

TRIODE PENTODE

ECL82

Combined triode and output pentode with separate cathodes intended for use as a combined a.f. amplifier and output valve or frame oscillator and output valve.

HEATER

V_h	6.3	V
I_h	780	mA

MOUNTING POSITION

Any

CAPACITANCES

C_{ap-at}	<0.25	pF
C_{ap-gt}	<0.02	pF
C_{g1p-at}	<0.02	pF
C_{g1p-gt}	<0.025	pF

Pentode section

C_{a-g1}	<0.3	pF
C_{in}	9.3	pF
C_{out}	8.0	pF
C_{g1-h}	<0.3	pF

Triode section

C_{a-g}	4.2	pF
C_{in}	2.7	pF
C_{out}	4.3	pF
C_{g-h}	<0.1	pF

CHARACTERISTICS

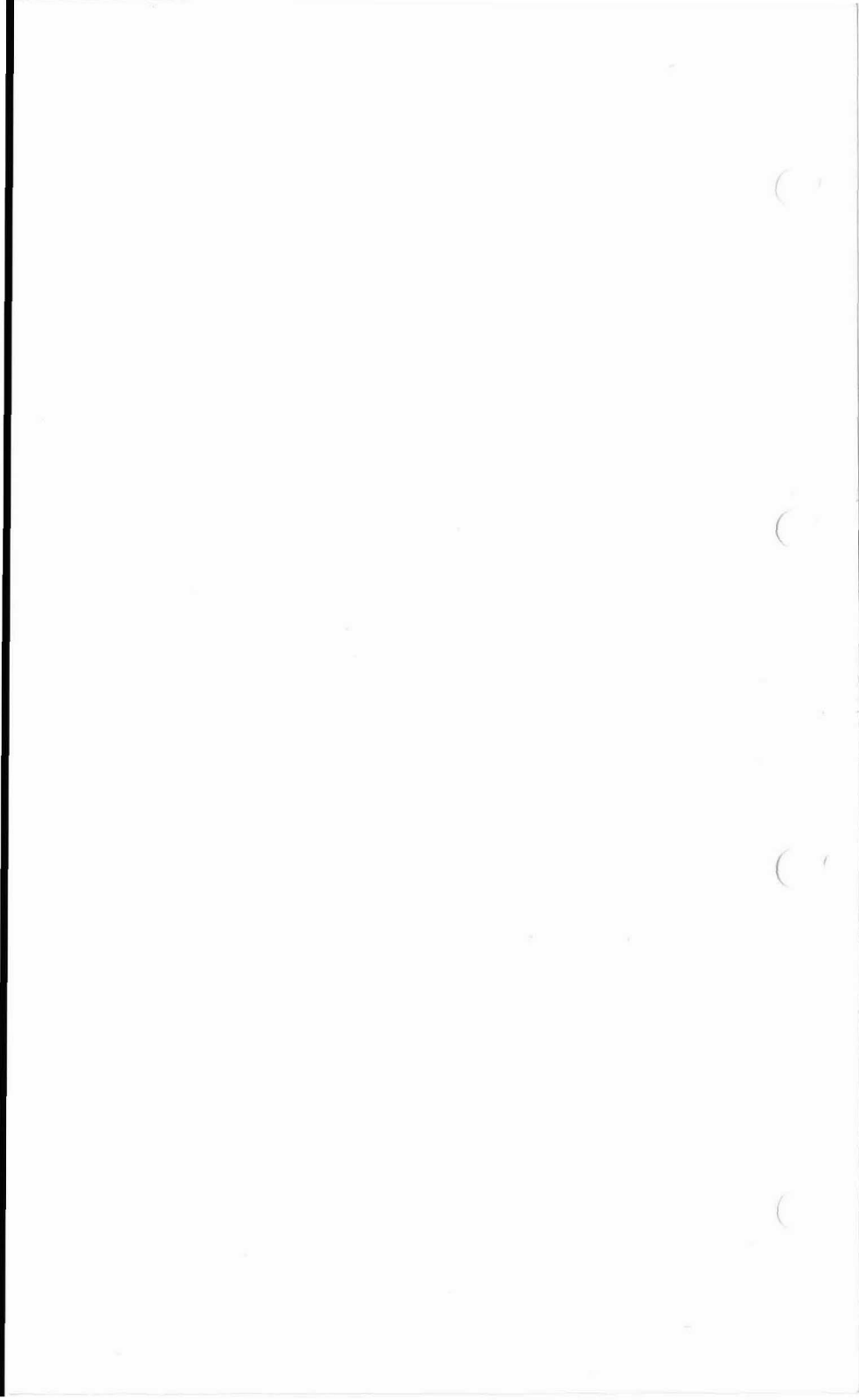
Pentode section

V_a	200	250	V
V_{g2}	200	250	V
I_a	35	28	mA
I_{g2}	7.0	5.7	mA
V_{g1}	-16	-22.5	V
g_m	6.4	5.0	mA/V
r_a	20	25	k Ω
μ_{g1-g2}	9.5	9.5	

