



S-BAND MAGNETRON

Service Types CV2362 to CV2368

The data should be read in conjunction with the Magnetron Preamble.

ABRIDGED DATA

Fixed frequency pulse magnetron

Frequency range (in seven bands)	2750 to 2855	MHz
Typical peak output power	1.15	MW
Magnet		separate
Output		no. 10 waveguide (2.840 x 1.340 inches internal)
Coupler		see pages 7 and 8
Cooling		water



GENERAL

Electrical

Cathode		indirectly heated
Heater voltage (see note 1)	8.5	V
Heater current	9.0	A
Heater starting current, peak value, not to be exceeded	50	A max
Cathode heating time (minimum)	3	minutes

Mechanical

Overall dimensions	17.32 x 6.00 x 6.00 inches max 441 x 153 x 153mm max
Net weight	12 pounds (5.5kg) approx
Mounting position	any

Cooling water

The water cooling system is connected to the valve via ¼-inch B.S.P. unions. The water flow must exceed 1 litre/minute with a maximum outlet temperature of 90°C. A 5-foot head of water will be adequate to ensure the flow.

MAXIMUM AND MINIMUM RATINGS (Absolute values)

These ratings cannot necessarily be used simultaneously, and no individual rating should be exceeded.

	Min	Max	
Heater voltage (see note 1)	7.65	9.35	V
Heater starting current (peak)	—	50	A
Anode voltage (peak)	—	40	kV
Anode current (peak)	—	80	A
Input power (peak)		3.0	MW
Input power (mean) (see note 2)	—	4.5	kW
Duty cycle	—	0.00125	
Pulse length	—	1.25	μ s
Rate of rise of voltage pulse (see note 4)	100	200	kV/ μ s
Anode temperature	—	90	$^{\circ}$ C
Cathode terminal temperature	—	150	$^{\circ}$ C
V.S.W.R. at the output coupler	—	1.5:1	

TYPICAL OPERATION

Operational Conditions

Heater voltage	6.0	V
Magnetic field (see note 5)	1800	gauss
Anode current (peak)	70	A
Pulse length	1.0	μ s
Pulse repetition rate	1000	p.p.s.

Typical Performance

Anode voltage (peak)	36	kV
Output power (peak)	1.15	MW
Output power (mean)	1.15	kW

X-RAY WARNING

High voltage magnetrons emit a significant intensity of X-rays not only from the cathode sidearm but also from the output waveguide. These rays can constitute a health hazard unless adequate shielding for X-ray radiation is provided. This is a characteristic of all magnetrons and the X-rays emitted correspond to a voltage much higher than that of the anode.

TEST CONDITIONS AND LIMITS

The valve is tested to comply with the following electrical specification

Test Conditions

	Oscillation		
	1	2	
Magnetic field (see note 5)	1800	1800	gauss
Heater voltage (for test)	6.0	6.0	V
Anode current (peak)	70	70	A
Duty cycle	0.00125	0.00125	
Pulse length (see note 3)	1.25	1.25	μ s
V.S.W.R. at the output coupler	1.1:1	1.5:1	
Rate of rise of voltage pulse	150	150	kV/ μ s

Limits

	Min		Max		
Anode voltage (peak)	34	38	—	—	kV
Efficiency	40	—	—	—	%
Frequency:					
CV2362	2750	2765	—	—	MHz
CV2363	2765	2780	—	—	MHz
CV2364	2780	2795	—	—	MHz
CV2365	2795	2810	—	—	MHz
CV2366	2810	2825	—	—	MHz
CV2367	2825	2840	—	—	MHz
CV2368	2840	2855	—	—	MHz
R.F. bandwidth at ¼ power	—	—	—	2.5	MHz
Frequency pulling	—	—	—	7.0	MHz
Stability (see note 6)	—	—	—	0.5	%
Heater current					see note 7
Temperature coefficient of frequency					see note 8

LIFE TEST

The quality of all production is monitored by the random selection of valves which are then life-tested under Oscillation 1 conditions above. If the valve is to be operated under conditions other than those specified herein, English Electric Valve Company Ltd. should be consulted to verify that the life of the valve will not be impaired.

