OUTPUT PENTODE

EL84

Output pentode rated for 12W anode dissipation, primarily intended for use in a.c. mains operated equipment.

HEATER

V_h	6.3	V
I_h	760	mA

CAPACITANCES

c_{in}	10.8	pF
c_{out}	6.5	pF
c_{a-g1}	<500	mpF
c_{g1-h}	<250	mpF

CHARACTERISTICS

Pentode connection

V_a	250	V
V_{g2}	250	V
I_a	48	mA
I_{g2}	5.5	mA
V_{g1}	–7.3	V
g_m	11.3	mA/V
r_a	38	kΩ
μ_{g1-g2}	19	

Triode connection (g_2 connected to a)

V_a	250	V
I_a	34	mA
V_{g1}	–9.0	V
g_m	10	mA/V
r_a	2.0	kΩ
μ	19.5	

OPERATING CONDITIONS AS SINGLE VALVE AMPLIFIER

Pentode connection

V_a	250	250	V
V_{g2}	250	250	V
R_a	5.2	4.5	kΩ
V_{g1}	–7.3	–7.3	V
I_a	48	48	mA
I_{g2}	5.5	5.5	mA
$V_{in(r.m.s.)}$ (P_{out} = 50mW)	300	300	mV
$V_{in(r.m.s.)}$ (D_{tot} = 10%)	4.3	4.4	V
P_{out} (D_{tot} = 10%)	5.7	5.7	W
D_3	9.5	8.0	%
D_2	2.0	5.0	%

Triode connection (g_2 connected to a)

V_a	250	V
R_a	3.5	kΩ
V_{g1}	–9.0	V
$I_{a(o)}$	34	mA
$V_{in(r.m.s.)}$ (P_{out} = 50mW)	1.0	V
$V_{in(r.m.s.)}$	6.0	V
P_{out}	1.5	W
D_{tot}	6.0	%
$I_{a(max.sig.)}$	39	mA

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Pentode connection

V_a	250	300	V
V_{g2}	250	300	V
R_k (per valve)	270	270	Ω
R_{a-a}	8.0	8.0	kΩ
$I_{a(o)}$	2×31	2×36	mA
$I_{g2(o)}$	2×3.5	2×4.0	mA
$V_{in(g1-g1)}$ r.m.s.	16	20	V
P_{out}	11	17	W
D_{tot}	3.0	4.0	%
$I_{a(max.sig.)}$	2×37.5	2×46	mA
$I_{g2(max.sig.)}$	2×7.5	2×11	mA

Distributed load conditions for maximum output (screen-grid tapping at 20% of primary turns)

V_a	300	300	V
V_{g2}	300	300	V
R_k (per valve)	390+47	270	Ω
R_{a-a}	6.0	8.0	kΩ
$I_{k(o)}$	2×28	2×40	mA
$V_{in(g1-g1)}$r.m.s.	17	18.3	V
P_{out}	14.4	15.4	W
D_{tot}	0.85	1.17	%
$I_{k(max.sig.)}$	2×55	2×48.5	mA

Distributed load conditions for minimum distortion (screen-grid tapping at 43% of primary turns)

V_a	300	300	V
V_{g2}	300	300	V
R_k (per valve)	390+47	270	Ω
R_{a-a}	6.0	8.0	kΩ
$I_{k(o)}$	2×28	2×40	mA
$V_{in(g1-g1)}$r.m.s.	16.8	16	V
P_{out}	10.1	11	W
D_{tot}	0.72	0.7	%
$I_{k(max.sig.)}$	2×47	2×45	mA

Triode connection (g_2 connected to a)

V_a	250	300	V
R_k (per valve)	560	560	Ω
R_{a-a}	10	10	kΩ
$I_{a(o)}$	2×20	2×24	mA
$V_{in(g1-g1)}$r.m.s.	16.5	20	V
P_{out}	3.4	5.2	W
D_{tot}	2.5	2.5	%
$I_{a(max.sig.)}$	2×21.5	2×26	mA

OPERATING CONDITIONS WITH CONTINUOUS SINE WAVE DRIVE

Single valve

V_a	250	250	V
$V_{g2(b)}$	250	250	V
*R_{g2}	4.7(±10%)	3.9(±10%)	kΩ
R_k	130	130	Ω
R_a	5.25	4.5	kΩ
$I_{a(o)}$	44	44	mA
$I_{g2(o)}$	5.1	5.2	mA
$V_{in(r.m.s.)}$	4.4	4.65	V
P_{out}	5.4	5.6	W
D_{tot}	12.5	13.9	%
$I_{a(max.sig.)}$	40	42	mA
$I_{g2(max.sig.)}$	8.6	8.4	mA
p_{g2}	1.8	1.8	W

*Decoupled by 8μF capacitor.

Two valves in push-pull

V_a	300	V
$V_{g2(b)}$	300	V
*R_{g2}	1.8(±10%)	kΩ
R_k (per valve)	270	Ω
R_{a-a}	8.0	kΩ
$I_{a(o)}$	2×35	mA
$I_{g2(o)}$	2×4.0	mA
$V_{in(g1-g1)r.m.s.}$	17.4	V
P_{out}	15	W
D_{tot}	3.4	%
$I_{a(max.sig.)}$	2×42	mA
$I_{g2(max.sig.)}$	2×7.0	mA
p_{g2}	1.93	W

*Screen-grid resistor common to both valves.

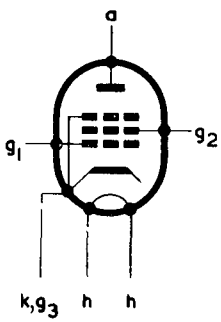
LIMITING VALUES

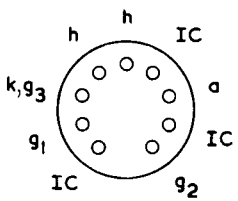
$V_{a(b)}$ max.	550	V
V_a max.	300	V
p_a max.	12	W
$V_{g2(b)}$ max.	550	V
V_{g2} max.	300	V
p_{g2} max.	2.0	W
I_k max.	65	mA
$-V_g$ max.	100	V
R_{g1-k} max.	300	kΩ
V_{h-k} max.	100	V
R_{h-k} max.	20	kΩ

