Triode *Type CAT 9*

HF POWER AMPLIFIER AND OSCILLATOR

General. A water-cooled anode transmitting triode fitted with a tungsten filament designed for use in communication or RF heating equipments.

The anode forms part of the envelope and must be fitted with a specially designed water jacket. The anode and filament seals require forced air cooling.

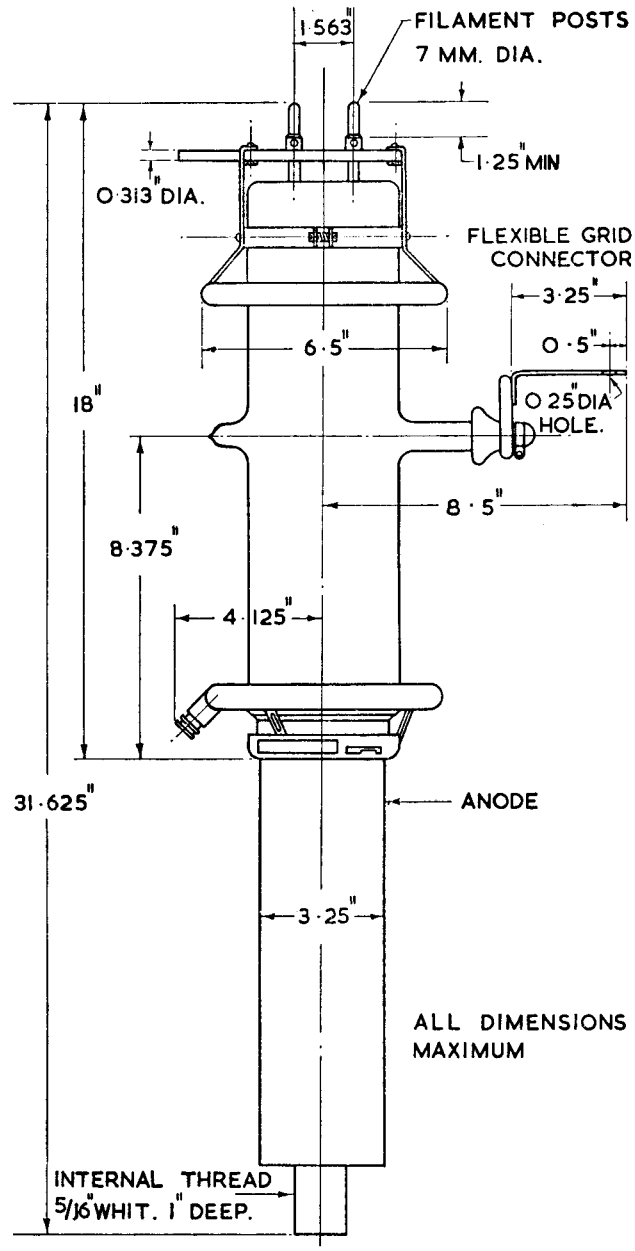
Cooling. All cooling supplies must be started before the application of any supply voltages.

The water flow to the anode must not be less than 4·5 gallons per minute. The temperature of the cooling water must not be greater than 65°C at the outlet. The air flow to the anode seal and to the filament seals should not be less than 4 cu. ft. per minute.

Filament Starting. The cold resistance of the filament is approximately 0·0167 Ω. The filament current must not exceed 130 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 its normal value during these standby periods.

Mounting. The valve must be completely supported by its water jacket with its axis in a vertical position. Rigid connections 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 2 months, it must be seasoned by operating for at least one hour at half the normal anode voltage and current. The anode voltages should then be increased slowly to the normal value.



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APPROXIMATE DATA

V_f		18–20	V
I_f		100	A
$V_{a(max)}$		15	kV
$p_{a(max)}$		18	kW
$p_{gl(max)}$		500	W
$I_{gl(pk)\ (RF)\ (max)}$		30	A
μ	at Va 15 kV	45	
r_a	V_{gl} 0	4,500	Ω
g_m		10	mA/V
$f_{(max)}$		40	Mc/s
$C_{a\text{-}gl}$	*Taken without water jacket*	21	pF
$C_{a\text{-}k}$		1·9	pF
$C_{gl\text{-}k}$		29	pF

Each valve is marked with the filament voltage to give 12 A emission at 90% saturation.