End of Life Criteria (under Test Conditions Oscillation 1)

Efficiency	35	% min
R.F. bandwidth at ¼ power	2.5	MHz max
Stability (see note 6)	1.0	% max

NOTES

1. With no anode input power.

During high voltage operation it is essential to operate the heater in accordance with the following schedule.

Mean Input Power (kW)	Heater Voltage (V)
less than 1.0	8.5
1.0 to 2.5	7.0
2.5 to 3.5	6.0
3.5 to 4.5	4.0

The valve heater shall be protected against arcing by the use of a minimum capacitance of 1000pF shunted across the heater directly at the input terminals; in some cases a capacitance as high as 2 μ F may be necessary depending on the equipment design. For further details see the preamble to this section.

2. The various parameters are related by the following formula:

$$P_i = i_{apk} \times v_{apk} \times D_u$$

where P_i = mean input power in watts

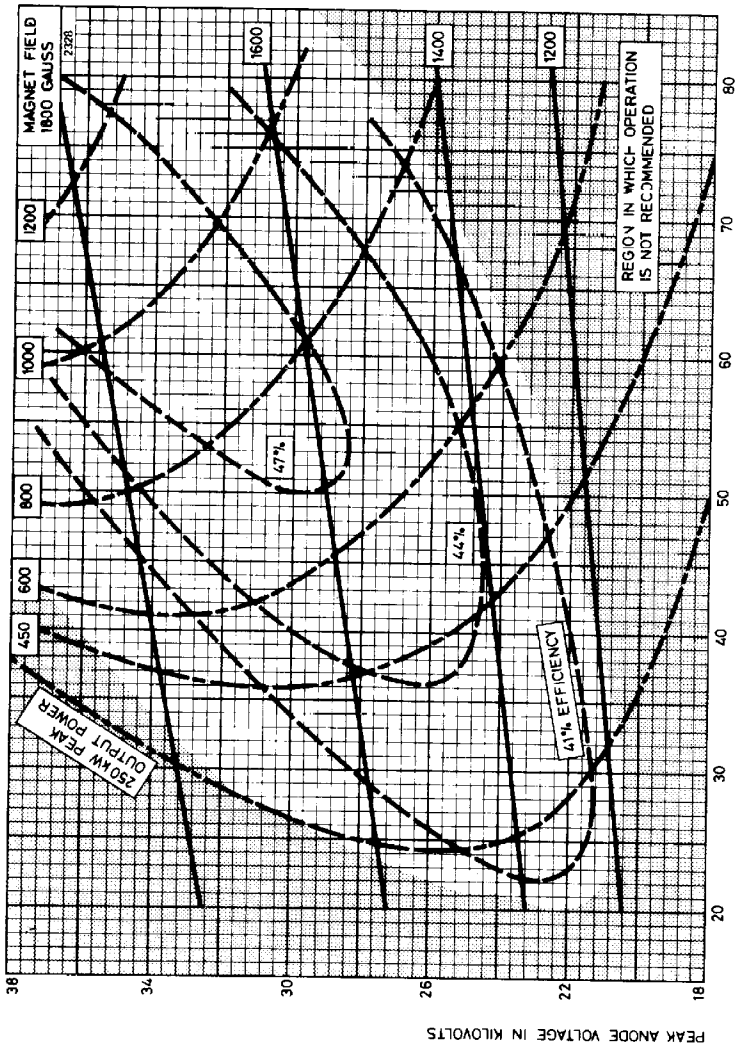
i_{apk} = peak anode current in amperes

v_{apk} = peak anode voltage in volts

and D_u = duty cycle.

