## GENERAL

The 14D12 is a radiation cooled triode with a graphite anode and a directly heated thoriated tungsten filament. It is intended for use in r.f. heating, modulating and transmitting equipment.

## RATINGS*

| | | | |
|---|---|---|---|
| Filament voltage | $V_f$ | 5·0±5% | V |
| Filament current (approx) | $I_f$ | 32·5** | A |
| Maximum anode voltage | $V_{a(max)}$ | 6·0 | kV |
| Maximum d.c. grid voltage | $V_{g(max)}$ | 1000 | V |
| Maximum anode dissipation | $p_{a(max)}$ | 500† | W |
| Maximum grid dissipation | $p_{g(max)}$ | 50 | W |
| Maximum peak cathode current | $i_{k(pk)max}$ | 3·0 | A |
| Maximum operating frequency | $f_{max}$ | 60 | Mc/s |
| Maximum bulb temperature | $T_{bulb(max)}$ | 250 | °C |
| Maximum seal temperature | $T_{seal(max)}$ | 200 | °C |

* Limiting values are absolute maximum values.

** The filament is suitable for direct switching.

† At this dissipation the anode runs bright red at approximately 870°C (Pyrometer reading).

## INTER-ELECTRODE CAPACITANCES

| | | | |
|---|---|---|---|
| Anode/grid | $c_{a-g}$ | 6·0 | pF |
| Grid/filament | $c_{g-f}$ | 11 | pF |
| Anode/filament | $c_{a-f}$ | 0·4 | pF |

## CHARACTERISTICS

| | | | |
|---|---|---|---|
| Anode voltage | $V_a$ | 4·0 | kV |
| Anode current | $I_a$ | 120 | mA |
| Mutual conductance | $g_m$ | 3·6 | mA/V |
| Amplification factor | $\mu$ | 22 | |
| Valve anode resistance ($\delta v_a/\delta i_a$) | $r_a$ | 6·1 | kΩ |

### Notes

Cooling is by low velocity air blast necessary under all conditions of valve service other than filament dissipation alone.



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**TYPICAL OPERATION**—At maximum operating conditions.
Class C r.f. power amplifier—unmodulated or frequency modulated.

| | | | | | |
|---|---|---|---|---|---|
| D.C. anode voltage | $V_a$ | 4·0 | 5·0 | 6·0 | kV |
| D.C. grid voltage | $V_g$ | 280 | 400 | 500 | V |
| Peak r.f. drive voltage | | 570 | 690 | 790 | V |
| D.C. anode current | $I_a$ | 585 | 530 | 500 | mA |
| D.C. grid current | $I_g$ | 175 | 155 | 145 | mA |
| Driving power | | 90 | 100 | 110 | W |
| Power output | $P_{out}$ | 1·8 | 2·2 | 2·5 | kW |

**TYPICAL OPERATION**—At maximum operating conditions ($f_{max}$ = 60Mc/s)
Class C self oscillator—anode supply d.c. or 3-phase full-wave rectified.

| | | | | | |
|---|---|---|---|---|---|
| D.C. anode voltage | $V_a$ | 4·0 | 5·0 | 6·0 | kV |
| D.C. anode current | $I_a$ | 585 | 530 | 500 | mA |
| D.C. grid current | $I_g$ | 175 | 155 | 145 | mA |
| Grid resistance | $R_g$ | 1·6 | 2·6 | 3·4 | kΩ |
| Power input | $P_{in}$ | 2·3 | 2·6 | 3·0 | kW |
| Power output | $P_{out}$ | 1·7 | 2·0 | 2·4 | kW |
| Power output at 85% transfer efficiency | $P_{out}$ | 1·45 | 1·75 | 2·0 | kW |
| Maximum anode dissipation | $p_{a(max)}$ | 500 | 500 | 500 | W |
| Grid dissipation | $p_g$ | 45 | 40 | 35 | W |

**TYPICAL OPERATION**—At maximum operating conditions ($f_{max}$ = 60 Mc/s)
Class C self oscillator—single-phase full-wave rectified, unsmoothed anode supply.

