

SPECIAL QUALITY PENTODE

E180F

Special quality high slope r.f. pentode intended for general industrial applications where stability of characteristics and long life are required.

This data should be read in conjunction with GENERAL NOTES - SPECIAL QUALITY VALVES which precede this section of the handbook, and the index numbers are used to indicate where reference should be made to a specific note.

HEATER

Suitable for parallel operation, a.c. or d.c.

V_h^1	6.3	V
I_h	300	mA

The maximum variation of heater current at $V_h = 6.3V$ is ± 15 mA.

MOUNTING POSITION

Any

CAPACITANCES (measured with an external shield)

	Minimum	Average	Maximum	
ca - g1	-	18	30	mpF
ca - k	-	-	100	mpF
* cin	6.6	7.5	8.4	pF
cin ($I_k = 16.3$ mA)	-	11.1	-	pF
* cout	2.5	3.0	3.5	pF
cg1 - h	-	-	0.1	pF

* Pin 6 is left floating during the capacitance measurements.

CHARACTERISTICS

Pentode connected			Triode connected g2 to a, g3 to k		
Va	180	V	Va	150	V
Vg3	0	V	Vg1	- 1.25	V
Vg2	150	V	Ia	16.5	mA
Vg1	- 1.25	V	gm	21	mA/V
Ia	13	mA	μ	50	
Ig2	3.3	mA	ra	2.4	k Ω
gm	16.5	mA/V			
ra	90	k Ω			
μ g1-g2	50				
- Vg1 max.,	500	mV			
(Ig1 = 0.3 μ A)					

OPERATING CONDITIONS AS R. F. AMPLIFIER

Pentode connected				Triode connected		
Va - e	180	190	V	Va - e	160	V
Vg3 - k	0	0	V	Vg3	0	V
Vg2 - e	150	160	V	Vg1 - e	+ 9.0	V
Vg1 - e	0	+ 9.0	V	Rk	620	Ω
Rk	100	630	Ω	Ia	16.5	mA
Ia	11.5	13	mA	gm	21	mA/V
Ig2	2.9	3.3	mA	Req(r.f.)	225	Ω
gm	15.5	16.5	mA/V			
Vg1 max.,						
(Ia=800 μ A) -	4.5	-	V			
Req(r.f.)	-	460	Ω			
* rg1(f=50Mc/s) -		6.0	k Ω			
* ϕ gm(f=50Mc/s) -		9.0	deg			
* Cathode connections strapped together						

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

	Average	Initial range	End of life*	
Anode current	13	12.2 to 13.8	11.5	mA
Va-e = 190V, Vg2-e = 160V				
Vg1-e = +9V, Rk = 630 Ω				

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	Average	Initial range	End of life*	
Screen-grid current	3.3	2.9 to 3.7	-	mA
Va-e=190V, Vg2-e=160V Vg1-e=+9V, Rk = 630Ω				
Mutual conductance	16.5	14.2 to 18.8	11	mA/V
Va-e=190V, Vg2-e=160V Vg1-e=+9V, Rk = 630Ω				
Negative control-grid current	-	< 0.5	< 1.0	μA
Va-e=190V, Vg2-e=160V Vg1-e=+9V, Rk = 78Ω Rg1-k = 100 kΩ				
Insulation resistance	-	> 20	-	MΩ
Between any two electrodes Vd.c.=100V				
Heater cathode insulation	-	> 4.0	-	MΩ
Vh-k = 60V				
Heater current	300	285 to 315	285 to 315	mA

* To allow for valve deterioration during life, circuits should be designed to function with a valve on which one or more of the characteristics have changed to the values stated.

SHOCK AND VIBRATION RATINGS

The E180F can withstand vibrations of 2.5g and 50 c/s for 96 hours and is proof against impact accelerations of approximately 300g.

