Triode *Type CAT 22*

HF POWER AMPLIFIER AND OSCILLATOR

General. A triode with a water cooled anode and fitted with a pure tungsten filament. This valve is suitable for use as a power amplifier or oscillator at frequencies up to 30 Mc/s.

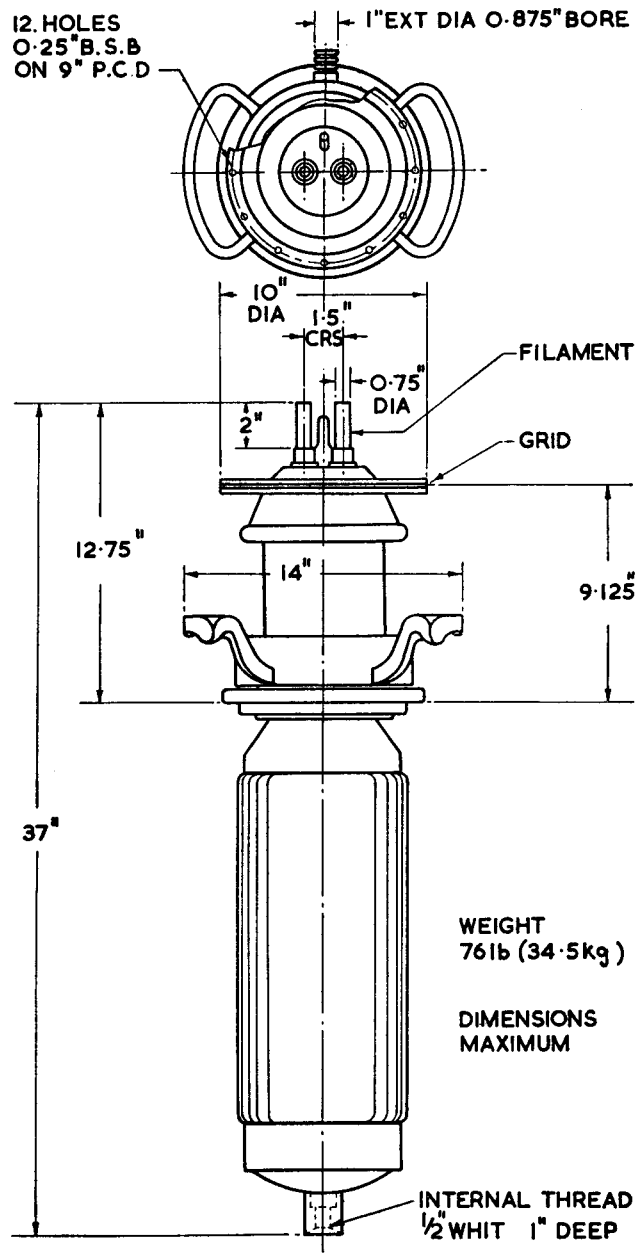
Cooling. The anode forms part of the valve envelope and must be fitted with a specially designed water jacket for cooling by circulating water in direct contact with the anode. The rated flow of water to the anode should not be less than 40 gallons per minute. The temperature of the cooling water must not exceed 150°F (65°C) at the outlet.

The anode and filament seals and filament leads require forced air cooling. The air flow to the seals should be 4 cu. ft. per min. at a pressure of 4 in. water gauge. The air flow to the filament leads should be from a nozzle placed vertically above the filament. The temperature of the leads must not exceed 100°C.

All cooling supplies must be in operation before applying any voltages to the valve and must continue for at least 2 minutes after their removal.

Filament Starting. The cold filament resistance is 0·0057 Ω. The filament current must not exceed 500 A at any time. If the valve is operated for periods of greater than 15 minutes' duration without anode voltage being applied, the filament voltage must be reduced to one-half the normal value during the standby period.

HT Switching. It is not permissible to apply directly an HT voltage in excess of one-third of the maximum rated anode voltage. When the valve is to be operated at a higher voltage the HT should either be gradually increased from a low value, or three-step switching be employed.



MARCONI'S WIRELESS TELEGRAPH COMPANY LIMITED

Head Office: Marconi House, Chelmsford, England. Telephone: Chelmsford 3221. Telegraphic Address: Expanse, Chelmsford

Mounting. The valve must be completely supported by its water jacket, which should be adjustable so that the axis of the valve may be made truly vertical. Rigid connection must be made to the anode only.

