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

CAPACITANCES[2]

	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

CHARACTERISTICS[3]

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	kΩ
μ_{g1-g2}	30	
R_k	0	Ω
V_{g1} (for 100 : 1 reduction in g_m)	−27	V

ABSOLUTE MAXIMUM RATINGS[4]

$V_{a(b)}$ 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	kΩ
R_{g1-k} max. (fixed bias)	100	kΩ
V_{h-k} max.	150	V
Maximum fatigue (continuous operation)	2.5	g
Maximum shock (short duration)	500	g
T_{bulb} max.	200	°C

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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

	A.Q.L.[5]	Individuals[6]			Lot average[7]		Lot standard deviation[8]	
GROUP A	(%)	Bogey[9]	Min.	Max.	Min.	Max.	Max.	
Insulation								
a-rest, g_2-rest, g_3-rest measured at −300V	0.25	—	100	—	—	—	—	MΩ
g_1-rest measured at −100V	0.25	—	100	—	—	—	—	MΩ
Reverse grid current								
R_{g1} max. = 500kΩ	0.25	—	—	0.5	—	—	—	μA
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
Anode current	0.65	8.25	6.0	10.5	—	—	—	mA
	—	—	—	—	7.6	8.9	0.77	mA
Screen-grid current	0.65	—	1.2	3.0	—	—	—	mA
	—	—	—	—	—	2.4	—	mA
Mutual conductance	0.65	2.45	1.8	3.1	—	—	—	mA/V
	—	—	—	—	2.25	2.65	0.23	mA/V
Group quality level[10]	1.0	—	—	—	—	—	—	

GROUP C

Mutual conductance. V_{g1} = –26V	2.5	—	4.0	60	—	—	—	μA/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-e} = 300V, V_{g2-e} = 200V, R_k = 240Ω	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 = 2.0kΩ	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 = 50μA	6.5	—	–55	–125	—	—	—	V
Amplification factor (μ_{g1-g2})	6.5	—	23	39	—	—	—	

TESTS	A.Q.L.[5] (%)	Individuals[6] Bogey[9]	Individuals[6] Min.	Individuals[6] Max.	Lot average[7] Min.	Lot average[7] Max.	Lot standard deviation[8] Max.	
GROUP E								
Fatigue[14]								
V_h = 6.9V, 1 minute on 3 minutes off. No other voltages applied, 5g min. peak acceleration, f = 170 ± 5c/s for 33 hours in each of 3 mutually perpendicular planes.								
Post fatigue tests								
Heater-to-cathode leakage current. V_{h-k} = ±100V	2.5	—	—	20	—	—	—	μA
Reverse grid current. R_{g1} max. = 500kΩ	2.5	—	—	1.0	—	—	—	μA
Mutual conductance	2.5	—	1.6	3.1	—	—	—	mA/V
Microphonic noise as in group C	2.5	—	—	25	—	—	—	mV (r.m.s.)
Shock[15]								
No applied voltages, 500g								
Post shock tests								
Heater-to-cathode leakage current. V_{h-k} = ±100V	2.5	—	—	20	—	—	—	μA
Reverse grid current. R_{g1} max. = 500kΩ	2.5	—	—	1.0	—	—	—	μA
Mutual conductance	2.5	—	1.6	3.1	—	—	—	mA/V
Microphonic noise as in group C	2.5	—	—	25	—	—	—	mV (r.m.s.)

GROUP F

Stability life test[14]

Running conditions. $R_{g1} = 100k\Omega$, $V_a = 250V$, $V_{h-k} = 135V$ (cathode negative), $R_k = 160\Omega$, $V_{g1-e} = 0V$

Stability life test end point

Change in mutual conductance after 1 hour	1.0	—	—	10	—	—	—	%

Intermittent life test

Running conditions. $R_{g1} = 100k\Omega$, $V_a = 250V$, $V_{h-k} = 135V$ (cathode negative), $R_k = 160\Omega$