ABSOLUTE MAXIMUM RATINGS⁴

Va(b) max.	400	V
Va max.	210	V
pa max.	3.0	W
Vg2 (b) max.	400	V
Vg2 max.	175	V
pg2 max.	0.9	W



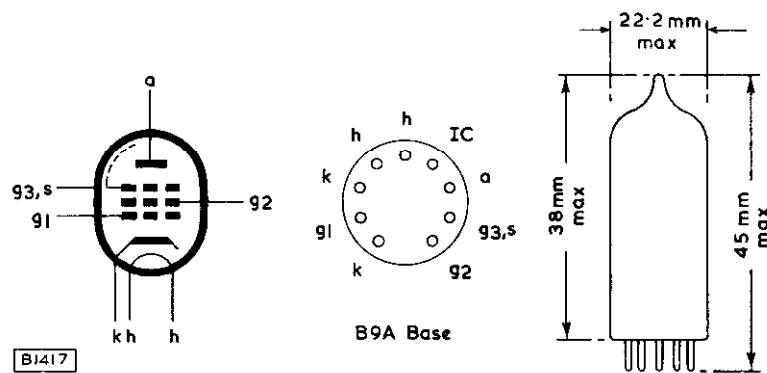
Ik max.	25	mA
+ Vg1 max.	0	V
- Vg1 max.	50	V
- vg1 (pk) max.	100	V
Rg1-k max. (fixed bias)	250	k Ω
Vh-k max.	60	V
Rh-k max.	20	k Ω
Tbulb max.	155	$^{\circ}$ C
Vh min.	6.0	V
Vh max.	6.6	V

OPERATING NOTE

Hum

The hum voltage referred to g1 has a maximum value of 100 μ V and is measured with centre tap of the heater winding earthed, a supply frequency of 50 c/s (including 3 % at 500 c/s) and a linear band-pass characteristic under the following conditions.

