

SPECIAL QUALITY OUTPUT PENTODE

E80L

Special quality output pentode designed for use in industrial equipment 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 series or parallel operation, a.c. or d.c.

V_h^1	6.3	V
I_h	700	mA

The maximum variation of heater current at $V_h = 6.3V$ is $\pm 35mA$. In order to achieve a useful valve life with the heater in a series connected chain, the absolute maximum variation of heater current due to voltage fluctuations and component tolerances should be $< \pm 1.5\%$.

MOUNTING POSITION

Any

CAPACITANCES²

	Minimum	Average	Maximum	←
C_{a-g1}	—	—	150	mpF
C_{in}	9.2	10	10.8	pF
C_{out}	6.3	6.8	7.3	pF
C_{g1-h}	—	—	250	mpF
C_{h-k}	—	7.0	—	pF

CHARACTERISTICS³

V_a	200	V
V_{g3}	0	V
V_{g2}	200	V
V_{g1}	-4.4	V
I_a	30	mA
I_{g2}	4.1	mA
g_m	9.0	mA/V
r_a	52	$k\Omega \leftarrow$
μ_{g1-g2}	21.5	
R_k	0	Ω

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

	Average	Initial range	End of life*
Anode current			
at $V_{a-e} = V_{g2-e} = 204.5V$ $V_{g3-k} = 0V, R_k = 130\Omega$	30	26.5 to 33.5	21 mA
at $V_{a-k} = V_{g2-k} = 200V$ $V_{g3-k} = 0V, V_{g1} = -14V$	—	< 200	— μA
Screen-grid current			
at $V_{a-e} = V_{g2-e} = 204.5V$ $V_{g3-k} = 0V, R_k = 130\Omega$	4.1	2.7 to 5.5	2.0 mA
Control-grid current			
at $V_{a-e} = V_{g2-e} = 204.5V$ $V_{g3-k} = 0V, R_k = 130\Omega$	—	< 0.5	1.0 μA
Mutual conductance			
at $V_{a-e} = V_{g2-e} = 204.5V$ $V_{g3-k} = 0V, R_k = 130\Omega$	9.0	7.4 to 10.6	6.0 mA/V
Power output			
at $V_{a-k} = V_{g2-k} = 200V$ $V_{g3-k} = 0V, I_a = 30mA$	—	> 2.0	— W

*To allow for valve deterioration during life, circuits should be designed to function with a valve whose characteristics have changed to the values stated.

OPERATING CONDITIONS AS SINGLE VALVE CLASS 'A' AMPLIFIER

V_{a-k}	200	250	V
V_{g3-k}	0	0	V
$V_{g2(b)}$	—	250	V
V_{g2-k}	200	—	V
R_k	130	270	Ω
R_a	7.0	10	k Ω
R_{g2}	—	1.0	k Ω
I_a	30	24	mA
I_{g2}	4.1	3.3	mA
$V_{in(r.m.s.)}$ ($P_{out} = 50mW$)	330	—	mV
$V_{in(r.m.s.)}$	3.0	3.0	V
P_{out}	2.7	2.8	W
D_{tot}	10	10	%



OPERATING CONDITIONS FOR TWO VALVES IN CLASS 'AB' PUSH-PULL

V_{a-k}	200	250	V
V_{g3-k}	0	0	V
V_{g2-k}	200	250	V
R_k (per valve)	130	270	Ω
R_{a-a}	9	9	k Ω
$I_{a(o)}$	2×20.6	2×23.5	mA
$I_{g2(o)}$	2×2.8	2×3.2	mA
$V_{in(g1-g1)r.m.s.}$	10.4	15.6	V
P_{out}	5.7	9.0	W
D_{tot}	3.0	4.5	$\frac{o}{o}$
I_a (max. sig.)	2×24.6	2×29.5	mA
I_{g2} (max. sig.)	2×4.9	2×6.6	mA

INSULATION

	<i>Initial Range</i>	<i>End of life*</i>
Between heater and cathode		
Measured at $V_{h-k} = 120V$		
(cathode positive) $R_{lim} = 1.0M\Omega$		
Leakage current	< 15	20 μA
Between any two arbitrary electrodes		
Measured at 300V		
(cathode positive)	> 50	10 M Ω

*To allow for valve deterioration during life, circuits should be designed to function with a valve whose characteristics have changed to the values stated.

