

TRIODE PENTODE

PCL83

Combined triode and output pentode with separate cathodes for use in television receivers with the triode as a frame blocking oscillator and the pentode as a frame output valve.

HEATER

Suitable for series operation a.c. or d.c.

I_h
 V_h

300 mA
12.6 V

MOUNTING POSITION

Any

CAPACITANCES (measured without an external shield)

C_{at-gp}
 C_{at-ap}
 C_{gt-gp}
 C_{gt-ap}

<0.1 pF
<1.6 pF
<0.03 pF
<0.05 pF

Pentode Section

C_{a-g1}
 C_{in}
 C_{out}
 C_{g1-h}

<0.2 pF
5.7 pF
4.7 pF
0.4 pF

Triode Section

C_{a-g}
 C_{a-k+h}
 C_{g-k+h}
 C_{g-h}

1.6 pF
0.35 pF
2.0 pF
0.1 pF

CHARACTERISTICS

Pentode Section

V_a
 V_{g2}
 I_a
 I_{g2}
 V_{g1}
 g_m
 r_a
 μ_{g1-g2}

170 V
170 V
30 mA
5.0 mA
-9.5 V
5.5 mA/V
53 kΩ
10

Triode Section

V_a
 I_a
 V_g
 g_m
 r_a
 μ

250 V
10.5 mA
-8.5 V
2.2 mA/V
7.7 kΩ
17

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PENTODE SECTION AS FRAME OUTPUT VALVE

Circuit design

To allow for valve spread and deterioration during life the frame output circuit should be designed around the following values.

V_a	70	70	V
V_{g2}	170	200	V
$i_{a(pk)}$	54	64	mA

For an average new valve the following figures will apply.

V_a	70	70	V
V_{g2}	170	200	V
$i_{a(pk)}$	81	96	mA

PENTODE SECTION AS AUDIO OUTPUT VALVE

Single Valve Class 'A'

V_a	170	200	V
V_{g2}	170	200	V
V_{g1}	-9.5	-13	V
$i_{a(o)}$	30	27	mA
$i_{g2(o)}$	4.8	4.4	mA
R_a	5.5	7.5	k Ω
$V_{in(r.m.s.)}$	5.0	5.2	V
P_{out}	2.2	2.5	W
D_{tot}	10	10.5	%

Two Valves in Class 'AB' Push-Pull

V_a	170	200	V
V_{g2}	170	200	V
R_k	180	220	Ω
$i_{a(o)}$	2×24	2×25	mA
i_a (max. sig.)	2×27.5	2×29	mA
$i_{g2(o)}$	2×3.8	2×3.9	mA
i_{g2} (max. sig.)	2×6.25	2×8.5	mA
R_{a-a}	6.5	7.5	k Ω
$V_{in(g1-g1)} \text{ r.m.s.}$	17	23.5	V
P_{out}	5.0	7.2	W
D_{tot}	3.6	4.2	%

TRIODE SECTION AS A.F. VOLTAGE AMPLIFIER

V_b (V)	R_a (k Ω)	i_a (mA)	R_k (k Ω)	$\frac{V_{out}}{V_{in}}$	V_{out} (V r.m.s.)	R_{g1}^* (k Ω)
170	100	1.07	2.7	14	21	330
200	100	1.17	3.3	13.5	26.5	330

$\frac{V_{out}}{V_{in}}$ measured with an input voltage of 100mV

V_{out} measured for a total harmonic distortion of 5%

*Grid resistor of following valve.

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LIMITING VALUES

Pentode Section

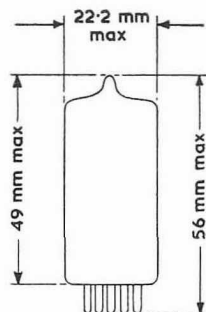
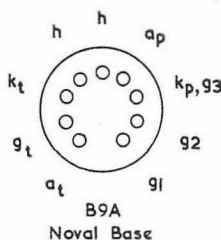
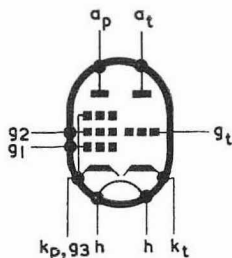
$V_{a(b)}$ max.	550	V
V_a max.	250	V
$+V_{a(pk)}$ max.	2.0	kV
$-V_{a(pk)}$ max.	500	V
p_a max.	5.4	W
$V_{g2(b)}$ max.	550	V
V_{g2} max.	250	V
p_{g2} max.	1.2	W
p_{g2} max. (speech and music)	2.4	W
I_k max.	45	mA
R_{g1-k} max. (self bias)	500	k Ω
R_{g1-k} max. (fixed bias)	250	k Ω
R_{g1-k} max. (timebase operation)	2.2	M Ω
V_{h-k} max. (d.c. heater negative with respect to cathode or a.c.r.m.s.)	250	V
V_{h-k} max. (d.c. heater positive with respect to cathode)	150	V