Vh	6.3	V
Ck	1000	μ F
Rg1-k	500	k Ω

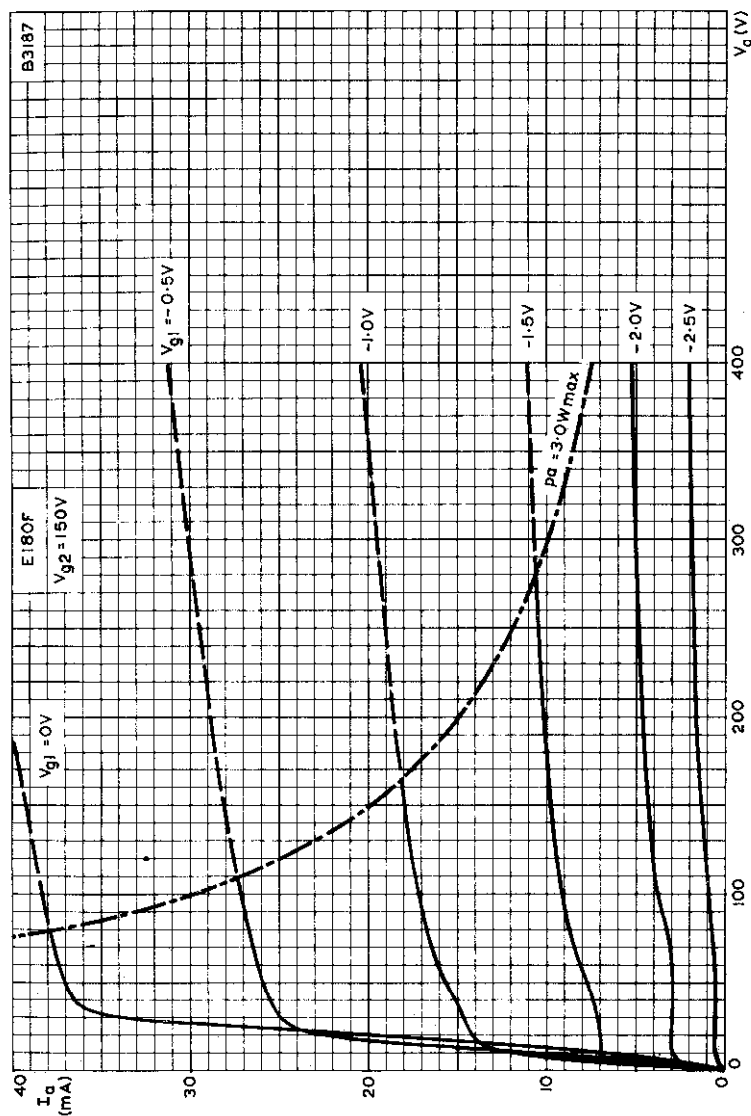


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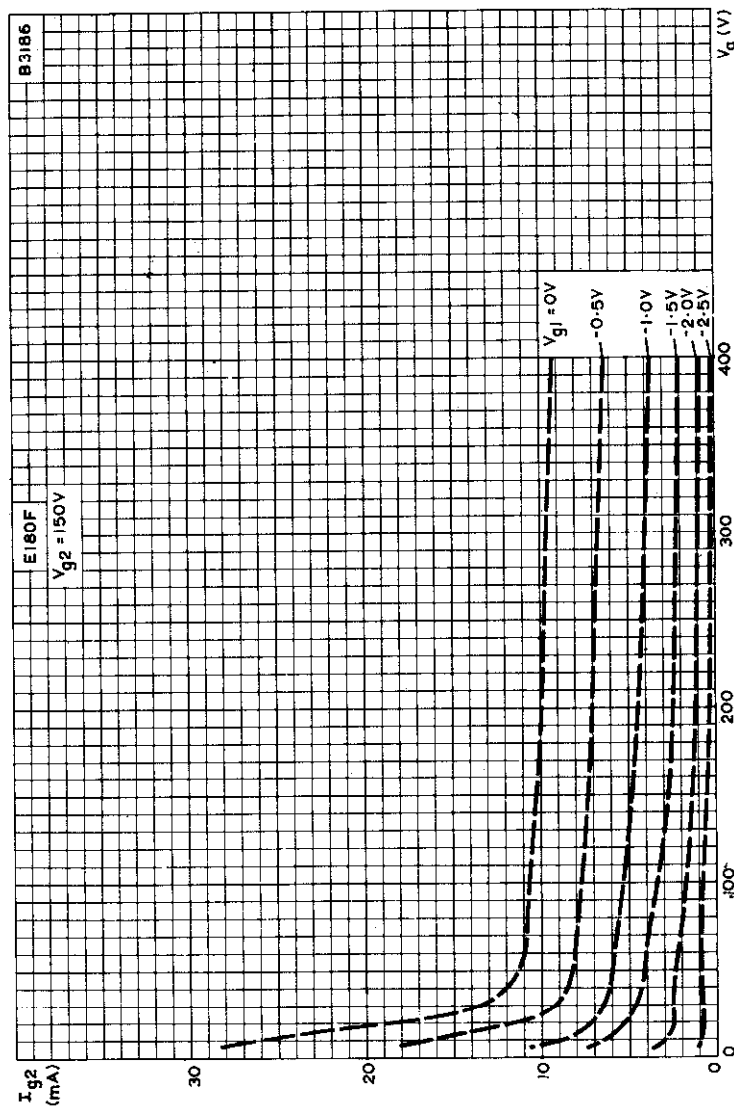


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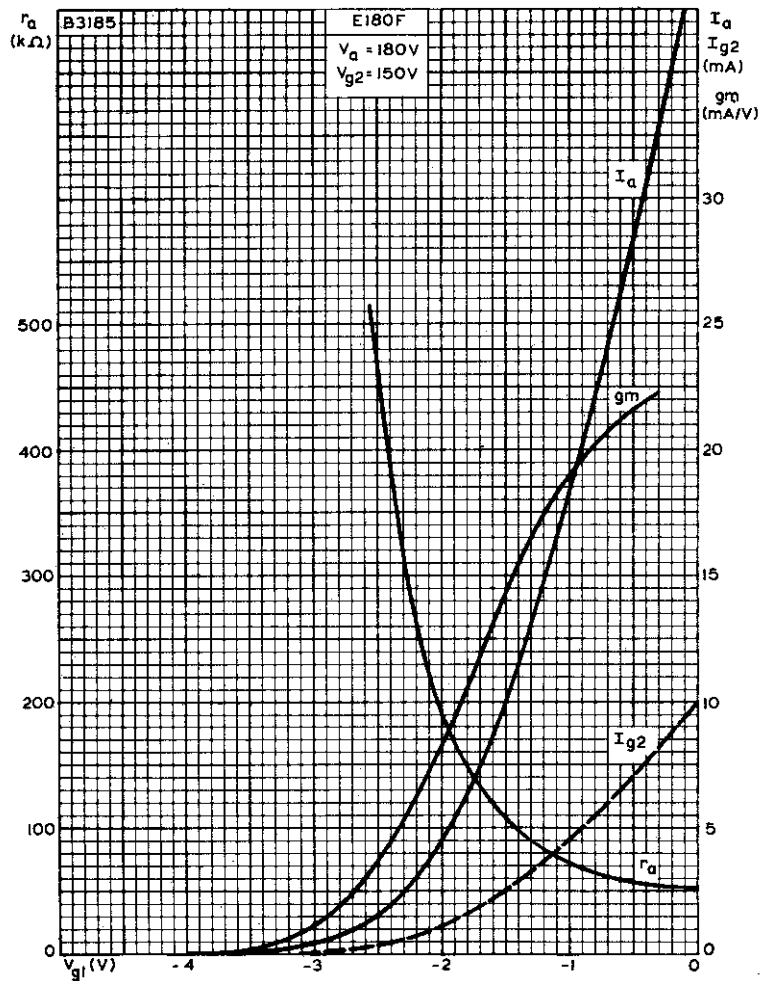
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH
CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 150V$



