

SPECIAL QUALITY VARIABLE-MU R.F. PENTODE

M8161

Special quality variable-mu r.f. pentode for use in equipment where mechanical vibration and shocks are unavoidable and where statistically controlled major electrical characteristics 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

V_h^1	6.3	V
I_h	200	mA

MOUNTING POSITION

Any

CAPACITANCES²

	Unshielded	Shielded	
C_{in}	4.8	5.0	pF
C_{out}	6.3	6.5	pF
C_{a-g1}	<15	<10	mpF
C_{h-k}	2.3	2.3	pF

CHARACTERISTICS³

V_a	200	V
V_{g2}	200	V
V_{g3}	0	V
I_a	8.25	mA
I_{g2}	2.1	mA
V_{g1}	-2.5	V
g_m	2.45	mA/V
r_a	900	k Ω ←
μ_{g1-g2}	30	
R_k	0	Ω
V_{g1} (for 100 : 1 reduction in g_m)	-27	V

ABSOLUTE MAXIMUM RATINGS⁴

$V_{a(b)}$ max.	500	V
V_a max.	300	V
p_a max.	3.0	W
$V_{g2(b)}$ max.	300	V
V_{g2} max.	300	V
p_{g2} max.	700	mW
$-V_g$ max.	55	V ←
I_k max.	14	mA
R_{g1-k} max. (cathode bias)	500	k Ω
R_{g1-k} max. (fixed bias)	100	k Ω
V_{h-k} max.	150	V
Maximum fatigue (continuous operation)	2.5	g
Maximum shock (short duration)	500	g
T_{bulb} max.	200	°C

TEST CONDITIONS (unless otherwise specified)

V_h (V)	V_a (V)	V_{g3} (V)	V_{g2} (V)	V_{g1} (V)	R_k (Ω)	V_{h-k} (V)
6.3	200	0	200	-2.5	0	0

TESTS

GROUP A	Insulation a-rest, g_2 -rest, g_3 -rest measured at -300V g_1 -rest measured at -100V Reverse grid current R_{g1} max. = 500k Ω	A.Q.L. ⁵ (%)		Individuals ⁶		Lot average ⁷		Lot standard deviation ⁸ Max.
		Bogey ⁹	Min.	Max.	Min.	Max.	Max.	
GROUP B	Heater current	0.65	184	216	—	—	—	mA
	Heater-to-cathode leakage current $V_{h-k} = 100V$ cathode positive cathode negative	0.65	—	10	—	—	—	μA
	$V_{h-k} = 100V$ cathode positive	—	—	—	—	3.0	—	μA
GROUP C	Anode current	{ 0.65 — }	8.25	6.0	10.5	7.6	8.9	mA
	Screen-grid current	{ 0.65 — }	—	1.2	3.0	—	2.4	mA
	Mutual conductance	{ 0.65 — }	2.45	1.8	3.1	2.25	2.65	mA/V
Group quality level ¹⁰		1.0	—	—	—	—	—	0.23mA/V

GROUP C

Mutual conductance. $V_{g1} = -26V$	2.5	—	4.0	60	—	—	$\mu A/V$
Reverse grid current. $V_{g1} = -50V$	2.5	—	—	1.0	—	—	μA
Change in mutual conductance. $V_h = 5.7V$	2.5	—	—	15	—	—	%
Reverse grid current. $V_h = 6.9V$, $V_{a-c} = 300V$, $V_{g2-e} = 200V$, $R_k = 240\Omega$	2.5	—	—	1.0	—	—	μA
Microphonic noise at the anode at 50c/s and 2.5g min. peak acceleration, $V_{a(b)} = 200V$, $R_a = 2.0k\Omega$	2.5	—	—	15	—	—	mV (r.m.s.)
Group quality level ¹⁰	6.5	—	—	—	—	—	—

GROUP D

Glass strain test ^{11A} . No applied voltages	6.5	—	—	—	—	—	—
Base strain test ¹² . No applied voltages	6.5	—	—	—	—	—	—
Capacitances ² (shielded). No applied voltages	6.5	—	—	—	—	—	—
C_{in}	—	—	3.8	5.2	—	—	pF
C_{out}	—	—	5.0	7.4	—	—	pF ←
C_{a-g1}	—	—	—	10	—	—	mpF
Grid 3 cut-off voltage. $V_{g1} = -7.0V$, $I_a = 50\mu A$	6.5	—	-55	-125	—	—	V
Amplification factor (μ_{g1-g2})	6.5	—	23	39	—	—	—

TESTS

GROUP E

Fatigue¹³

$V_h = 6.9V$, 1 minute on 3 minutes off. No other voltages applied, 5g min. peak acceleration, $f = 170 \pm 5c/s$ for 33 hours in each of 3 mutually perpendicular planes.