Intermittent life test end points

		A.Q.L.[5] (%)	Min.	Max.	
Sub-group (a)					
Inoperatives[16]	500 hours	2.5	—	—	
	1000 hours	4.0	—	—	
Heater current	500 hours	2.5	184	216	mA
Heater-to-cathode leakage current. $V_{h-k} = \pm 100V$	500 hours	2.5	—	20	μA
	1000 hours	4.0	—	30	μA
Reverse grid current. R_{g1} max. = 500kΩ	500 hours	2.5	—	0.75	μA
	1000 hours	4.0	—	1.0	μA
Mutual conductance	500 hours	2.5	1.6	3.1	mA/V
	1000 hours	4.0	1.5	3.1	mA/V
Average change in mutual conductance	500 hours	—	—	15	%
Sub-group (b)					
Insulation as in group A	500 hours	4.0	50	—	MΩ
	1000 hours	6.5	30	—	MΩ
Group quality level[10]	500 hours	6.5	—	—	
	1000 hours	10	—	—	

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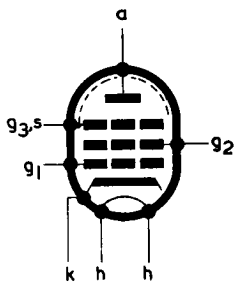
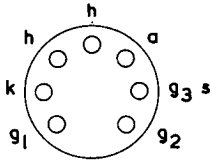
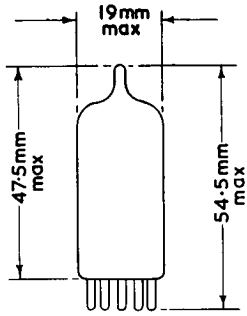
	A.Q.L.[5] (%)	Min.	Max.	
GROUP G				
Valves are held for 28 days and retested for				
Inoperatives[16]	0.5	—	—	
Reverse grid current. R_{g1} max. = 500kΩ	0.5	—	0.75	μA

3594

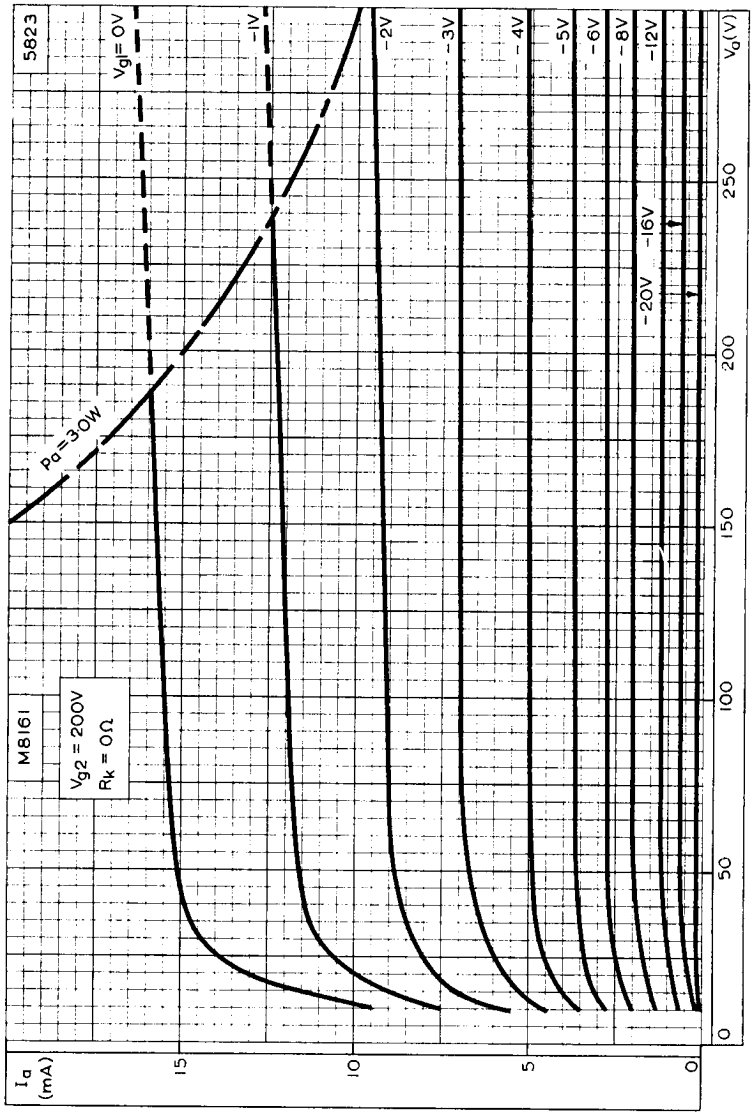




B7G Base



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_{g2} = 200V.