ABSOLUTE MAXIMUM RATINGS¹

$V_{a(b)}$ max.	600	V
V_a max.	300	V
p_a max.	8.0	W
$V_{g2(b)}$ max.	600	V
V_{g2} max.	300	V
p_{g2} max.	2.6	W
$-V_{g1}$ max.	100	V
$-V_{g3}$ max.	100	V
I_k max.	50	mA
R_{g1-k} max. (self bias)	1.0	M Ω
V_{h-k} max.	120	V
R_{h-k} max.	20	k Ω
T_{bulb} max.	225	$^{\circ}C$

SHOCK AND VIBRATION

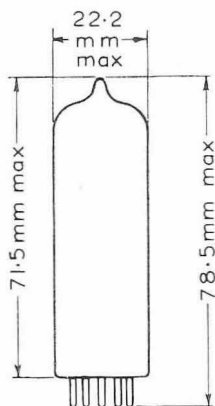
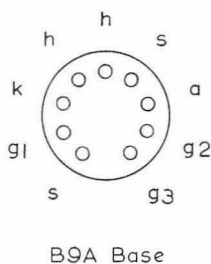
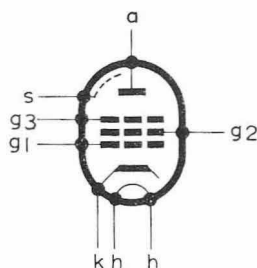
The E80L can withstand vibrations of 2.5g and 50c/s for 96 hours and is proof against impact accelerations of approximately 500g.

OPERATING NOTES

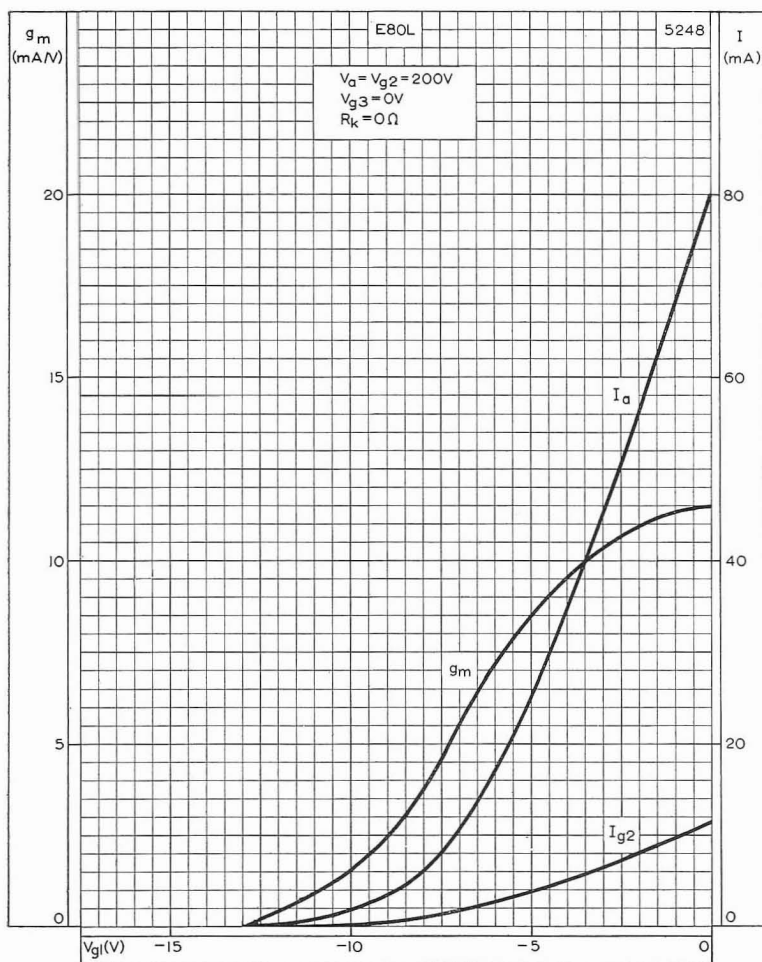
The hum voltage referred to g_1 has a maximum value of $250\mu V$ and is measured with the centre tap of the heater winding earthed, at a supply frequency of 50c/s and with a linear band-pass filter under the following conditions:

V_{a-k}	200	V
V_{g2-k}	200	V
R_a	1.0	k Ω
R_k	130	Ω

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The bulb and base dimensions of this valve are in accordance with BS448 Section B9A