3. Tolerance $\pm 10\%$.
4. The rate of rise of voltage is the slope of the steepest tangent to the leading edge of the voltage pulse above 80% amplitude. Any capacitance used in the viewing system must not exceed 6.0pF.
5. The variation of magnetic field within a cylinder 1½ inches (38.10mm) diameter and 1.125 inch (28.58mm) long, situated centrally and co-axially between the poles of the magnet should not exceed 10% overall. The position of the magnet must be adjusted so that the axis of the field is in line with the axis of the anode. The north pole of the magnet must be adjacent to the cathode terminal. The user is invited to consult English Electric Valve Company Ltd. on the choice of magnets.
6. With the valve operating into a mismatch of v.s.w.r. 1.5:1, phased to give maximum instability. Pulses are defined as missing when the r.f. energy level is less than 70% of the normal energy level in the rated frequency range of the valve. Missing pulses are expressed as a percentage of the number of input pulses over an interval of 60 seconds.
7. Measured with heater voltage of 8.5V and no anode input power, the heater current limits are 8.0A minimum, 10A maximum.
8. Design test only. The maximum frequency change with anode temperature change (after warm-up) is $-0.07\text{MHz}/^\circ\text{C}$.

TYPICAL PERFORMANCE CHART

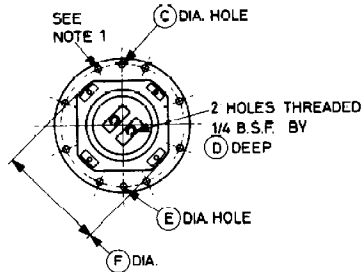


PEAK ANODE CURRENT IN AMPERES

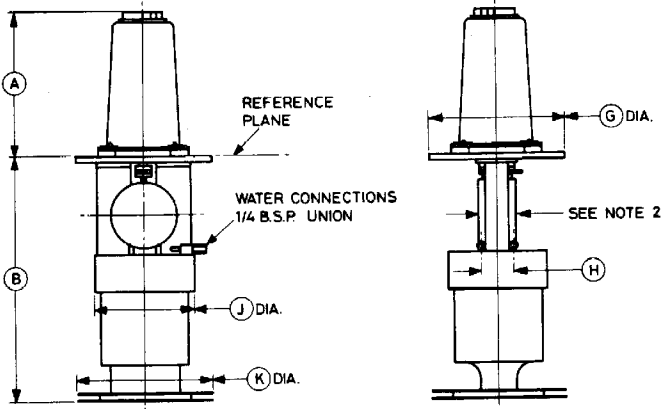
OUTLINE

Ref	Inches	Millimetres
A	6.375 ± 0.035	161.93 ± 0.89
B	10.875 ± 0.032	276.23 ± 0.81
C	$0.312 \begin{matrix} +0.003 \\ -0.000 \end{matrix}$	$7.925 \begin{matrix} +0.076 \\ -0.000 \end{matrix}$
D	0.250	6.35
E	$0.250 \begin{matrix} +0.003 \\ -0.000 \end{matrix}$	$6.350 \begin{matrix} +0.076 \\ -0.000 \end{matrix}$
F	4.750 max	120.7 max
G	$6.000 \begin{matrix} +0.000 \\ -0.010 \end{matrix}$	$152.4 \begin{matrix} +0.00 \\ -0.25 \end{matrix}$
H	1.375 ± 0.032	34.93 ± 0.81
J	4.406 ± 0.015	111.9 ± 0.38
K	5.875 ± 0.016	149.23 ± 0.38

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Millimetre dimensions have been derived from inches.

