

OUTPUT PENTODE

EL34

Output pentode rated for 25W anode dissipation,
intended for use in a.c. mains operated equipment.

PRELIMINARY DATA

HEATER

V_h	6.3	V
I_h	1.5	A

CAPACITANCES

C_{out}	7.2	pF
C_{in}	15.5	pF
C_{a-g1}	<1.1	pF
C_{g1-h}	<1.0	pF
C_{k-h}	11	pF

CHARACTERISTICS

V_a	250	V
V_{g2}	250	V
V_{g3}	0	V
I_a	100	mA
I_{g2}	14.9	mA
V_{g1}	-13.5	V
g_m	11	mA/V
r_a	15	k Ω
μ_{g1-g2}	11	

OPERATING CONDITIONS AS SINGLE VALVE CLASS "A" AMPLIFIER

Pentode connection

V_a	250	V
V_{g2}	250	V
V_{g3}	0	V
V_{g1}	-13.5	V
R_k	120	Ω
I_a	100	mA
I_{g2}	14.9	mA
R_a	2.0	k Ω
V_{in} (r.m.s.) ($P_{out}=50mW$)	0.5	V
* P_{out}	11	W
V_{in} (r.m.s.)	8.7	V
* D_{tot}	10	%

* P_{out} and D_{tot} are measured at fixed bias and therefore represent the power output available during the reproduction of speech and music. When a sustained sine wave is applied to the control grid the bias across the cathode resistor will readjust itself as a result of the increased anode and screen-grid currents. This will result in approximately 10% reduction in power output.

Output pentode rated for 25W anode dissipation, intended for use in a.c. mains operated equipment.

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Distributed load conditions with screen-grid tapping at 43% of primary turns

$V_{a+} V_{Rk}$	430	430	V
R_{g2} (per valve)	1	1	k Ω
$V_{g2+} V_{Rk}$	425	425	V
$I_{a(0)}$	2×62.5	2×62.5	mA
I_a (max. sig.)	2×65	2×70	mA
$I_{g2(0)}$	2×5.0	2×5.0	mA
I_{g2} (max. sig.)	2×5.1	2×7.5	mA
R_k (per valve)	470	470	Ω
$V_{in(g1-g1)}$ r.m.s.	32	52	V
R_{a-a}	6.6	6.6	k Ω
P_{out}	20	37	W
D_{tot}	0.8	1.3	%

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Fixed bias

V_b	425	375	V
* R_{g2}	1000	470	Ω
V_{g3}	0	0	V
$I_{a(0)}$	2×30	2×35	mA
I_a (max. sig.)	2×120	2×120	mA
$I_{g2(0)}$	2×4.4	2×4.7	mA
I_{g2} (max. sig.)	2×25	2×25	mA
V_{g1}	-38	-32	V
R_{a-a}	3.4	2.8	k Ω
$V_{in(g1-g1)}$ r.m.s.	54	45	V
P_{out}	55	44	W
D_{tot}	5.0	5.0	%

*Screen-grid resistor common to both valves.

These operating conditions apply with a stabilised line voltage and allow for a 25V drop in the primary winding of the output transformer at maximum signal. If there is an additional drop of 25V in the h.t. line voltage at maximum signal $P_{out} = 45W$ and 36W. The optimum anode-to-anode load under these conditions are 4.0k Ω and 3.8k Ω respectively.

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OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

With separate screen-grid supply and fixed bias

$V_{b(a)}$	500	800	V
$V_{b(g_2)}$	400	400	V
* R_{g_2}	750	750	Ω
V_{g_3}	0	0	V
$I_{a(0)}$	2×30	2×25	mA
I_a (max. sig.)	2×125	2×91	mA
$I_{g_2(0)}$	2×4.0	2×3.0	mA
I_{g_2} (max. sig.)	2×25	2×19	mA
V_{g_1}	-36	-39	V
R_{a-a}	4.0	11	k Ω
$V_{in(g_1-g_2)}$ r.m.s.	51	47	V
P_{out}	70	100	W
D_{tot}	5.0	5.0	%

*Screen-grid resistor common to both valves.

