BW/BY1156

R.F. POWER TRIODES

The data should be read in conjunction with the Power Triode Preamble.

ABRIDGED DATA

Two r.f. power triodes intended primarily for industrial service. They differ only in the method of anode cooling and in anode dissipation.

Anode cooling:		
BW1156	water; separate jacket	
BY1156	vapour; separate boiler unit	
Anode dissipation:		
BW1156	175	kW max
BY1156	125	kW max
Anode voltage	14	kV max
Frequency for full ratings	27	MHz max
Output power (class C unmodulated)	250	kW

GENERAL

Electrical

Filament (two sections) (see note 1)	thoriated tungsten	
Filament voltage per section (see note 2)	12.2	V
Filament current per section	290	A
Surge filament current per section (peak) (see note 3)	700	A max
Filament cold resistance per section	5.0	mΩ
Peak usable cathode current	260	A
Perveance	8.0	$mA/V^{3/2}$
Amplification factor (V_a = 9.0kV, I_a = 5.0A)	23	
Mutual conductance (V_a = 9.0kV, I_a = 5.0A)	100	mA/V
Inter-electrode capacitances:		
grid to anode	110	pF
grid to filament	290	pF
anode to filament	5.0	pF

Mechanical

Overall dimensions	see outline drawings
Net weight:	
BW1156	60 pounds (27kg) approx
BY1156	125 pounds (57kg) approx
Mounting position	vertical, filament pins up

Accessories

Filament leads	MA130
Grid connector	MA66B
Water jacket for BW1156	BW4035
Sealing ring (supplied with BW1156)	MA243
Boiler unit, integral condenser, for BY1156	BY4036
Boiler unit, separate condenser required, for BY1156	BY4060
Sealing ring (supplied with BY1156)	MA260
Thermal fuse (2 supplied with BY1156)	MA85D

COOLING

Anode

The anode of the BW1156 must be fitted into a water jacket for cooling, the recommended jacket being type BW4035. With an anode dissipation of 175kW, the water flow necessary is 40imp.gal/min (182 l./min). The temperature of the cooling water at the outlet must not exceed 65°C nor should the temperature rise across the jacket exceed 15°C.

The BY1156 is vapour cooled and may be operated either in boiler unit BY4036 or BY4060. In BY4036 the steam generated at the anode is condensed by means of an internal water cooled condenser. The steam produced in BY4060 is led away by suitably insulated tubing for condensation at some convenient point external to the boiler unit.

Two thermal fuses (part number MA85D) are provided with each valve to give protection against anode overheating; only one fuse at a time need be used. Alternative positions for mounting the thermal fuse are provided by four threaded holes equally spaced round the top surface of the anode ring. The fuse should be screwed into the desired position and connected by a non-conducting cord passing over the anode corona ring to a suitable switching device; a tension of about 1 pound (450g) should be applied to the fuse via the cord. If the temperature exceeds a safe limit, the fuse cord is pulled outwards; this should actuate the switching device and remove all electrical supplies from the valve. Replacement fuses can be supplied to order.

Filament and Grid Seals

The temperature of the filament and grid seals must not exceed 140°C. A flow of air of 60ft^3/min (1.7m^3/min) directed into the filament header via a 2 inch (51mm) diameter nozzle before, during and after the application of any voltages is usually adequate for limiting the temperature of these seals.

Anode Seal and Bulb

The anode seal and bulb temperatures must not exceed 180°C.

INSTALLATION

The BY1156 should be lifted by means of four lifting hooks hooked under the anode corona ring (see outline drawing and also page 8 for details of a suitable lifting hook), the hooks being connected by cables to a suitable spreader plate and lifting tackle.