Post fatigue tests

Heater-to-cathode leakage current.

$V_{h-k} = \pm 100V$

Reverse grid current.

$R_{g1} \text{ max.} = 500k\Omega$

Mutual conductance

Microphonic noise as in group C

Shock¹⁵

No applied voltages, 500g

Post shock tests

Heater-to-cathode leakage current.

$V_{h-k} = \pm 100V$

Reverse grid current.

$R_{g1} \text{ max.} = 500k\Omega$

Mutual conductance

Microphonic noise as in group C

A.Q.L. ⁵ (%)	Individuals ⁶		Lot average ⁷		Lot standard deviation ⁸ Max.
	Bogey ⁹	Min.	Min.	Max.	
2.5	—	—	—	—	μA
2.5	—	—	—	—	μA
2.5	—	1.6	—	—	mA/V
2.5	—	—	—	—	mV (r.m.s.)
2.5	—	20	—	—	μA
2.5	—	—	—	—	μA
2.5	—	1.0	—	—	mA/V
2.5	—	3.1	—	—	mV (r.m.s.)
2.5	—	—	—	—	μA
2.5	—	—	—	—	μA
2.5	—	1.6	—	—	mA/V
2.5	—	—	—	—	mV (r.m.s.)



A.Q.L. ⁵ (%)	Min.	Max.
2.5	—	—
4.0	—	—
2.5	184	216
2.5	—	20
4.0	—	30
2.5	—	0.75
4.0	—	1.0
2.5	1.6	3.1
4.0	1.5	3.1
—	—	15
4.0	50	—
6.5	30	—
10	—	—



GROUP G

Valves are held for 28 days and retested for

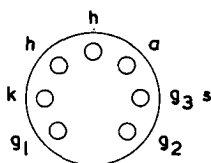
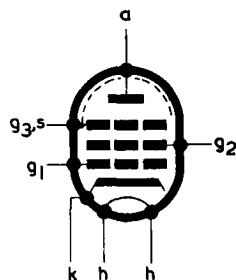
Inoperatives¹⁶

Reverse grid current.