These operating conditions apply with stabilised line voltages and allow for a 25V drop in the primary winding of the output transformer at maximum signal. If there is an additional drop of 25V in the line voltages at maximum signal $P_{out}=58W$ and $90W$. The optimum anode-to-anode load under these conditions are $5.0k\Omega$ and $11k\Omega$ respectively.

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Cathode bias

V_b		375	V
* R_{g_2}		470	Ω
† R_k		130	Ω
V_{g_3}		0	V
$I_{a(0)}$		2×75	mA
I_a (max. sig.)		2×95	mA
$I_{g_2(0)}$		2×11.5	mA
I_{g_2} (max. sig.)		2×22.5	mA
R_{a-a}		3.4	k Ω
$V_{in(g_1-g_2)}$ r.m.s.		42	V
P_{out}		35	W
D_{tot}		5.0	%

*Screen-grid resistor common to both valves.

†Common cathode bias resistor.

These operating conditions allow for a 20V drop in the primary winding of the output transformer and a 5V drop in the h.t. line voltage at maximum signal.

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OPERATING CONDITIONS AS SINGLE VALVE CLASS "A" AMPLIFIER

Triode connection (g_2 connected to a, g_3 to k)

V_{a+}, V_{Rk}	375	V
V_{g3}	0	V
R_k	370	Ω
I_a	70	mA
V_{g1}	-26	V
R_a	3.0	k Ω
V_{in} (r.m.s.) ($P_{out}=50mW$)	1.7	V
P_{out}	6.0	W
V_{in} (r.m.s.)	18.9	V
D_{tot}	8.0	%

OPERATING CONDITIONS FOR TWO VALVES IN PUSH-PULL

Triode connection (g_2 connected to a, g_3 to k)

V_{a+}, V_{Rk}	400	430	V
V_{g3}	0	0	V
* R_k	220	†250	Ω
$I_{a(0)}$	2×65	2×64	mA
I_a (max. sig.)	2×71	2×67	mA
V_{g1}	-29	-32	V
R_{a-a}	5.0	10	k Ω
V_{in} (g_1-g_1) r.m.s.	44	48	V
P_{out}	16	14	W
D_{tot}	3.0	<1.0	%

*Common cathode bias resistor.

†Un-bypassed.

LIMITING VALUES

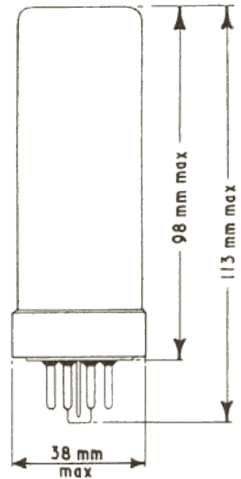
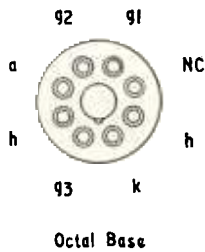
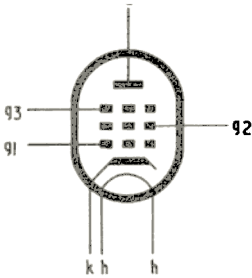
$V_{a(b)}$ max.	2.0	kV
V_a max.	800	V
p_a max.	25	W
p_a max. (max. signal speech and music)	27.5	W
$V_{g2(b)}$ max.	800	V
V_{g2} max.	425	V
p_{g2} max.	8.0	W
I_k max.	150	mA
V_{g1} max. ($I_{g1}=+0.3\mu A$)	-1.3	V
R_{g1-k} max. (cathode bias)	700	k Ω
R_{g1-k} max. (fixed bias)	500	k Ω
V_{h-k} max.	100	V
R_{h-k} max.	20	k Ω

