

# BW/BY1144 Series

R.F. POWER  
TRIODES

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

## ABRIDGED DATA

Three r.f. transmitting triodes differing in anode dissipation, method of anode cooling or filament terminals. The tubes have grid terminals suitable for cathode drive operation.

Anode cooling:

BW1144 . . . . .	water; separate jacket
BY1144, BY1144L . . . . .	vapour; separate boiler unit

Anode dissipation:

BW1144 . . . . .	100	kW max
BY1144, BY1144L . . . . .	125	kW max
Anode voltage . . . . .	14	kV max
Frequency for full ratings . . . . .	27	MHz max
Output power (class C telegraphy) . . . . .	200	kW

The BY1144L is identical with BY1144 but is equipped with flexible leads on the four filament terminals (see outline drawing on page 11).

## GENERAL

### Electrical

Filament (two sections) (see note 1) . . . . .	thoriated tungsten
Filament voltage per section (see note 2) . . . . .	9.6 V
Filament current per section . . . . .	290 A
Surge filament current per section (peak) (see note 3) . . . . .	700 A max
Filament cold resistance per section . . . . .	4.0 mΩ
Peak usable cathode current . . . . .	175 A
Perveance . . . . .	6.0 mA/V <sup>3/2</sup>
Amplification factor ( $V_a = 9.0kV, I_a = 5.0A$ ) . . . . .	34
Mutual conductance ( $V_a = 9.0kV, I_a = 5.0A$ ) . . . . .	85 mA/V
Inter-electrode capacitances (average):	
grid to anode . . . . .	108 pF
grid to filament . . . . .	259 pF
anode to filament . . . . .	3.5 pF

## Mechanical

Overall dimensions . . . . .	see outline drawings
Net weight:	
BW1144 . . . . .	56 pounds (25.5kg) approx
BY1144, BY1144L . . . . .	125 pounds (57kg) approx
Mounting position . . . . .	vertical, filament end up

## Accessories

Filament leads for BW1144, BY1144 . . . . .	MA130
Grid connector . . . . .	MA66B
Water jacket for BW1144 . . . . .	BW4035
Sealing ring (supplied with BW1144) . . . . .	MA243
Boiler unit, integral condenser, for BY1144, BY1144L . . . . .	BY4036
Boiler unit, separate condenser required, for BY1144, BY1144L . . . . .	BY4060
Sealing ring (supplied with BY1144, BY1144L) . . . . .	MA260
Thermal fuse (2 supplied with BY1144, BY1144L) . . . . .	MA85D

## COOLING

### Anode

The anode of the BW1144 must be fitted into a water jacket for cooling, the recommended jacket being type BW4035. A flow of water of 22 to 25 imp. gal/min (100 to 115 l./min) is required; 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 BY1144 and BY1144L are 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 BY1144 and BY1144L 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 lb (450g) should be applied to the fuse via the cord. If the temperature exceeds a safe limit, the fuse core 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<sup>3</sup>/min (1.7m<sup>3</sup>/min) directed into the filament header via a 2-inch (50mm approx) maximum diameter nozzle before and during 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 BY1144 and BY1144L should be lifted by means of four lifting hooks hooked under the anode corona ring (see outline drawings and also page 12 for details of a suitable lifting hook), the hooks being connected by cables to a suitable spreader plate and lifting tackle.

## R.F. POWER AMPLIFIER AND OSCILLATOR (Class C Telegraphy, key-down conditions, one valve)

### MAXIMUM RATINGS (Absolute values)

Anode voltage (see note 4)	14	kV max
Anode current	18	A max
Anode dissipation (see note 5):		
BW1144	100	kW max
BY1144, BY1144L	125	kW max
Grid dissipation	2.75	kW max
Operating frequency (for full ratings)	27	MHz max

### TYPICAL OPERATING CONDITIONS (For amplifier)

Anode voltage	14	kV
Grid voltage	-765	V
Peak r.f. grid drive voltage	1305	V
Anode current	17.5	A
Grid current (approx)	3.1	A
Anode dissipation	45	kW
Grid dissipation (approx)	1.7	kW
Driving power (approx)	4.0	kW
Output power	200	kW
Efficiency	81	%