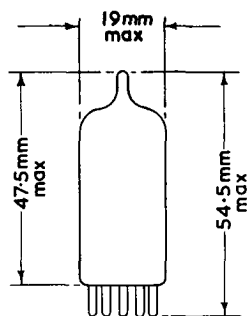
R_{g1} max. = 500k Ω

A.Q.L. ⁵ ($\frac{0}{100}$)	Min.	Max.	
0.5	—	—	
0.5	—	0.75	μA

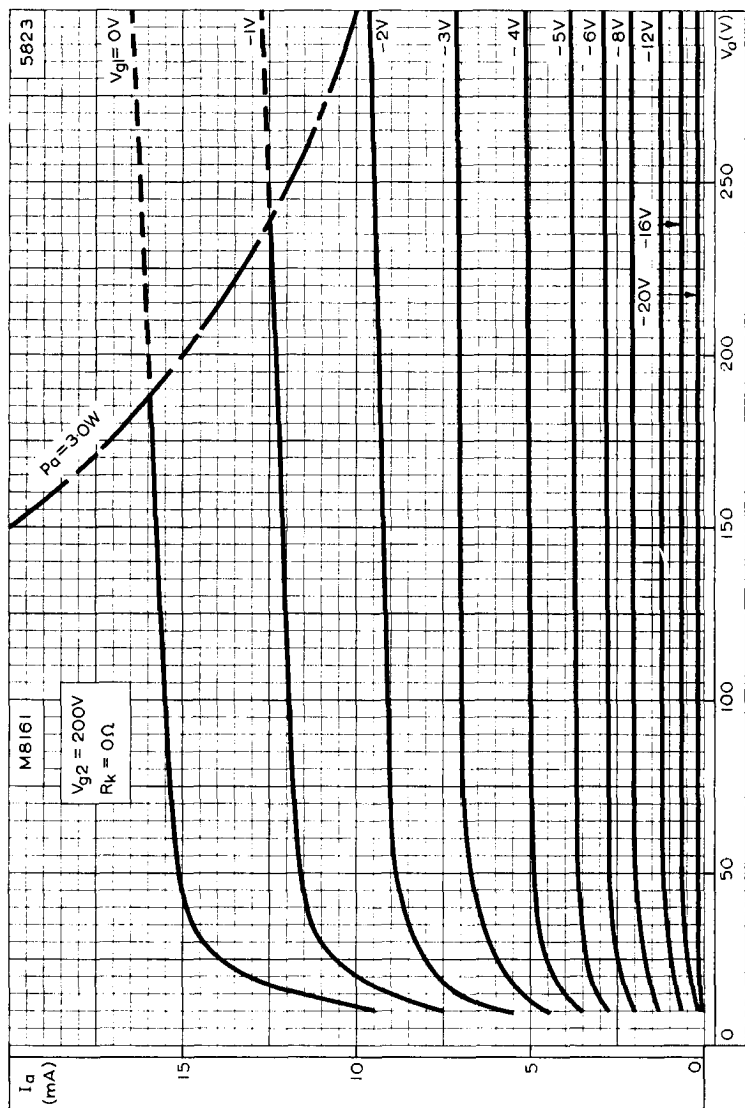
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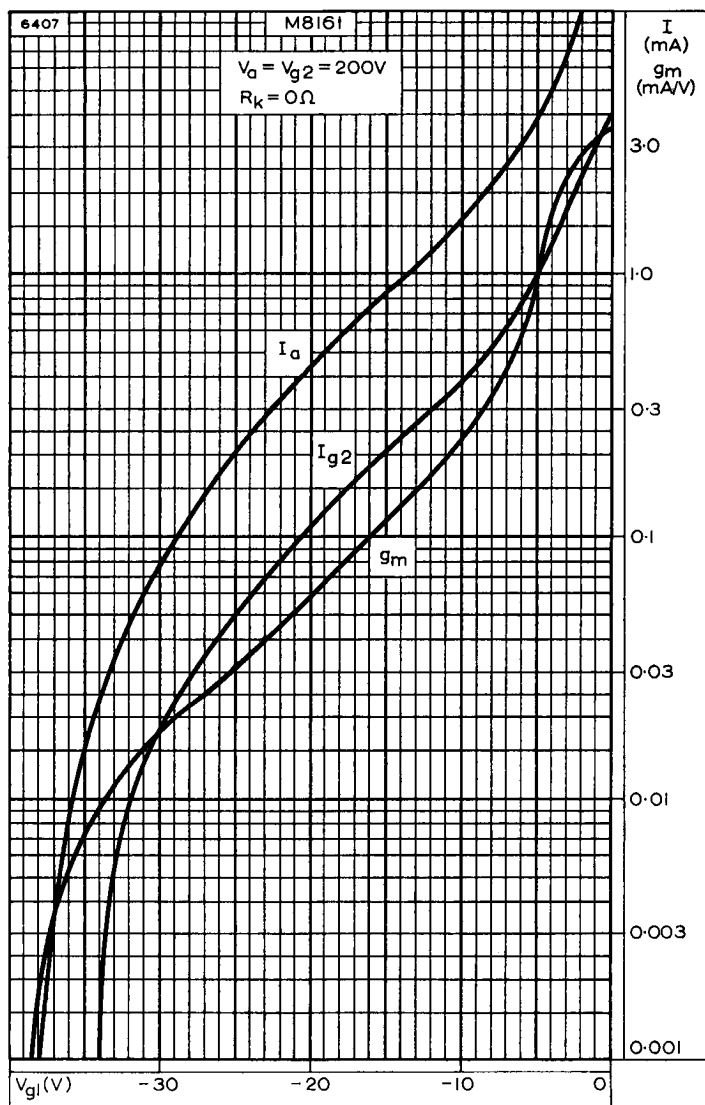
B7G Base