Typical Operation

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

(*Unmodulated, one valve, key down conditions*)

V_a		15	12	10	kV
I_a		2·65	2·6	2·4	A
V_{gl}		–450	–375	–440	V
I_{gl}	(a)	250	280	300	mA
$v_{gl(pk)}$		1,450	1,375	1,440	V
P_{dr}	(a)	350	400	420	W
Z_a		2,900	2,400	2,000	Ω
p_a		12·5	10	7·7	kW
P_{out}		27·3	21·2	16·3	kW

(2) HF POWER AMPLIFIER. CLASS C

(*Anode modulated, one valve, carrier conditions, permissible modulation 100%*)

V_a		12	10	kV
I_a		1·05	1·1	A
V_{gl}		–740	–650	V
I_{gl}	(a)	70	72	mA
$v_{gl(pk)}$		1,230	1,140	V
P_{dr}	(a)	90	85	W
Z_a		5,200	4,150	Ω
p_a		3·0	3·2	kW
P_{out}		9·6	7·8	kW

(3) HF POWER AMPLIFIER. CLASS B TELEPHONY

(*One valve, carrier conditions, permissible modulation 100%*)

V_a			15	10	kV
I_a			1·2	1·2	A
V_{gl}			–330	–220	V
$v_{gl(pk)}$			570	510	V
P_{dr}	(a)	(b)	85	80	W
Z_a			3,240	1,900	Ω
p_a			12·4	8·75	kW
P_{out}			5·6	3·25	kW

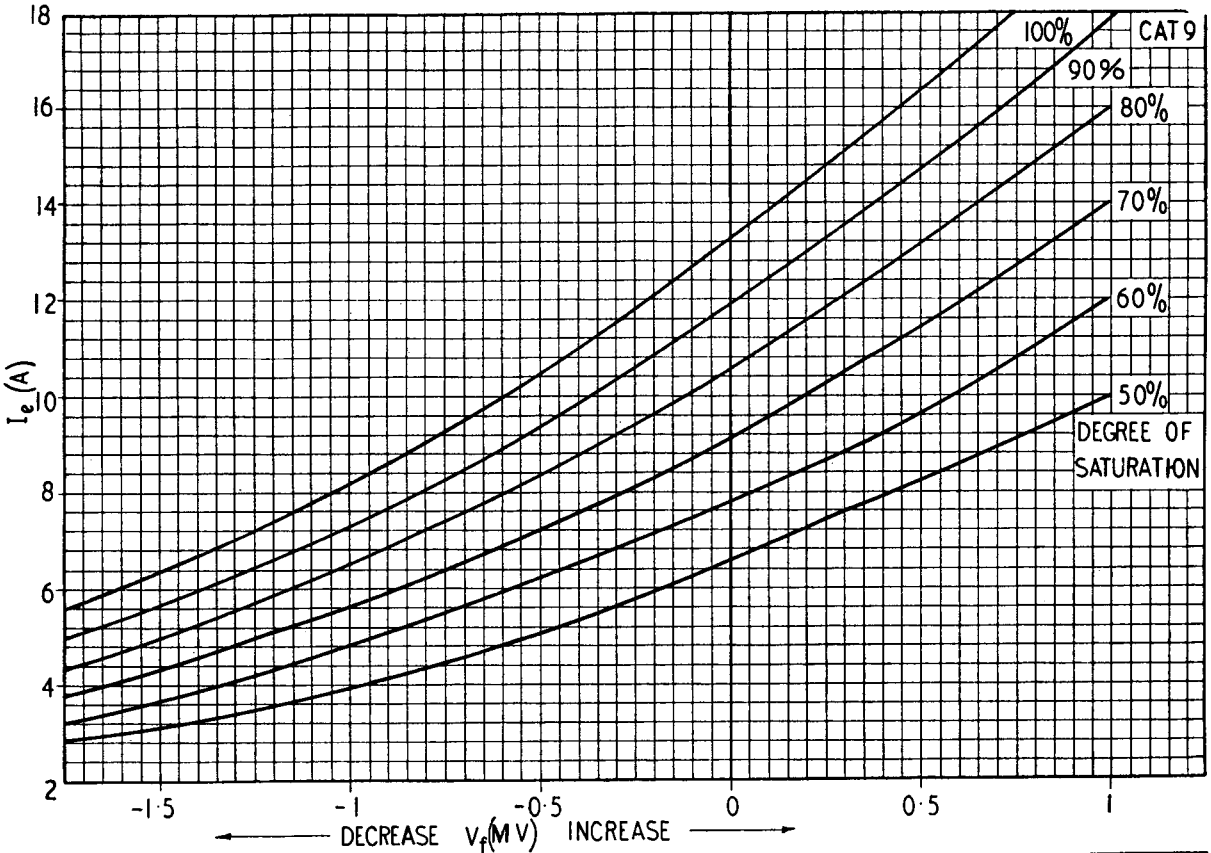
The figures given above are only applicable to operation at frequencies up to 20 Mc/s. Above 20 Mc/s the anode voltage must be reduced in accordance with the following table:

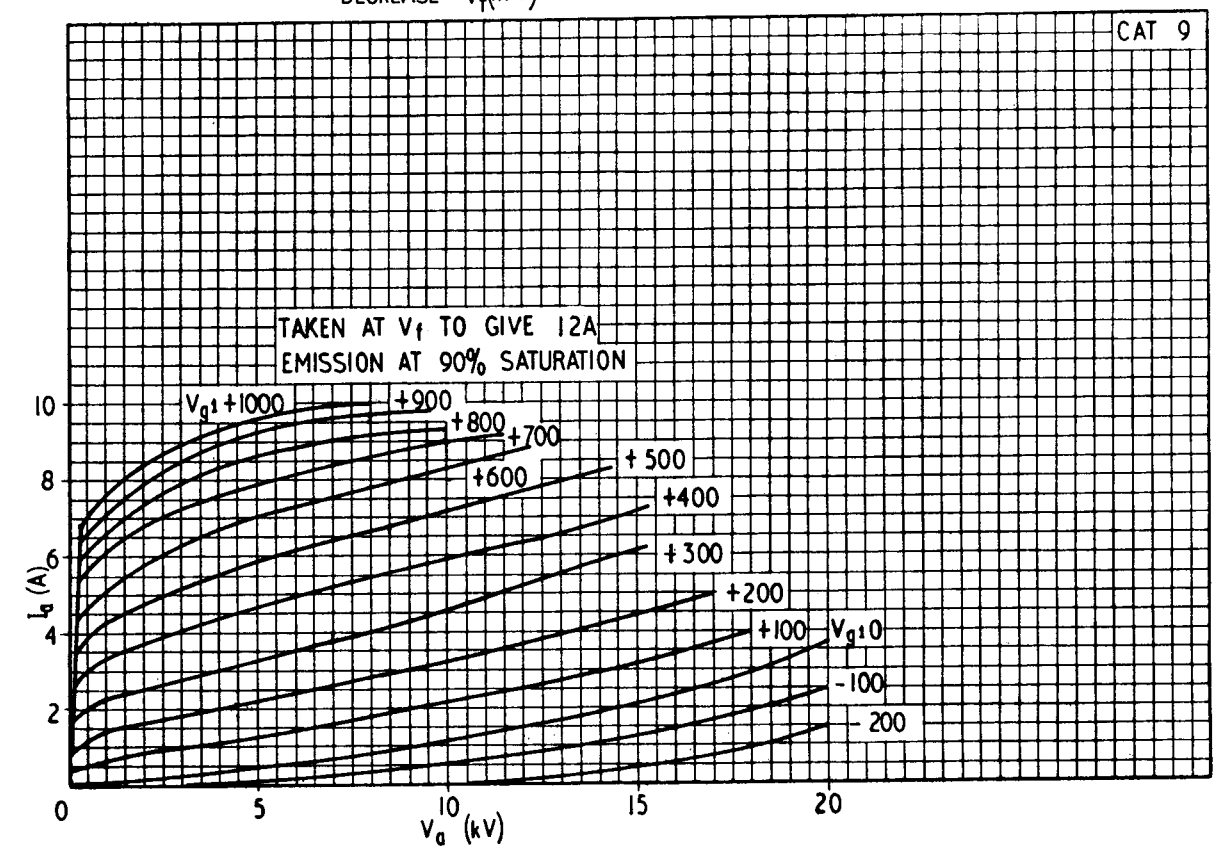
f (Mc/s)	20	25	30	40
$\%V_{a(max)}$	100	75	50	35