Triode section

V_a	100	V
I_a	3.5	mA
V_g	0	V
g_m	2.5	mA/V
r_a	28	k Ω
μ	70	





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TRIODE SECTION AS A.F. VOLTAGE AMPLIFIER

V_b (V)	R_a (k Ω)	I_a (mA)	R_k (k Ω)	R_g (M Ω)	Z_{source} (k Ω)	$\frac{V_{out}}{V_{in}}$	D_{tot} (%)	R_{g1}^* (k Ω)
250	100	1.05	1.5	3.3	0	48	0.8	330
200	100	0.85	1.5	3.3	0	47	1.0	330
150	100	0.6	1.8	3.3	0	45	1.9	330
100	100	0.38	1.8	3.3	0	41	6.0	330
250	100	1.05	1.5	3.3	220	44	0.75	330
200	100	0.85	1.5	3.3	220	43	0.85	330
150	100	0.6	1.8	3.3	220	41	1.05	330
100	100	0.38	1.8	3.3	220	34	3.6	330
250	220	0.63	2.2	3.3	0	55.5	0.75	680
200	220	0.52	2.2	3.3	0	54.5	1.0	680
150	220	0.36	2.7	3.3	0	52	1.85	680
100	220	0.23	2.7	3.3	0	47	4.25	680
250	220	0.63	2.2	3.3	220	51.5	0.7	680
200	220	0.52	2.2	3.3	220	50	0.5	680
150	220	0.36	2.7	3.3	220	47	1.0	680
100	220	0.23	2.7	3.3	220	38	3.75	680
250	100	1.4	0	22	0	50	0.5	330
200	100	1.05	0	22	0	48.5	0.7	330
150	100	0.7	0	22	0	46	1.55	330
100	100	0.37	0	22	0	44	8.0	330
250	100	1.4	0	22	220	46	2.2	330
200	100	1.05	0	22	220	44	2.1	330
150	100	0.7	0	22	220	42.5	1.6	330
100	100	0.37	0	22	220	37	5.9	330
250	220	0.78	0	22	0	58	0.5	680
200	220	0.59	0	22	0	56	0.8	680
150	220	0.4	0	22	0	53	1.7	680
100	220	0.21	0	22	0	46	5.6	680
250	220	0.78	0	22	220	52.5	2.2	680
200	220	0.59	0	22	220	51	2.0	680
150	220	0.4	0	22	220	48.5	1.4	680
100	220	0.21	0	22	220	42	3.1	680

*Grid resistor of following valve

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

D_{tot} measured for $V_{out} = 10V$

MICROPHONY AND HUM

The triode section can be used without special precautions against microphony and hum in circuits in which the input voltage is $>10mV(r.m.s.)$ for an output of 50mW from the output stage.

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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	50	V
V_{g2}	170	V
$i_a(\text{pk})$	85	mA
For an average new valve the following figures will apply		
V_a	50	V
V_{g2}	170	V
$i_a(\text{pk})$	135	mA
V_{g1} adjusted so that $I_{g1} = +0.3\mu\text{A}$		

PENTODE SECTION AS AUDIO OUTPUT VALVE

Single valve class 'A'

V_a	200	250	V
$V_{g2(b)}$	200	250	V
* R_{g2}	0	2.2	k Ω
$I_a(o)$	35	28	mA
$I_{g2(o)}$	7.0	5.5	mA
$I_{g2}(\text{max. sig.})$	16	10.5	mA
V_{g1}	-16	-22.5	V
R_k	390	680	Ω
$V_{in(r.m.s.)}$ ($P_{out} = 50\text{mW}$)	600	780	mV
R_a	5.6	9.0	k Ω
$V_{in(r.m.s.)}$	6.6	9.5	V
† P_{out}	3.5	3.4	W
D_{tot}	10	10	%

Two valves in class 'AB' push-pull

V_a	200	250	V
$V_{g2(b)}$	200	250	V
** R_{g2}	0	2.7	k Ω
$I_a(o)$	2×35	2×21.5	mA
$I_a(\text{max. sig.})$	2×39.5	2×27.5	mA
$I_{g2(o)}$	2×7.0	2×4.2	mA
$I_{g2}(\text{max. sig.})$	2×16.5	2×9.2	mA
†† R_k	190	390	Ω
$V_{in(g1-g1)r.m.s.}$	25	38	V
R_{a-a}	6.0	10	k Ω
P_{out}	9.8	9.0	W
D_{tot}	4.0	5.0	%

*Undecoupled screen-grid resistor.

† P_{out} and D_{tot} are measured at fixed bias and therefore represent the power output available during the reproduction of speech and music.