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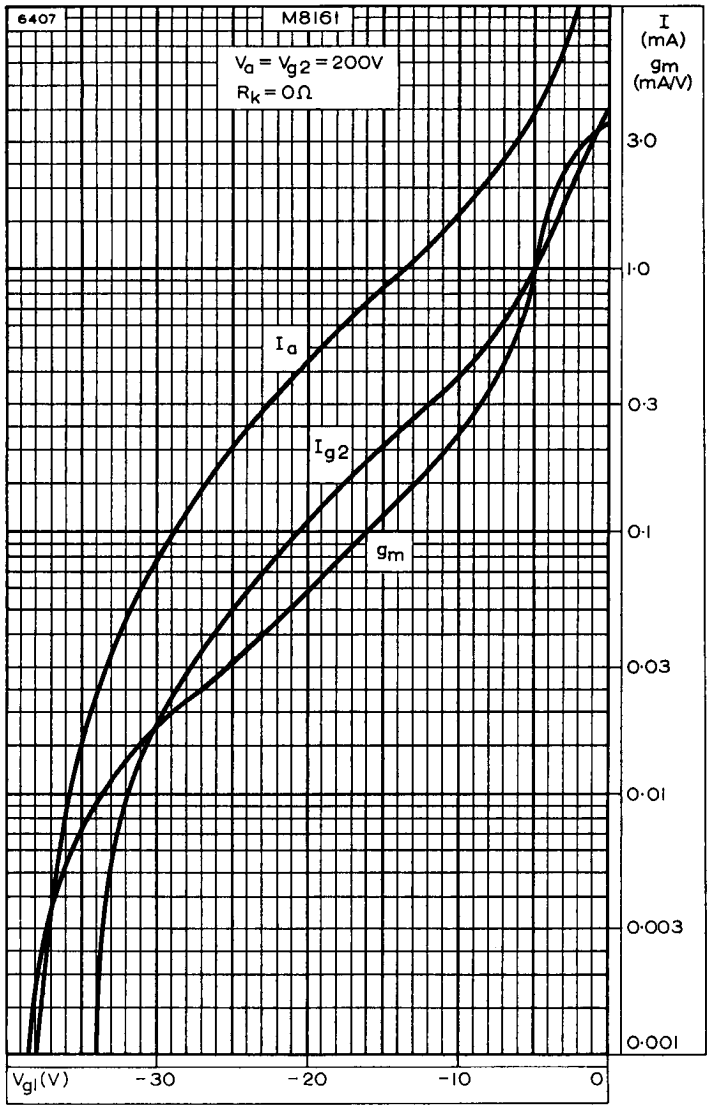
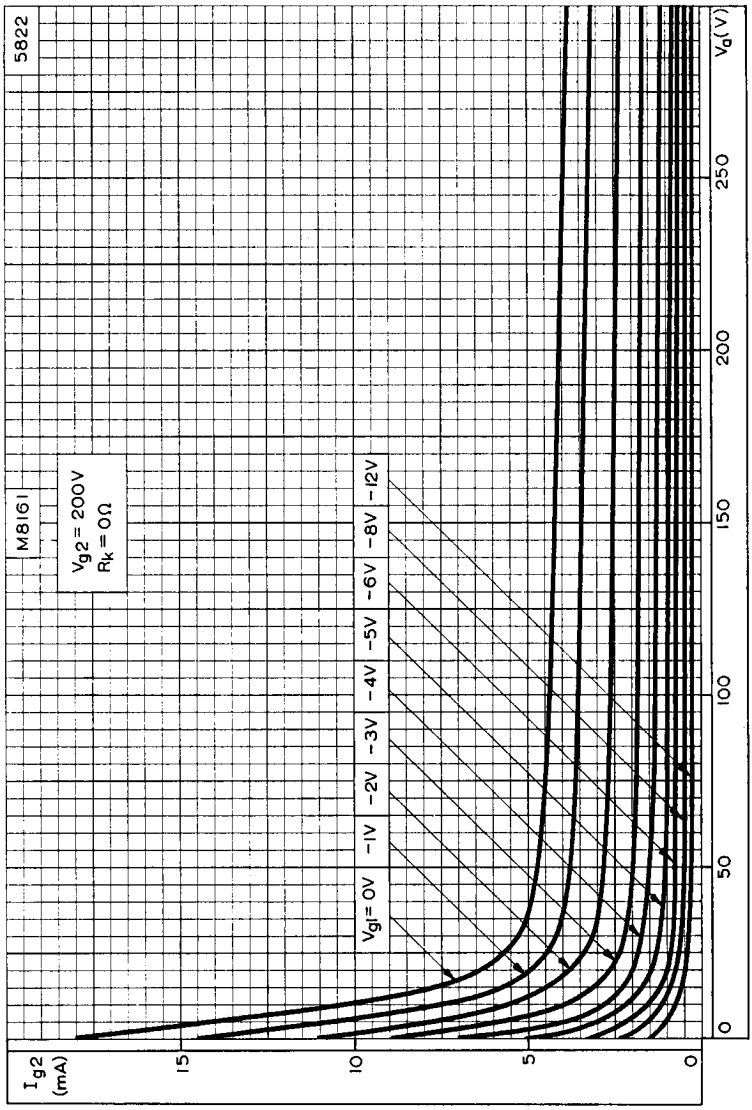