EL84

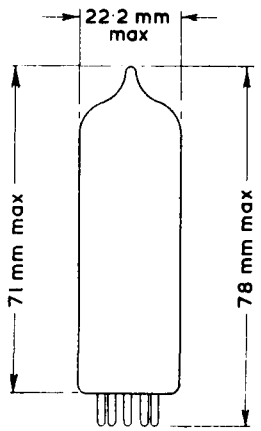
OUTPUT PENTODE

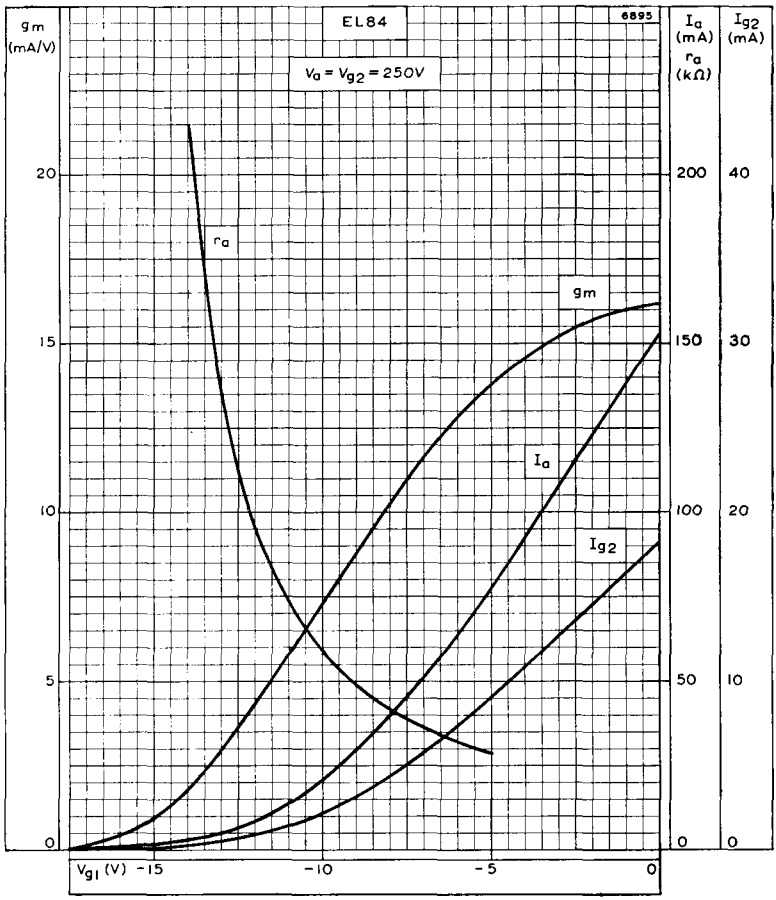
2834



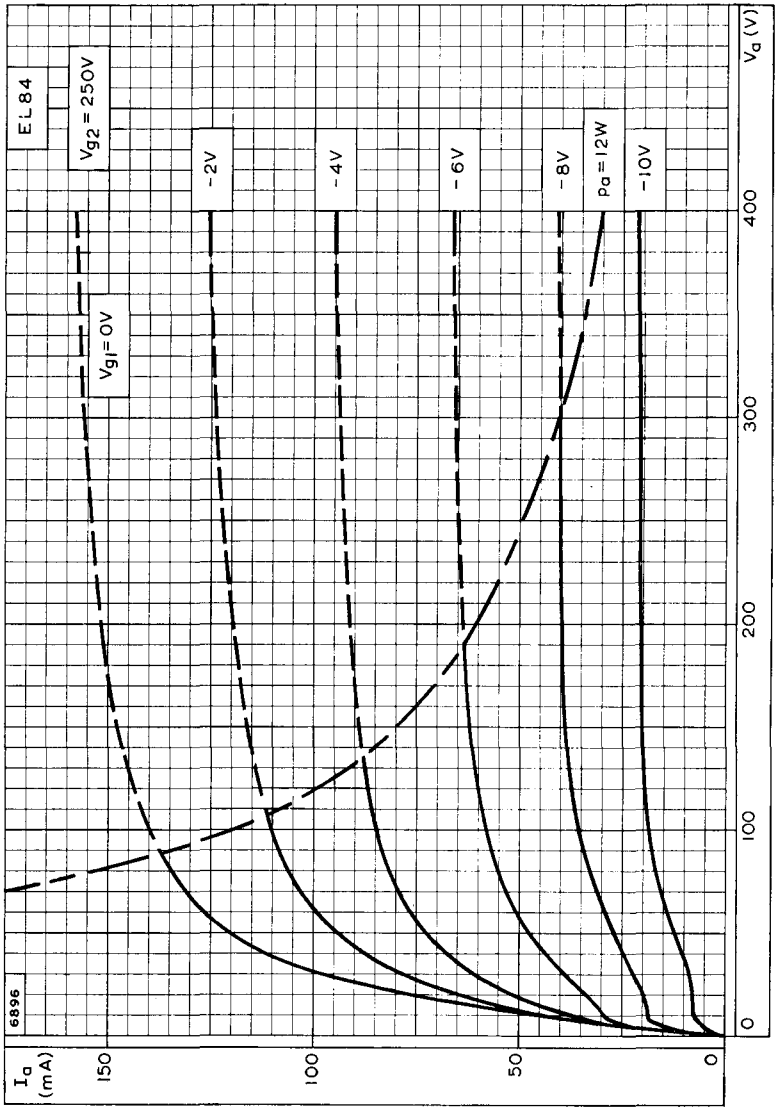


B9A Base

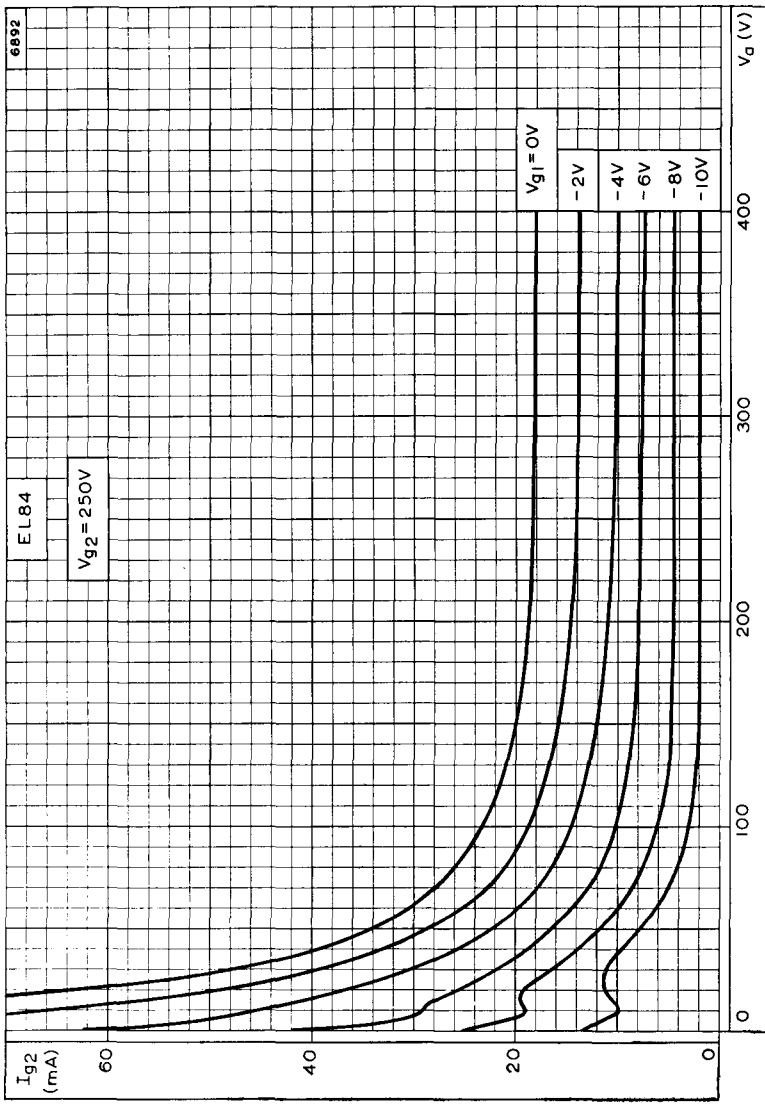




