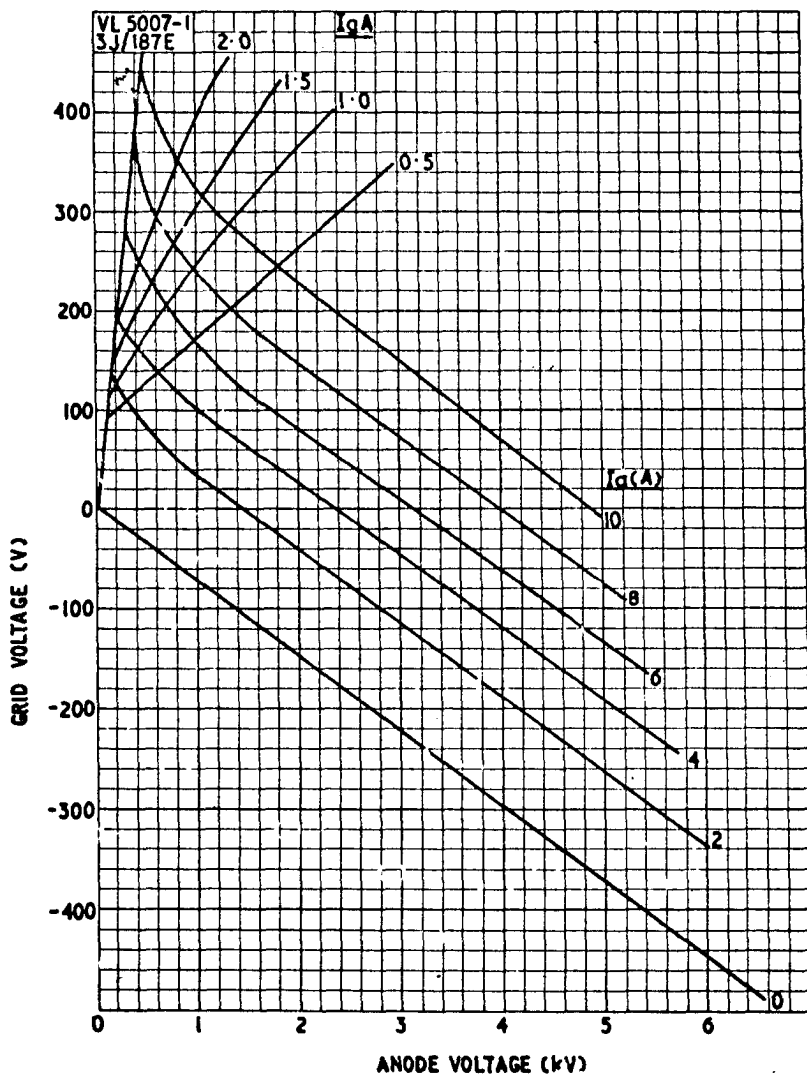
Fig. 1.—Anode Current and Grid Current versus Anode Voltage



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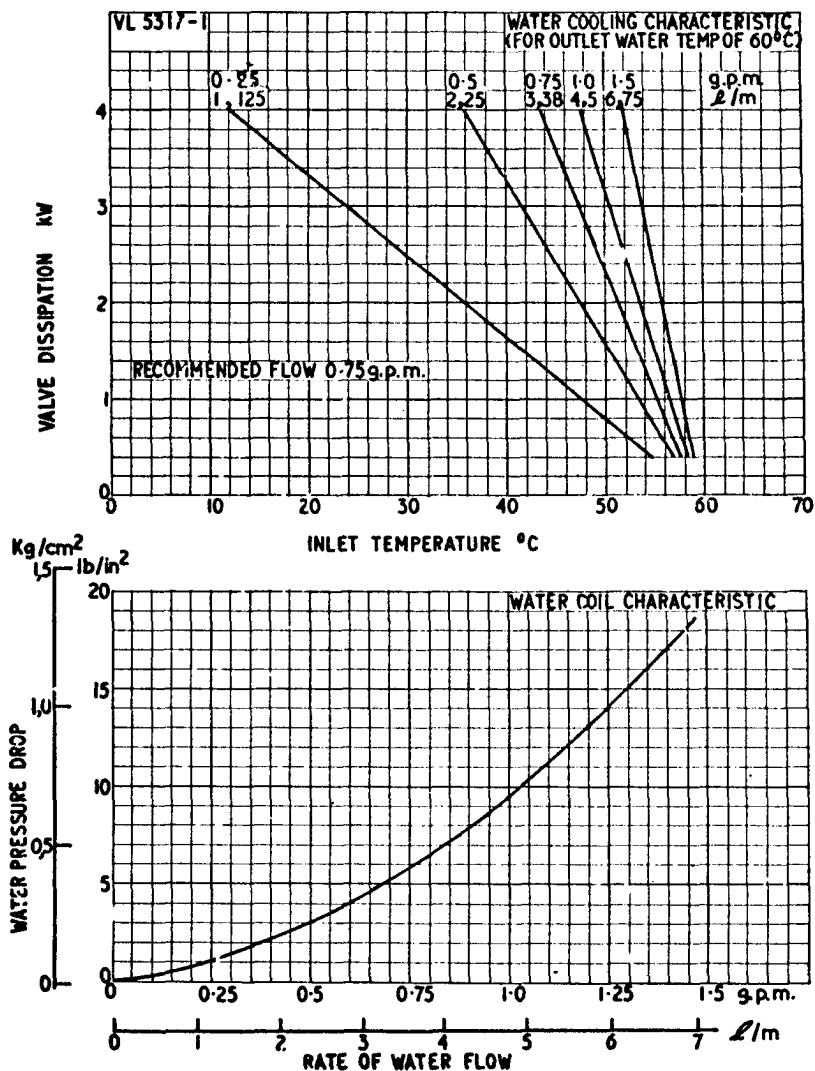
Fig. 2.—Constant Current Characteristics