SCREEN-GRID CURRENT PLOTTED AGAINST ANODE VOLTAGE
WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 150V$

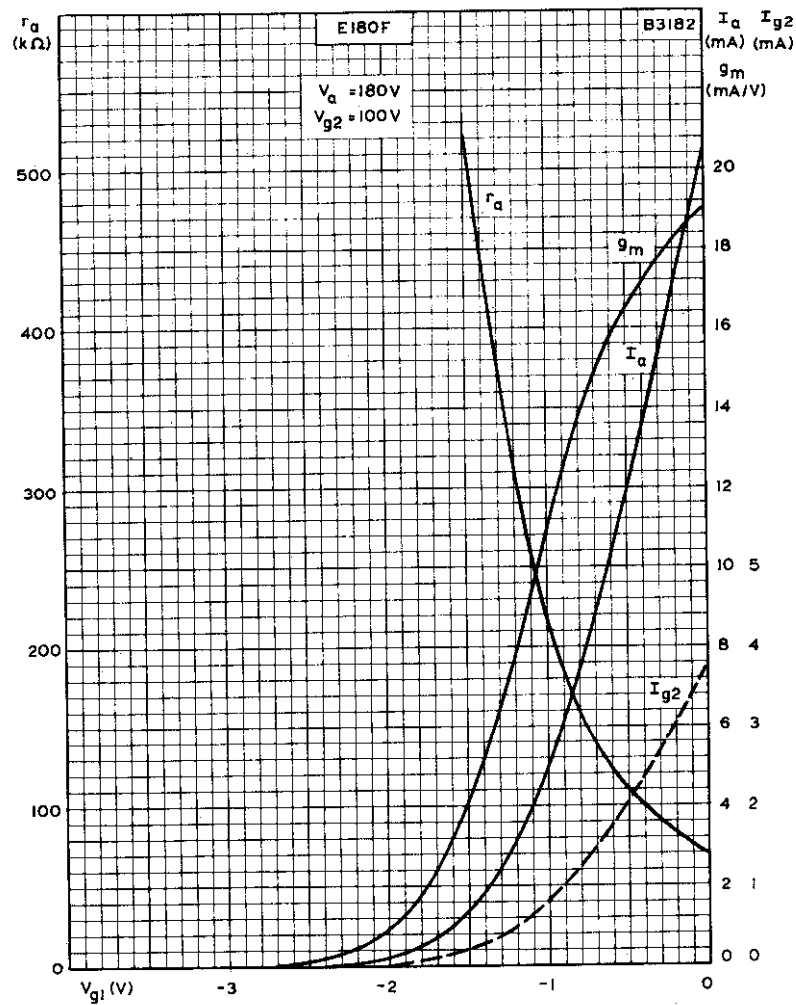
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ANODE CURRENT, SCREEN-GRID CURRENT, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE.