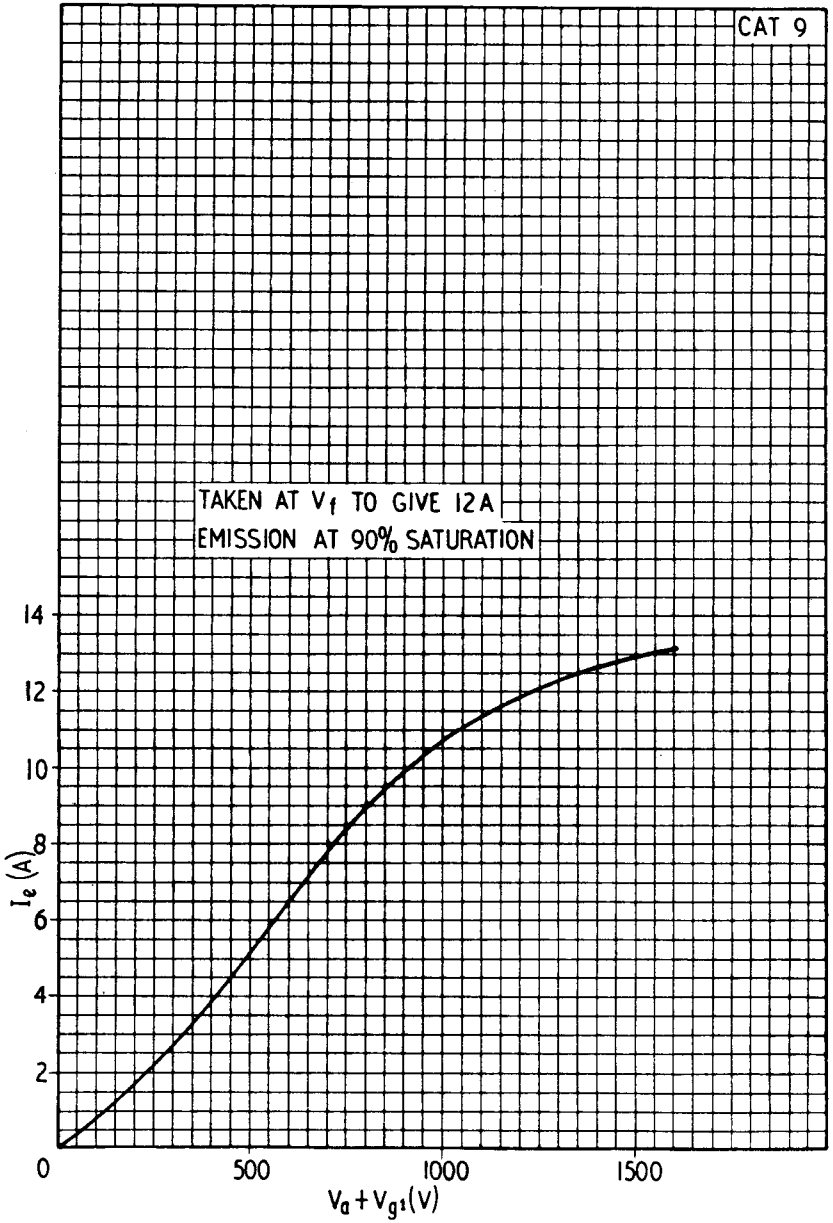
NOTES

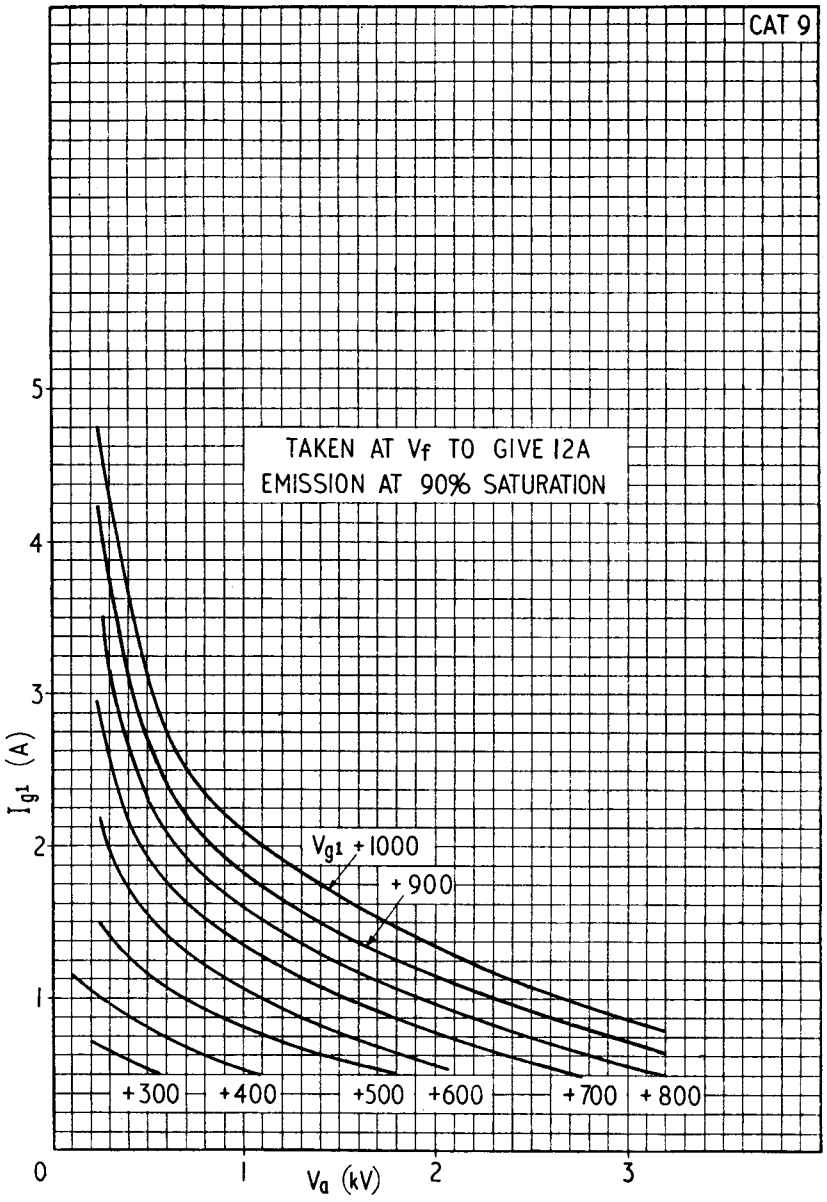
(a) Subject to wide variation. The figures are approximate only.