**Common screen-grid resistor undecoupled.

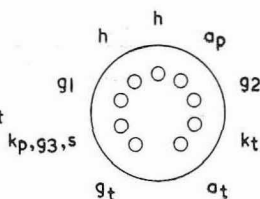
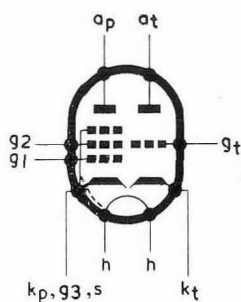
††Common cathode bias resistor.

TRIODE PENTODE

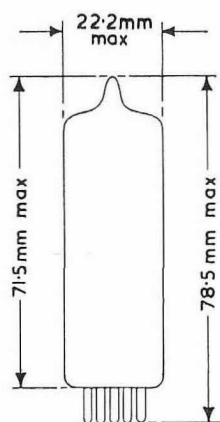
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2324



B9A Base



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LIMITING VALUES

Pentode section

$V_{a(b)}$ max.	550	V
V_a max.	300	V
$\ddagger +V_{a(pk)}$ max.	2.5	kV
$\ddagger -V_{a(pk)}$ max.	500	V
p_a max. (frame output)	5.0	W
p_a max. (audio applications)	7.0	W
$V_{g2(b)}$ max.	550	V
V_{g2} max.	300	V
p_{g2} max.	1.8	W
p_{g2} max. (speech and music)	3.2	W
I_k max.	50	mA
R_{g1-k} max. (fixed bias)	1.0	MΩ
R_{g1-k} max. (cathode bias)	2.0	MΩ
V_{h-k} max.	100	V
R_{h-k} max.	20	kΩ

Triode section

$V_{a(b)}$ max.	550	V
V_a max.	300	V
$\ddagger +V_{a(pk)}$ max.	600	V
p_a max.	1.0	W
I_k max.	15	mA
$*I_{k(pk)}$ max.	200	mA
R_{g-k} max. (fixed bias)	1.0	MΩ
R_{g-k} max. (cathode bias)	3.0	MΩ
R_{g-k} max. (grid current biasing)	22	MΩ
Z_{g-k} max. ($f = 50\text{c/s}$)	500	kΩ
V_{h-k} max.	100	V
R_{h-k} max.	20	kΩ

*Maximum pulse duration 200μs

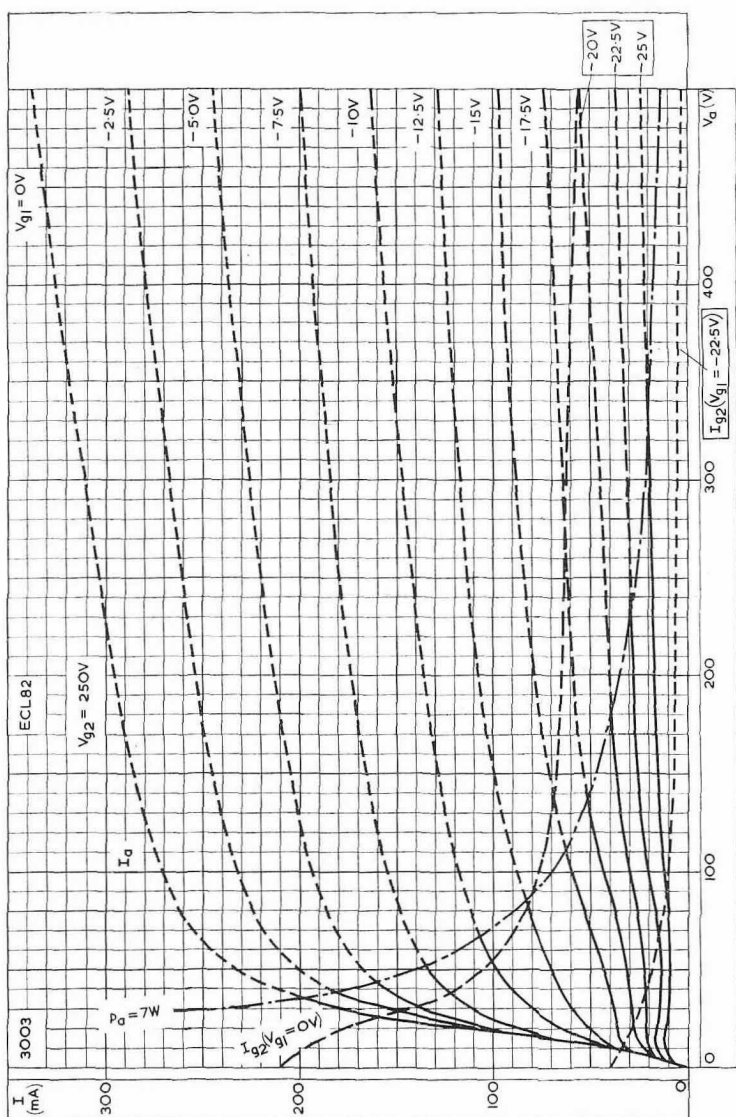
‡Maximum pulse duration 4% of one cycle with a maximum of 800μs