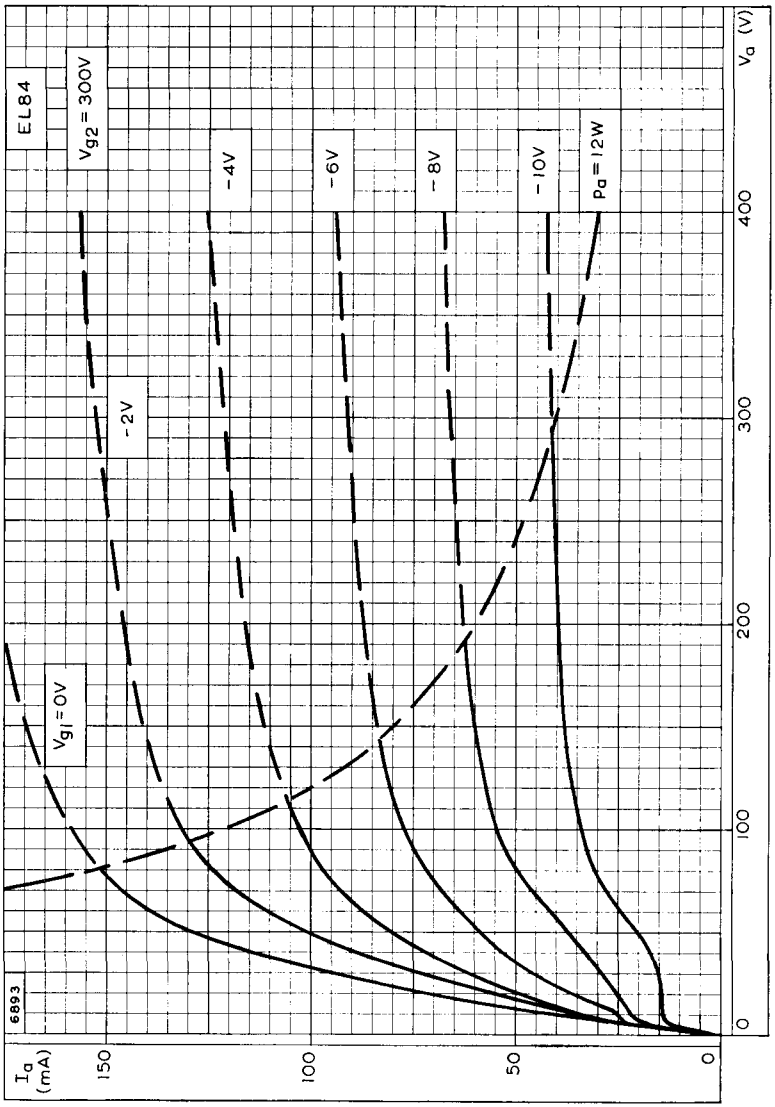
ANODE AND SCREEN-GRID CURRENTS, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE



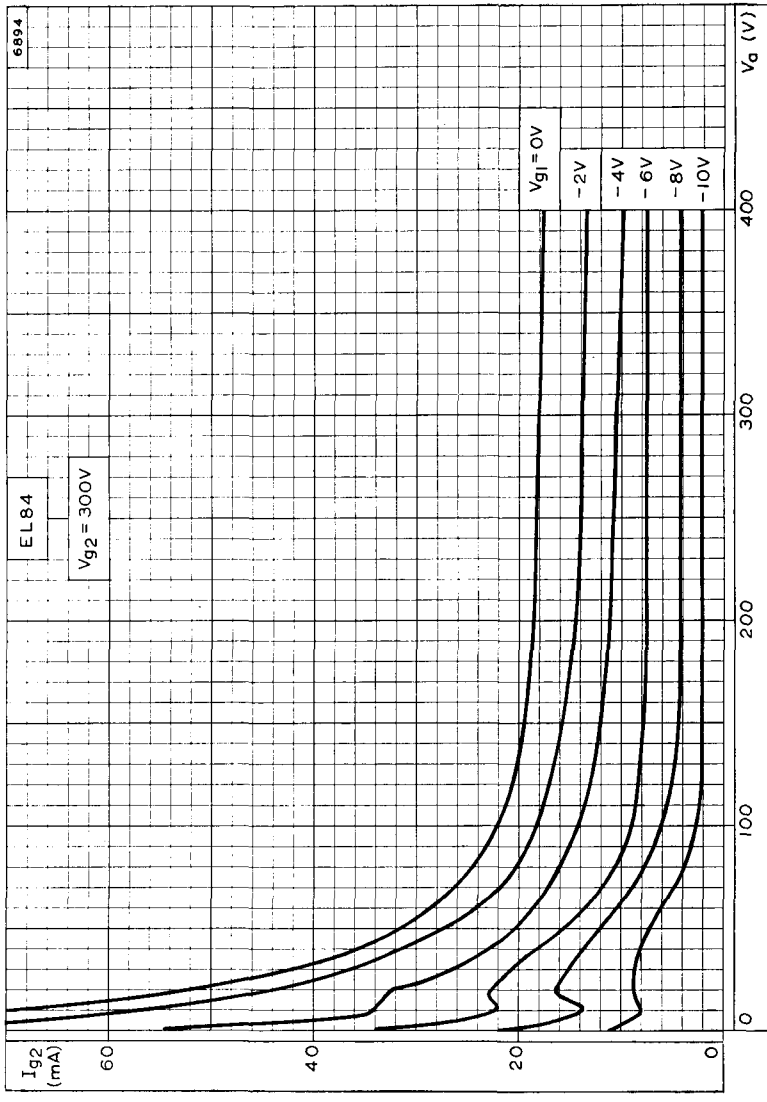
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. V_{g2} = 250V