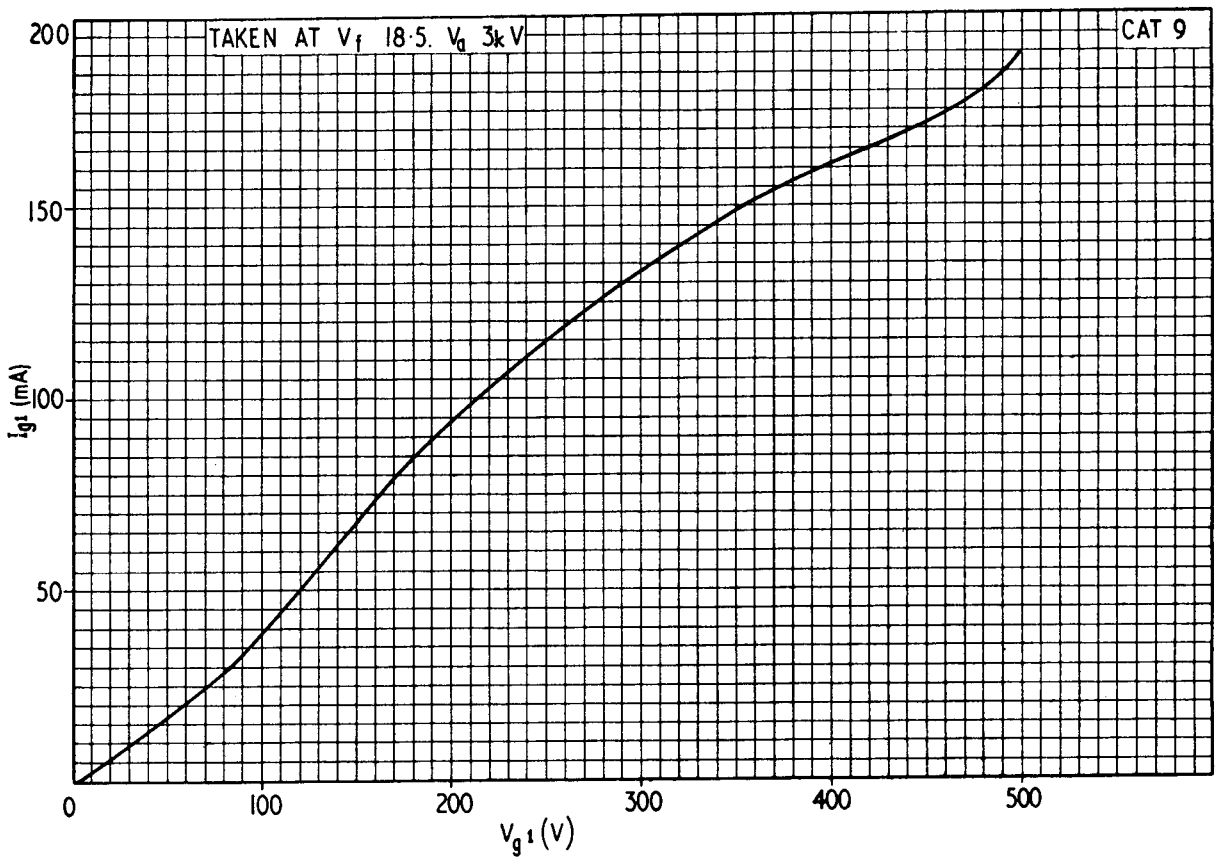
(b) At crest of audio cycle with 100% modulation.