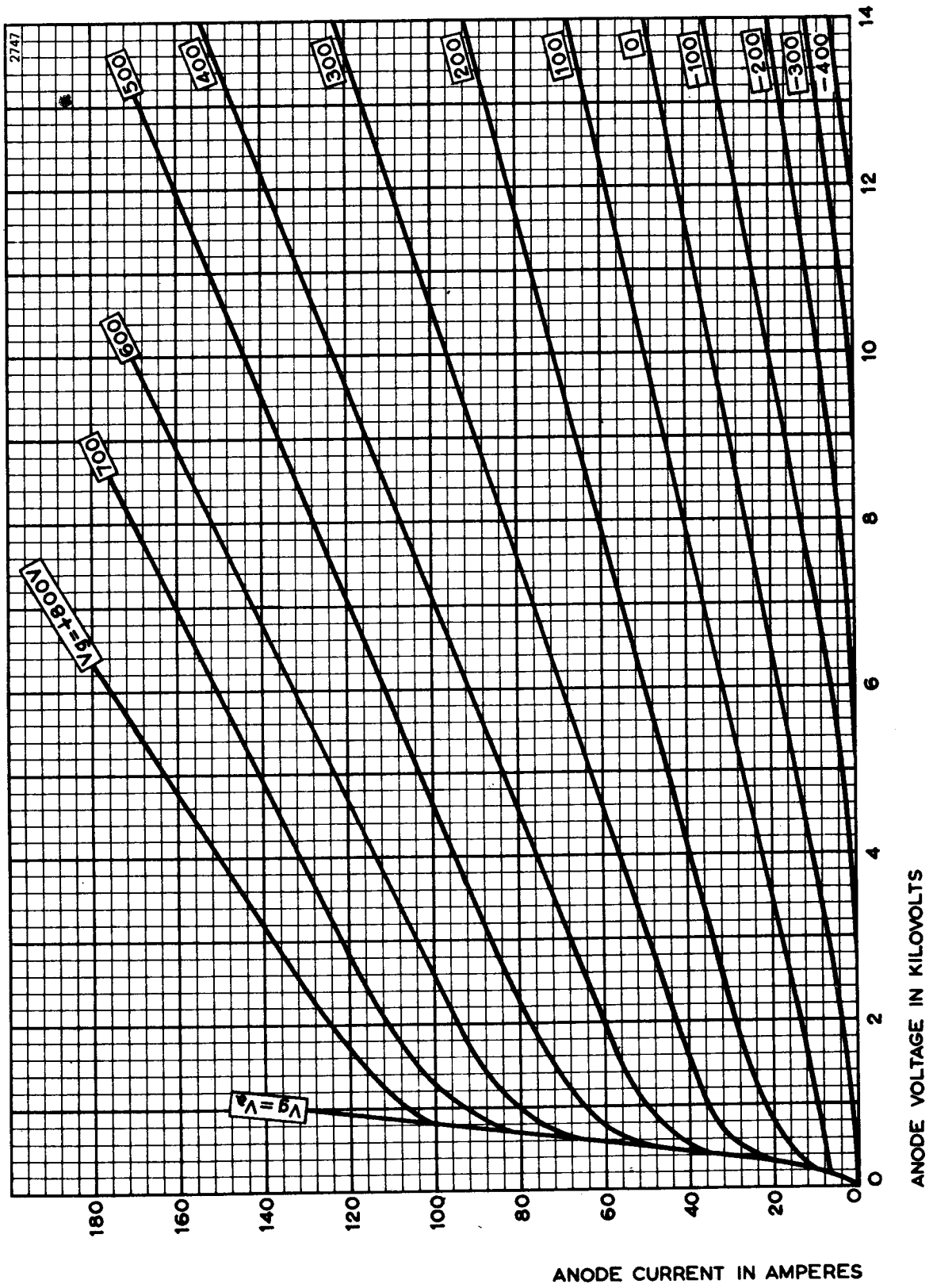
## RANGE OF CHARACTERISTICS FOR EQUIPMENT DESIGN

	Min	Max	
Filament current per section at filament voltage 9.6V . . . . .	263	311	A
Filament current difference between sections . . . . .	—	15	A
Amplification factor ( $V_a = 9.0\text{kV}$ , $I_a = 5.0\text{A}$ ) . . . . .	31	39	
Mutual conductance ( $V_a = 9.0\text{kV}$ , $I_a = 5.0\text{A}$ ) . . . . .	78	102	mA/V
Grid voltage (negative value) ( $V_a = 10\text{kV}$ , $I_a = 0.1\text{A}$ ) . . . . .	—	370	V
Grid voltage ( $V_a = 9.0\text{kV}$ , $I_a = 5.0\text{A}$ ) . . . . .	145	222	V
Anode current ( $V_a = 1.5\text{kV}$ , $V_g = +400\text{V}$ ) . . . . .	48	72	A
Grid current ( $V_a = 1.5\text{kV}$ , $V_g = +400\text{V}$ ) . . . . .	10	16	A
Anode current ( $V_a = 4.0\text{kV}$ , $V_g = +400\text{V}$ ) . . . . .	66	98	A
Grid current ( $V_a = 4.0\text{kV}$ , $V_g = +400\text{V}$ ) . . . . .	2.0	10	A
Anode current ( $V_a = 10\text{kV}$ , $V_g = +400\text{V}$ ) . . . . .	90	138	A
Grid current ( $V_a = 10\text{kV}$ , $V_g = +400\text{V}$ ) . . . . .	0	6.0	A

