Osram
VALVES
MADE IN ENGLAND

DET22 U.H.F. TRIODE

DESCRIPTION

Type DET 22 is an indirectly heated disc seal triode (without internal feedback) intended mainly as a common grid, earthed anode, concentric line oscillator. It may also be used as a power amplifier.

When used in a co-axial line circuit with an anode input of 10 watts, the output power is approximately 0.5 watts at 10 cms. rising to 3 watts at 30 cms.

The lower limit of operating wavelength is 8—8.5 cms.

RATINGS

Heater Voltage	6.3	
Heater Current	0.4	amps.
Anode Voltage	350	max
Anode Dissipation	10	watts max.
Mean Anode Current	40	mA. max.
Peak Anode Current	150	mA. max.
Amplification Factor	30	approx.
Mutual Conductance measured at Va=250 ; Ia=20 mA.	6.0	mA./volt
Anode Seal Temperature	140	°C. max.

Capacitances :

Grid to Cathode	2.2	pF approx.
Anode to Grid	1.1	,, ,,
Anode to Cathode	0.02	,, ,,

PRECAUTIONS IN USE

In order to limit the anode seal temperature, and also to limit the rate of change of anode seal temperature, it is necessary for the mass of metal in close thermal contact with the anode disc to be not less than 2 ozs. (approx. 60 gms.) of brass or its equivalent.

DIMENSIONS

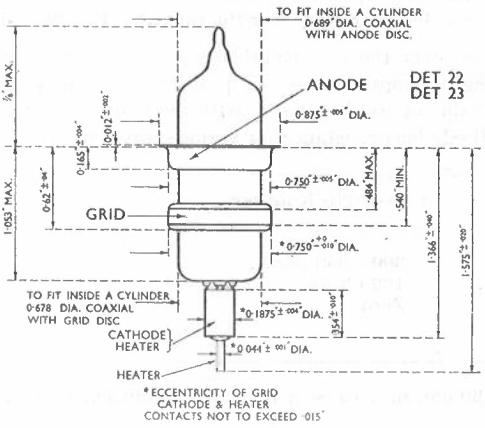

Fig. 1

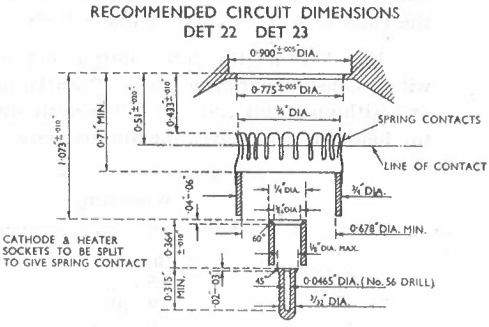

Fig. 2

TYPE DET22

CIRCUIT DESIGN

A typical circuit arrangement is shown in Fig. 5 where the anode-grid and grid-cathode circuits are both co-axial lines, the grid tube being common to both circuits.

The anode-grid and grid-cathode circuits are both tuned by means of movable bridges, and it is essential that good contact be maintained between these bridges and the tubes on which they slide. Ideally these bridges should be one quarter of a wavelength in length, in order that the actual contact may occur at a current node, but over the wavelength range of 10—60 cms. a good compromise is effected with a bridge 2.5 cm. in length. In order that bias may be used, a capacity is incorporated in the grid-cathode bridge.

Feedback is obtained by means of a probe (6 B.A. threaded rod) which makes contact with the anode line and passes through a $\frac{1}{4}$" diameter hole in the grid line. The displacement of the end of the probe from the cathode tube is thus readily adjustable. For wavelengths longer than 30 cms. it is desirable to terminate the probe by a small circular plate, but for wavelengths below 30 cms. the plate may be dispensed with, and for wavelengths around 10 cms. the increased capacity prohibits its use.

The output may be taken from the oscillator into a 75 ohm. cable by means of a capacity probe, as indicated in Fig. 5. The coupling can be adjusted to optimum by sliding the probe along the line or by varying the depth of penetration towards the grid line.

The complete range of oscillation between the lower wavelength limit (determined by the valve or the circuit) and the upper wavelength limit (determined by the circuit) is not possible with a single probe position. A complete range of oscillation can be obtained with three probe positions, and for a typical circuit and the probe positions marked " A," " B " and " C " in Fig. 5 the range of wavelengths that was obtained is given in the following table :—

Probe Position.	Distance from Anode Plane	Range of λ with Anode Line on $\frac{3\lambda}{4}$ mode.	Min. λ with Anode Line on $\lambda/4$ mode.
A	28.5 mm.	9—14 cm.	24 cm.
B	43.5 mm.	11—19 cm.	29 cm.
C	58.5 mm.	12—24 cm.	35 cm.

The heater-cathode circuit may be tuned by means of a capacity bridge. The tuning is not critical for the longer wavelengths, but it is necessary for wavelengths around 10 cms., and must be used if maximum efficiency is required. However, a bridge fixed 7.2 cms. from the valve end of the cathode line will give reasonable operation over the range 8—12 cms.

Fig. 4 shows the power output obtainable over the wavelength range of 10—35 cms., with a constant input power of 10 watts, using the appropriate probe position and coupling, and with optimum grid bias. The optimum value of grid bias varies with the frequency, and the following table gives the approximate cathode bias resistance for various wavelengths.