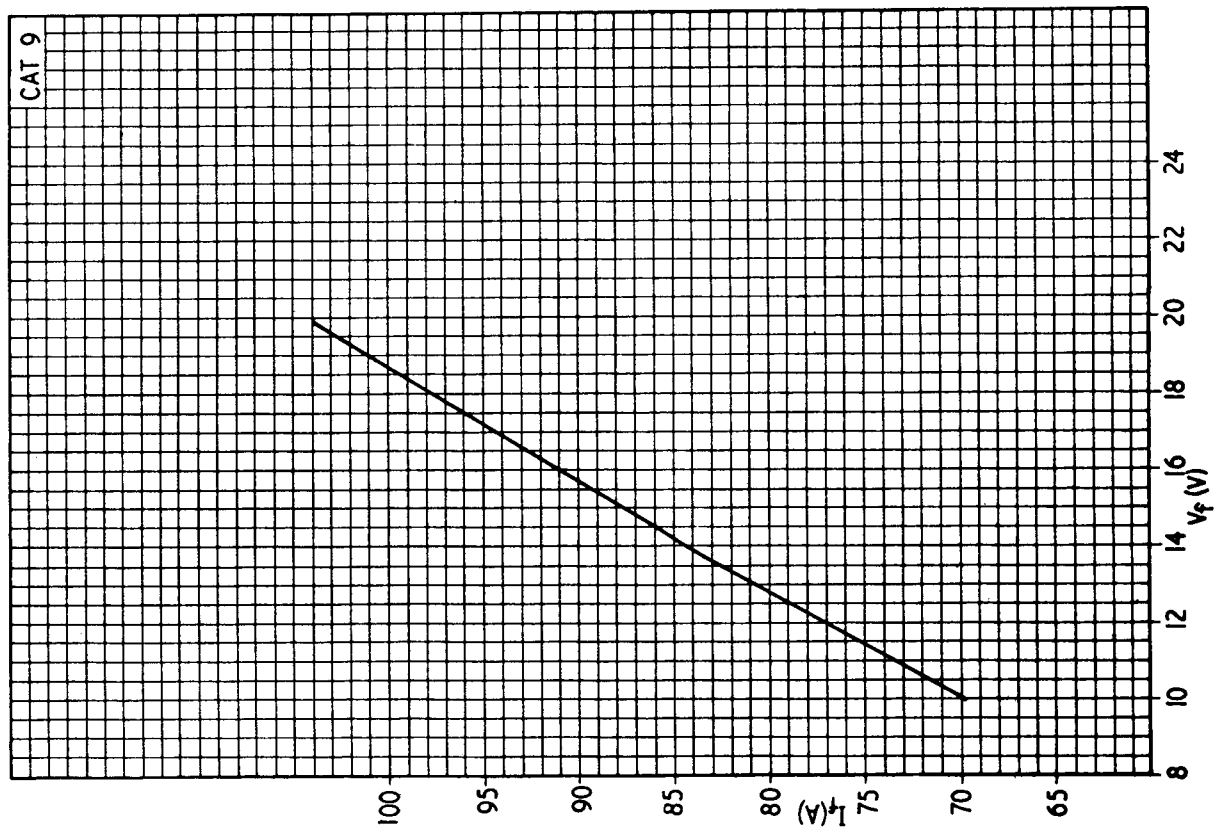

CAT 9
100%
90%
80%
70%
60%
50%
DEGREE OF SATURATION
I_e (A)
18
16
14
12
10
8
6
4
2
-1·5
-1
-0·5
0
0·5
1
DECREASE V_f (MV) INCREASE


CAT 9
TAKEN AT V_f TO GIVE 12A
EMISSION AT 90% SATURATION
V_g +1000
+900
+800
+700
+600
+500
+400
+300
+200
+100
V_g 0
-100
-200
I_a (A)
10
8
6
4
2
0
5
10
15
20
V_a (kV)


CAT 9
TAKEN AT V_f TO GIVE 12A
EMISSION AT 90% SATURATION
I_e (A)
0
2
4
6
8
10
12
14
500
1000
1500
$V_a + V_{g1}$ (V)


CAT 9
TAKEN AT V_f TO GIVE 12A
EMISSION AT 90% SATURATION
I_{g1} (A)
0
1
2
3
4
5
1
2
3
V_a (kV)
V_{g1} +1000
+900
+300
+400
+500
+600
+700
+800


TAKEN AT V_f 18·5. V_a 3k V
CAT 9
200
150
100
50
0
100
200
300
400
500
I_{g1} (mA)
V_{g1} (V)


CAT 9
100
95
90
85
80
75
70
65
I_f(A)
8
10
12
14
16
18
20
22
24
V_f (V)

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