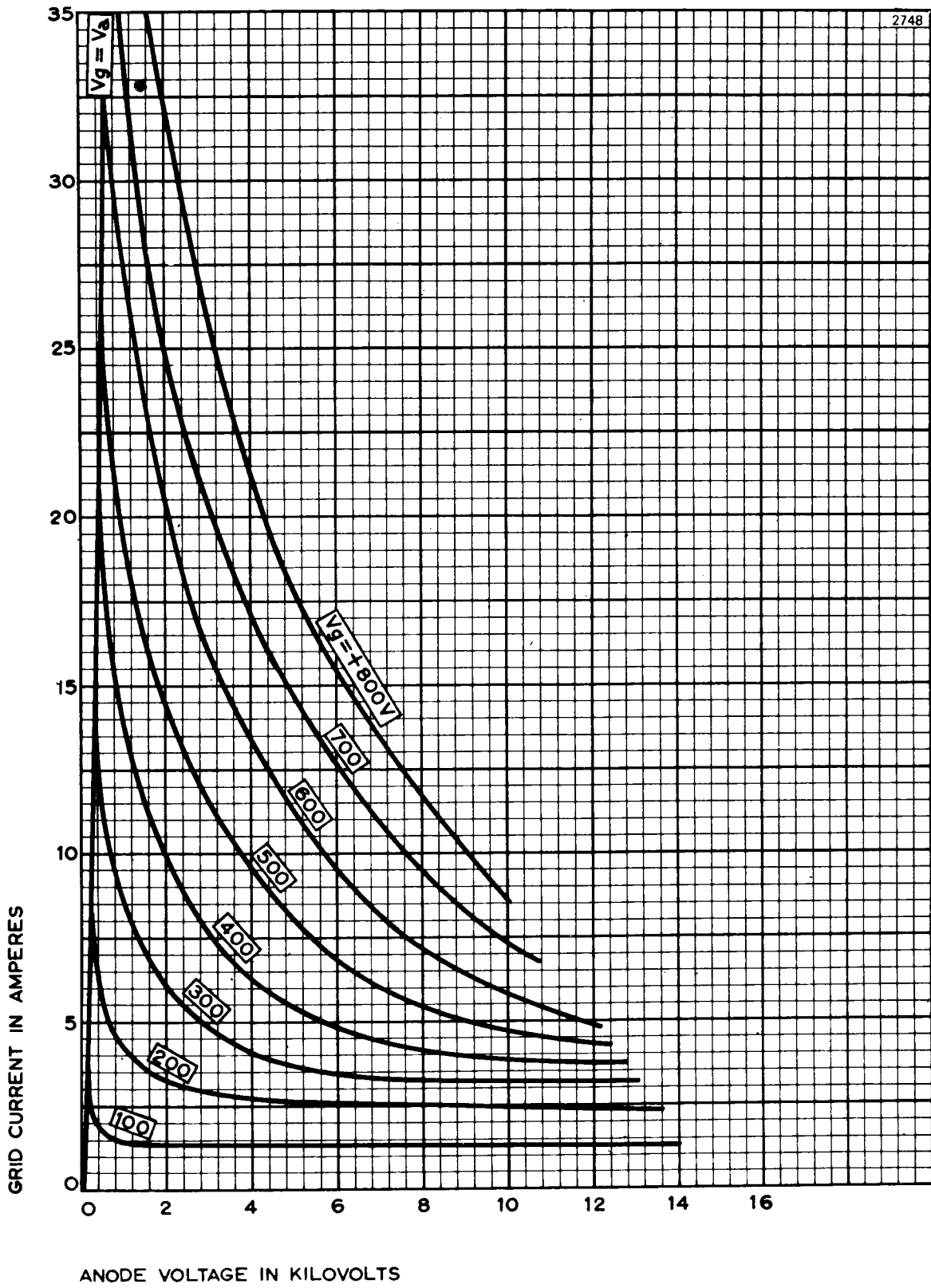
### NOTES

1. The filament comprises two separate sections and these should be operated in phase quadrature. Each section is connected across diametrically opposite filament pins.
2. The valve must be operated at the stated filament voltage. Fluctuation in filament voltage must not exceed  $\pm 5\%$ .
3. The filament current must not exceed 700A per section, even momentarily, at any time.
4. The maximum anode voltage for class C anode modulated operation (100% modulation) is 12kV.
5. The maximum anode dissipation for class C anode modulated operation is 67kW for BW1144 and 83kW for BY1144, BY1144L. These values correspond to 100kW and 125kW respectively at 100% sine wave modulation.