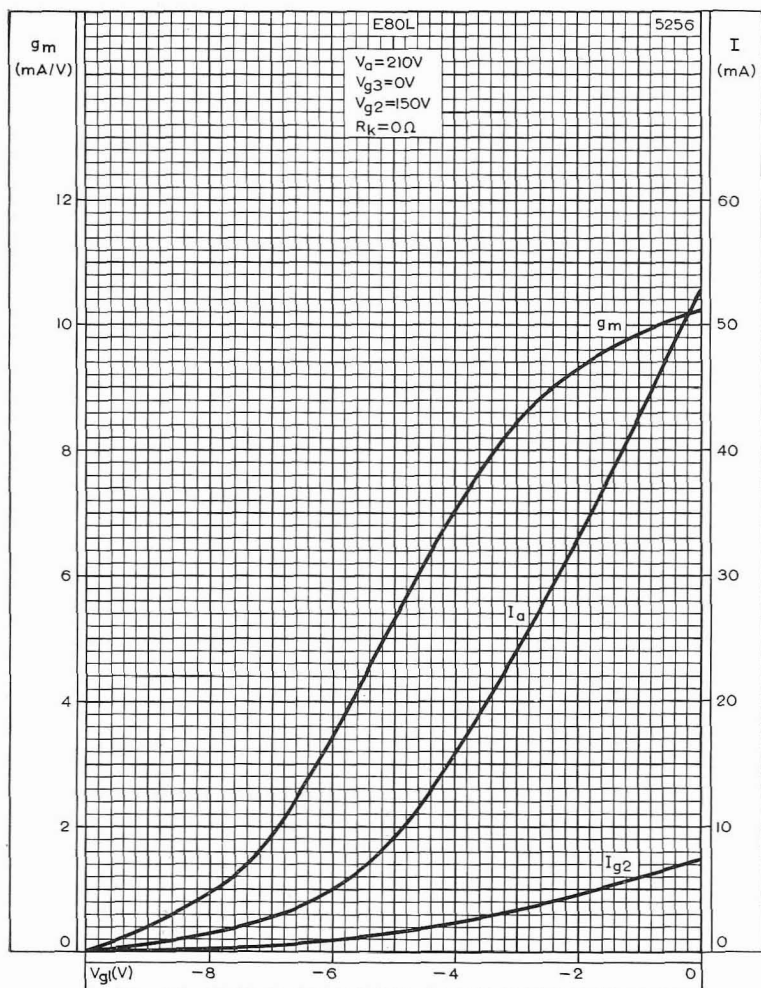


ANODE CURRENT, SCREEN-GRID CURRENT AND MUTUAL
CONDUCTANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE

$$V_a = V_{g2} = 200V$$

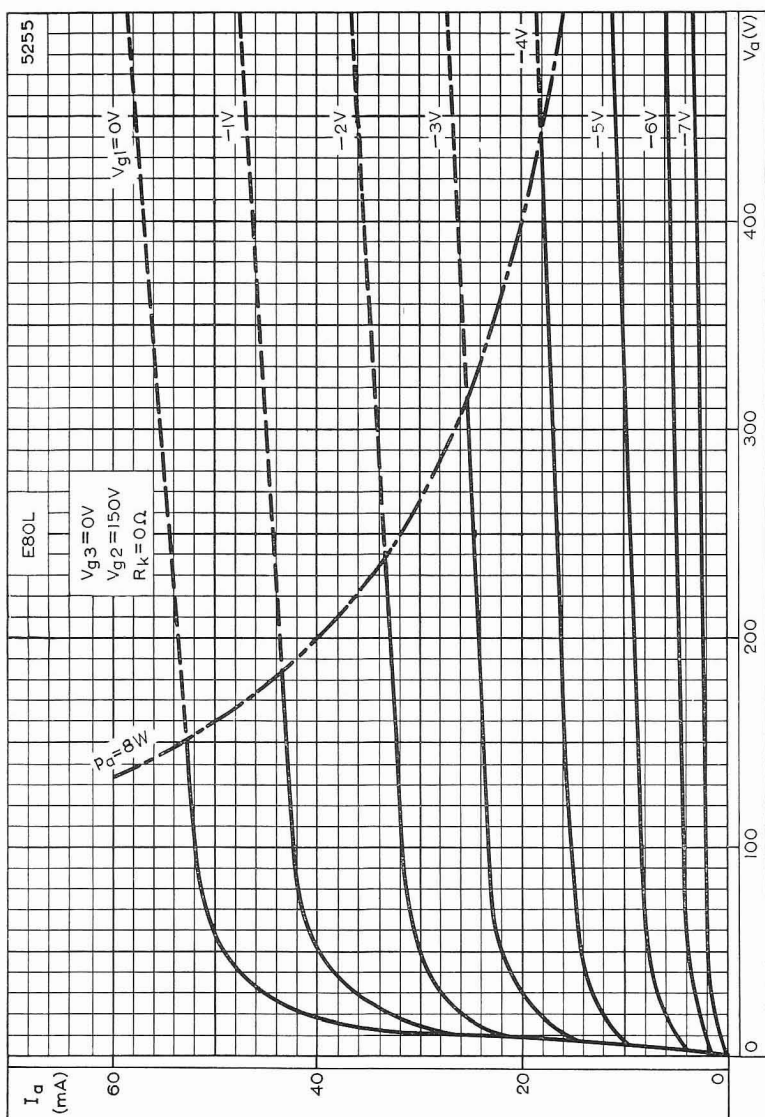
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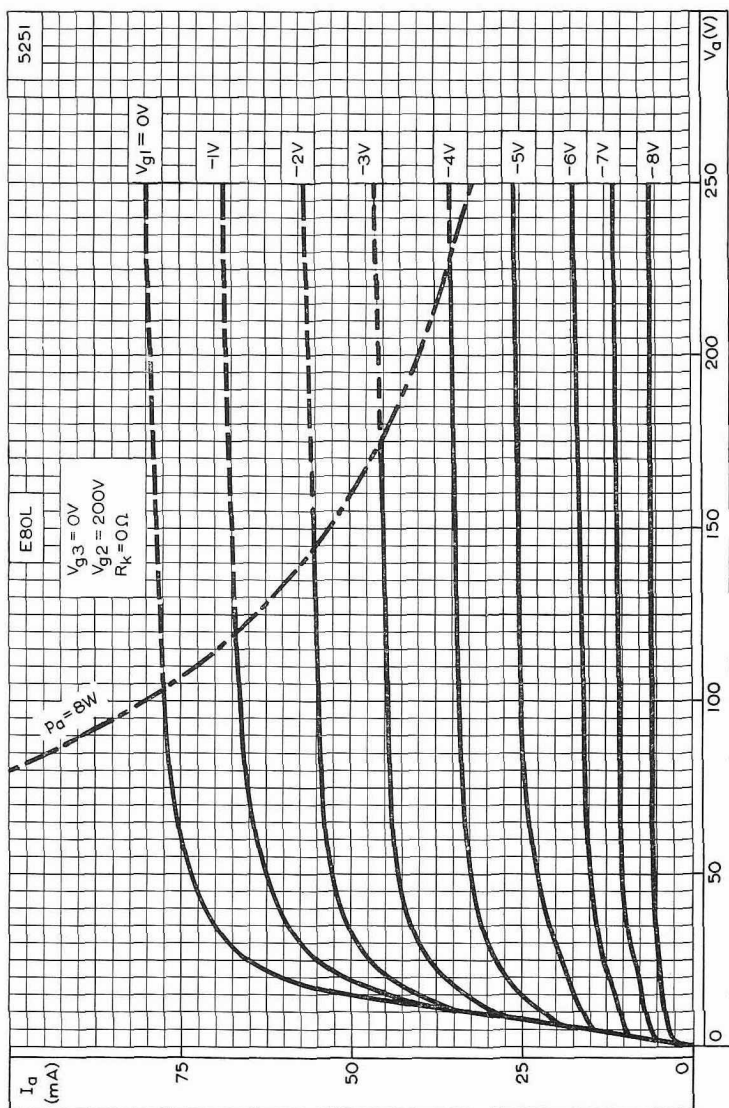
ANODE CURRENT, SCREEN-GRID CURRENT AND MUTUAL CONDUCTANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE

$V_{g1} = 210V$, $V_{g2} = 150V$



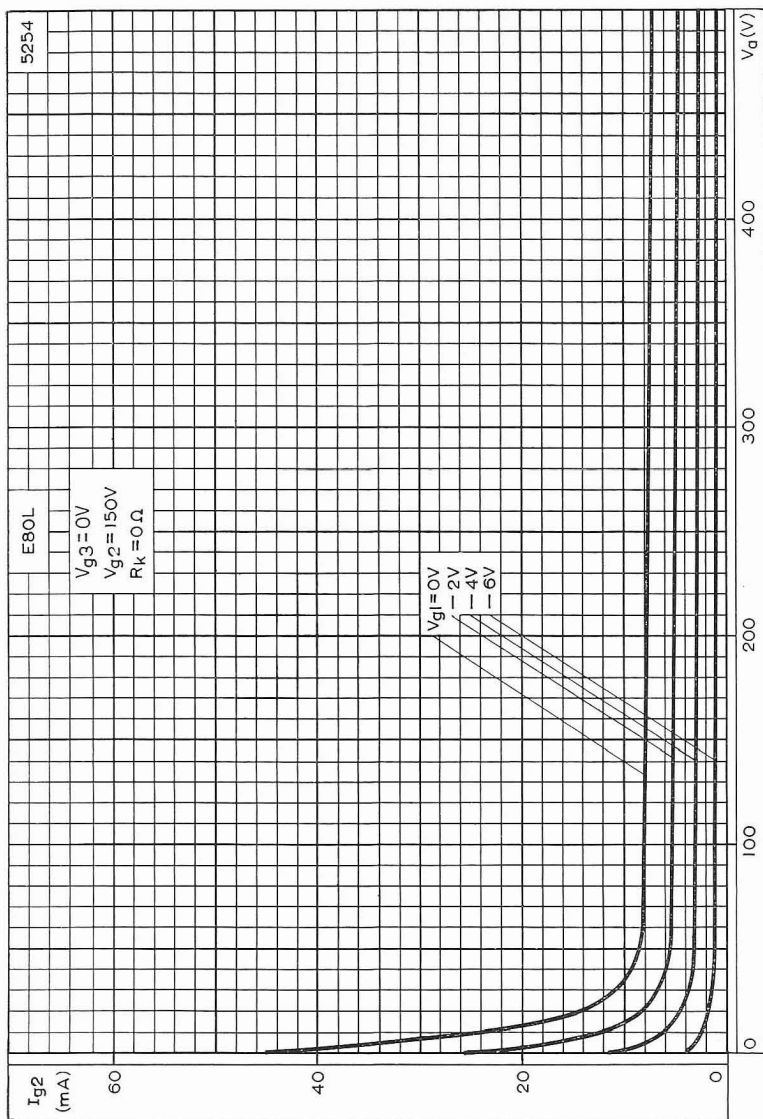
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH
 CONTROL-GRID VOLTAGE AS PARAMETER
 $V_{g2} = 150V$