Triode Section

$V_{a(b)}$ max.	550	V
V_a max.	250	V
p_a max.	3.5	W
I_k max.	20	mA
$*I_{k(pk)}$ max.	250	mA
$-V_{g1(pk)}$ max.	350	V
R_{g1-k} max.	1.0	M Ω
V_{h-k} max. (d.c. heater negative with respect to cathode or a.c.r.m.s.)	250	V
V_{h-k} max. (d.c. heater positive with respect to cathode)	150	V

*Max. pulse duration 400 μ sec.

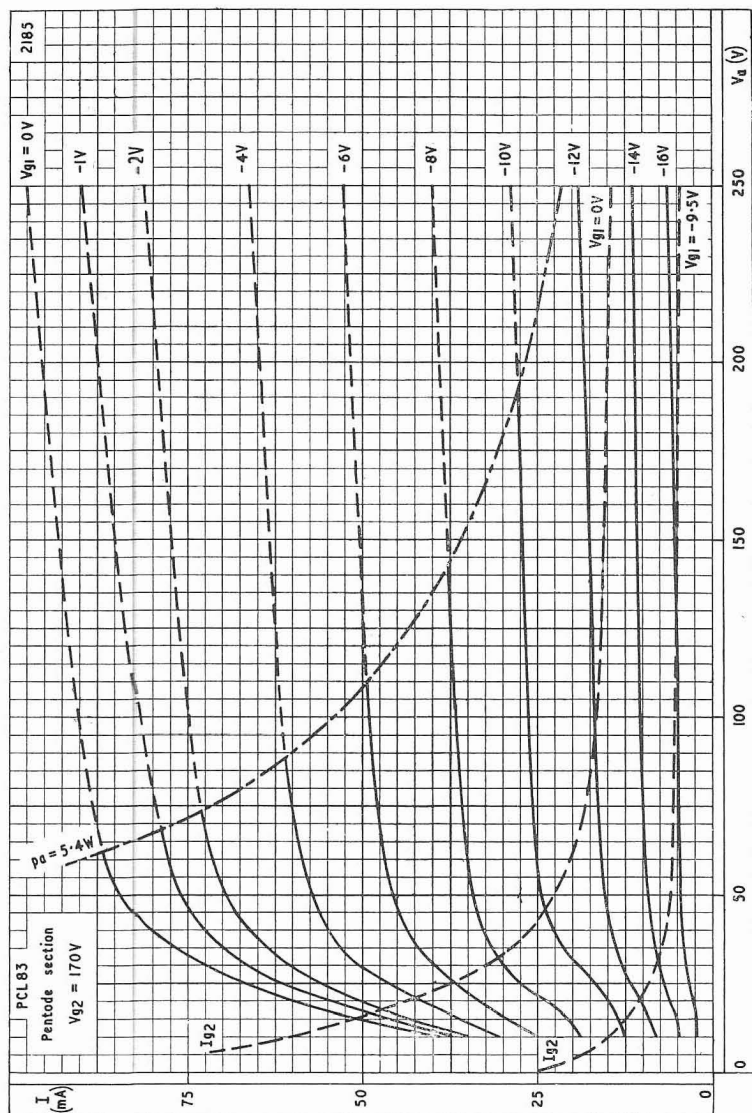
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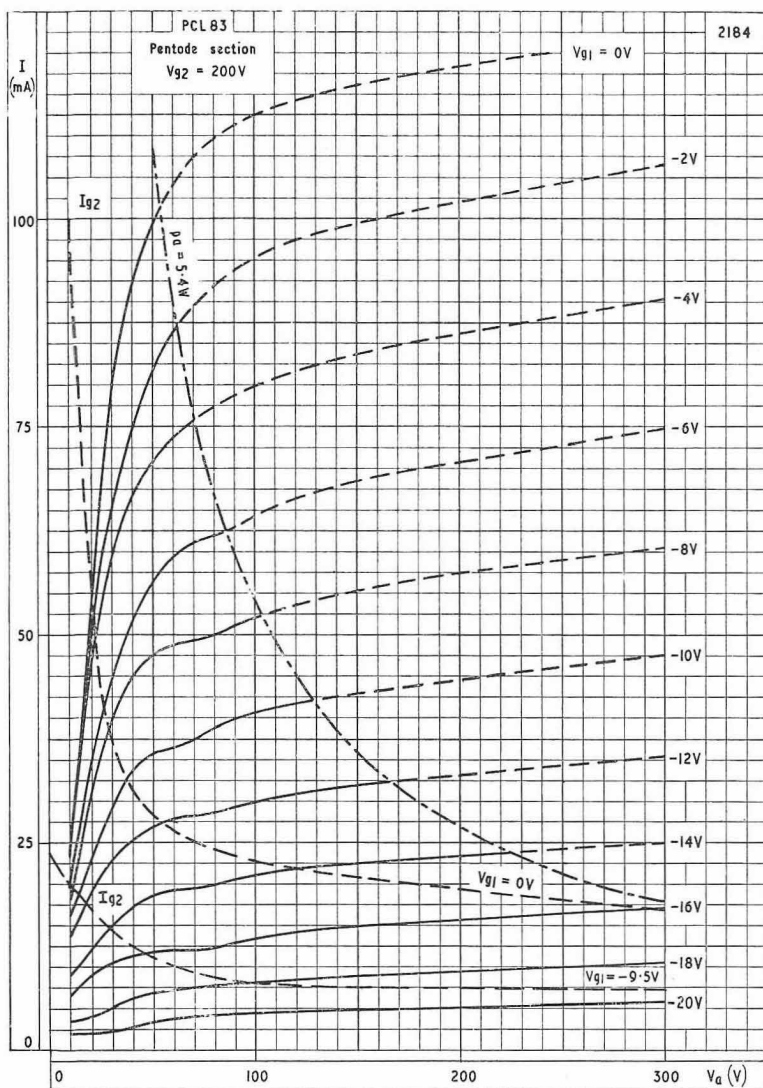


ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 170V$

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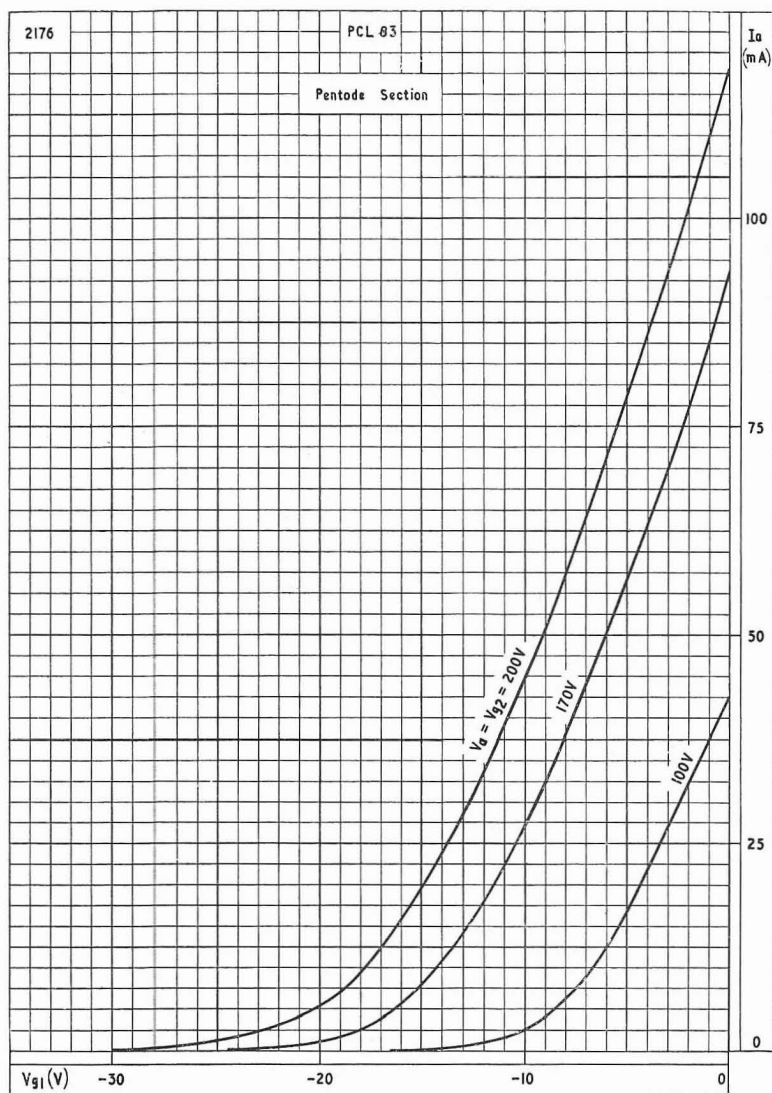


ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 200V$

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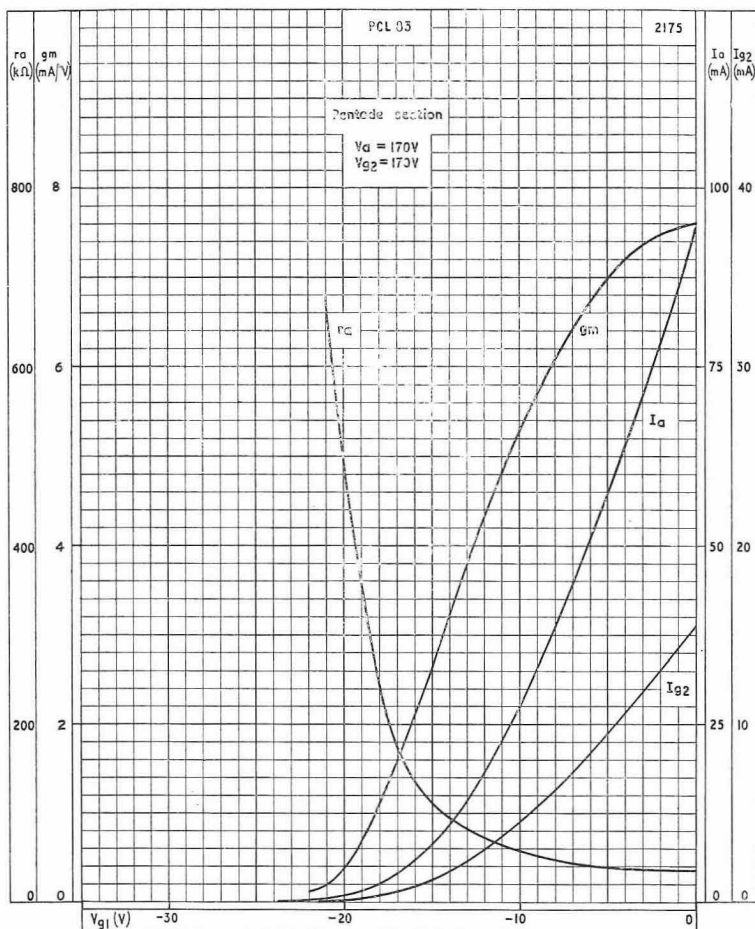