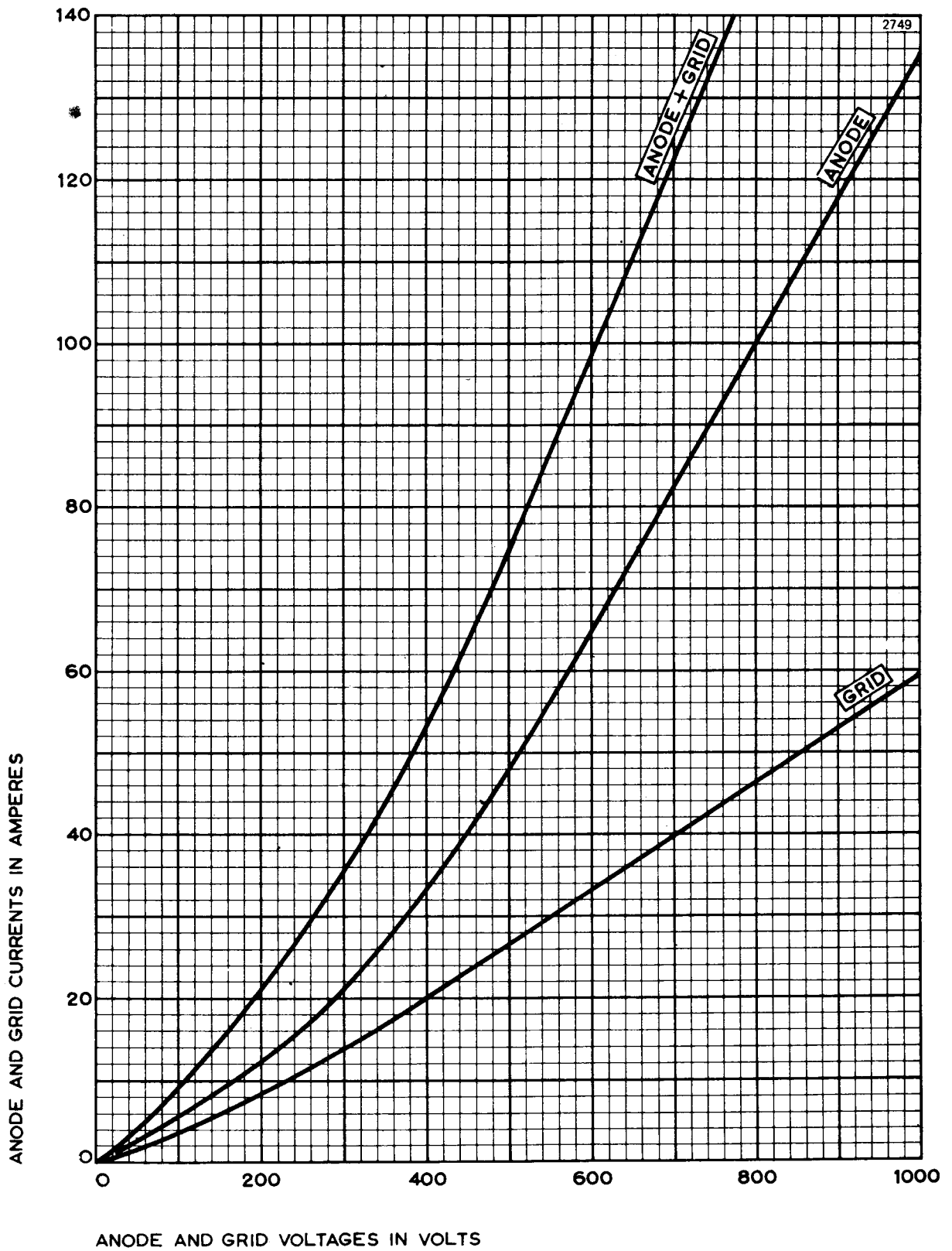
# TYPICAL ANODE CHARACTERISTICS



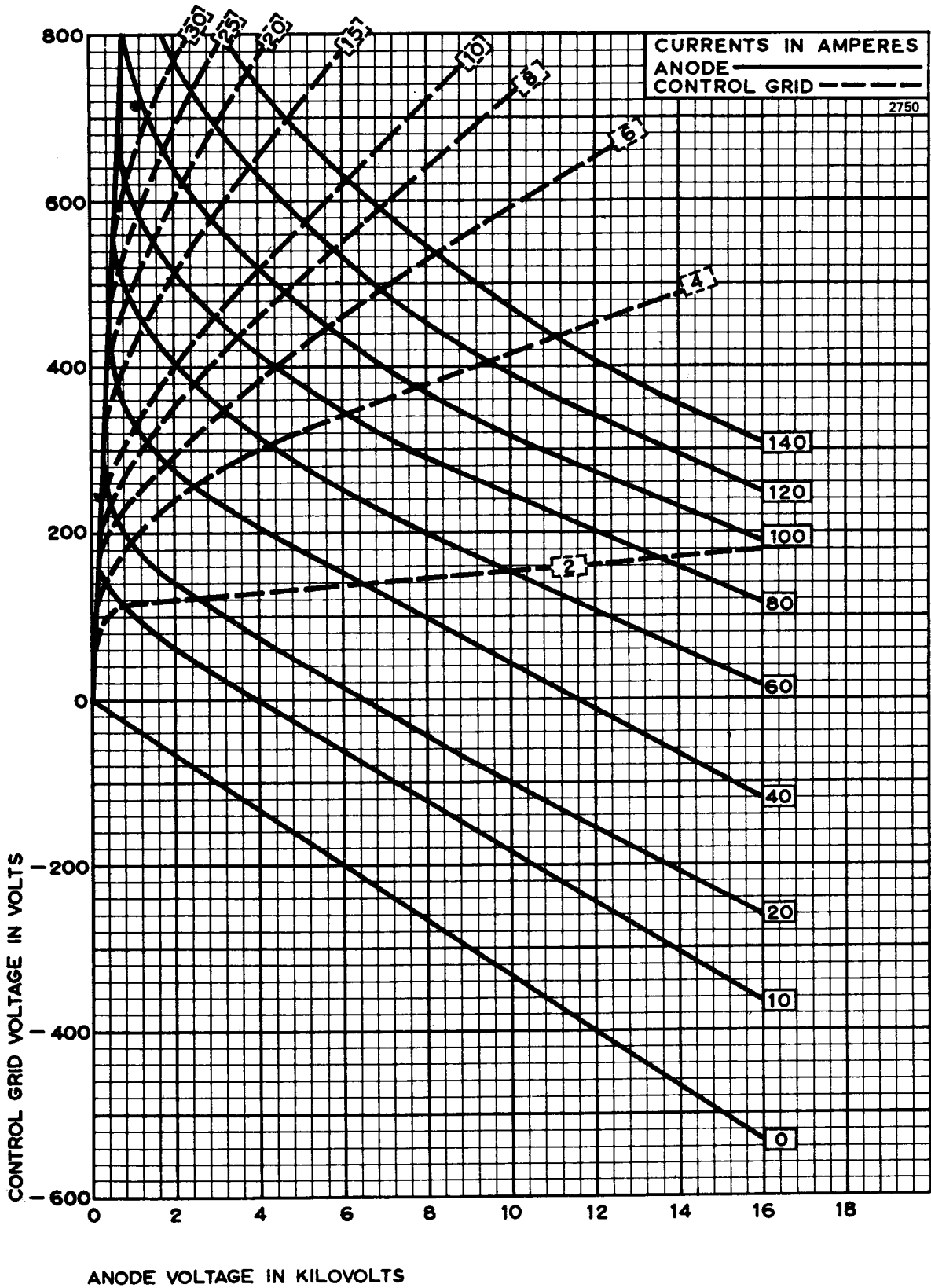