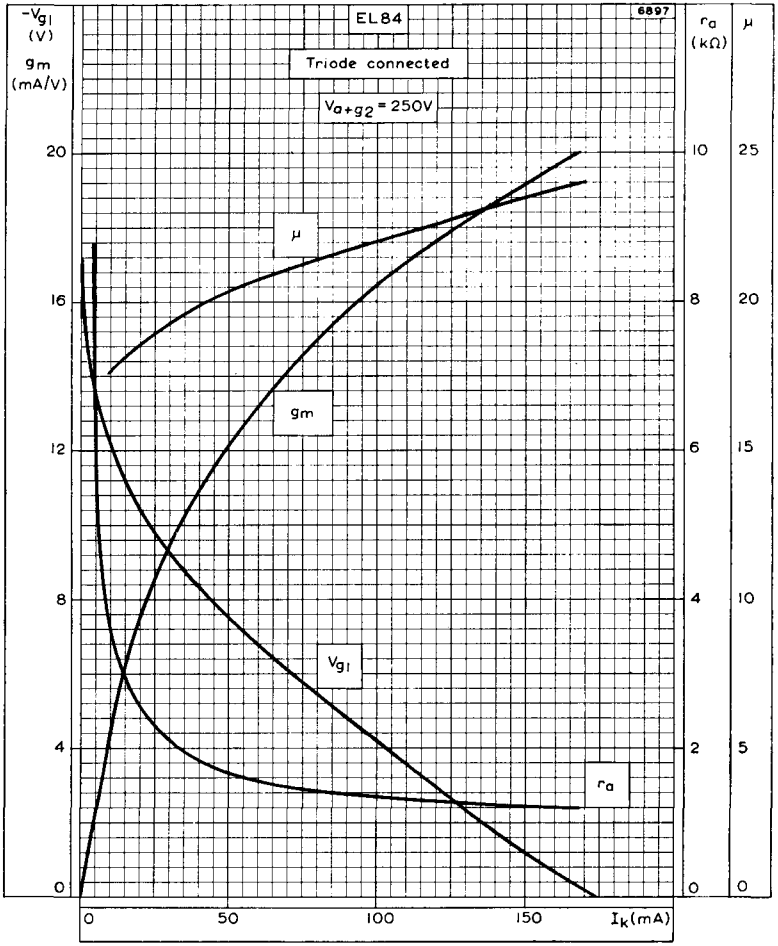
SCREEN-GRID CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. V_{g2} = 250V



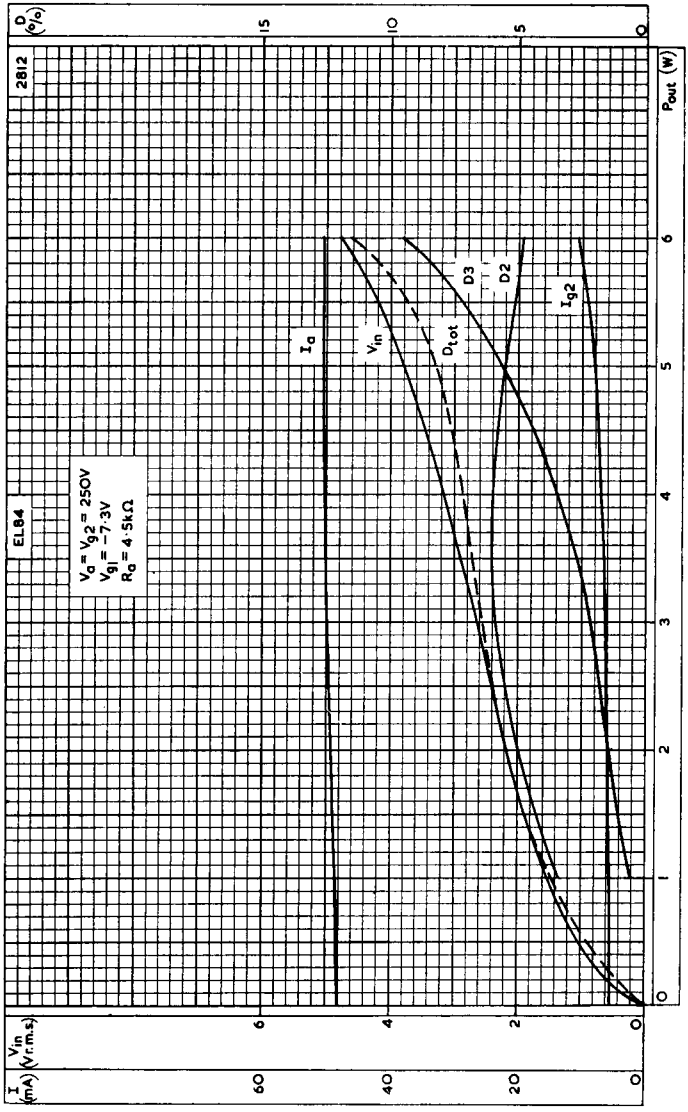
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. V_{g2} = 300V



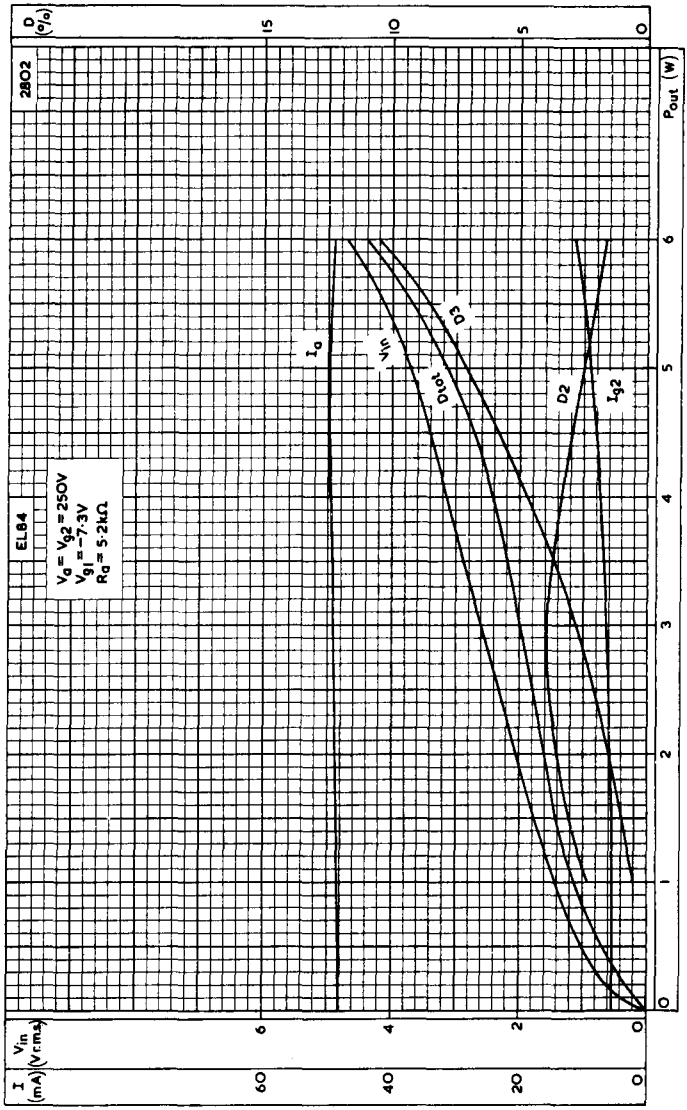
SCREEN-GRID CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. V_{g2} = 300V