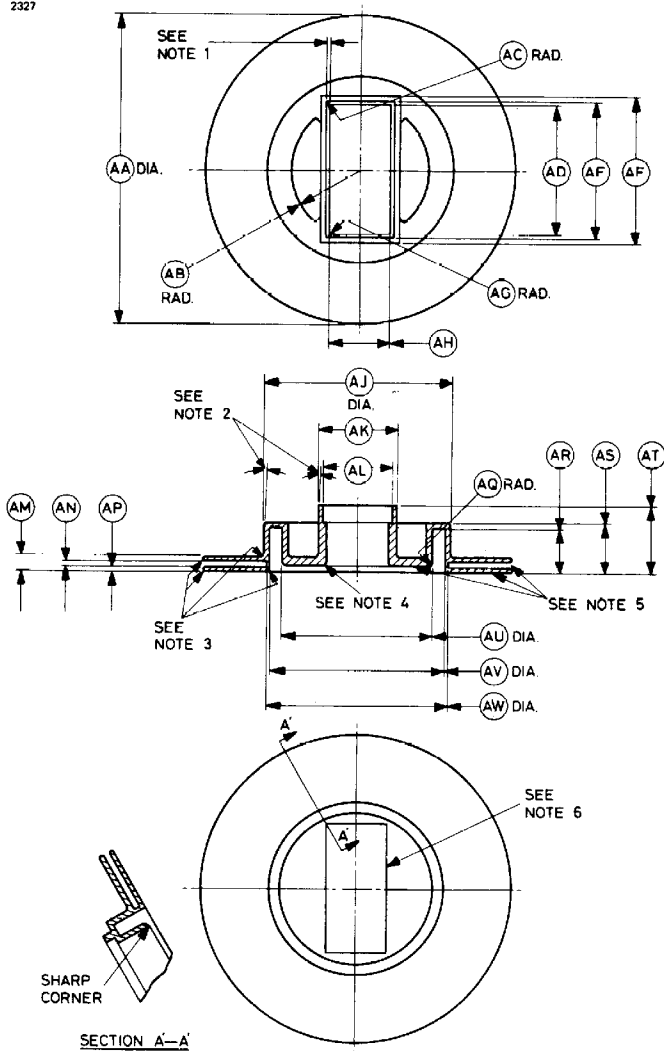


Outline Notes

1. Holes to clear 8 studs 0.250 inch (6.35mm) diameter equally spaced on 5.500 inch (139.7mm) P.C.D. and within 0.005 inch (0.13mm) of nominal position with the valve located by dowel pins 0.307 inch (7.80mm) diameter and 0.245 inch (6.22mm) diameter spaced 5.500 ± 0.002 inch (139.700 ± 0.051 mm) apart.
2. The valve is to fit between magnet poles 3.010 inch (76.45mm) diameter and 2.125 inch (53.98mm) apart, located symmetrically with respect to dowel holes in the mounting flange and 2.500 inch (63.5mm) from the reference plane.

COUPLER

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See page 8 for dimensions and notes.

Dimensions for Coupler (All dimensions without limits are nominal)

Ref	Inches	Millimetres	Ref	Inches	Millimetres
AA	5.875	149.2	AM	0.375	9.53
AB	1.500	38.10	AN	0.125	3.18
AC	0.050 max	1.27 max	AP	0.125	3.18
AD	2.840 ± 0.003	72.136 ± 0.076	AQ	0.090	2.29
AE	3.005 + 0.005 - 0.000	76.327 + 0.127 - 0.000	AR	0.980 ± 0.005	24.89 ± 0.13
AF	3.250	82.55	AS	1.125	28.58
AG	0.025 max	0.64 max	AT	1.500	38.10
AH	1.340 ± 0.003	34.036 ± 0.076	AU	3.320 ± 0.005	84.33 ± 0.13
AJ	4.125	104.8	AV	3.880 ± 0.005	98.55 ± 0.13
AK	1.750	44.45	AW	4.000	101.6
AL	1.505 + 0.005 - 0.000	38.227 + 0.127 - 0.000			

Millimetre dimensions have been derived from inches.

Notes for Coupler

1. These faces parallel to within 25'.
2. Maximum draft angle 2°.
3. Radius on these corners 0.031 inch (0.79mm).
4. On all four sides 0.125 inch (3.2mm) radius at centre fairs to give a sharp corner as shown in section A' - A'; length of fairing not to exceed 0.125 inch (3.2mm).
5. These faces to be flat, smooth, free from machining marks and square with rectangular bore.
6. Rectangular bore to be within 0.003 inch (0.076mm) of nominal position.