# TYPICAL GRID CHARACTERISTICS



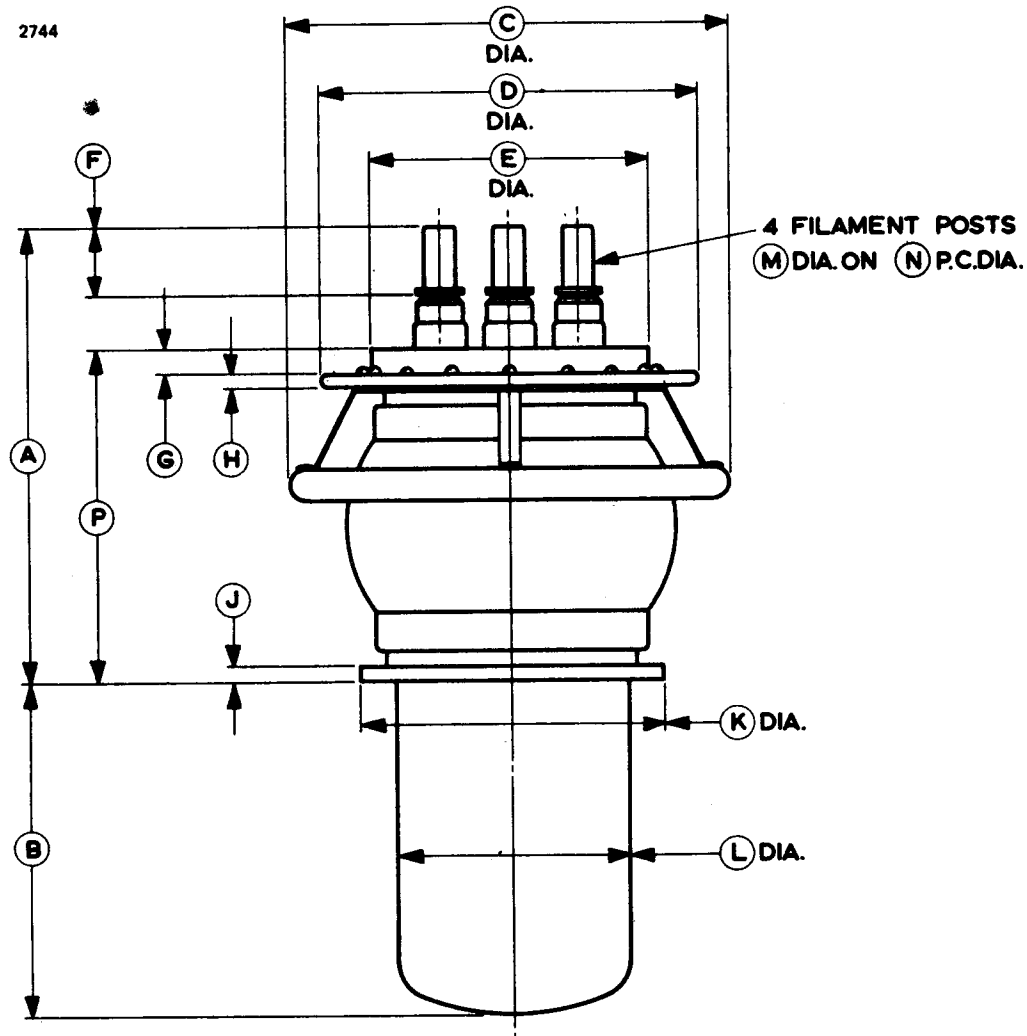
# TYPICAL STRAPPED CHARACTERISTICS



# TYPICAL CONSTANT