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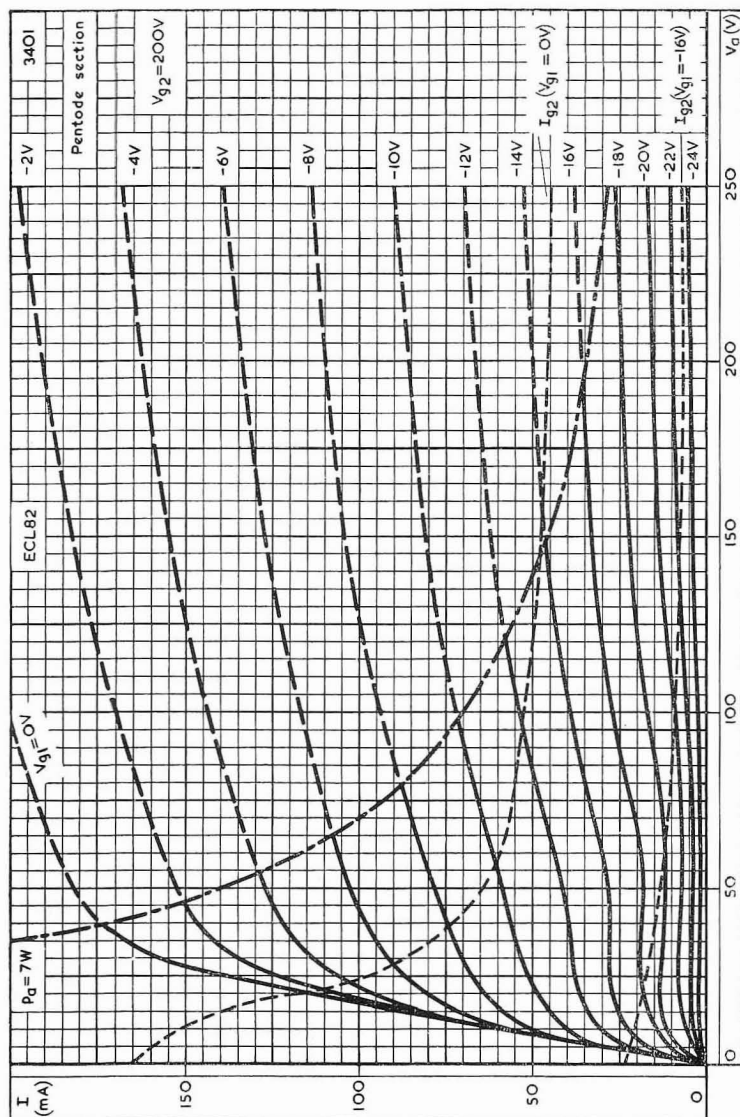


ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 250V$

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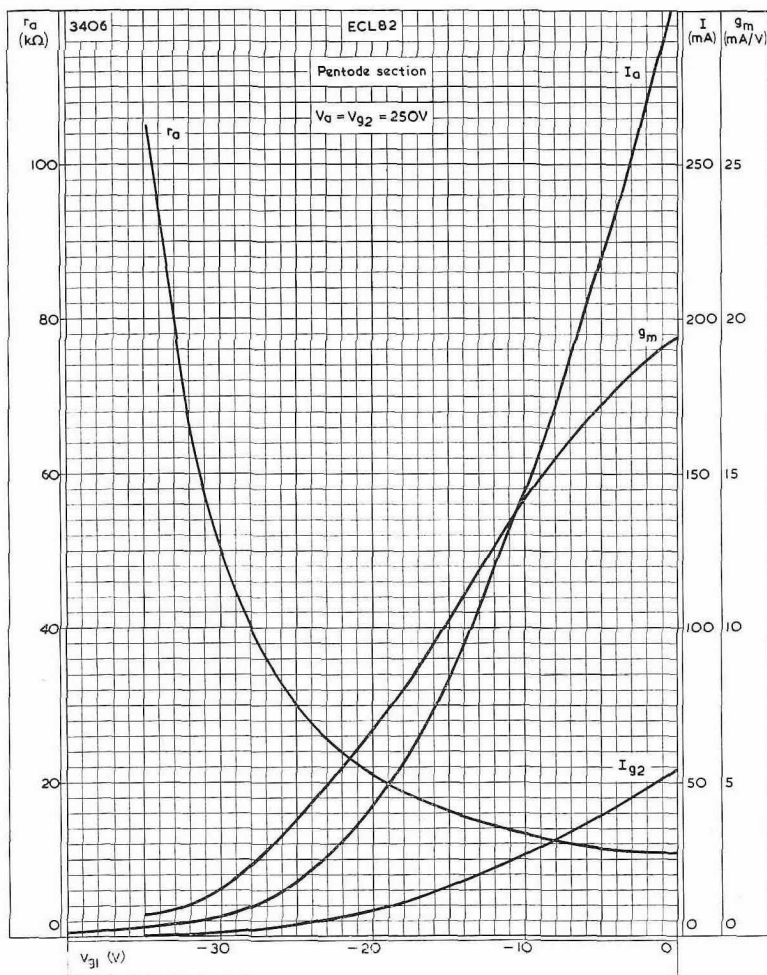


ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 200V$

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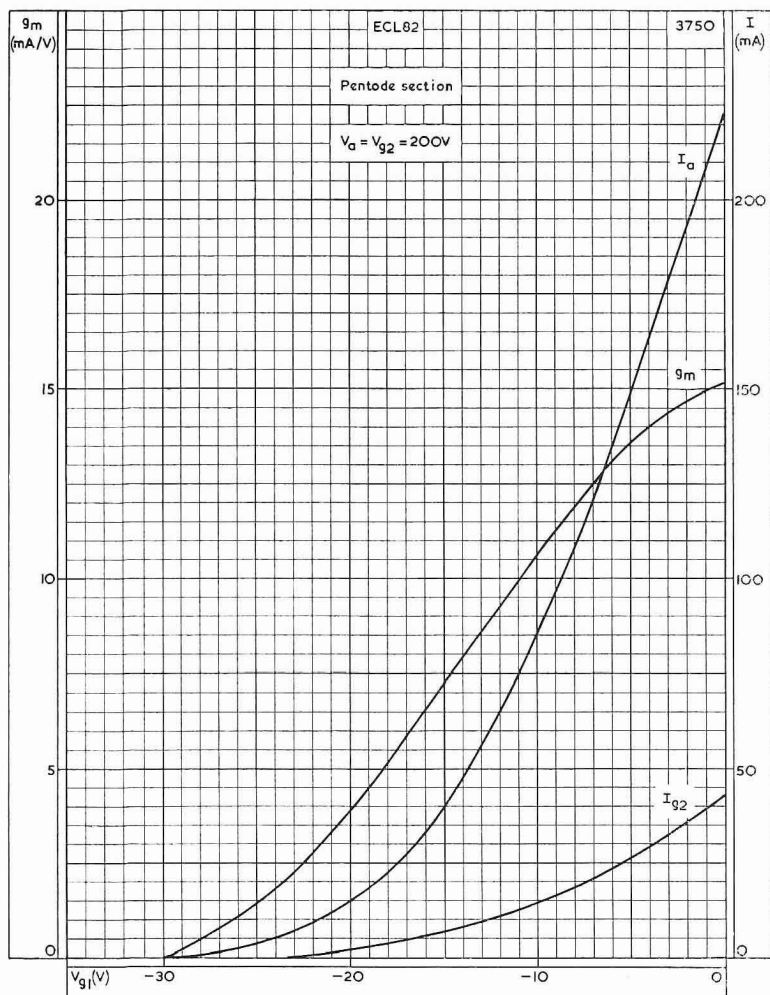


ANODE AND SCREEN-GRID CURRENTS, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE.
 $V_a = V_{g2} = 250V$

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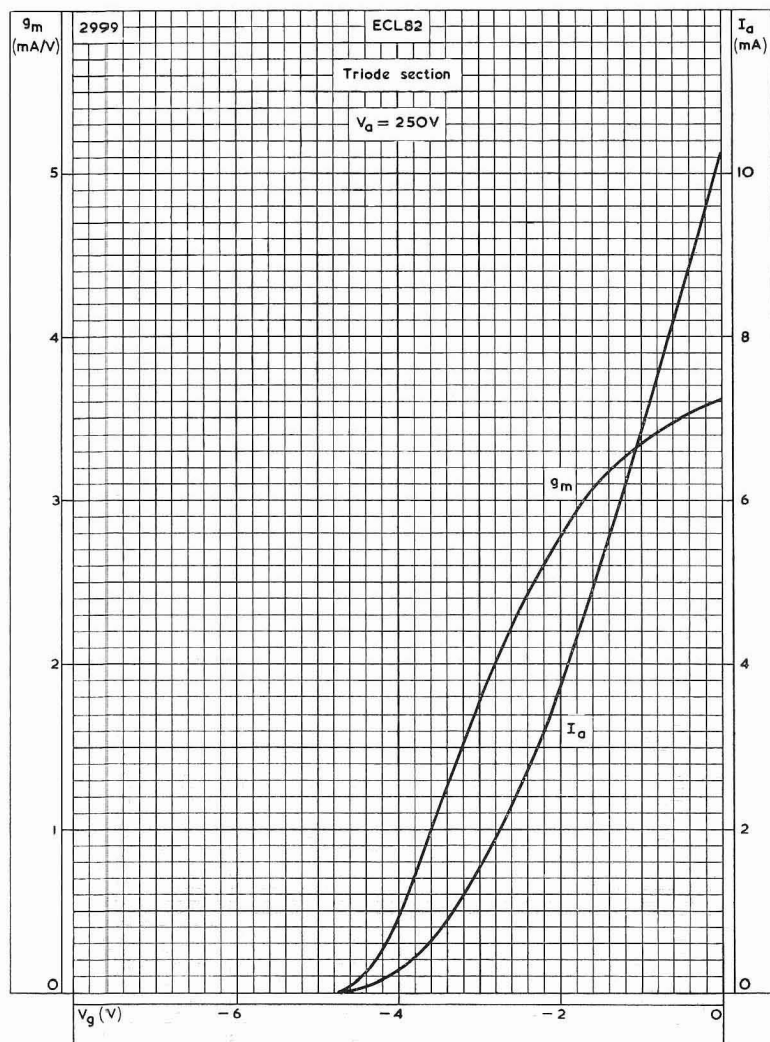