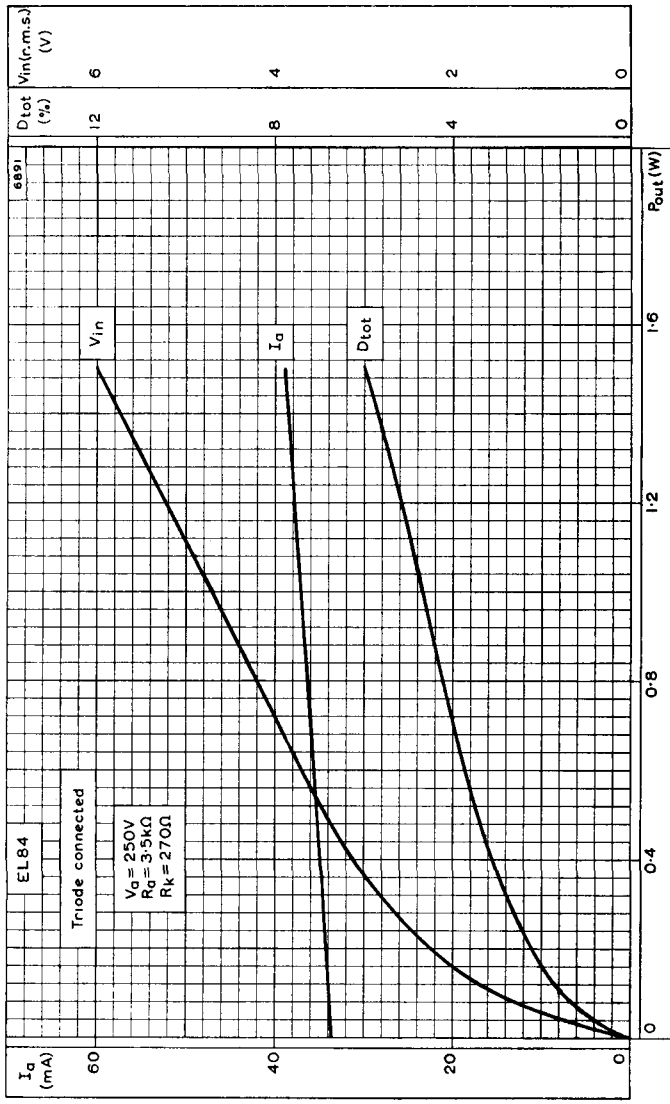
CONTROL-GRID VOLTAGE, AMPLIFICATION FACTOR, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CATHODE CURRENT WHEN TRIODE CONNECTED