ANODE CURRENT PLOTTED AGAINST CONTROL-GRID VOLTAGE FOR VARIOUS ANODE AND SCREEN-GRID VOLTAGES

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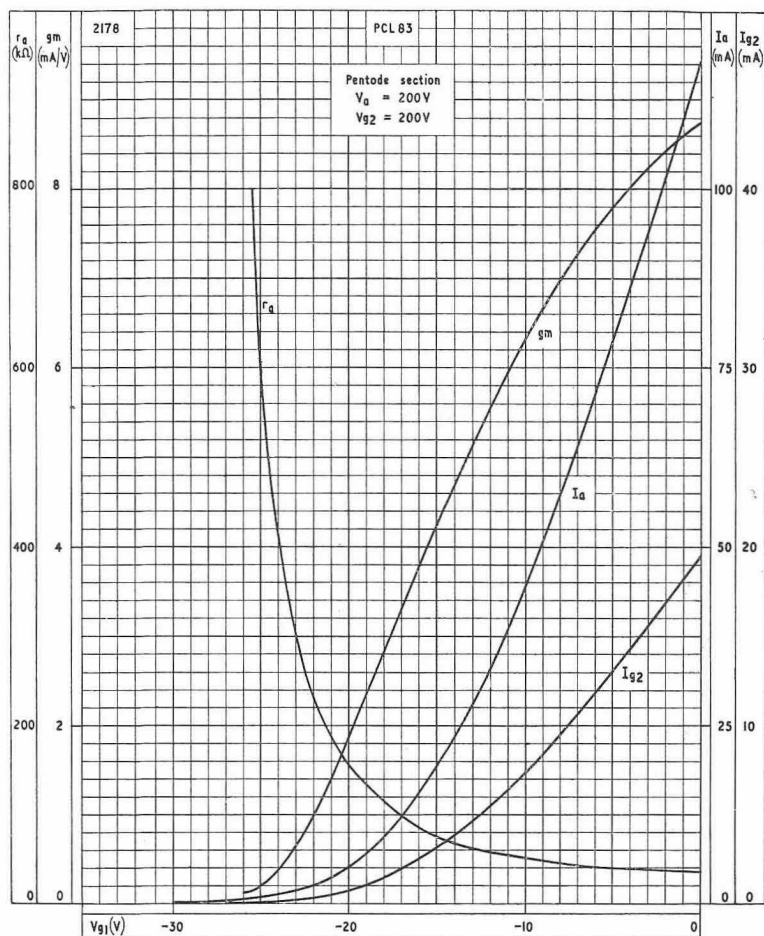
ANODE CURRENT, SCREEN-GRID CURRENT, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE

$$V_a = V_{g2} = 170V$$

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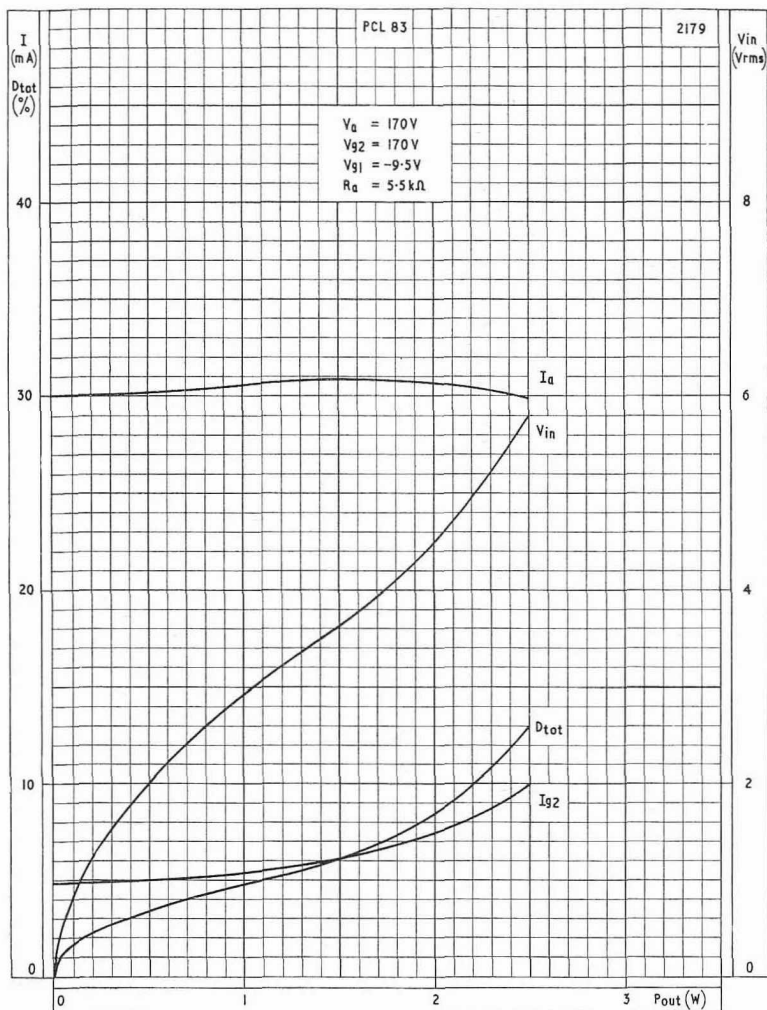
ANODE CURRENT, SCREEN-GRID CURRENT, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE

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

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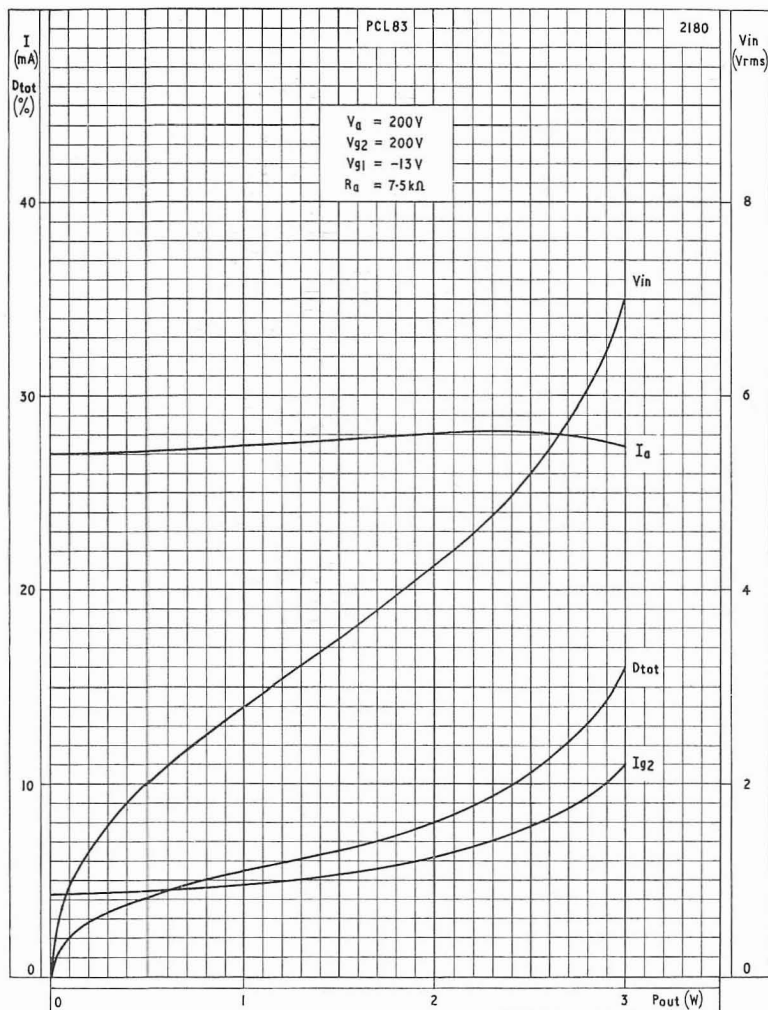


PERFORMANCE OF PENTODE SECTION AS CLASS 'A' AMPLIFIER WITH
FIXED BIAS. $V_a = 170V$

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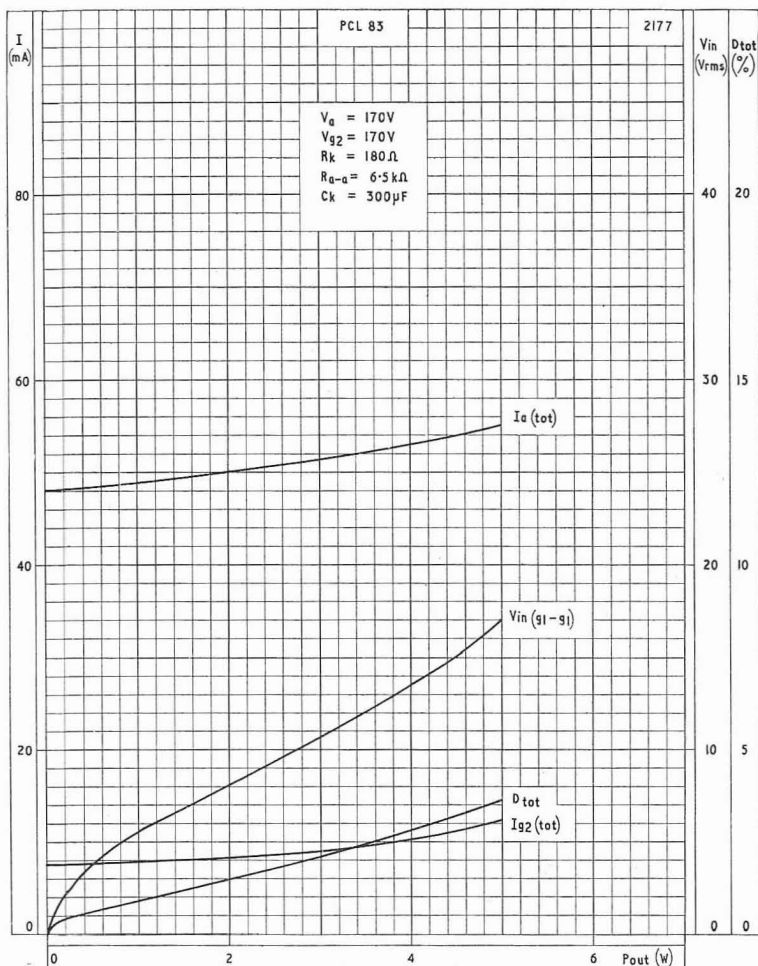