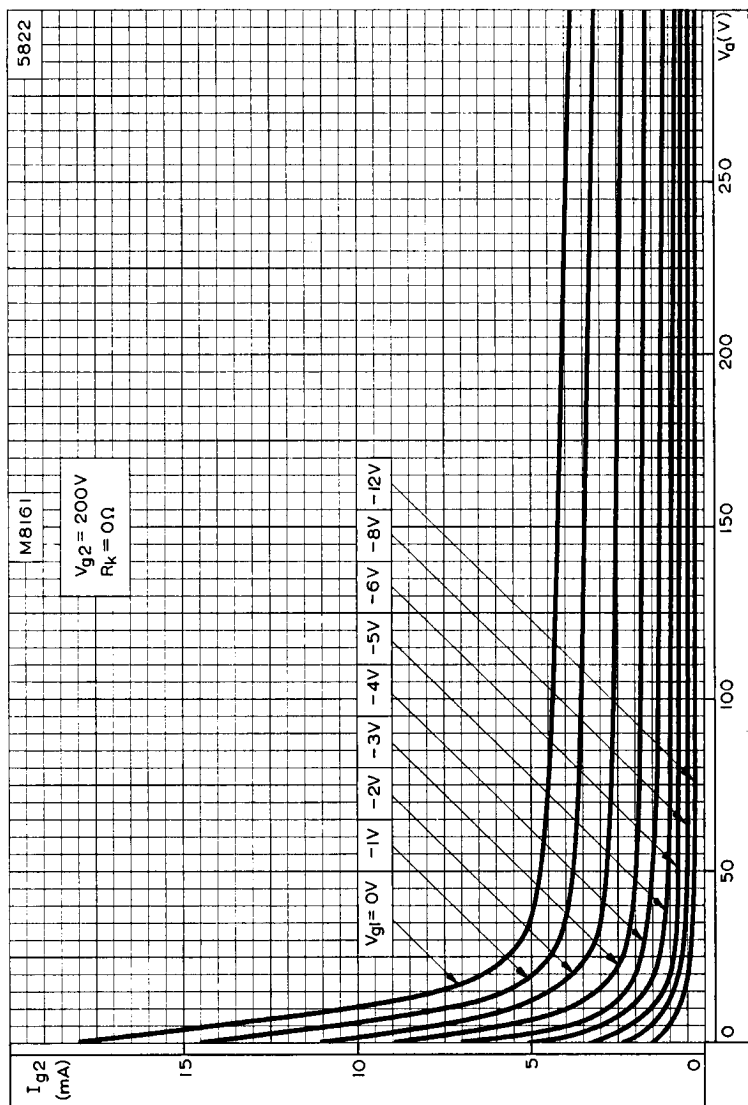
The bulb and base dimensions of this valve are in accordance with BS448 Section B7G



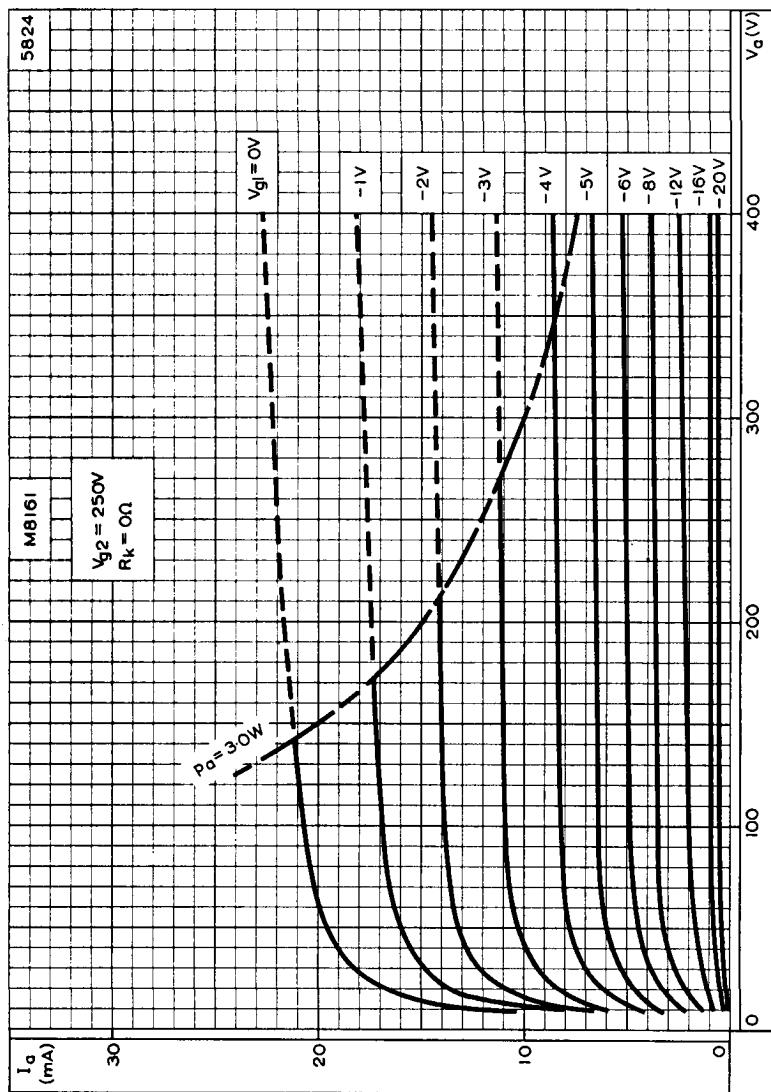
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-
GRID VOLTAGE AS PARAMETER. $V_{k2} = 200V$.