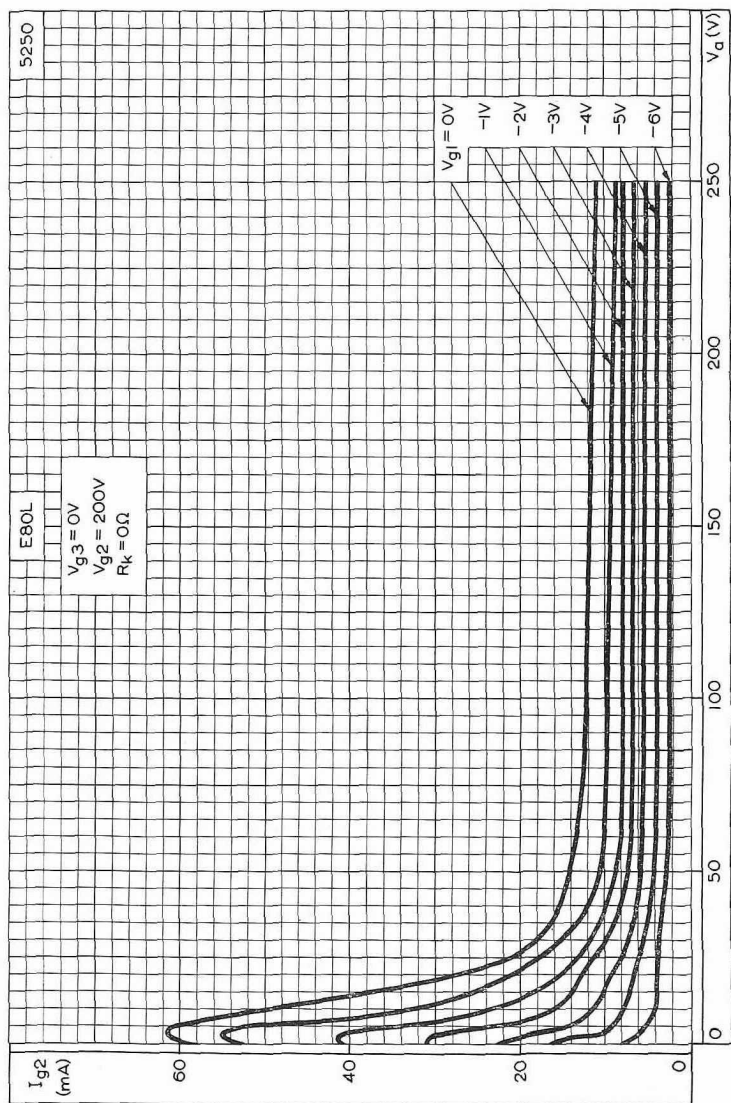
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH
 CONTROL-GRID VOLTAGE AS PARAMETER