OUTPUT PENTODE

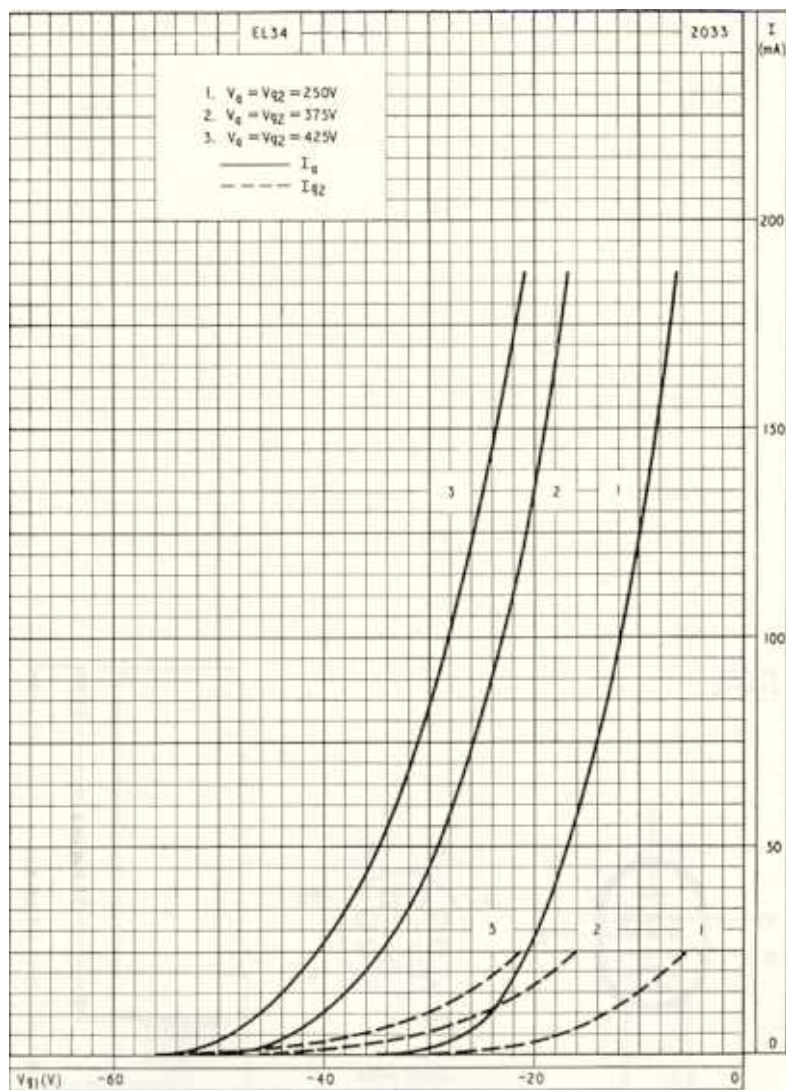
EL34

Output pentode rated for 25W anode dissipation,
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1933



Output pentode rated for 25W anode dissipation, intended for use in a.c. mains operated equipment.