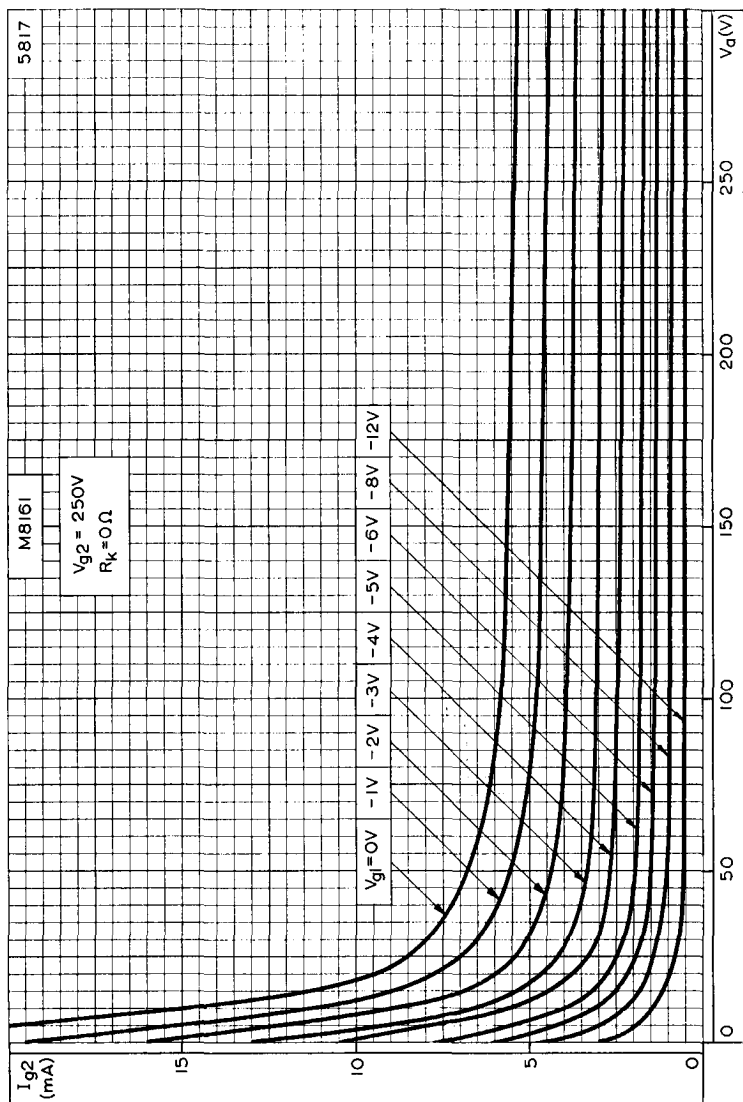
ANODE CURRENT, SCREEN-GRID CURRENT AND MUTUAL CONDUCTANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE. $V_a = V_{g2} = 200V$.