CURRENT CHARACTERISTICS



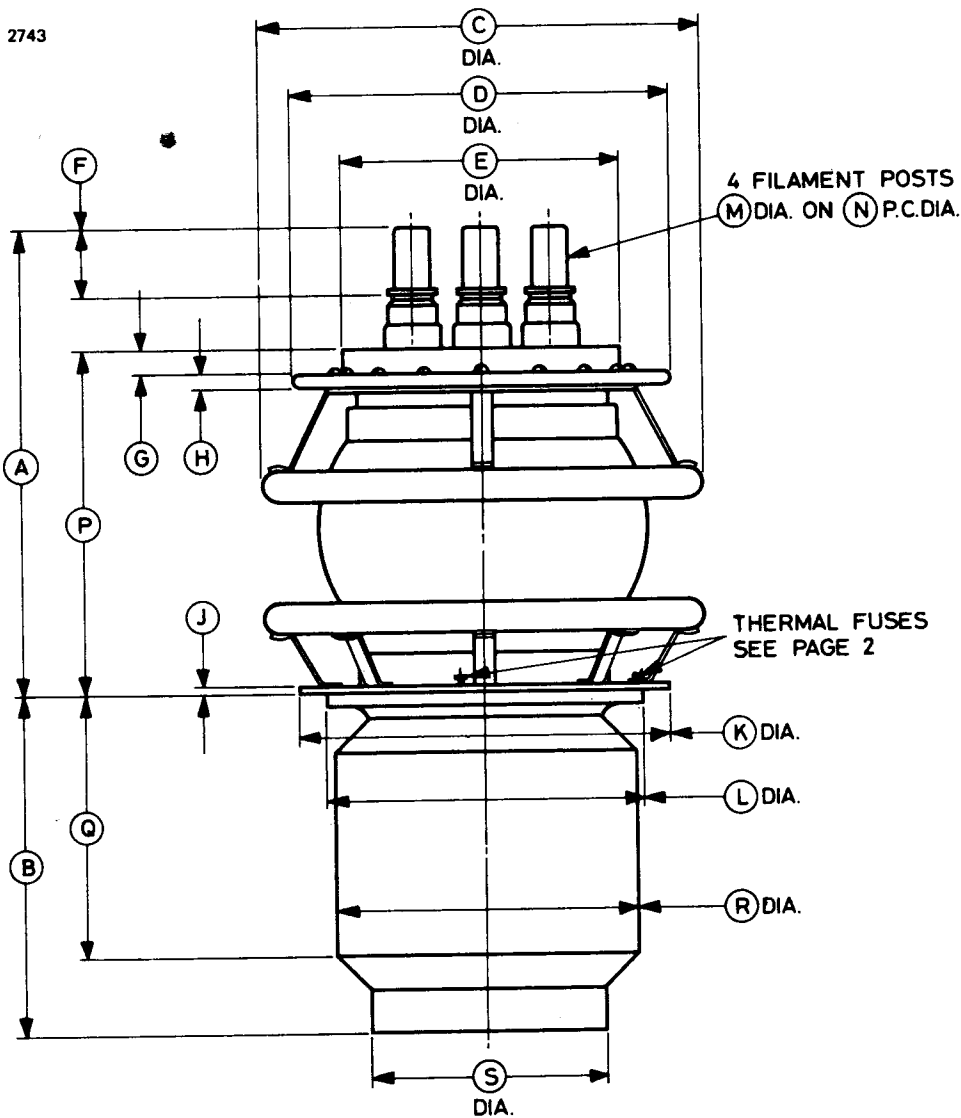
**OUTLINE FOR BW1144 (All dimensions without limits are nominal)**



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 BY1144 (All dimensions without limits are nominal)**