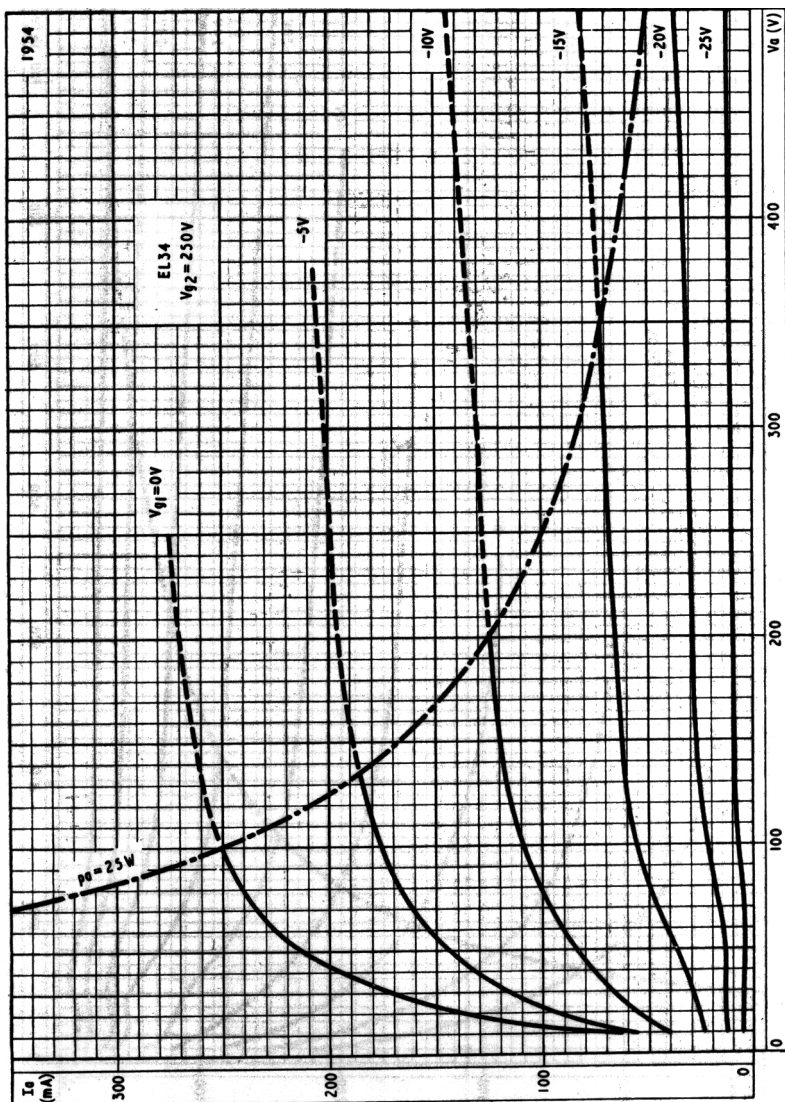


ANODE AND SCREEN-GRID CURRENT PLOTTED AGAINST CONTROL GRID VOLTAGE

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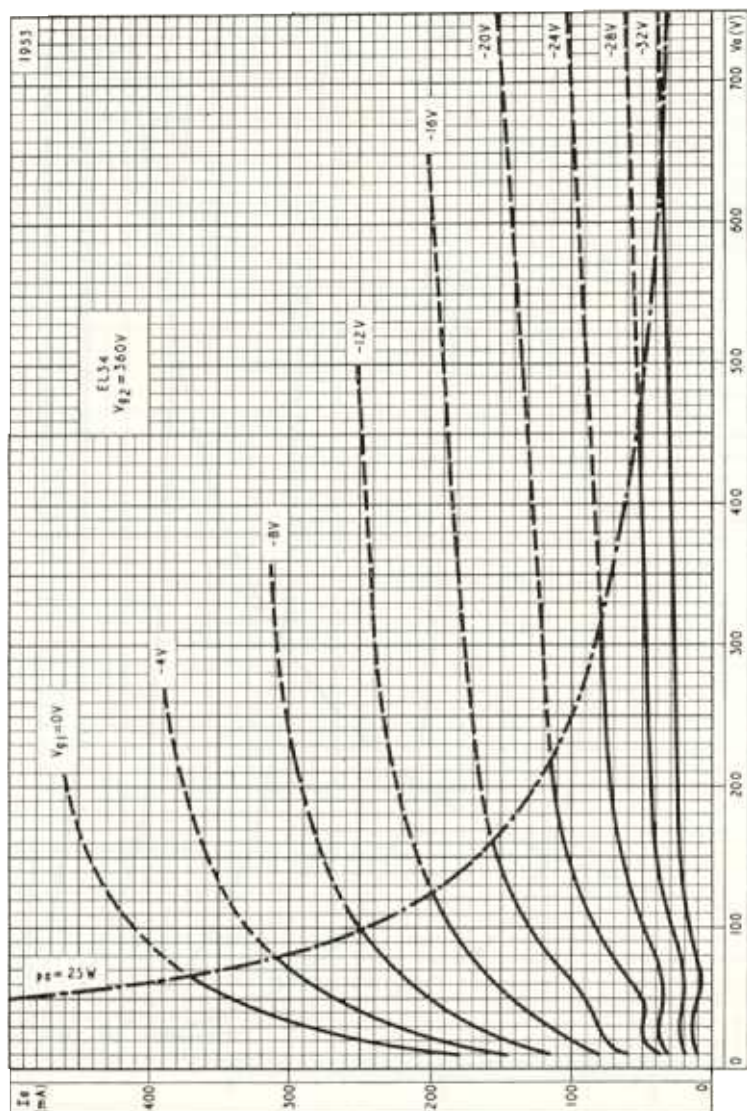
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH
CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 250V$