ANODE AND SCREEN-GRID CURRENTS AND MUTUAL CONDUCTANCE
PLOTTED AGAINST CONTROL-GRID VOLTAGE. $V_a = V_{g2} = 200V$

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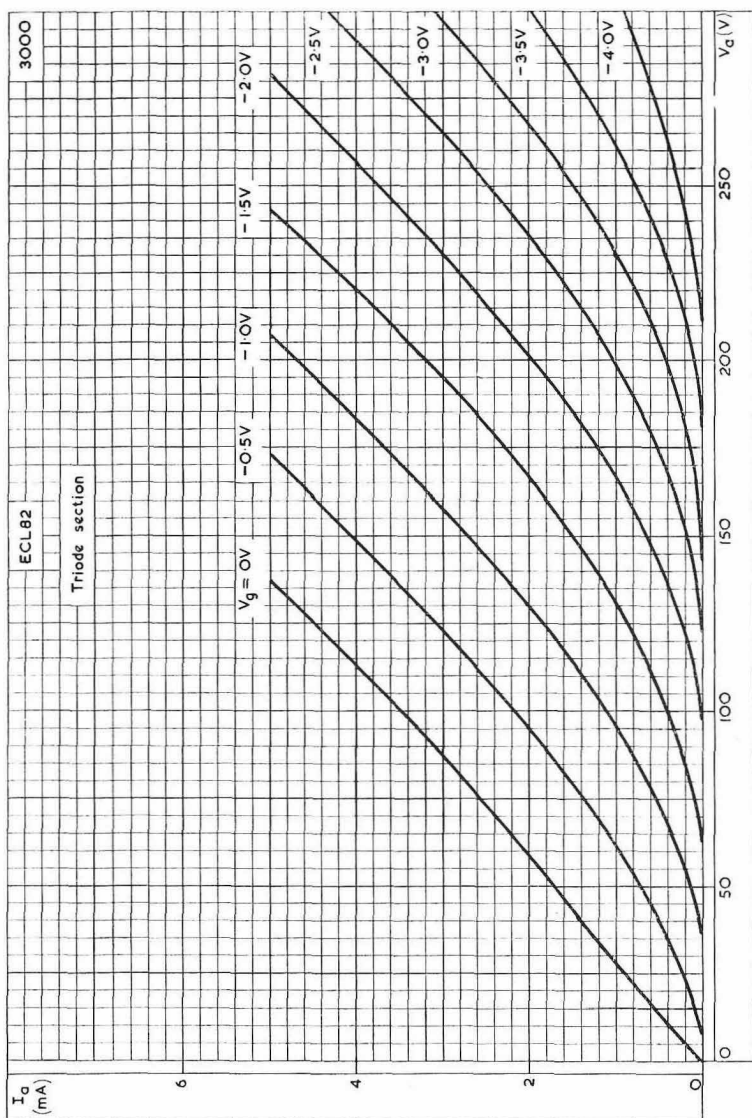