$V_{g2} = 200V$

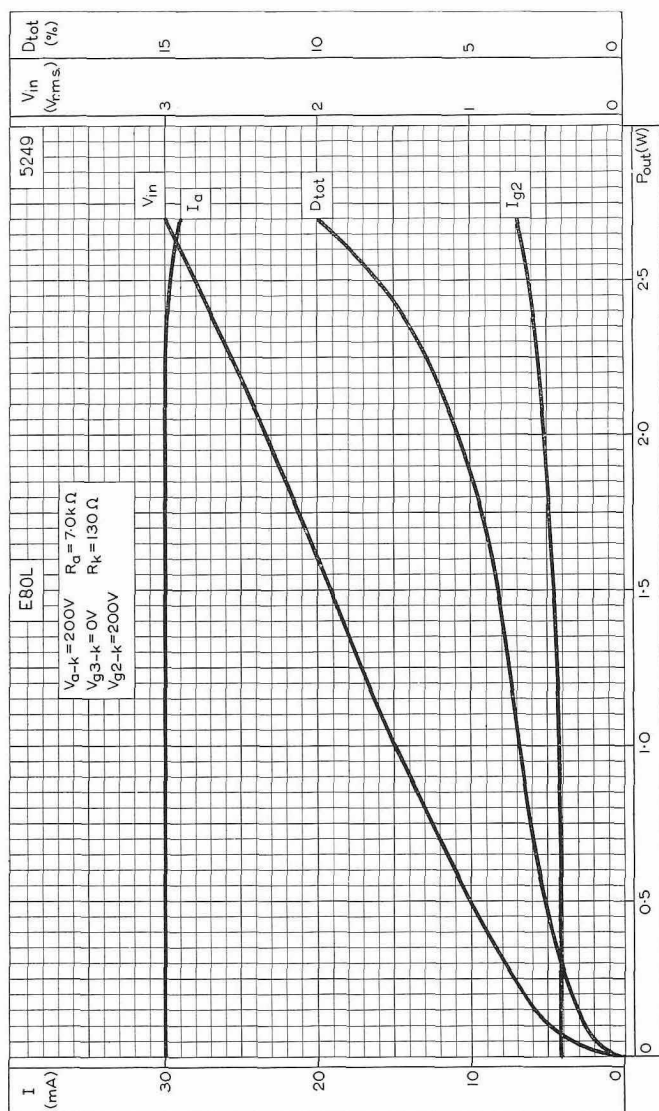


SCREEN-GRID CURRENT PLOTTED AGAINST ANODE VOLTAGE
 WITH CONTROL-GRID VOLTAGE AS PARAMETER

$V_{g2} = 150V$

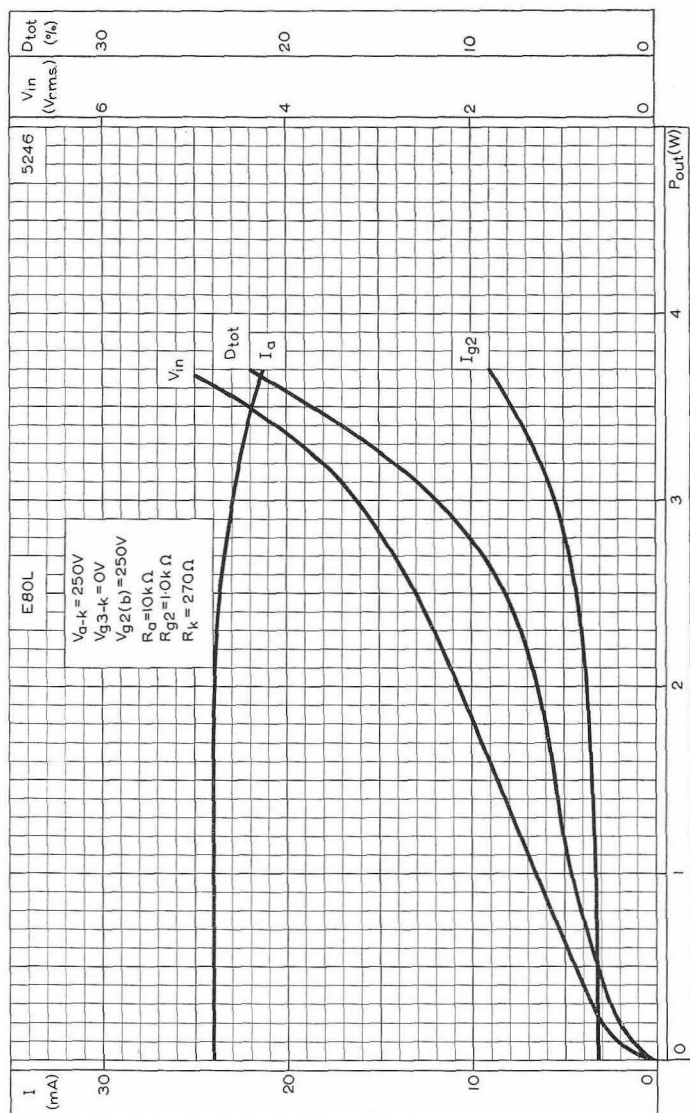


SCREEN-GRID CURRENT PLOTTED AGAINST ANODE VOLTAGE