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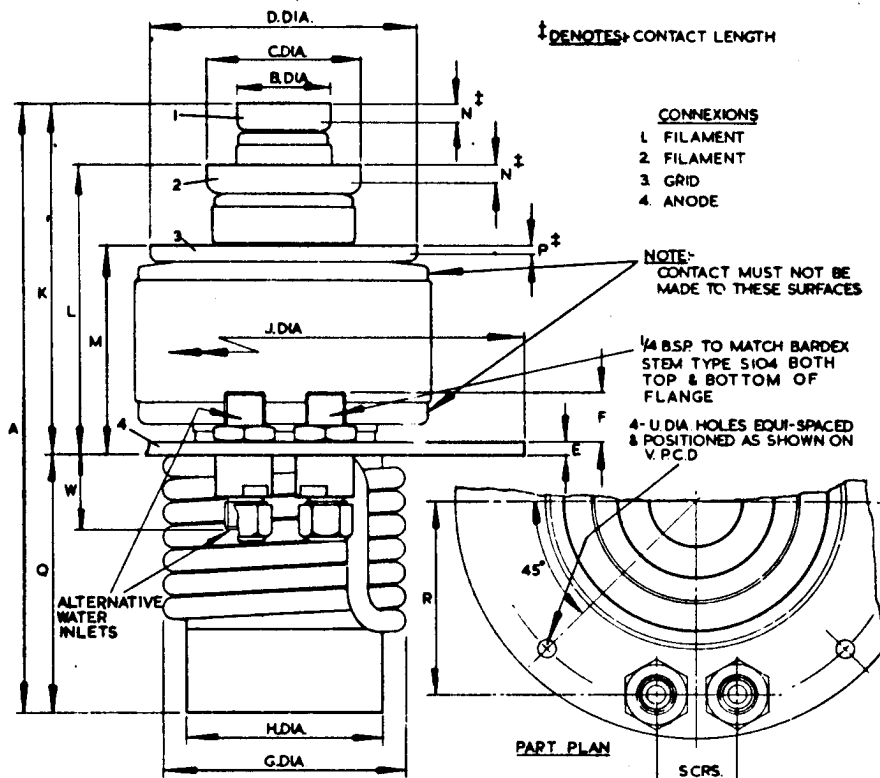
Fig. 3.—Cooling Characteristics



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Fig. 4.—3R/187E Outline



NOTE: IN HIGH FREQUENCY CIRCUITS, CONTACT 2 SHOULD BE USED IN THE RETURN PATH FOR CATHODE CURRENT.

NOTE: BASIC FIGURES ARE IN INCHES

DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	227.0 MAX.	8 15/16 MAX.	L	108.7 ± 4.8	4 9/32 ± 3/16
B	31.8 ± 0.4	1 1/4 ± 1/64	M	75.4 ± 3.2	2 31/32 ± 1/8
C	50.8 ± 0.4	2 ± 1/64	N	4.7 MIN. 6.4 MAX.	3/16 MIN. 1/4 MAX.
D	88.9 ± 0.4	3 1/2 ± 1/64	P	3.1 MIN. 4.8 MAX.	1/8 MIN. 3/16 MAX.
E	4.8 ± 0.4	3/16 ± 1/64	Q	86.5 ± 3.2	3 3/32 ± 1/8
F	15.9 ± 0.8	5/8 ± 1/32	R	65.1 ± 0.8	2 9/16 ± 1/32
G	82.6 MAX.	3 1/4 MAX.	S	27.0 ± 0.8	1 1/16 ± 1/32
H	65.1 MAX.	2 9/16 MAX.	U	6.53 ± 0.18	0.257 ± 0.007
J	158.8 ± 0.8	6 1/4 ± 1/32	V	139.70 ± 0.25	5.500 ± 0.010
K	131.8 ± 4.8	5 1/16 ± 7/16	W	25.4 ± 1.6	1 ± 1/16