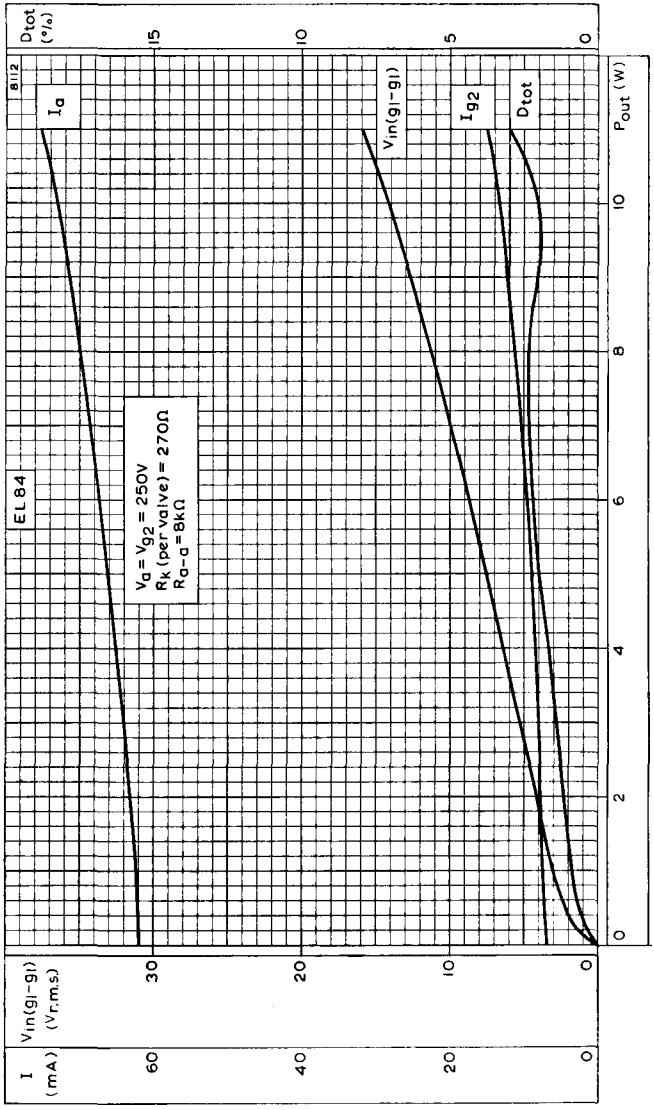
PERFORMANCE OF EL84 WHEN USED AS A SINGLE VALVE AMPLIFIER WITH A LOAD OF 4.5kΩ



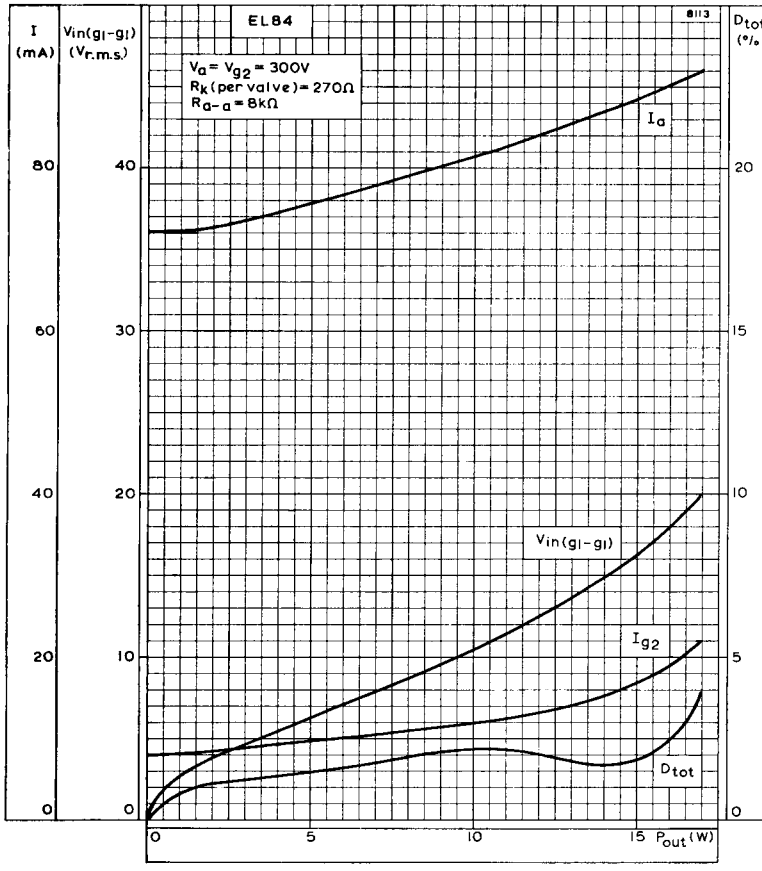
PERFORMANCE OF EL84 WHEN USED AS A SINGLE VALVE AMPLIFIER WITH A LOAD OF 5.2kΩ



PERFORMANCE OF EL84 TRIODE CONNECTED AS A SINGLE VALVE AMPLIFIER

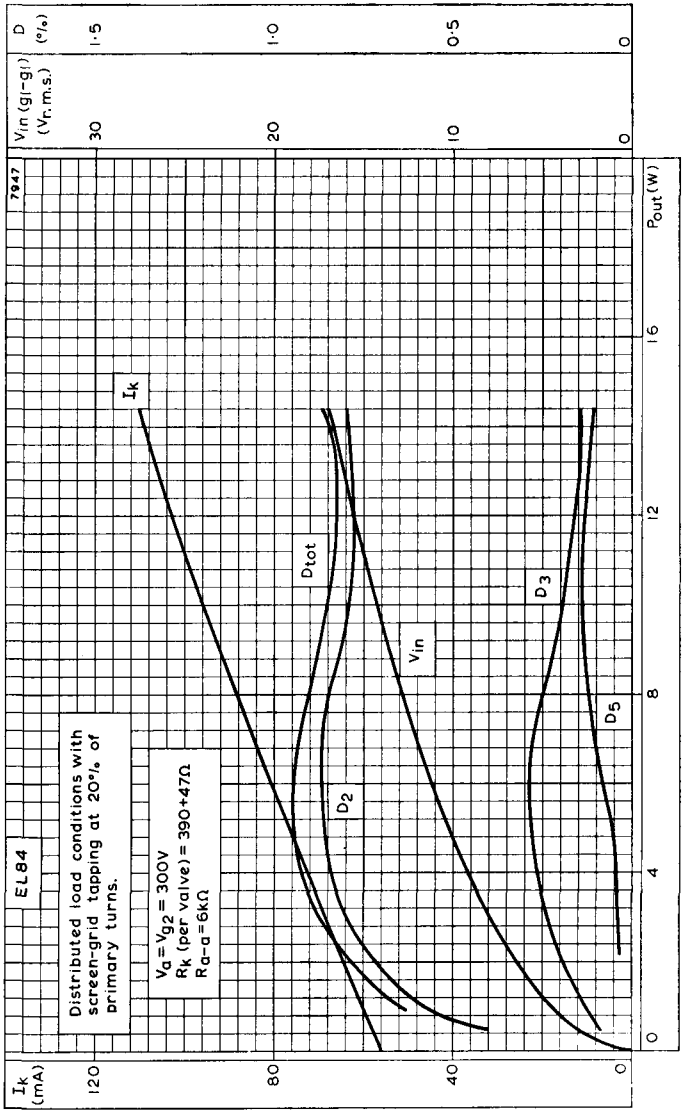


PERFORMANCE OF TWO EL84 IN PUSH-PULL
$V_a = V_{g2} = 250V$

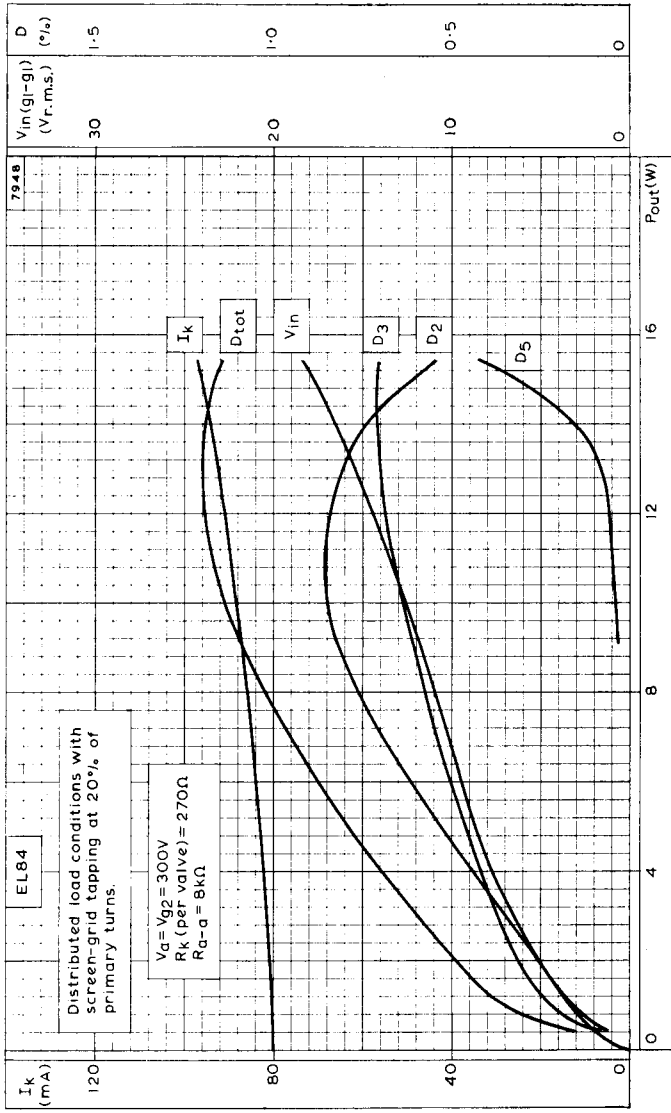


PERFORMANCE OF TWO EL84 IN PUSH-PULL