Seasoning. Whenever a new valve is put into service or when a valve has been idle for a period of approximately two months, it must be seasoned by operating, for at least one hour, at half the normal anode voltage and current. The anode voltage should then be increased slowly to the normal value.

APPROXIMATE DATA

V_f (nominal)	32·5V	μ	taken at $\frac{1}{2} I_{e\,(pk)}$	45
I_f	460 A	g_m		50 mA/V
V_a	20 kV	r_a		900 Ω
p_a	150 kW	$c_{g1\text{-}k}$	taken without water jacket	100 pF
p_{g1}	8 kW	$c_{a\text{-}k}$		4·5 pF
$I_{g1(rf)}$	100 A	$c_{g1\text{-}a}$		52 pF

Each valve is marked with V_f to give 100A emission $I_{e\,(pk)}$ at 90% saturation.

(1) RF POWER AMPLIFIER AND OSCILLATOR. CLASS C TELEGRAPHY

(One valve, unmodulated conditions)

Maximum permissible ratings

V_a	20	kV
V_{g1}	–2	kV
I_a	20	A
p_a	150	kW
p_{g1}	8	kW

Typical Operation

V_a		15	18	20	kV
V_{g1}		–950	–1030	–1070	V
$v_{g1(pk)}$		2650	2730	2770	V
I_a		18·8	18·8	18·8	A
I_{g1}	(a)	4·3	4·3	4·2	A
Z_a		400	490	550	Ω
P_{dr}	(a)	11·5	11·6	11·6	kW
p_a		74	80	104	kW
P_{out}		209	258	272	kW

(2) RF POWER AMPLIFIER. CLASS C

Anode modulated. (One valve, carrier conditions)

Maximum permissible ratings

V_a	15	kV
V_{g1}	–2	kV
I_a	10	A
p_a	100	kW
p_{g1}	8	kW
$\%_{mod}$	100 %	

Typical Operation

V_a		10	15	kV
V_{g1}		–900	–1100	V
$v_{g1(pk)}$		1850	2050	V
I_a		9·6	9·8	A
I_{g1}	(a)	1·9	1·8	A
Z_a		435	715	Ω
P_{dr}		3·5	3·8	kW
p_a		32	39	kW
P_{out}		64	108	kW

(3) RF POWER AMPLIFIER. CLASS B TELEPHONY

(One valve, carrier conditions)