R.F. AMPLIFIER AND OSCILLATOR

(Class C unmodulated conditions, one valve)

MAXIMUM RATINGS (Absolute values)

Anode voltage	14	kV max
Anode current	28	A max
Anode dissipation:		
BW1156	175	kW max
BY1156	125	kW max
Grid dissipation	3.0	kW max
Operating frequency (for full ratings)	27	MHz max

TYPICAL OPERATING CONDITIONS (For amplifier)

Anode voltage	12	kV
Grid voltage	−1400	V
Peak r.f. grid drive voltage	2150	V
Anode current	27	A
Grid current (approx)	4.0	A
Anode dissipation (including filament and grid losses)	85	kW
Grid dissipation (approx)	3.0	kW
Driving power (approx)	9.5	kW
Output power	250	kW
Efficiency	76	%

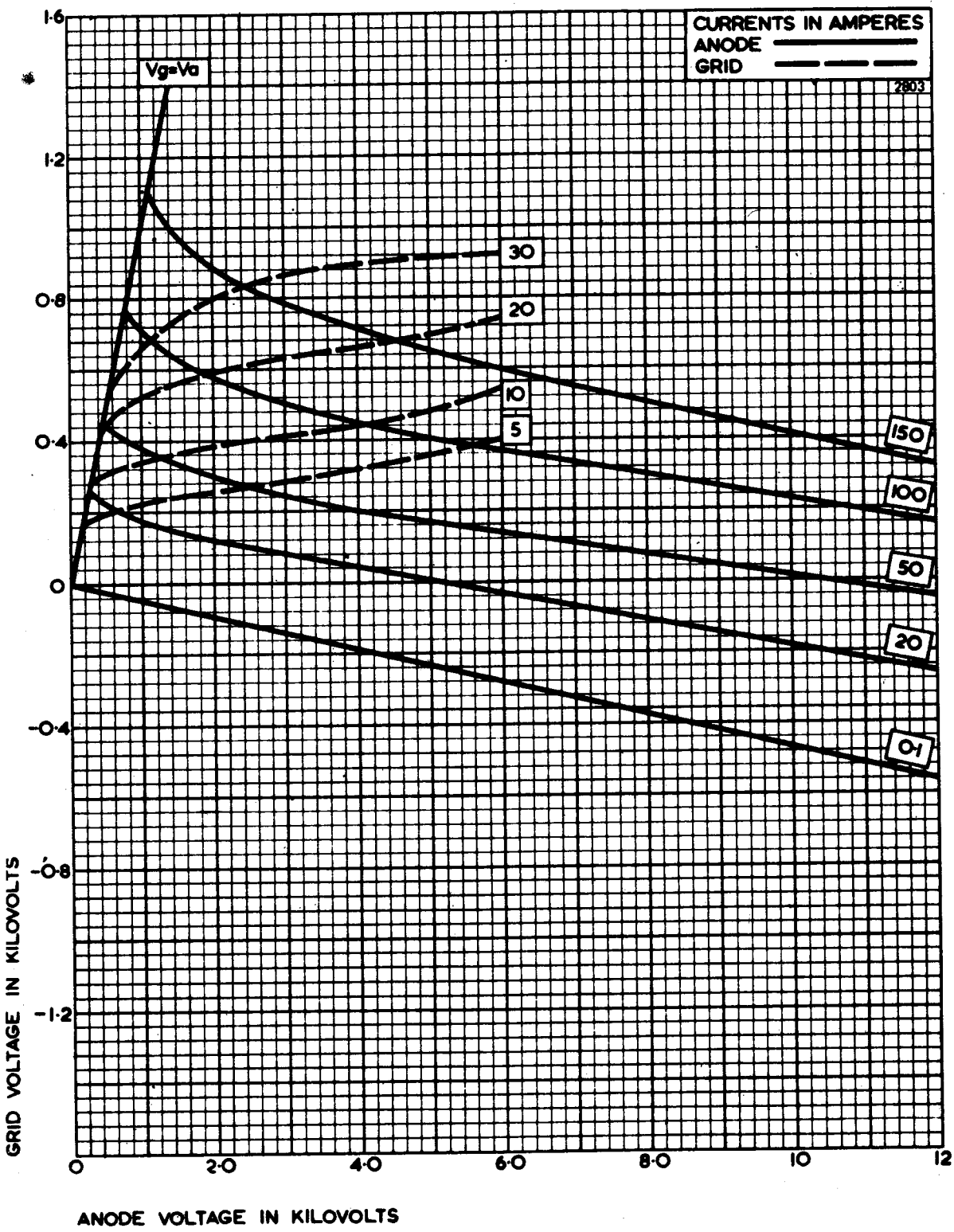
RANGE OF CHARACTERISTICS FOR EQUIPMENT DESIGN

	Min	Max	
Filament current per section at filament voltage 12.2V	263	311	A
Filament current difference between sections	—	15	A
Amplification factor (V_a = 9.0kV, I_a = 5.0A)	18	28	
Mutual conductance (V_a = 9.0kV, I_a = 5.0A)	80	110	mA/V
Grid voltage (negative value) (V_a = 7.5kV, I_a = 0.1A)	—	400	V
Grid voltage (V_a = 9.0kV, I_a = 5.0A)	240	320	V
Anode current (V_a = 1.5kV, V_g = +600V)	75	125	A
Grid current (V_a = 1.5kV, V_g = +600V)	20	40	A
Anode current (V_a = 1.5kV, V_g = +750V)	120	160	A
Grid current (V_a = 1.5kV, V_g = +750V)	25	55	A
Grid voltage (V_a = 1.5kV, I_a = 130A)	600	850	V
Grid current (V_a = 1.5kV, I_a = 130A)	20	50	A