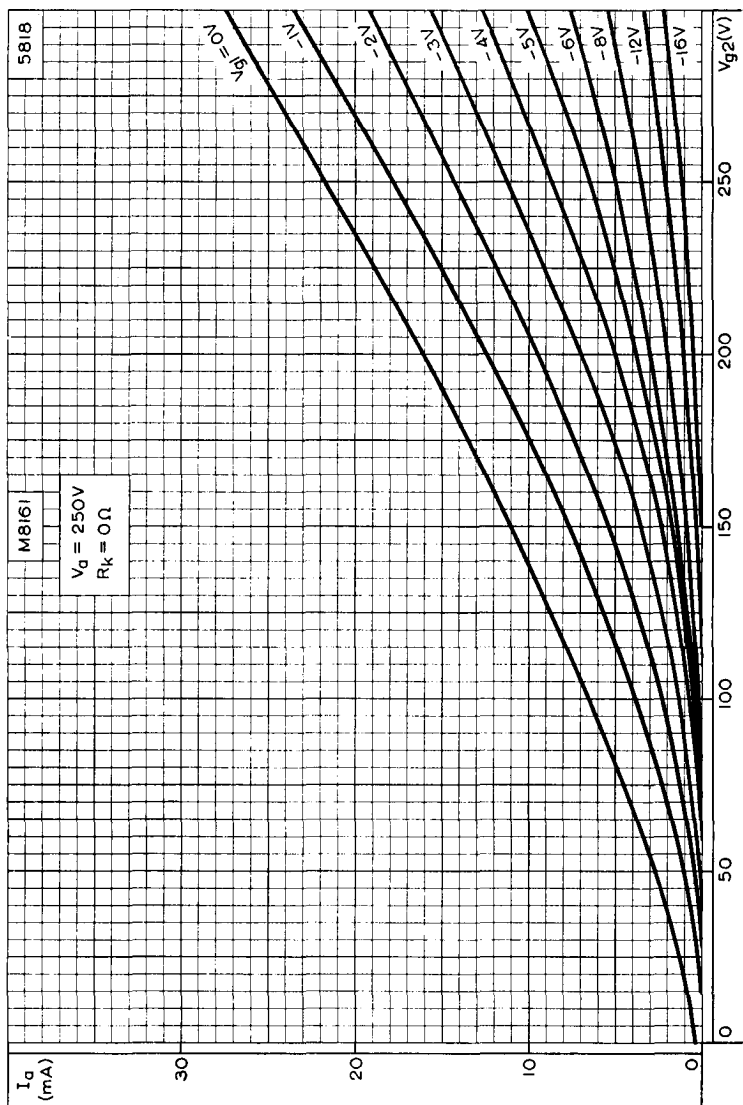
SCREEN-GRID CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 200V$.



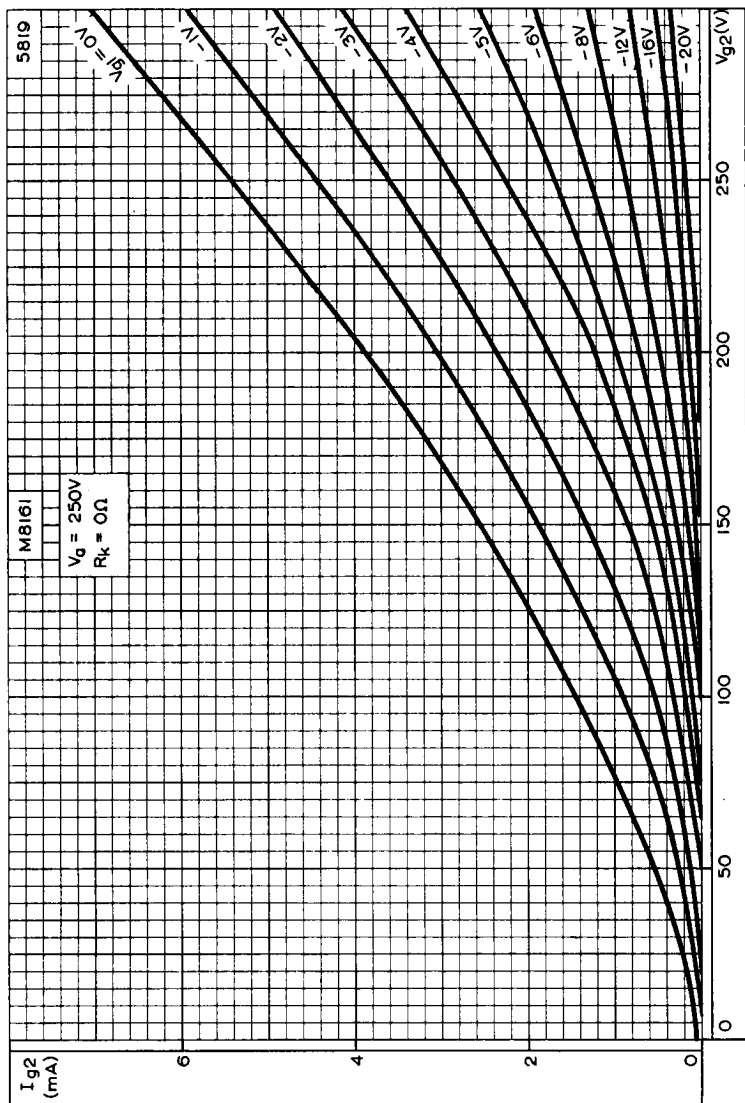
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-
GRID VOLTAGE AS PARAMETER. $V_{g2} = 250V$.