Wavelength.	Cathode Bias Resistance.
30 cm.	300—350 ohms.
15 cm.	100 ohms.
12 cm. and less	Zero

The use of zero bias at a wavelength of 30 cm. may cause a reduction in efficiency of as much as 50%.

TYPE DET22

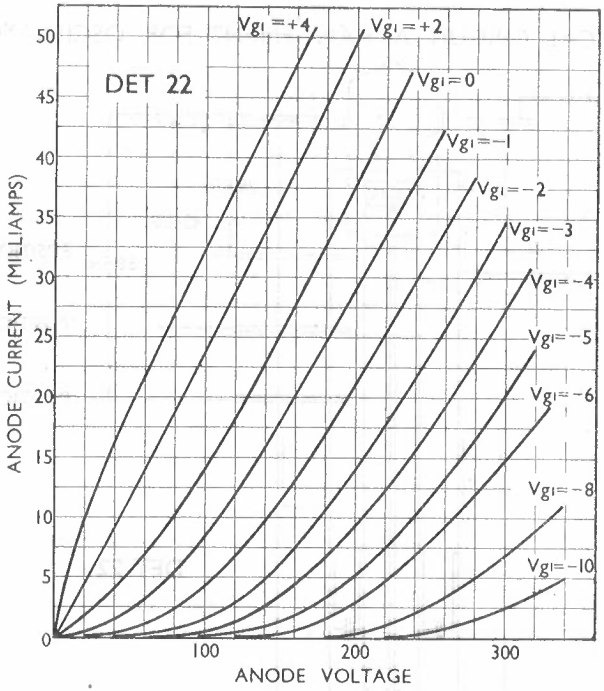

Fig. 3

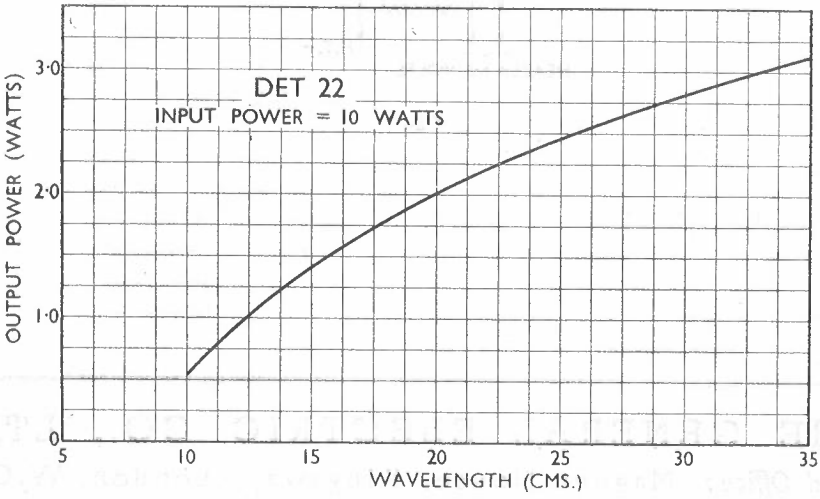

Fig. 4

TYPE DET22

TYPICAL CIRCUIT ARRANGEMENT FOR OSCILLATOR

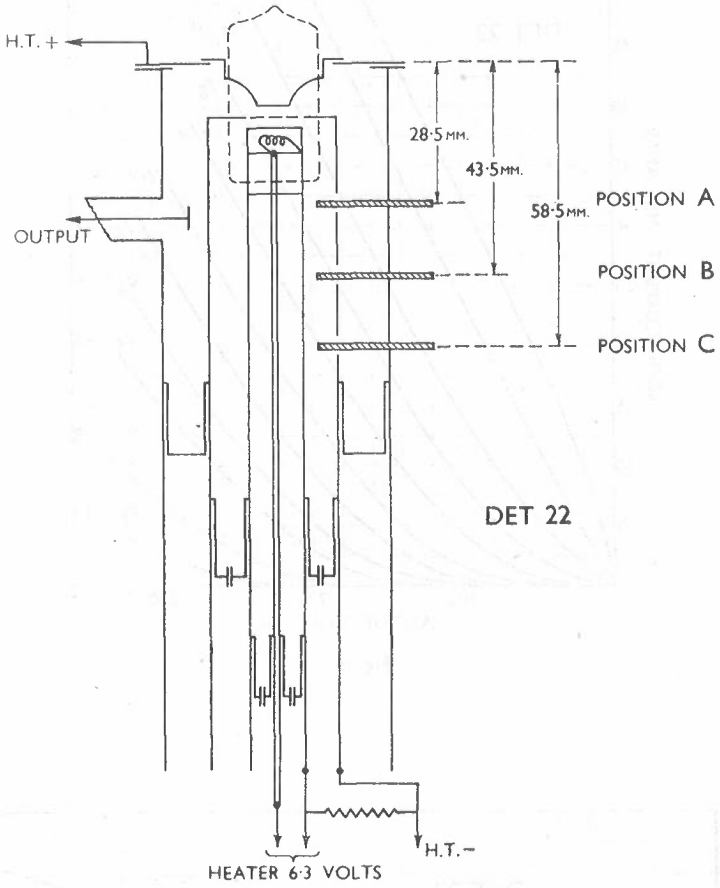

Fig. 5

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