EL34

OUTPUT PENTODE

Output pentode rated for 25W anode dissipation, intended for use in a.c. mains operated equipment.

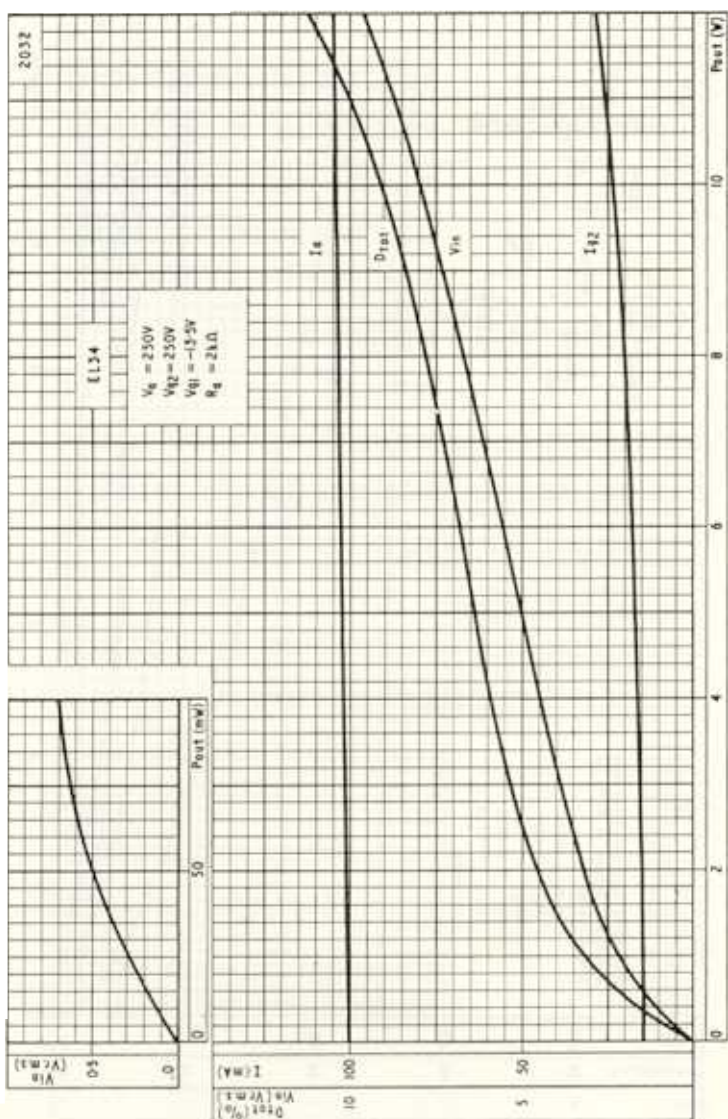


ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL GRID VOLTAGE AS PARAMETER $V_{g2} = 360V$