| | | | |
|---|---|---|---|
| A.C. anode voltage (r.m.s.) | $V_{a(r.m.s.)}$ | 4·25 | kV |
| Mean anode voltage | $V_{a(av)}$ | 3·8 | kV |
| D.C. anode current | $I_a$ | 405 | mA |
| D.C. grid current | $I_g$ | 105 | mA |
| Grid resistance | $R_g$ | 2·0 | kΩ |
| Power input | $P_{in}$ | 1·9 | kW |
| Power output | $P_{out}$ | 1·4 | kW |
| Power output at 85% transfer efficiency | $P_{out}$ | 1·2 | kW |
| Maximum anode dissipation | $p_{a(max)}$ | 500 | W |
| Grid dissipation | $p_g$ | 20 | W |

**TYPICAL OPERATION**—At maximum operating conditions ($f_{max}$ = 60 Mc/s)
Class C self oscillator—with a.c. anode supply.

| | | | |
|---|---|---|---|
| A.C. anode voltage (r.m.s.) | $V_{a(r.m.s.)}$ | 4·25 | kV |
| Mean anode voltage | $V_{a(av)}$ | 1·9 | kV |
| Mean anode current | $I_{a(av)}$ | 290 | mA |
| Mean grid current | $I_{g(av)}$ | 62 | mA |
| Grid resistance | $R_g$ | 325 | Ω |
| Power input | $P_{in}$ | 1·4 | kW |
| Power output | $P_{out}$ | 0·8 | kW |
| Power output at 85% transfer efficiency | $P_{out}$ | 0·7 | kW |
| Maximum anode dissipation | $p_{a(max)}$ | 500 | W |
| Grid dissipation | $p_g$ | 15 | W |

**TYPICAL OPERATION**—At maximum operating conditions per valve.
Class B1 audio amplification—push pull operation.

| | | | |
|---|---|---|---|
| Anode voltage | $V_a$ | 6·0 | kV |
| A.C. anode current (r.m.s.) | $I_{a(r.m.s.)}$ | 0·25 | A |
| Power input | $P_{in}$ | 1·0 | kW |
| Power output | $P_{out}$ | 0·5 | kW |
| Anode dissipation | $p_a$ | 0·5 | kW |
| Anode efficiency | | 50 | % |
| Bias signal | $V_g$ | –220 | V |
| Peak signal voltage | $v_{sig(pk)}$ | 220 | V |

**MOUNTING POSITION**—Vertical, anode upwards.

**TOP CAP**—Anode.

**BASE**—Special.



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## OPERATING INSTRUCTIONS

### Installation

The valve should be mounted vertically with the anode upwards. Connections should always make good electrical contact to prevent overheating pins and seals, particularly by r.f. current.

It is essential that connection be made to both grid pins when running at higher frequencies to reduce current taken by each pin. The valve must be protected against excessive vibration and shock.

### Cooling

Forced air blast is recommended for all conditions of valve service except filament dissipation alone.

An air flow of 50 cu. ft./min. directed vertically upwards on to the grid and filament pins is ample.

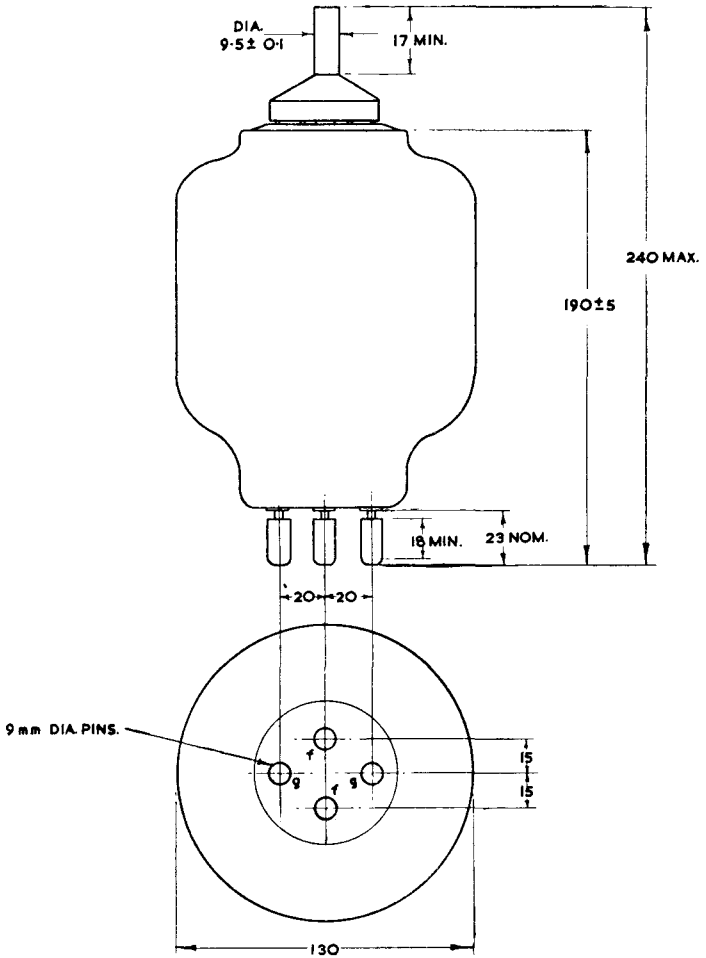
The anode connector should be designed to keep the temperature of the anode seal below the maximum temperature stated.