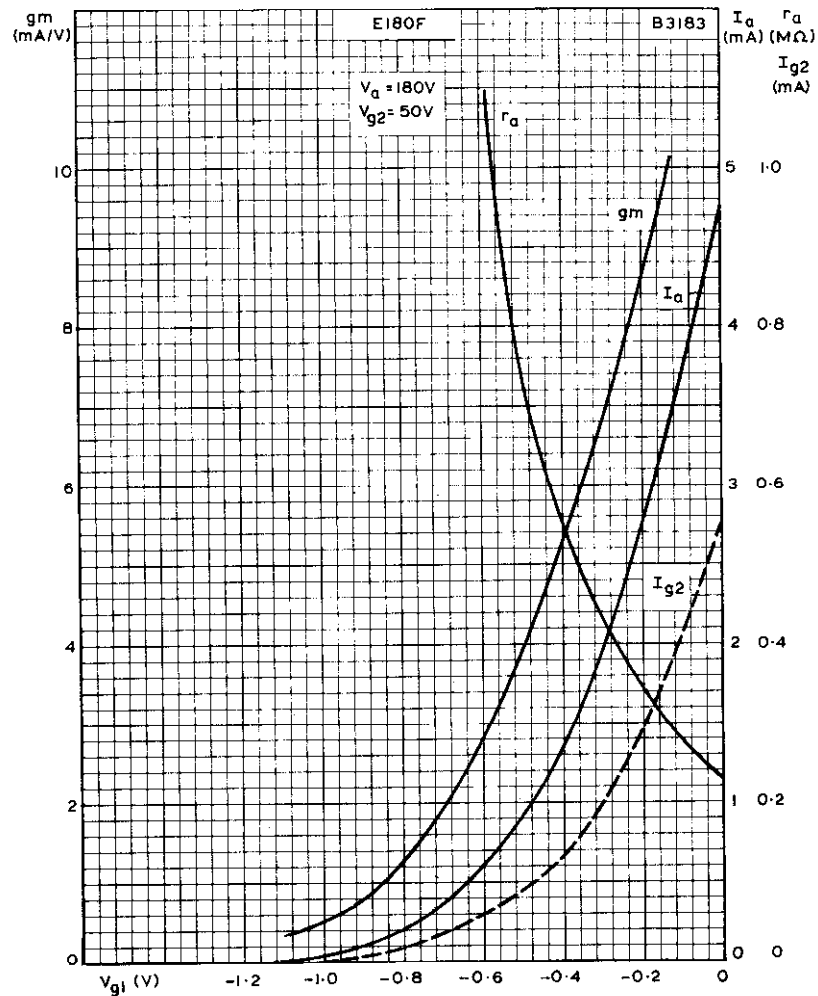
$V_a = 180V$, $V_{g2} = 150V$.



ANODE CURRENT, SCREEN-GRID CURRENT, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE.
 $V_a = 180V$, $V_{g2} = 100V$