ANODE CURRENT AND MUTUAL CONDUCTANCE PLOTTED AGAINST GRID VOLTAGE FOR TRIODE SECTION. $V_a = 250$ V

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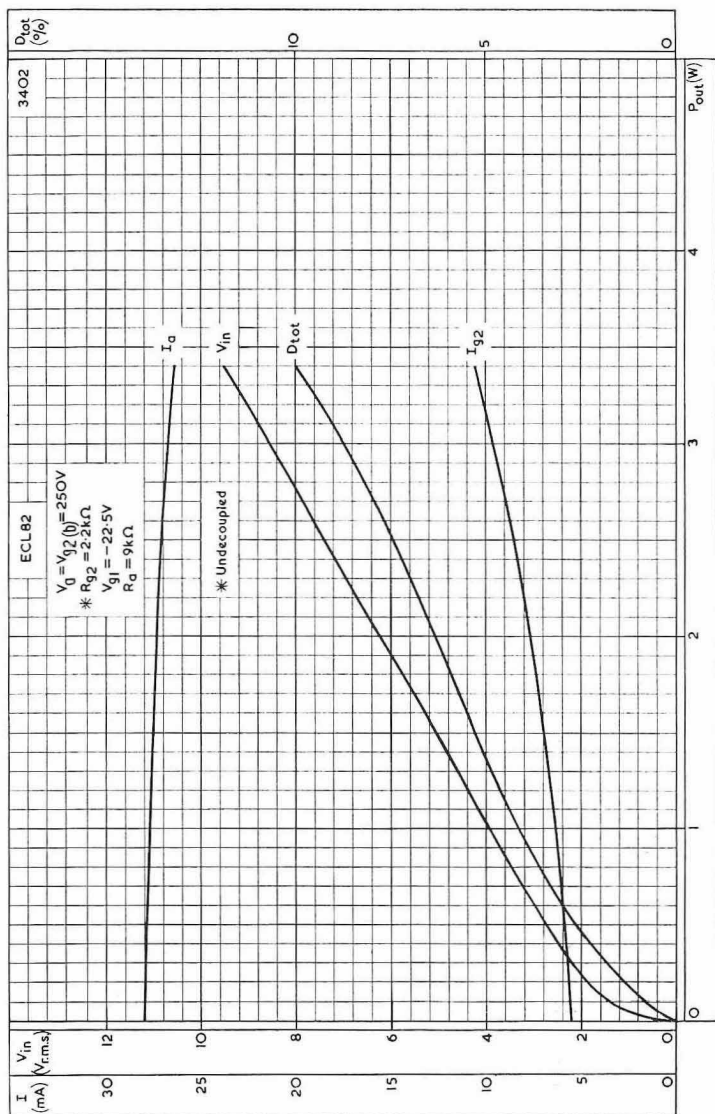


ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH GRID VOLTAGE AS PARAMETER FOR TRIODE SECTION

TRIODE PENTODE

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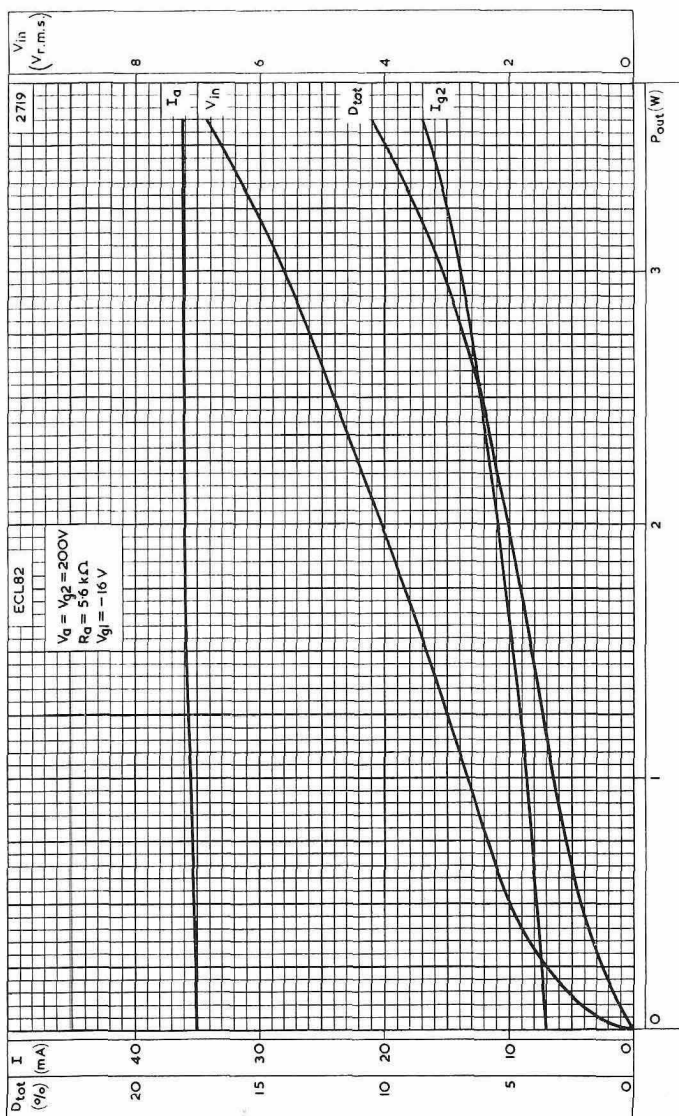