PERFORMANCE OF PENTODE SECTION AS CLASS 'A' AMPLIFIER WITH
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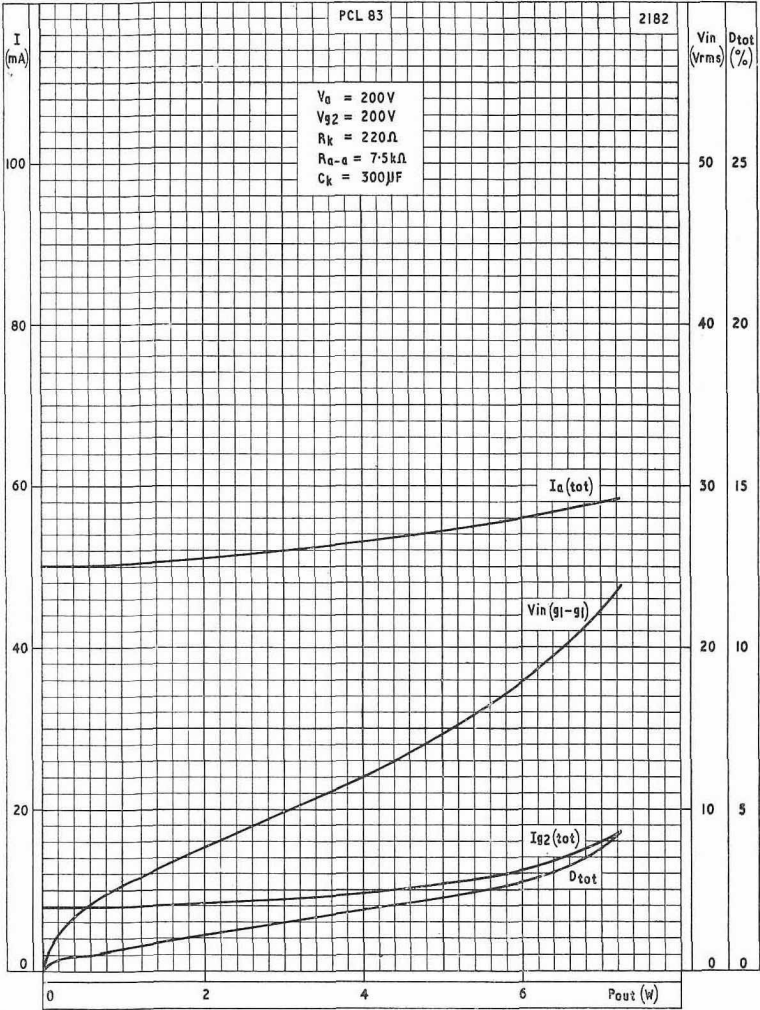