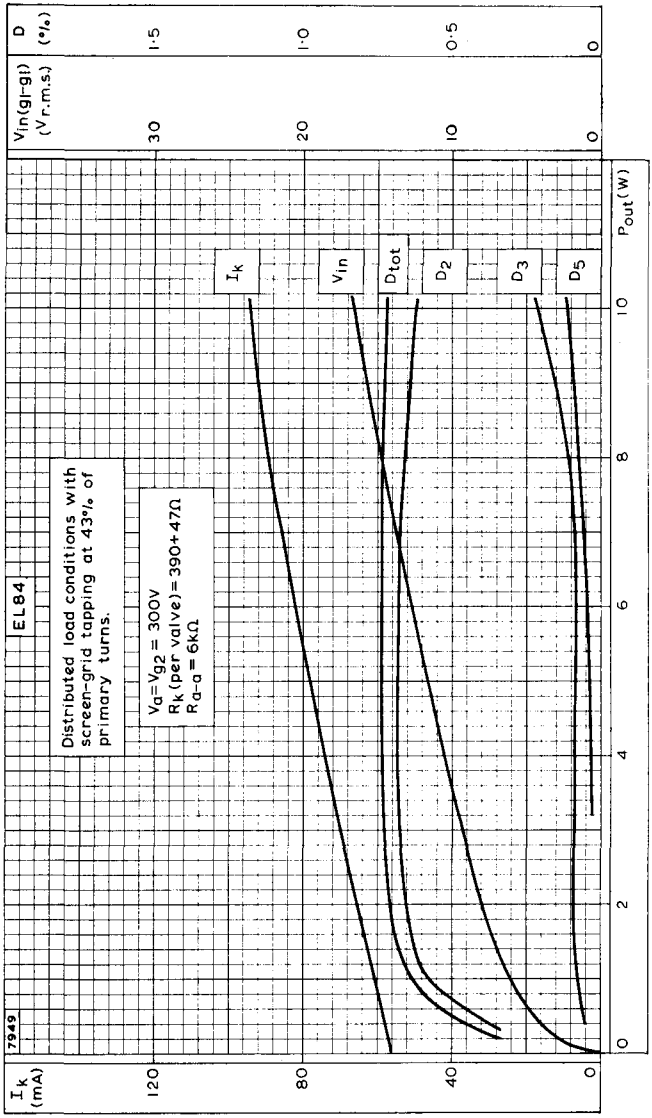
$V_a = V_{g2} = 300V$



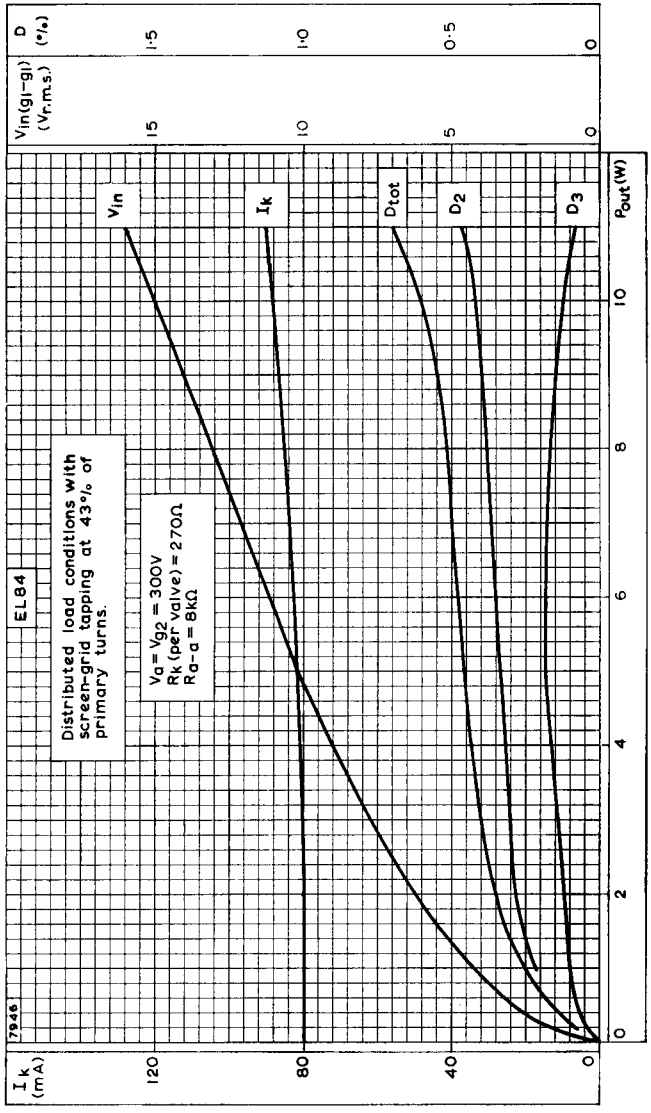
PERFORMANCE OF TWO EL84 IN PUSH-PULL WITH DISTRIBUTED LOAD CONDITIONS. SCREEN-GRID TAPPING AT 20% OF PRIMARY TURNS. $R_{a-a} = 6k\Omega$



PERFORMANCE OF TWO EL84 IN PUSH-PULL WITH DISTRIBUTED LOAD CONDITIONS. SCREEN-GRID TAPPING AT 20% OF PRIMARY TURNS. $R_{a-a} = 8k\Omega$



PERFORMANCE OF TWO EL84 IN PUSH-PULL WITH DISTRIBUTED LOAD CONDITIONS. SCREEN-GRID TAPPING AT 43% OF PRIMARY TURNS. $R_{a-a} = 6k\Omega$