WITH CONTROL-GRID VOLTAGE AS PARAMETER
 $V_{g2} = 200V$

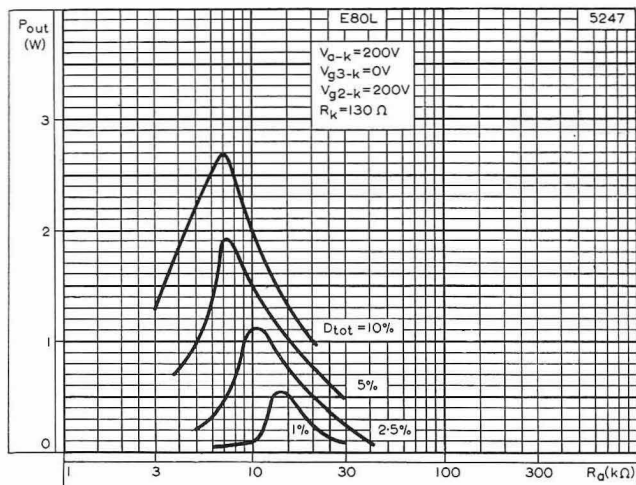
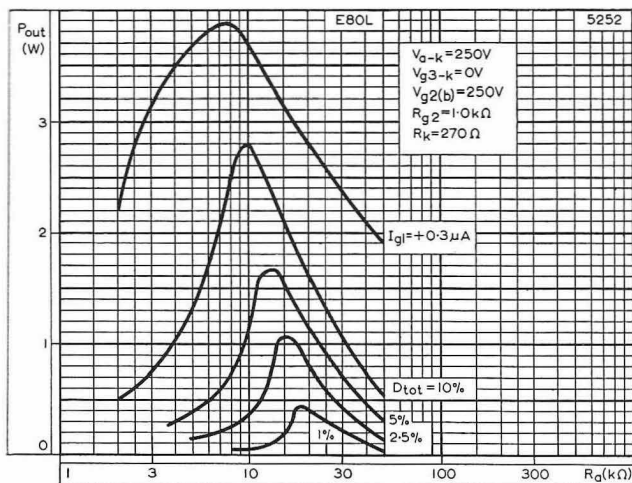
PERFORMANCE OF E80L AS CLASS 'A' AMPLIFIER. $R_k = 7.0k\Omega$

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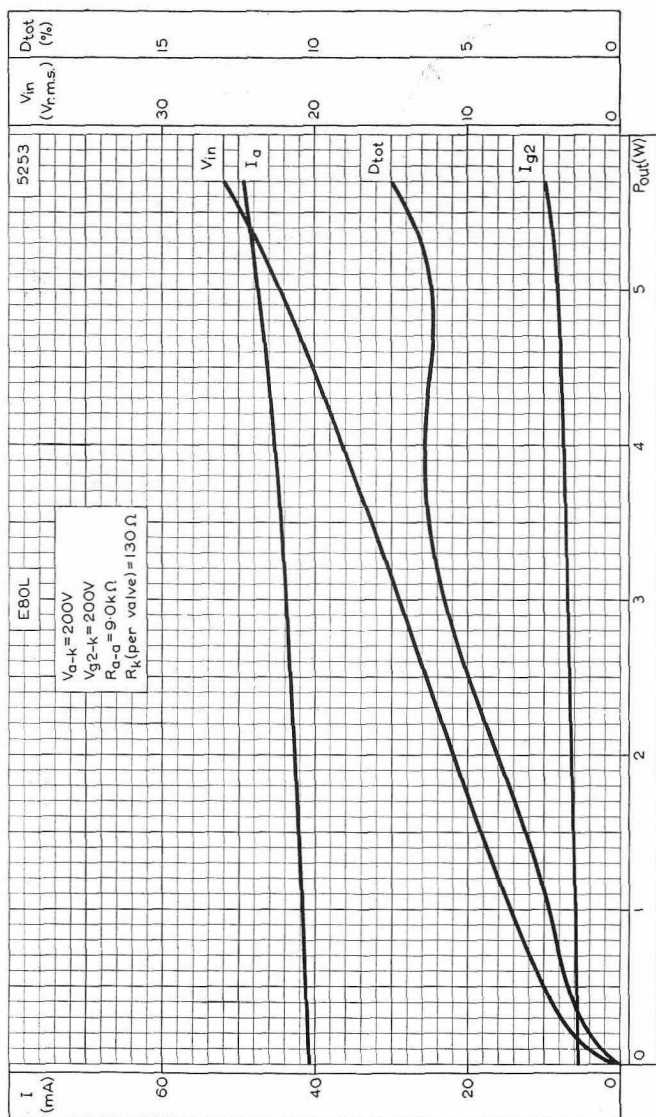