Maximum permissible ratings

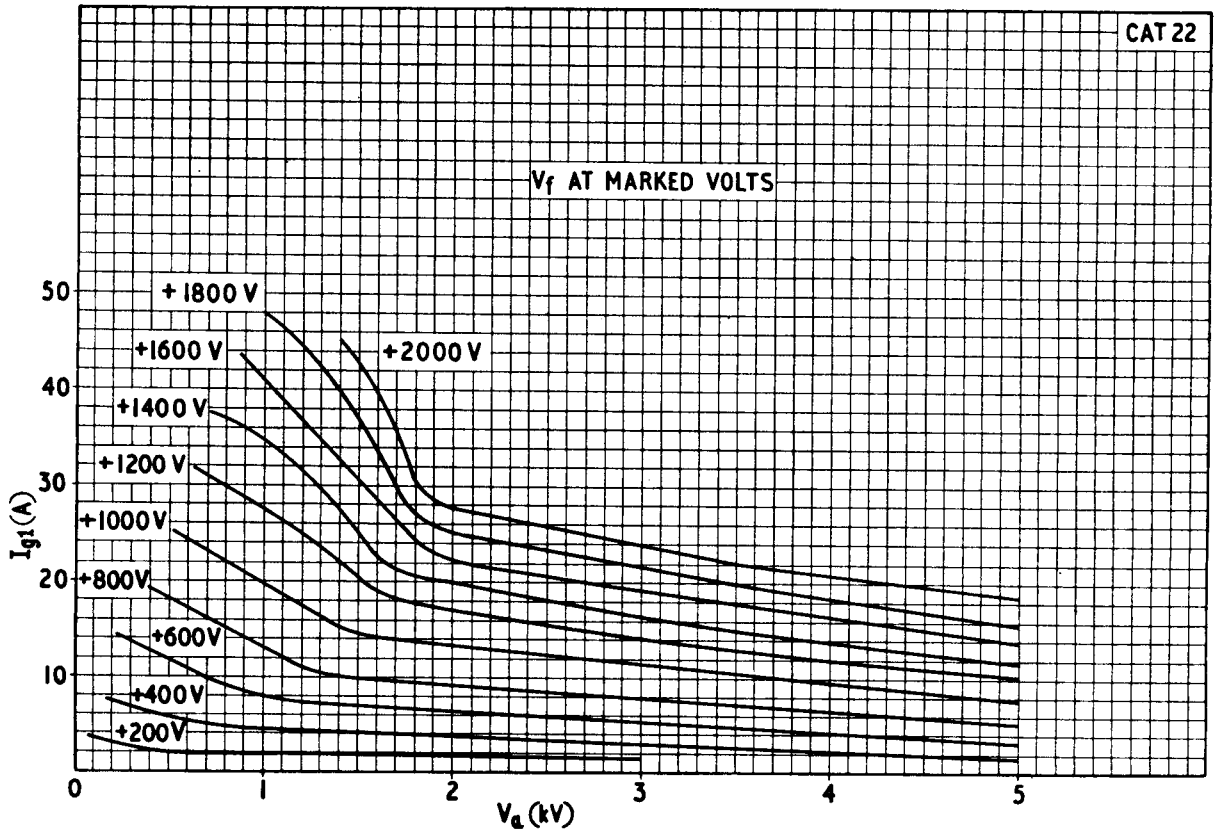
V_a	20	kV
V_{g1}	–1000	V
I_a	12	A
p_a	150	kW
$\%_{mod}$	100 %	