PERFORMANCE OF SINGLE ECL82 CLASS 'A' AMPLIFIER. $V_a = V_{g2(b)} = 250V$

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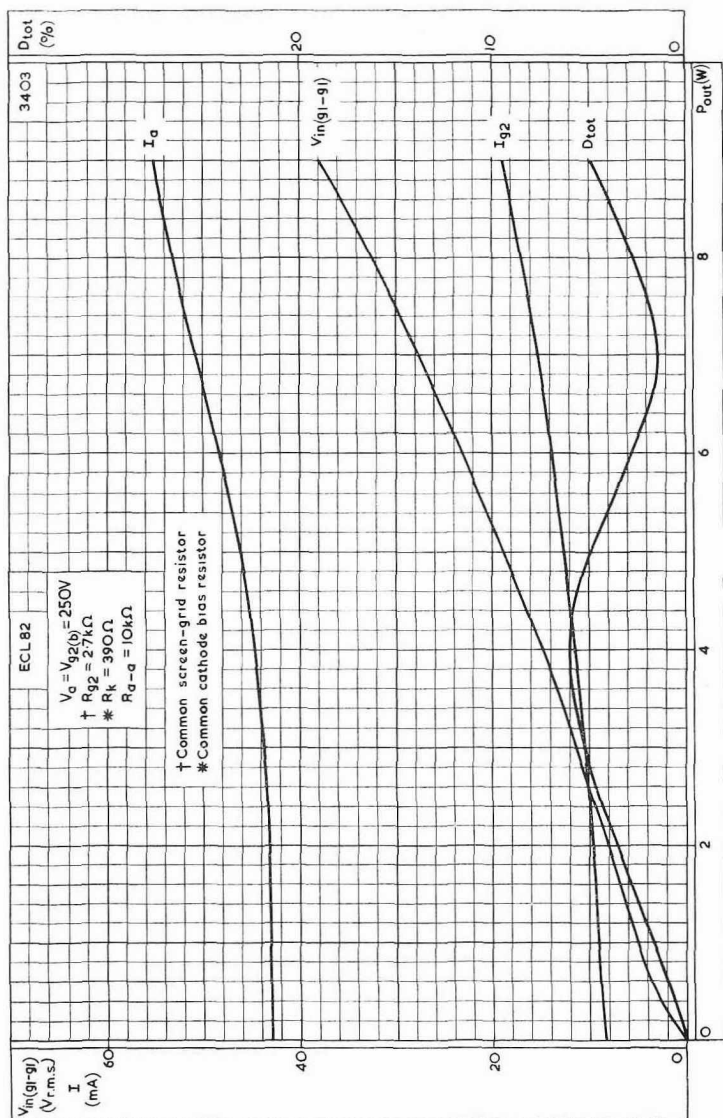


PERFORMANCE OF SINGLE ECL82 CLASS 'A' AMPLIFIER. $V_a = V_{g2} = 200V$

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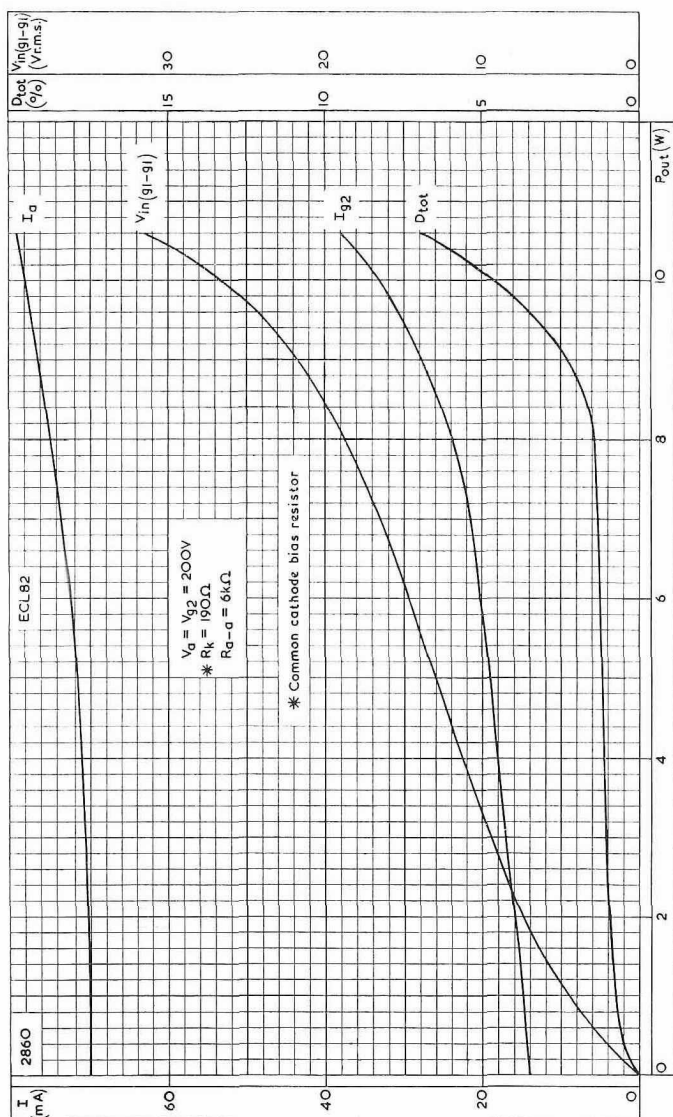


PERFORMANCE OF ECL82 IN PUSH-PULL. $V_a = V_{g2(b)} = 250V$

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PERFORMANCE OF ECL82 IN PUSH-PULL. $V_a = V_{g2} = 200V$