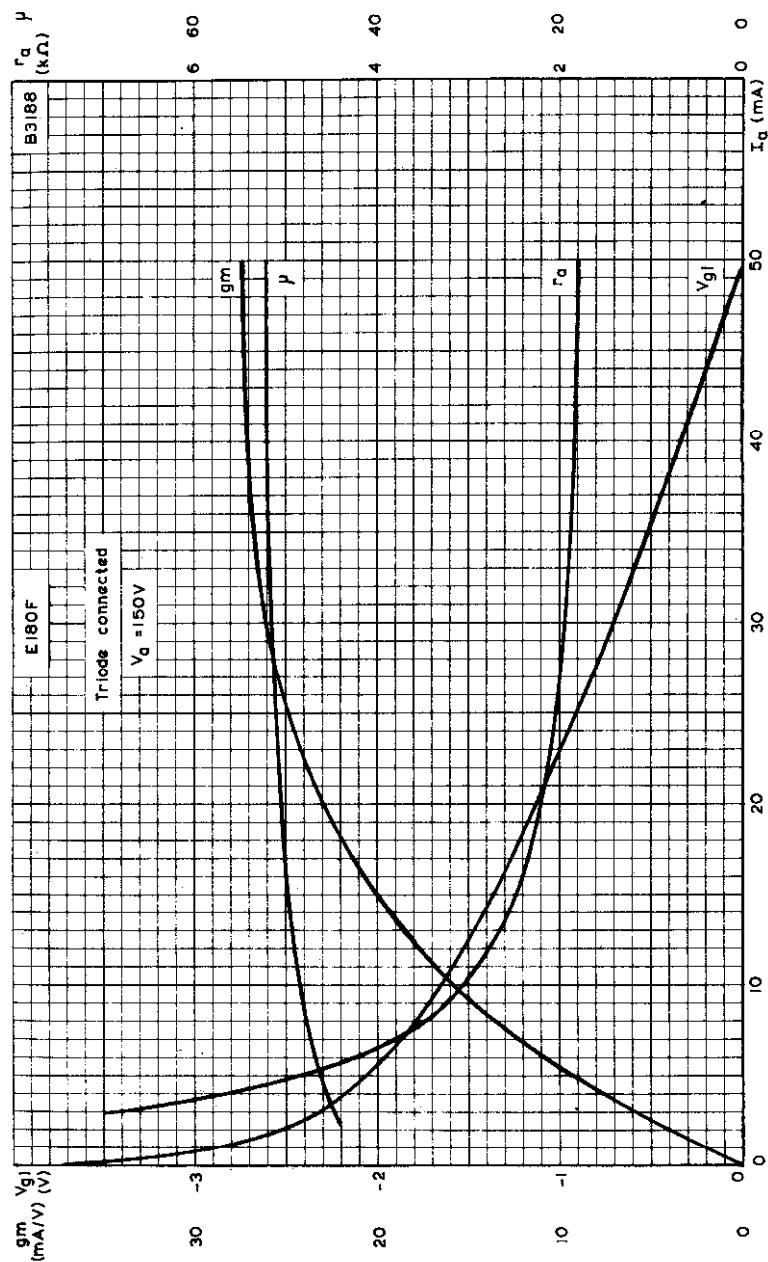
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ANODE CURRENT, SCREEN-GRID CURRENT, MUTUAL CONDUCTANCE AND
ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE.