ANODE CURRENT, SCREEN-GRID CURRENT AND MUTUAL CONDUCTANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE. $V_a = V_{g2} = 200V$.



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

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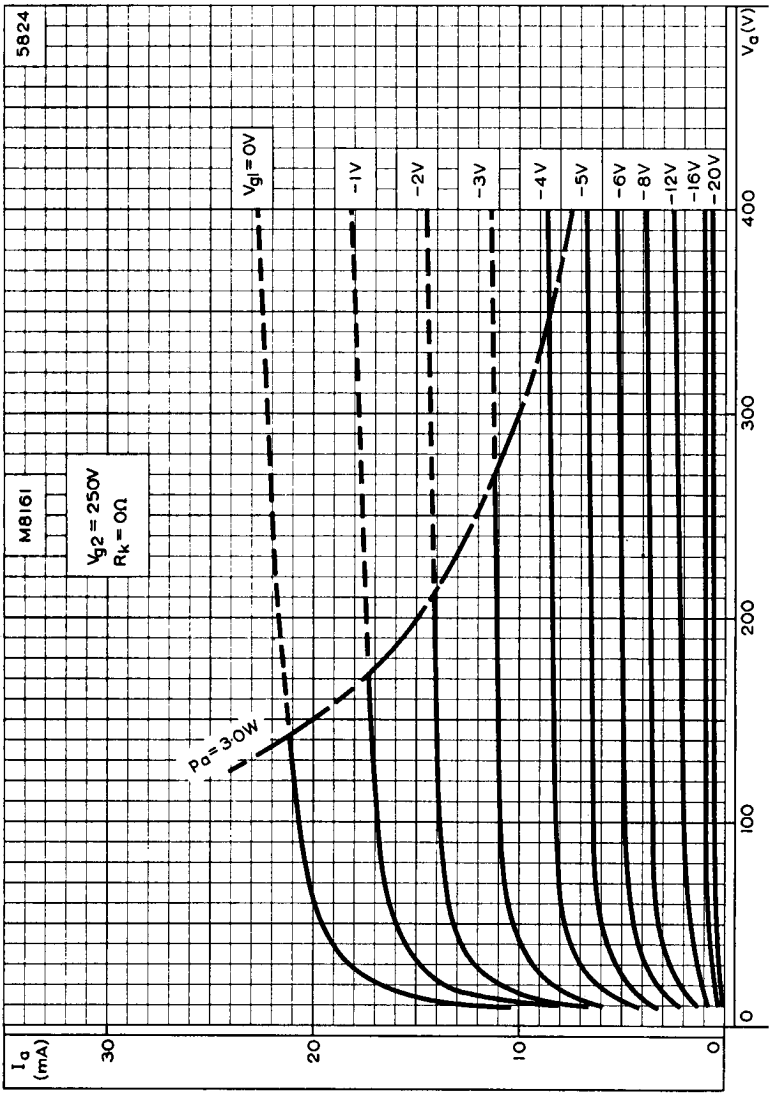
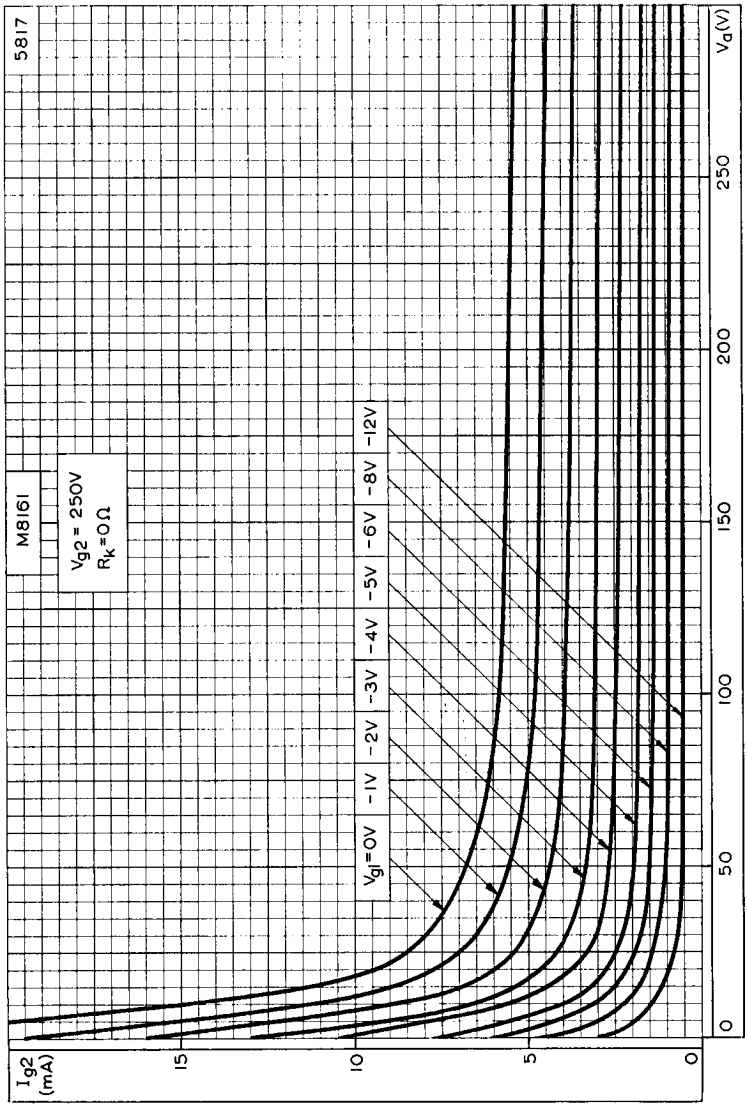


ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. V_{g2} = 250V.