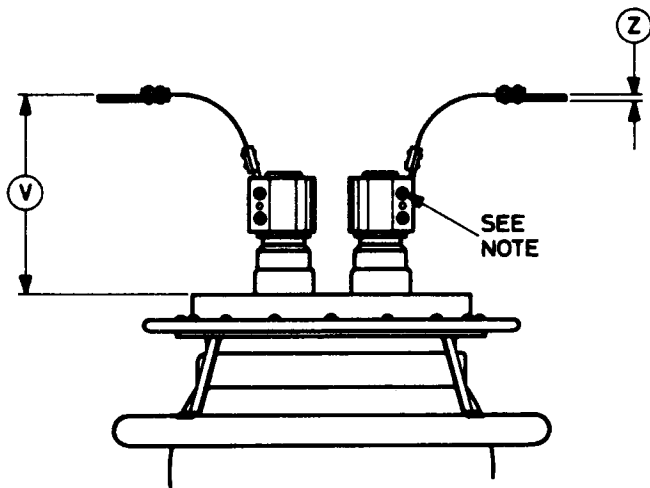
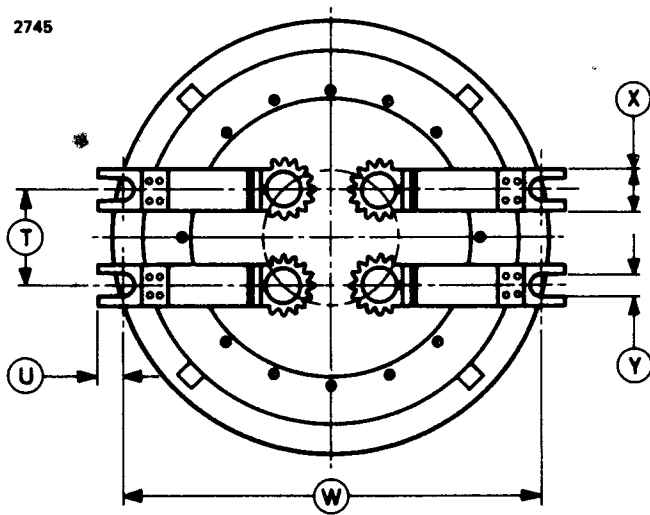


Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	13.800 max	350.5 max	K	$10.875 \pm 0.031$	$276.2 \pm 0.8$
B	10.187 max	258.8 max	L	$9.312 \pm 0.015$	$236.5 \pm 0.4$
C	13.062 max	331.8 max	M	0.875	22.23
D	$11.125 \pm 0.062$	$282.6 \pm 1.6$	N	4.000	101.6
E	$8.086 \pm 0.031$	$205.4 \pm 0.8$	P	$10.217 \pm 0.250$	$259.5 \pm 6.4$
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	$0.375 \pm 0.031$	$9.53 \pm 0.79$	S	6.875	174.6
J	$0.250 \pm 0.031$	$6.35 \pm 0.79$			

Millimetre dimensions have been derived from inches.

**OUTLINE FOR BY1144L (All dimensions without limits are nominal)**

2745



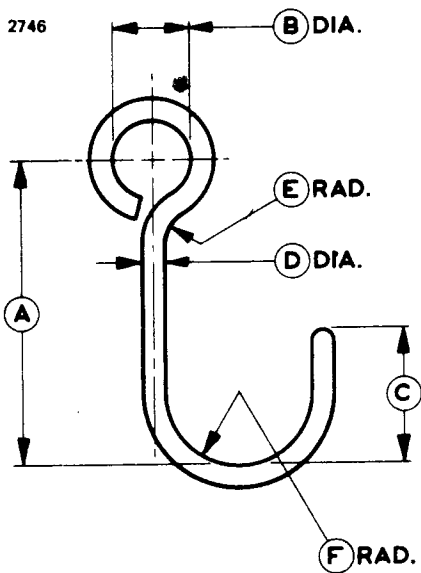
Ref	Millimetres	Inches	Ref	Millimetres	Inches
T*	71.83	2.828	X	31.5 ± 0.5	1.240 ± 0.020
U*	19.05	0.750	Y	14.5 ± 0.2	0.567 ± 0.008
V*	138.0	5.437	Z	3.15	0.124
W	297.0	11.687			

Inch dimensions have been derived from millimetres except where indicated thus \*.

**Note** Two hexagon socket cap head screws 10–32UNF.

**All other dimensions identical with BY1144.**

# LIFTING HOOK (See page 3)



Ref	Inches	Millimetres
A	2 <sup>1</sup> / <sub>4</sub>	57.2
B	9 <sup>1</sup> / <sub>16</sub>	14.3
C	1	25.4
D	3 <sup>1</sup> / <sub>16</sub>	4.8
E	1 <sup>1</sup> / <sub>4</sub>	6.4
F	17 <sup>1</sup> / <sub>32</sub>	13.5

Millimetre dimensions have been derived from inches.