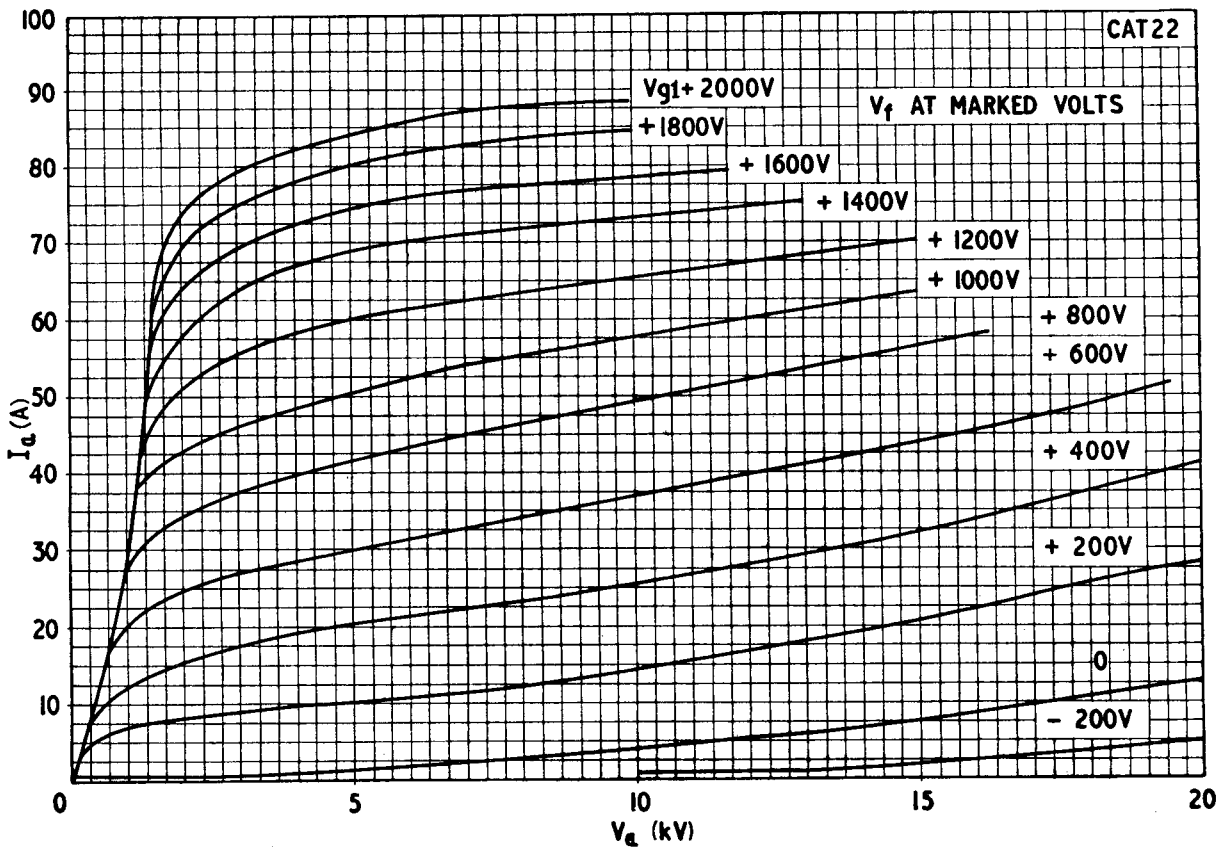
Typical Operation

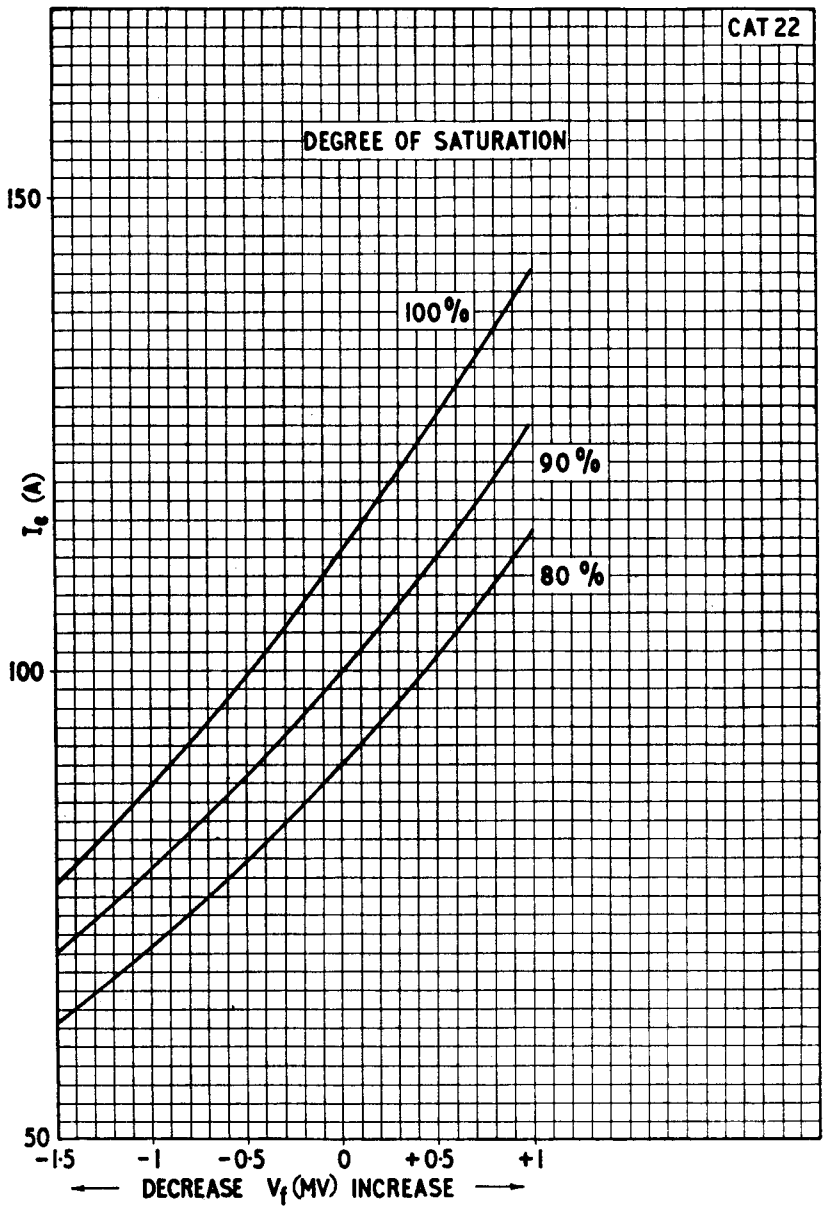
V_a			15	20	kV
V_{g1}			–330	–440	V
$v_{g1(pk)}$			900	940	V
I_a			10·6	10·6	A
Z_a			330	480	Ω
P_{dr}	(a)	(b)	5·4	5·6	kW
p_a			114	146	kW
P_{out}			46	67	kW