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

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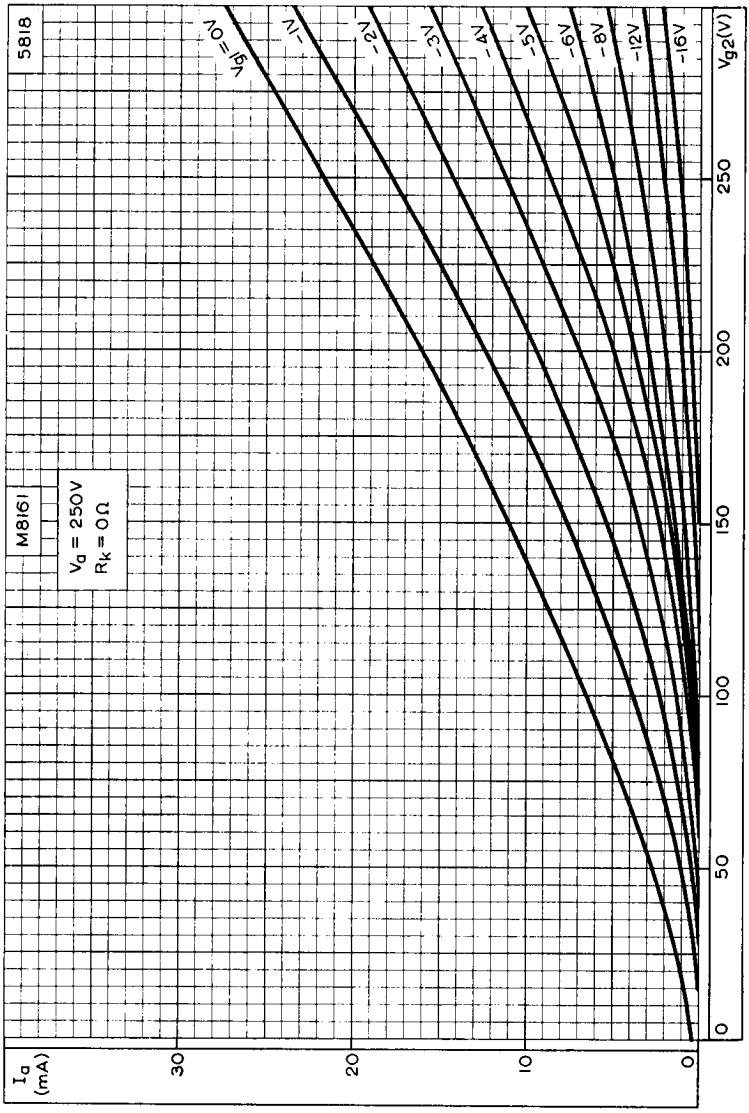
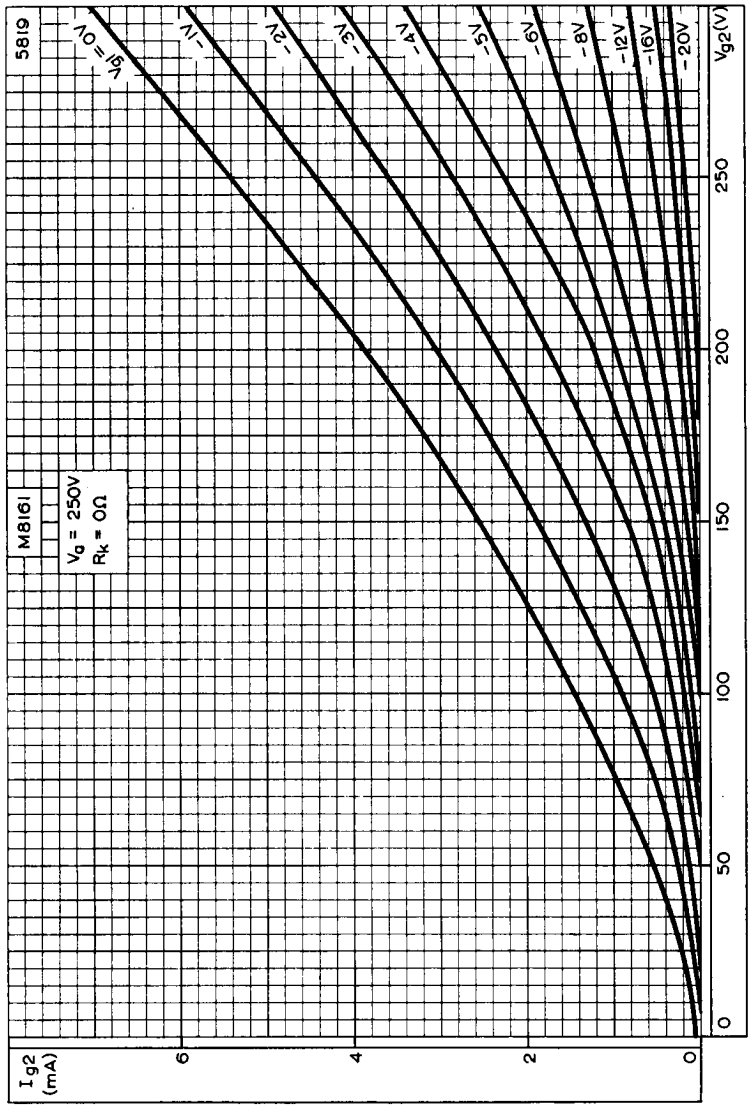


ANODE CURRENT PLOTTED AGAINST SCREEN-GRID VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. V_a = 250V.