### Operation

The operating data list conditions for maximum output for respective classes of service at the relevant anode voltage. Linear interpolation between anode voltage steps is admissible. As these conditions utilize some or all of the maximum valve ratings, close control of conditions has to be maintained.

In Class C self oscillator service, precautions should be taken against excessive mains voltage variation. Current overload trips should be included in anode and grid circuits as well as an under current trip in the grid circuit.

In industrial r.f. heating it is not usual that all precautions can be taken, and under these conditions some reductions in operating conditions have to be made so that widely fluctuating loads, poor h.t. regulation, and mains variations can be accommodated. Each type of variation brings its own problems and no set rules are practicable.




All dimensions in millimetres.



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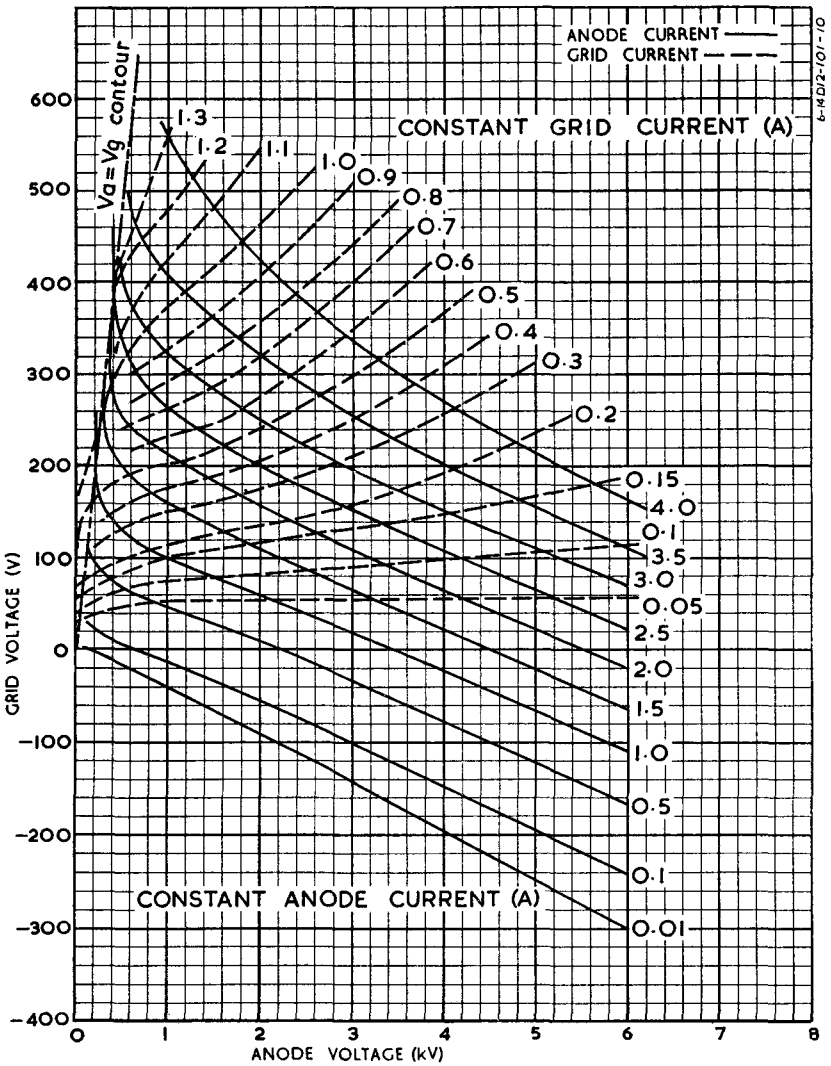
## CONSTANT CURRENT CHARACTERISTICS