OUTPUT PENTODE

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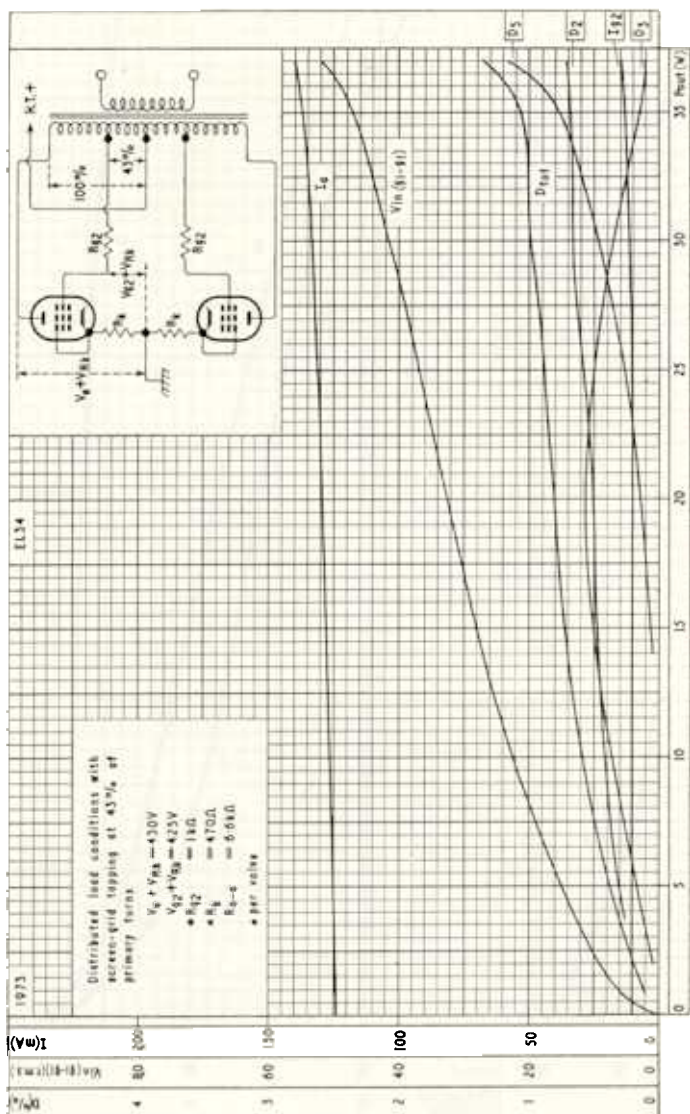
PERFORMANCE OF EL34 WHEN USED AS A SINGLE VALVE CLASS "A" AMPLIFIER



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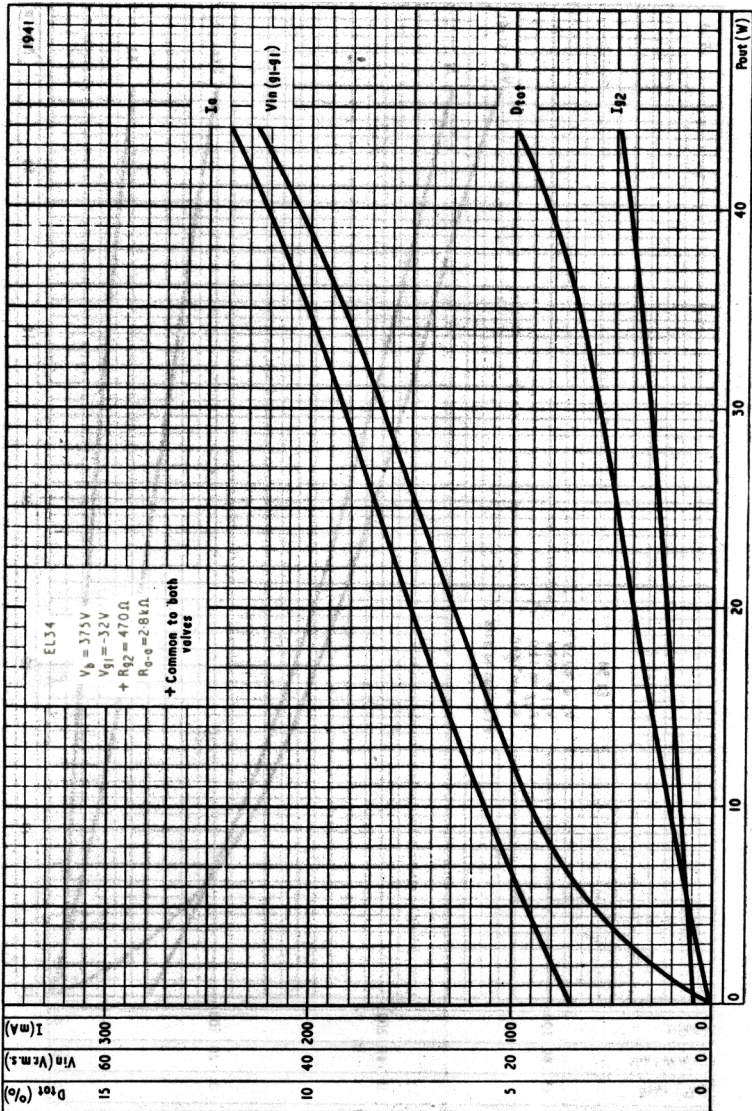
PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH DISTRIBUTED LOAD CONDITIONS. SCREEN-GRID TAPPING AT 43% OF PRIMARY TURNS