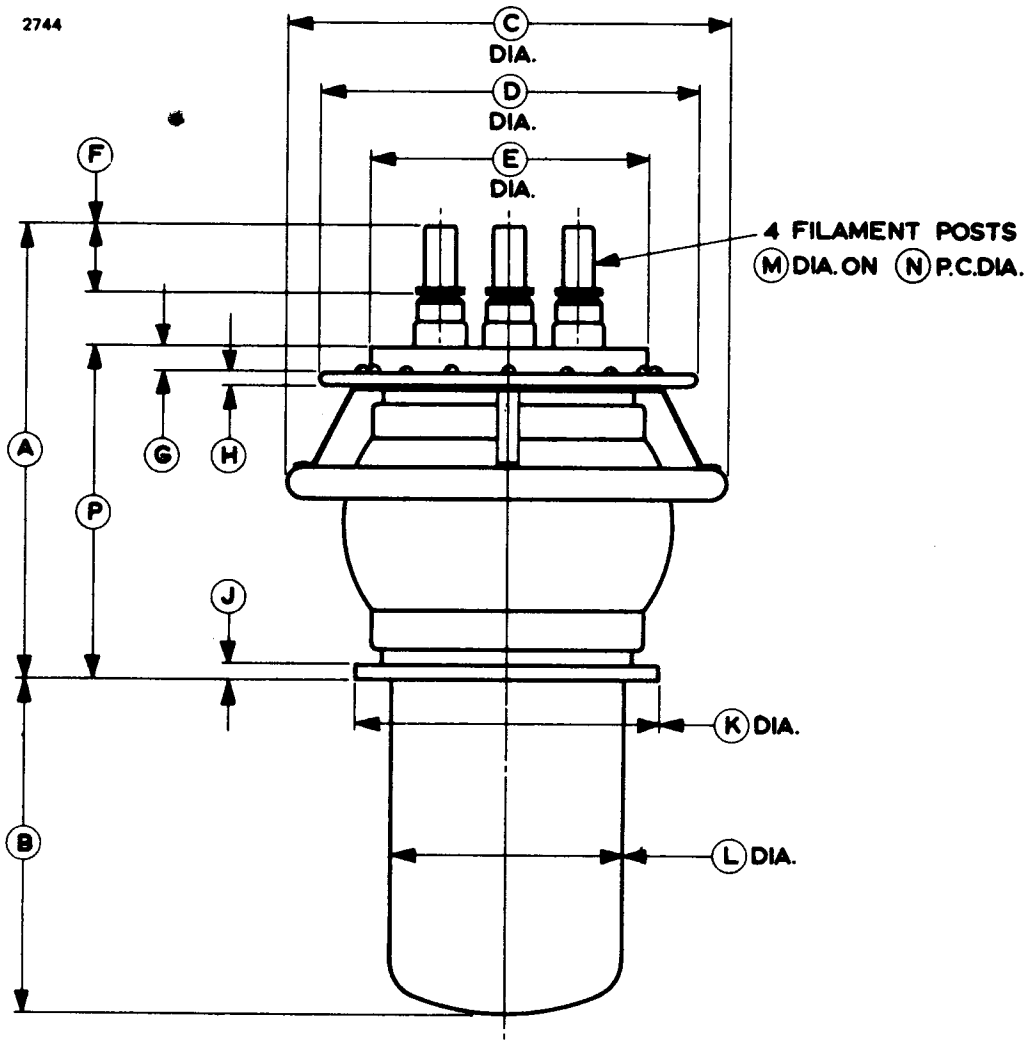
NOTES

1. The filament comprises two separate sections designed to operate in phase quadrature. Each section is connected across diametrically opposite filament pins. If desired the two sections may be connected in parallel.