PERFORMANCE OF PCL83 IN PUSH-PULL. $V_a=170V$

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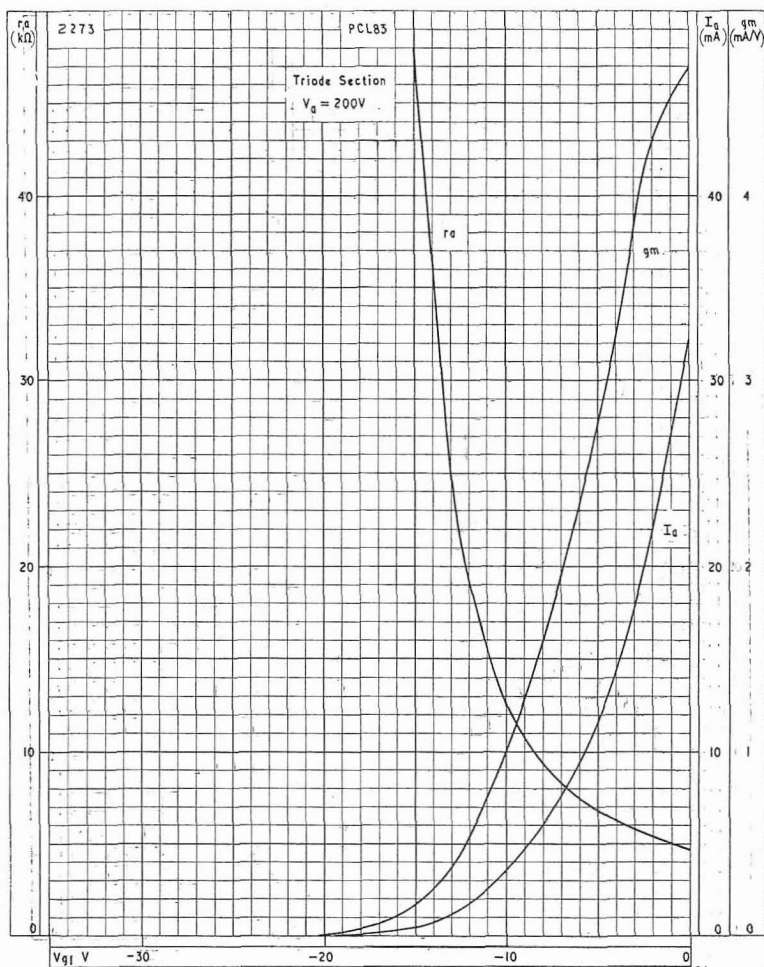


PERFORMANCE OF PCL83 IN PUSH-PULL. $V_a=200V$

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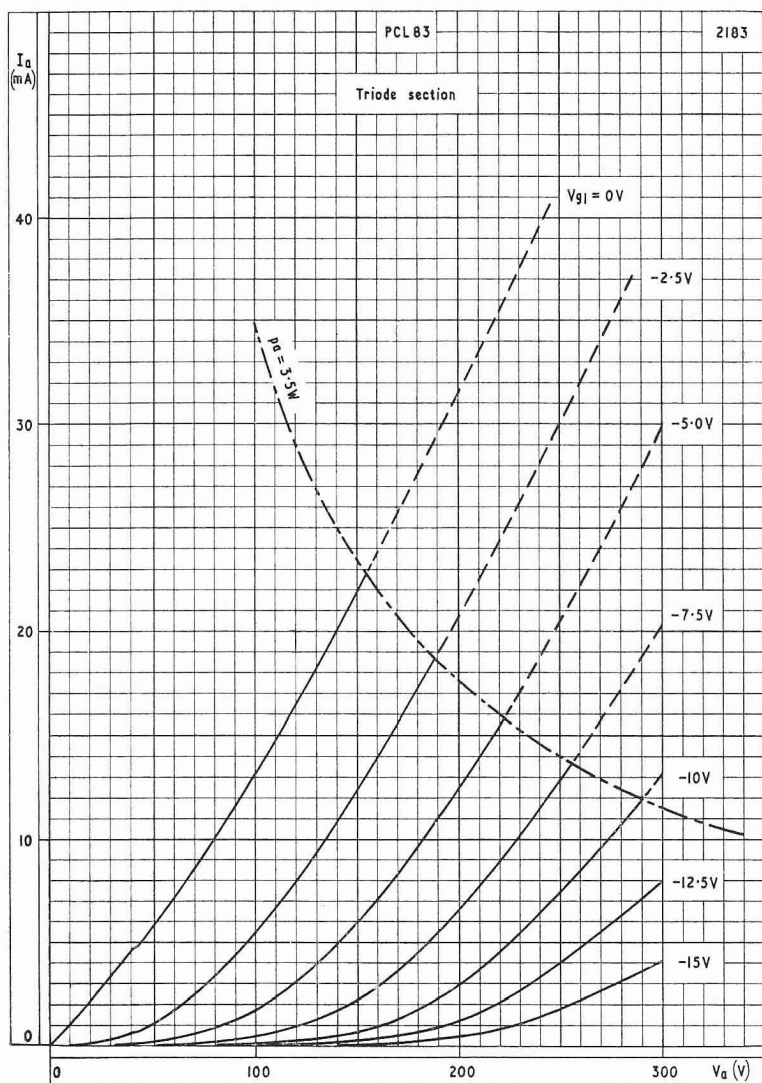


ANODE CURRENT, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE
PLOTTED AGAINST GRID VOLTAGE

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ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH GRID VOLTAGE AS PARAMETER