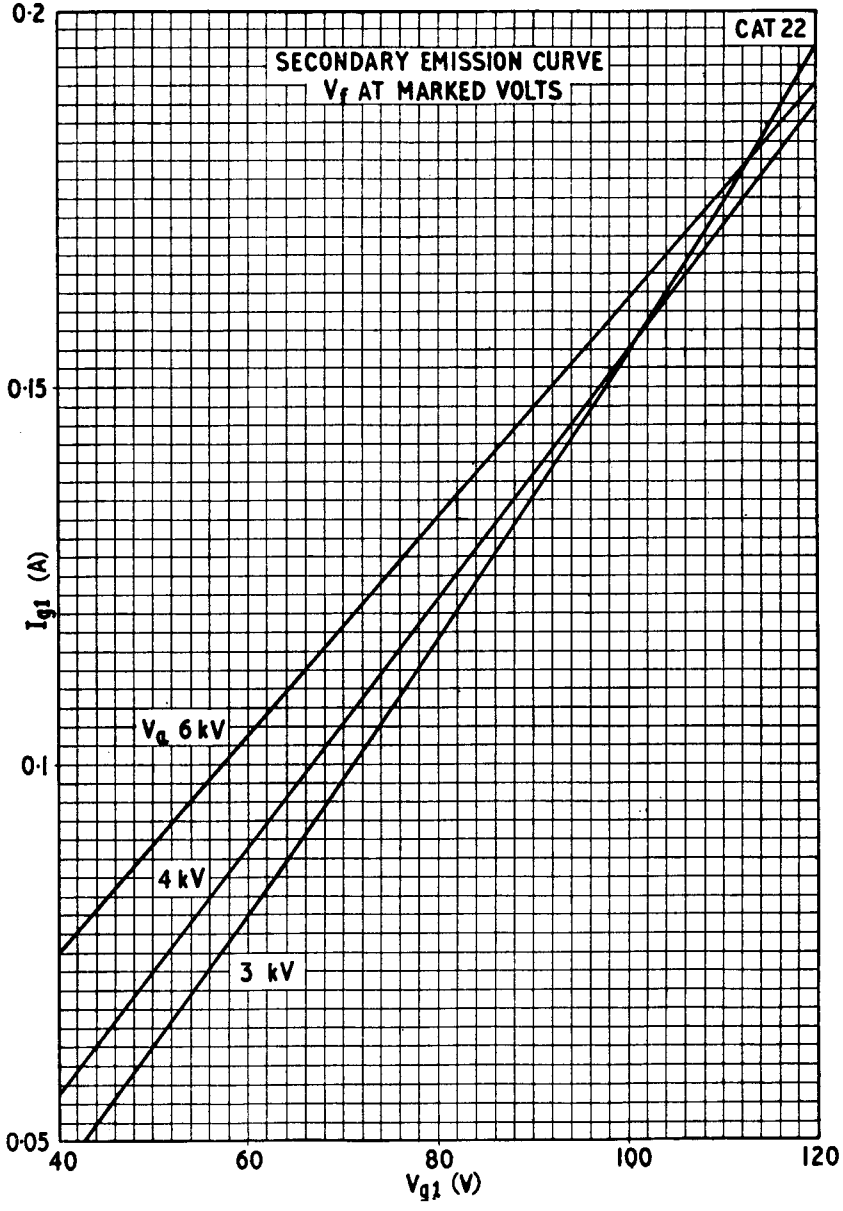
NOTES

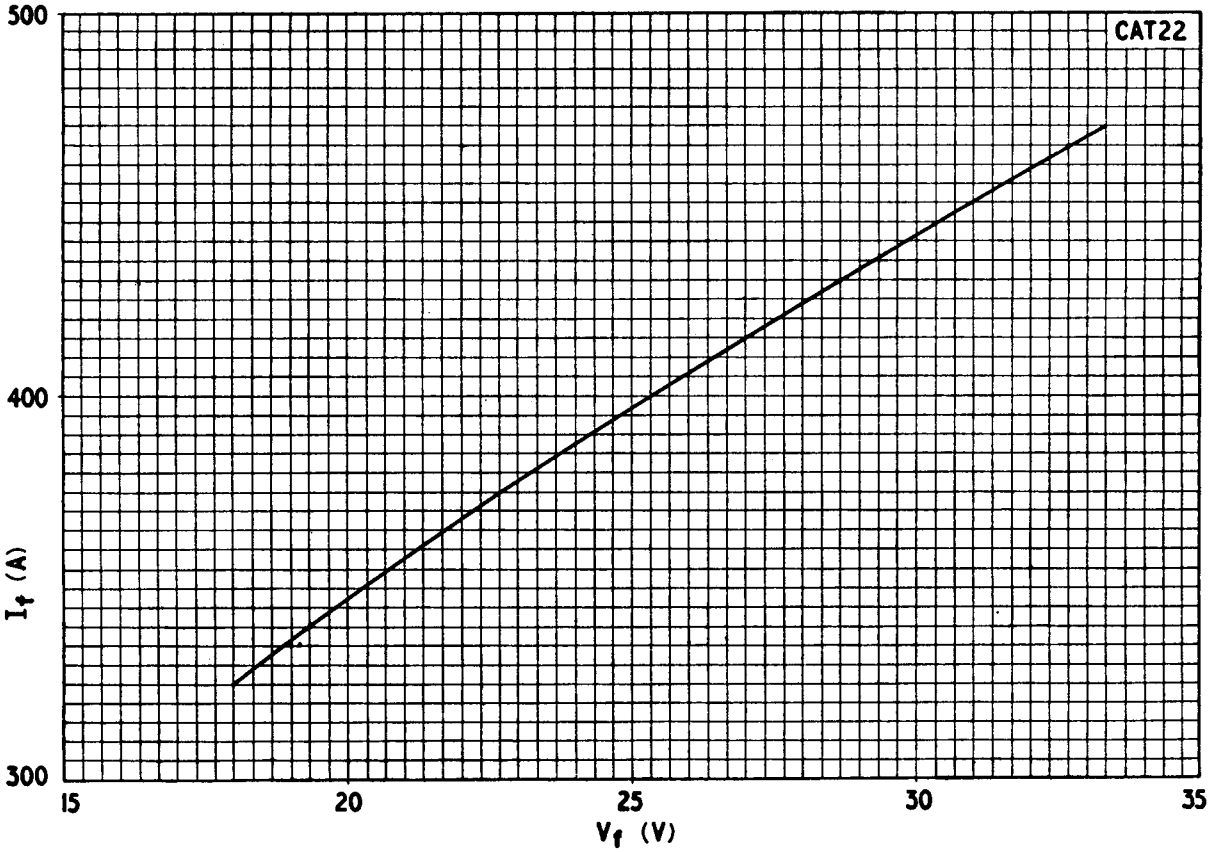
(a) Subject to wide variation. Figures are approximate only.
(b) At crest of audio cycle with 100% modulation.


CAT 22
V_f AT MARKED VOLTS
+1800 V
+1600 V
+1400 V
+1200 V
+1000V
+800V
+600V
+400V
+200V
+2000 V
I_{g1} (A)
V_a (kV)


CAT22
V_f AT MARKED VOLTS
Vg1+ 2000V
+1800V
+ 1600V
+ 1400V
+ 1200V
+ 1000V
+ 800V
+ 600V
+ 400V
+ 200V
0
- 200V
I_a (A)
V_a (kV)


CAT 22
DEGREE OF SATURATION
150
100
50
I_g (A)
100%
90%
80%
-1·5
-1
-0·5
0
+0·5
+1
← DECREASE V_f (MV) INCREASE →


CAT 22
SECONDARY EMISSION CURVE
V_f AT MARKED VOLTS
0·2
0·15
0·1
0·05
I_{g1} (A)
V_a 6 kV
4 kV
3 kV
40
60
80
100
120
V_{g1} (V)


CAT22
500
400
300
I_f (A)
15
20
25
30
35
V_f (V)

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