2. The valve must be operated at the stated filament voltage. Fluctuations in filament voltage must not exceed ±5%.
3. The filament current must not exceed 700A per section, even momentarily, at any time.

TYPICAL CONSTANT CURRENT CHARACTERISTICS



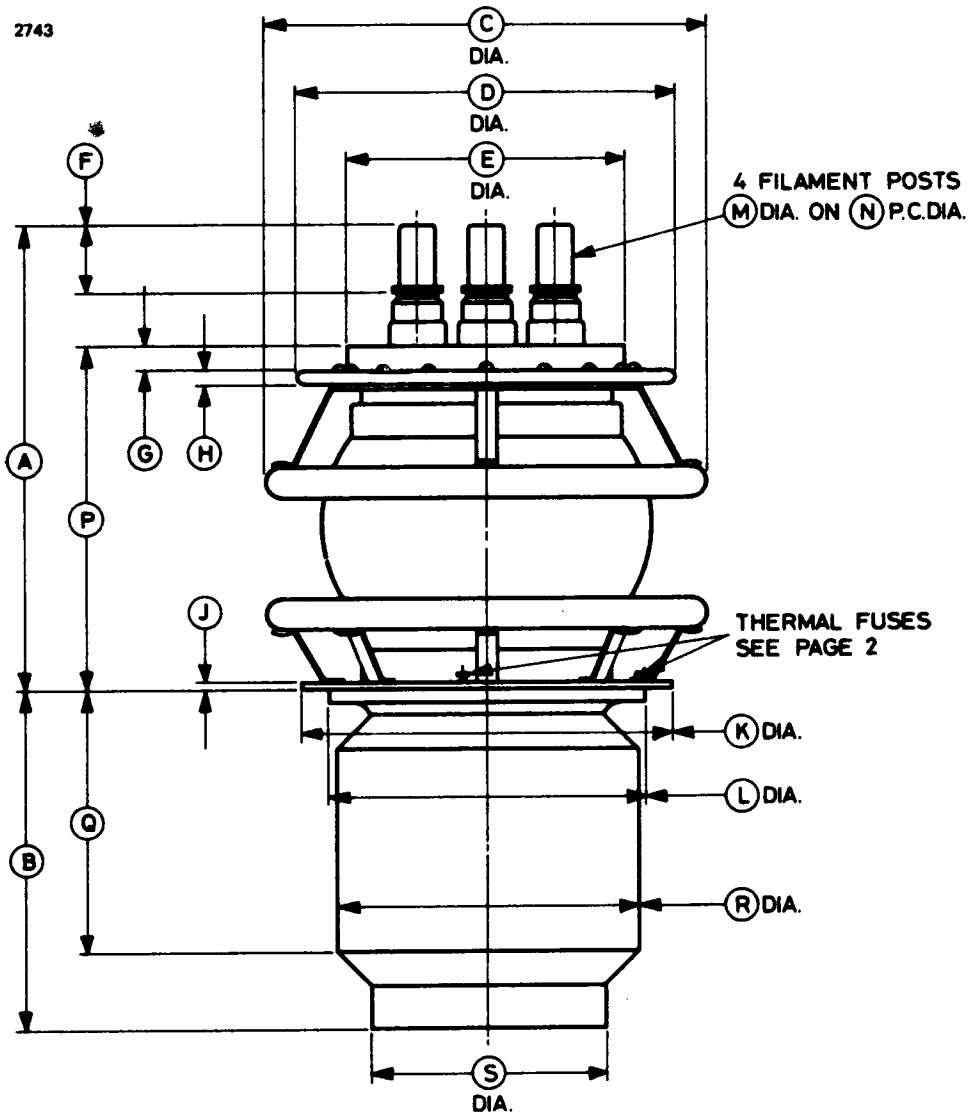
OUTLINE FOR BW1156 (All dimensions without limits are nominal)