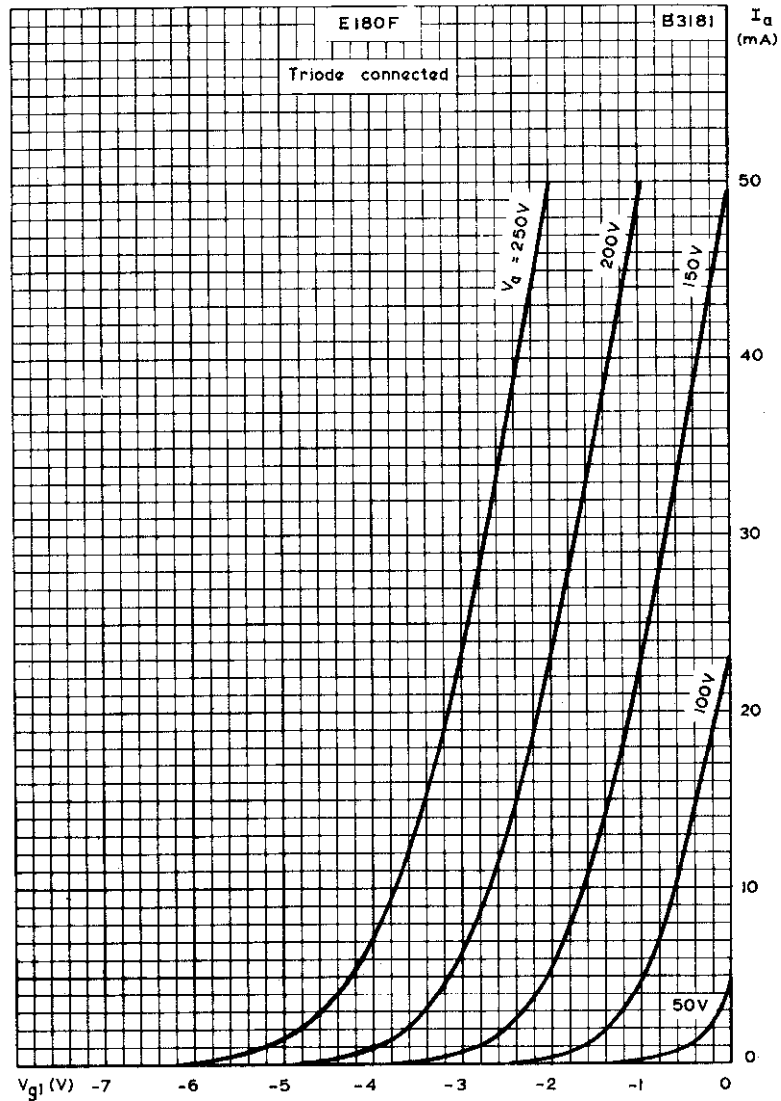
$V_a = 180V$, $V_{g2} = 50V$



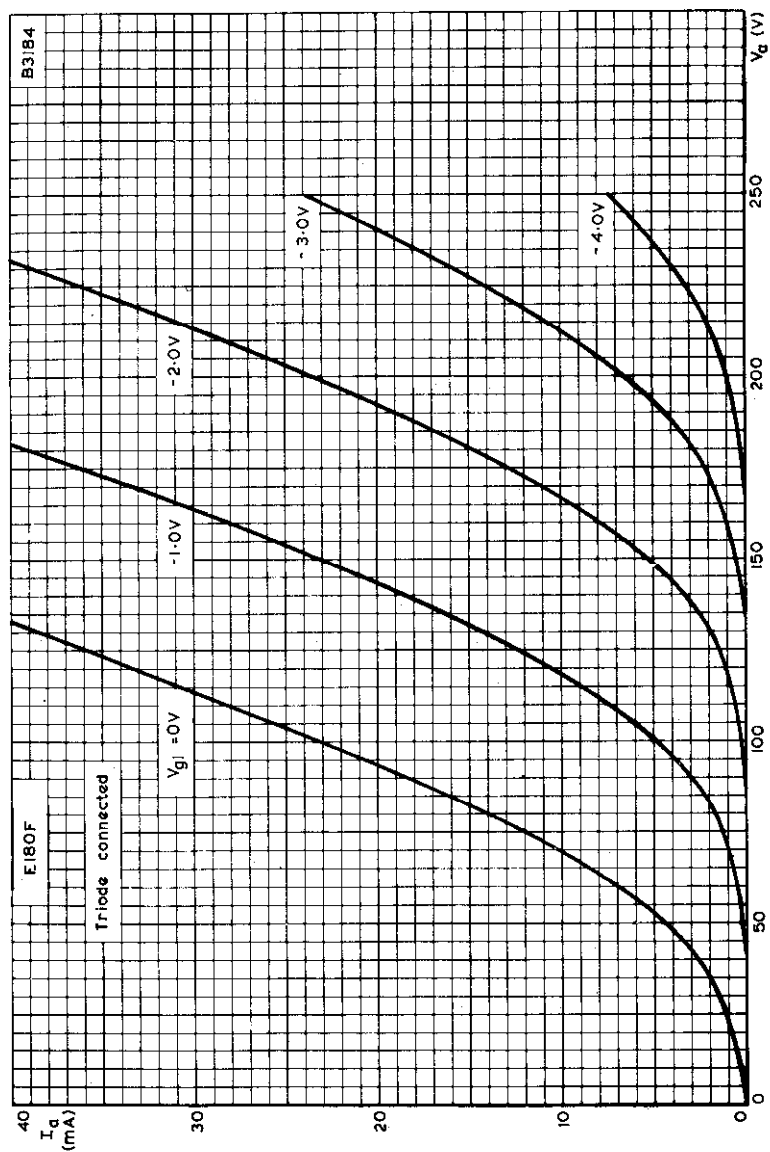
MUTUAL CONDUCTANCE, AMPLIFICATION FACTOR, ANODE IMPEDANCE,
AND CONTROL-GRID VOLTAGE PLOTTED AGAINST ANODE CURRENT
TRIODE CONNECTED.

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ANODE CURRENT PLOTTED AGAINST CONTROL-GRID VOLTAGE WITH ANODE VOLTAGE AS PARAMETER. TRIODE CONNECTED.



ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH
CONTROL-GRID VOLTAGE AS PARAMETER. TRIODE CONNECTED.