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

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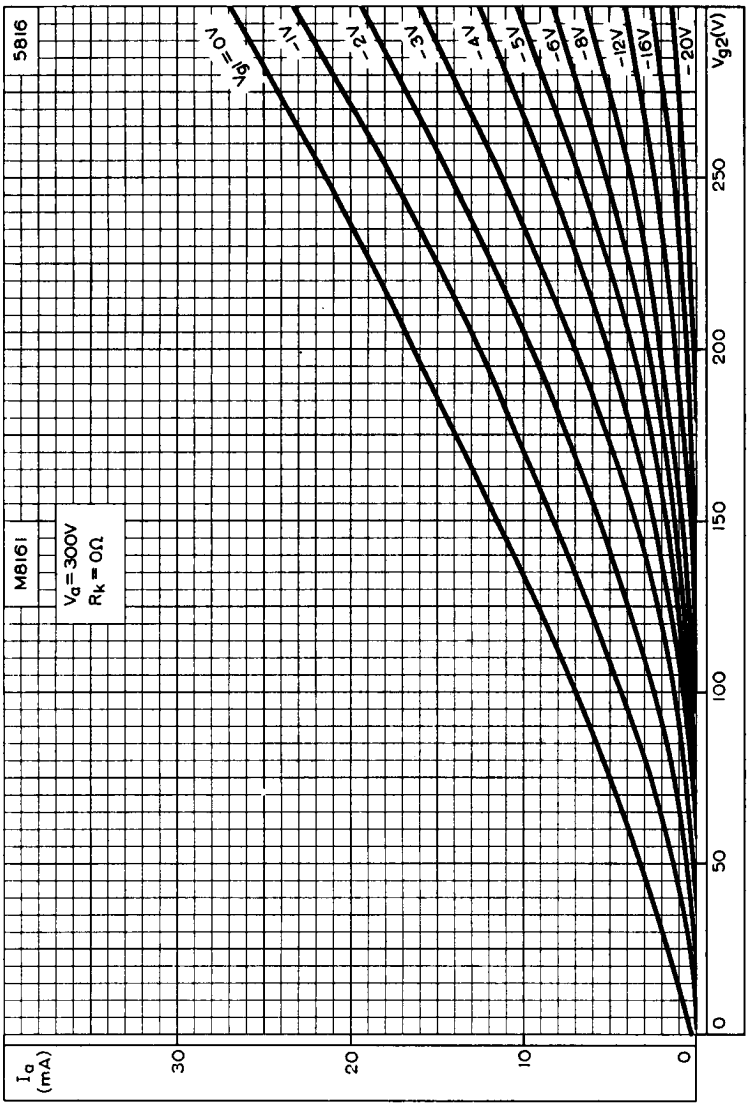
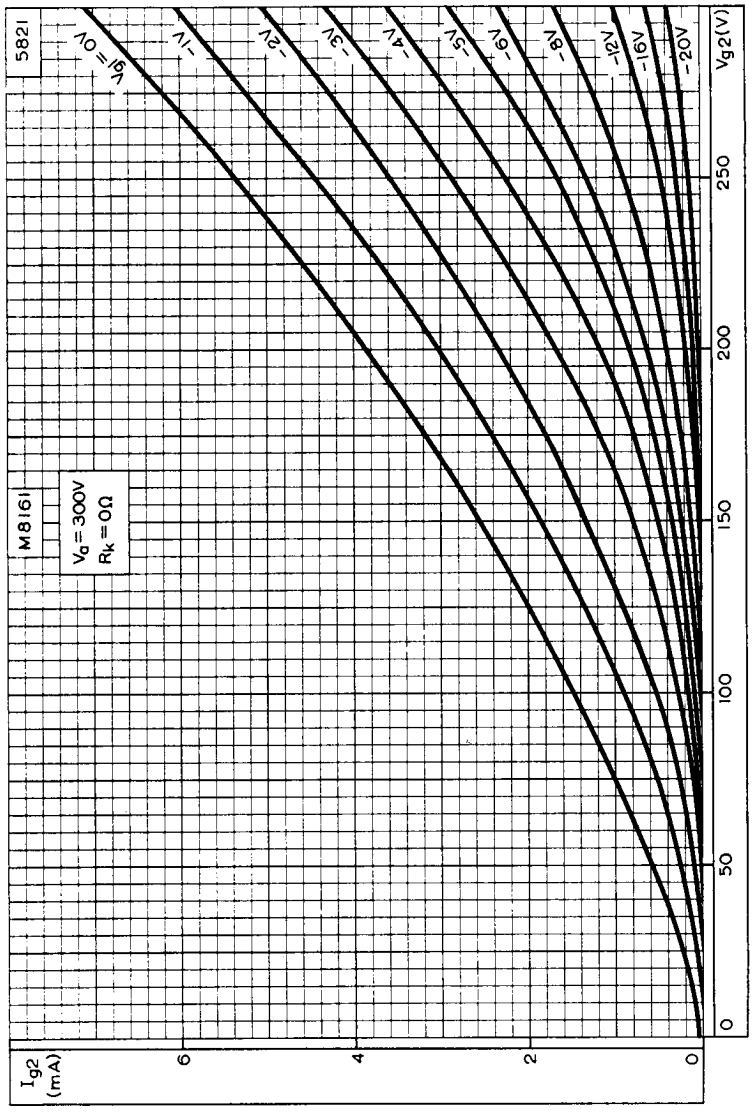