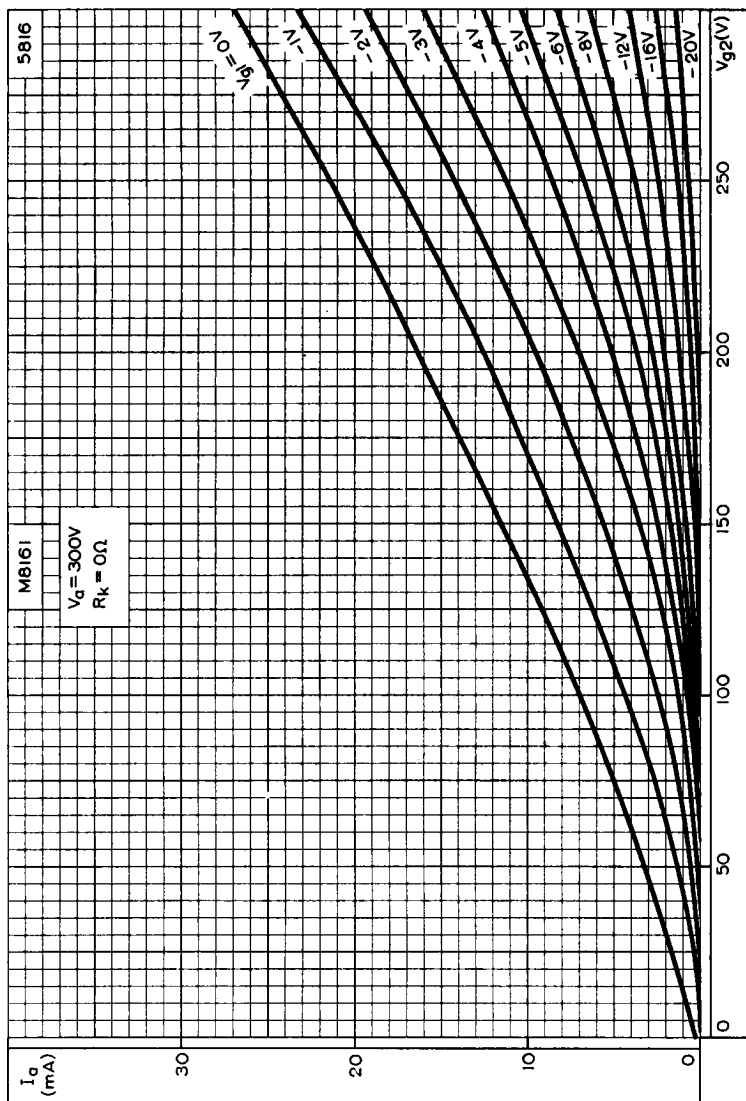
SCREEN-GRID CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 250V$.



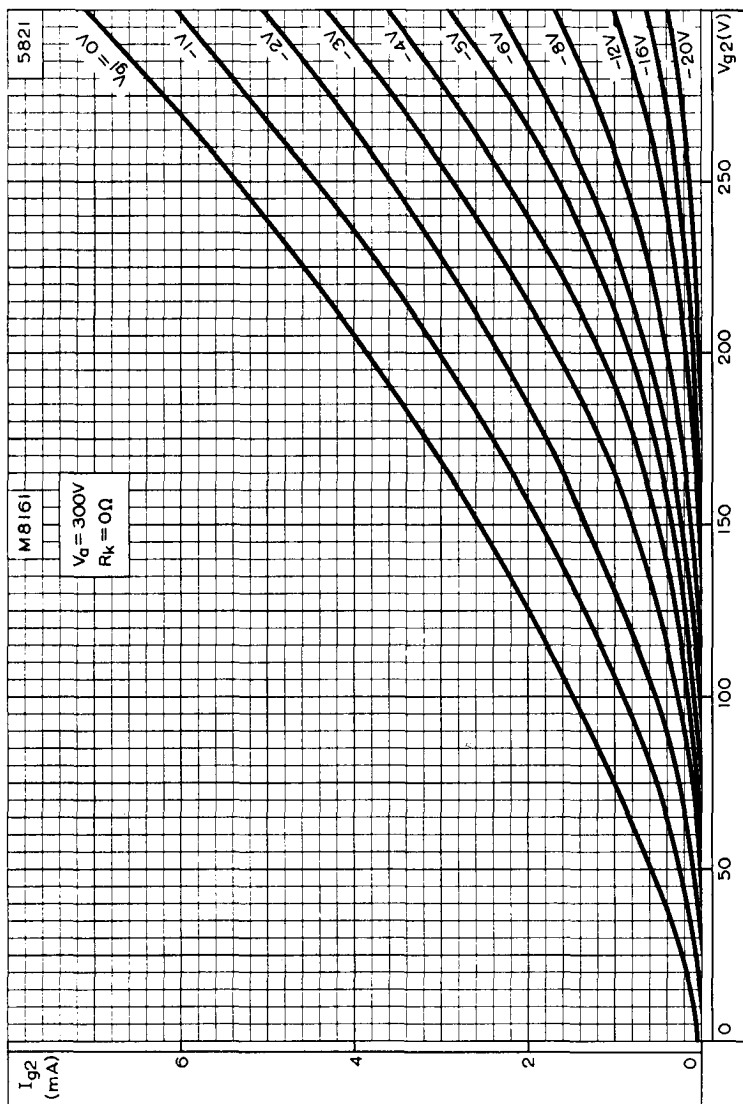
ANODE CURRENT PLOTTED AGAINST SCREEN-GRID VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_a = 250V$.