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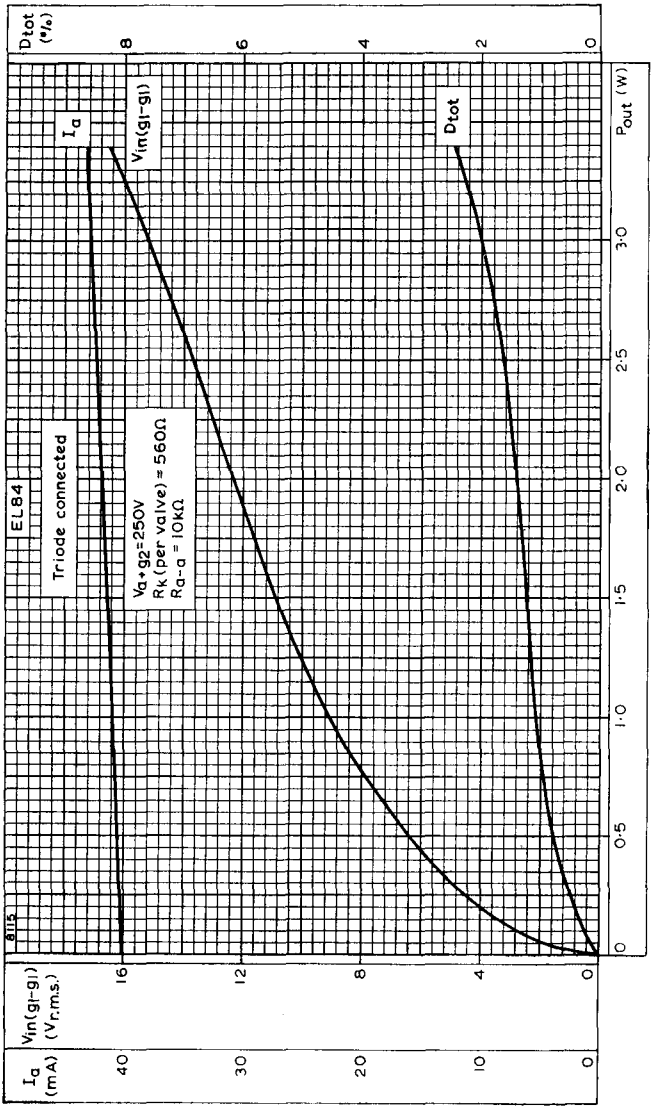
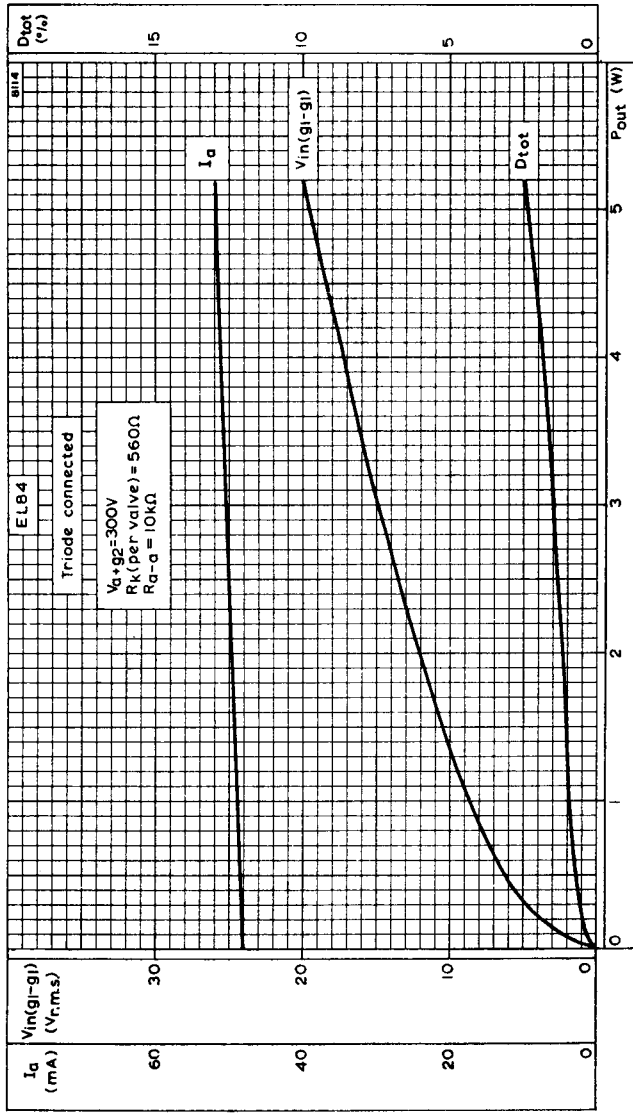
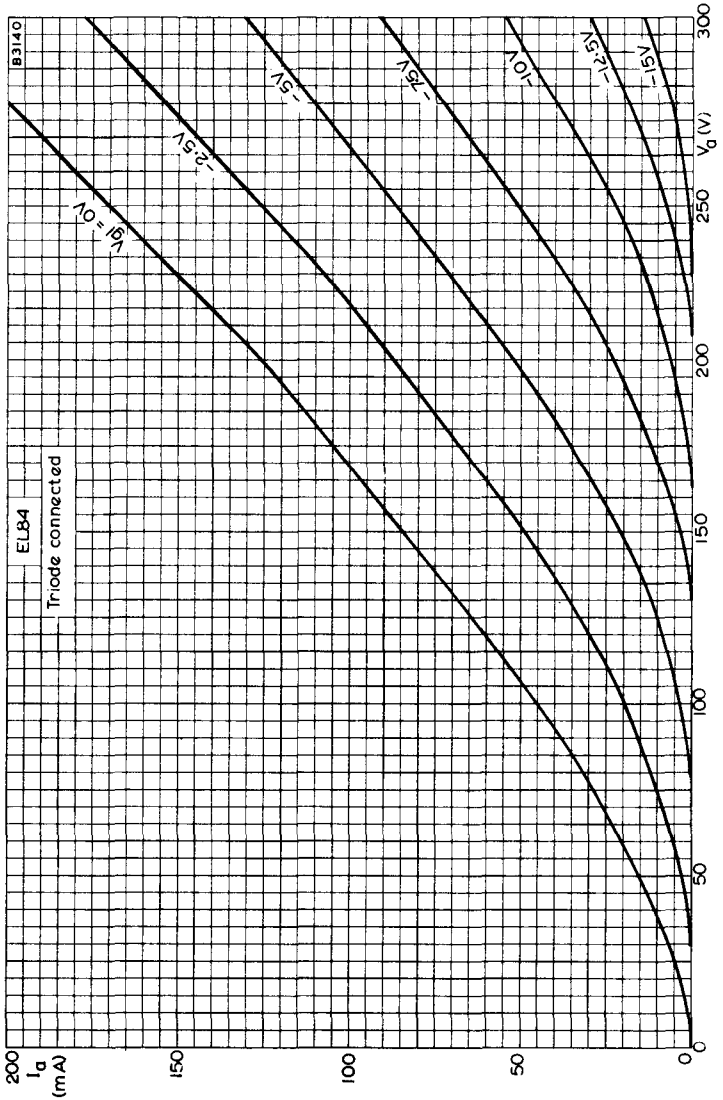


PERFORMANCE OF TWO EL84 TRIODE CONNECTED IN PUSH-PULL.
$V_{a+g2} = 250V$



PERFORMANCE OF TWO EL84 TRIODE CONNECTED IN PUSH-PULL.
$V_{a-g2} = 300V$



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