PERFORMANCE OF E80L AS CLASS 'A' AMPLIFIER. $R_a = 10k\Omega$

POWER OUTPUT PLOTTED AGAINST ANODE LOAD. $V_a = 200V$ POWER OUTPUT PLOTTED AGAINST ANODE LOAD. $V_a = 250V$

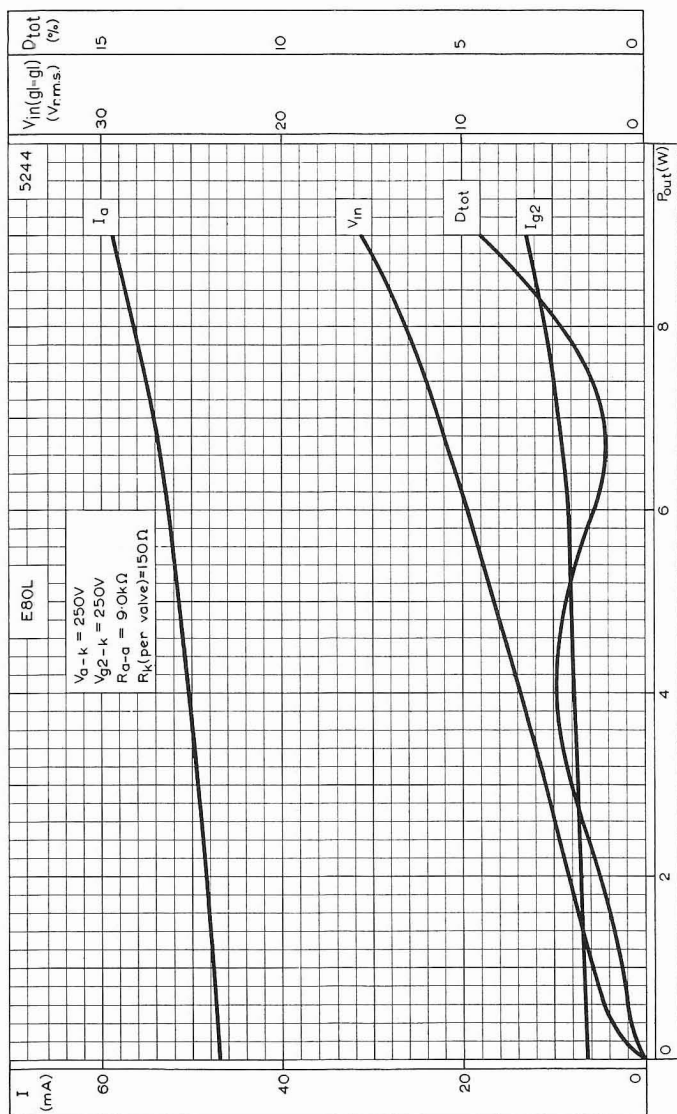
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PERFORMANCE OF $2 \times E80L$ IN CLASS 'AB' PUSH-PULL
 $V_{a-k} = V_{g2-k} = 200V$



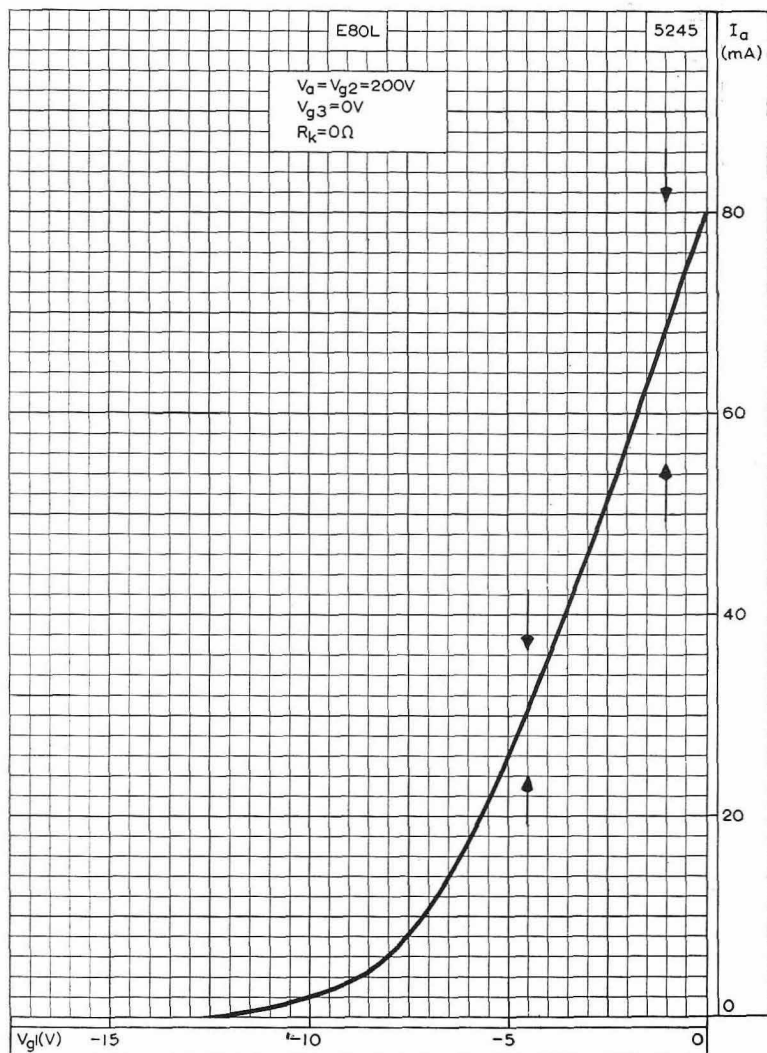
PERFORMANCE OF $2 \times E80L$ IN CLASS 'AB' PUSH-PULL

$$V_{a-k} = V_{g2-k} = 250V$$



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ANODE CURRENT PLOTTED AGAINST CONTROL-GRID VOLTAGE
WITH INDICATION OF INITIAL SPREADS