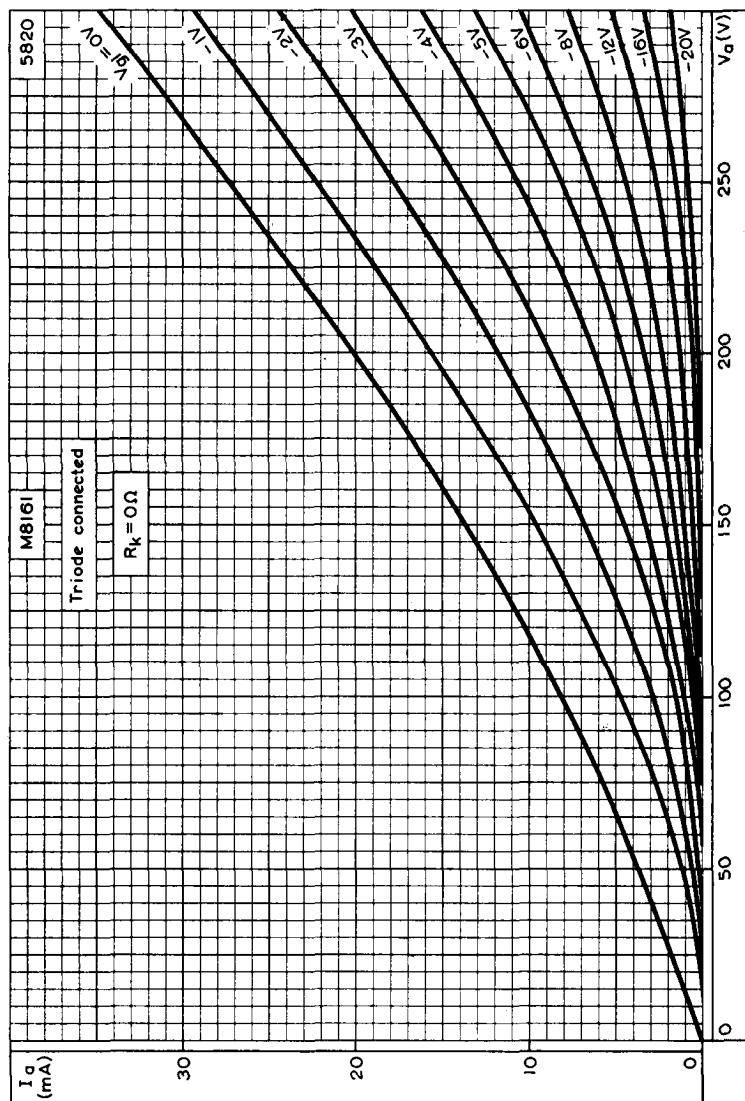
SCREEN-GRID CURRENT PLOTTED AGAINST SCREEN-GRID VOLTAGE
WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g0} = 250V$.



ANODE CURRENT PLOTTED AGAINST SCREEN-GRID VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_a = 300V$.



SCREEN-GRID CURRENT PLOTTED AGAINST SCREEN-GRID VOLTAGE
WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_a = 300V$.



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