ANODE CURRENT PLOTTED AGAINST SCREEN-GRID VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. V_a = 300V.



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

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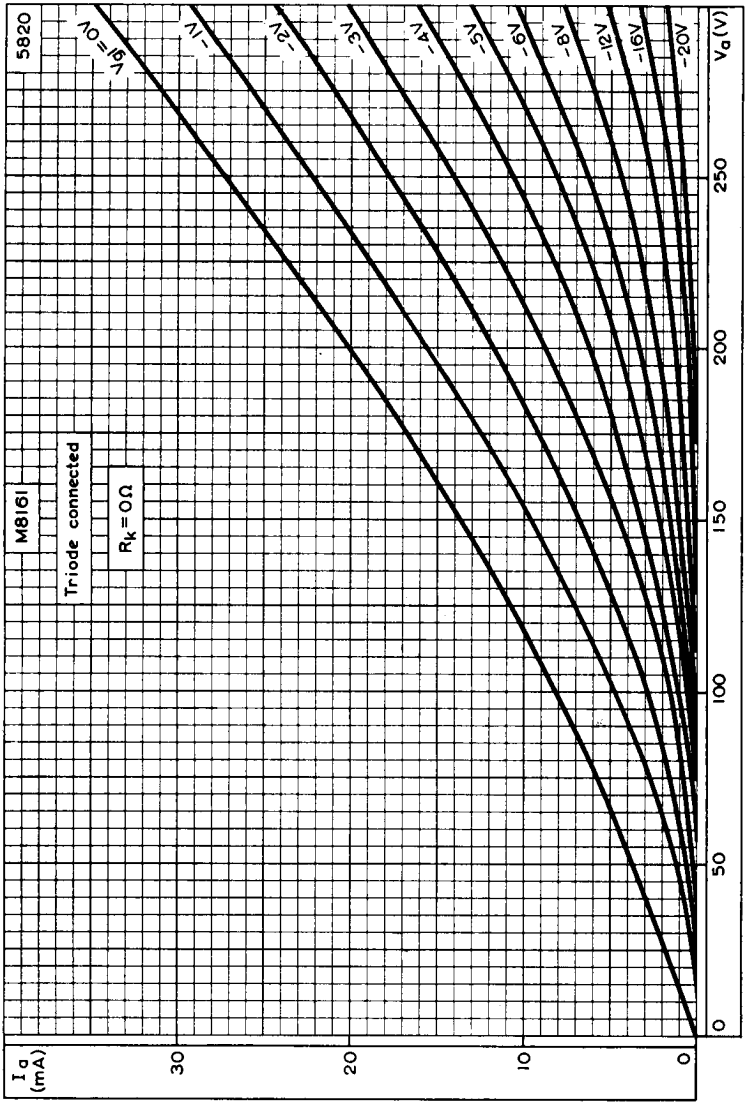

ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER, WHEN TRIODE CONNECTED.