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	13.500 max	342.9 max	H	0.375 ± 0.031	9.53 ± 0.79
B	9.938 ± 0.031	252.4 ± 0.8	J	0.500 ± 0.031	12.70 ± 0.79
C	13.062 max	331.8 max	K	9.000	228.6
D	11.125 ± 0.062	282.6 ± 1.6	L	6.915	175.6
E	8.086 ± 0.031	205.4 ± 0.8	M	0.875	22.23
F	2.000	50.80	N	4.000	101.6
G	0.750 min	19.05 min	P	9.919 ± 0.250	251.9 ± 6.4

Millimetre dimensions have been derived from inches.

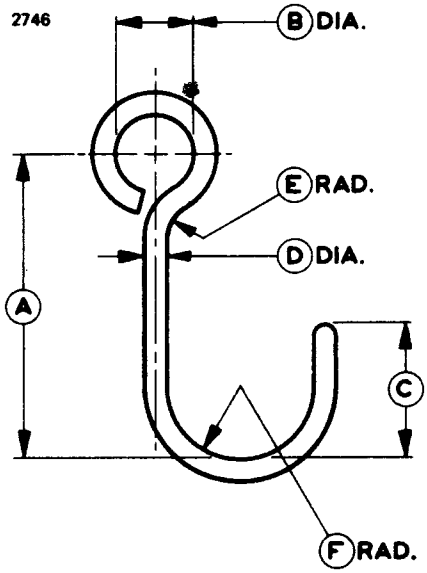
OUTLINE FOR BY1156 (All dimensions without limits are nominal)



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	13.800 max	350.5 max	K	10.875 ± 0.031	276.2 ± 0.8
B	10.187 max	258.8 max	L	9.312 ± 0.015	236.5 ± 0.4
C	13.062 max	331.8 max	M	0.875	22.23
D	11.125 ± 0.062	282.6 ± 1.6	N	4.000	101.6
E	8.086 ± 0.031	205.4 ± 0.8	P	10.217 ± 0.250	259.5 ± 6.4
F	2.000	50.80	Q	7.781 max	197.6 max
G	0.750 min	19.05 min	R	9.000 max	228.6 max
H	0.375 ± 0.031	9.53 ± 0.79	S	6.875	174.6
J	0.250 ± 0.031	6.35 ± 0.79			

Millimetre dimensions have been derived from inches.

LIFTING HOOK (See page 3)



Ref	Inches	Millimetres
A	$2\frac{1}{4}$	57.2
B	$\frac{9}{16}$	14.3
C	1	25.4
D	$\frac{3}{16}$	4.8
E	$\frac{1}{4}$	6.4
F	$\frac{17}{32}$	13.5

Millimetre dimensions have been derived from inches.