OUTPUT PENTODE

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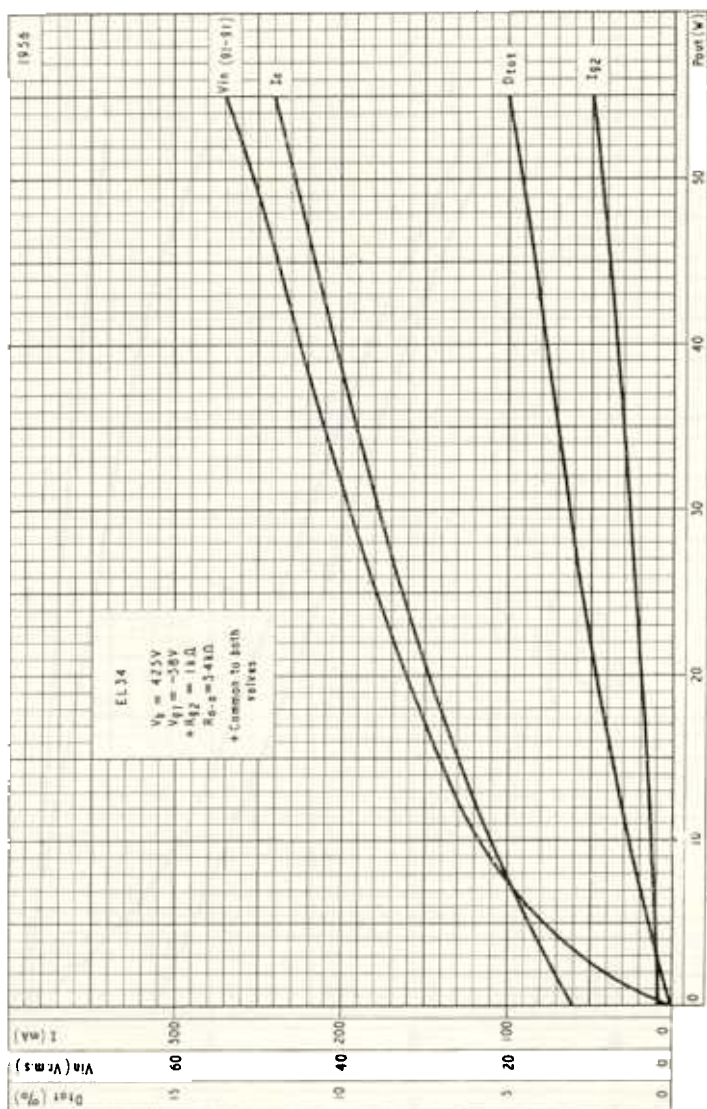
Output pentode rated for 25W anode dissipation,
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PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH FIXED BIAS AND $V_b = 375V$



Output pentode rated for 25W anode dissipation, intended for use in a.c. mains operated equipment.



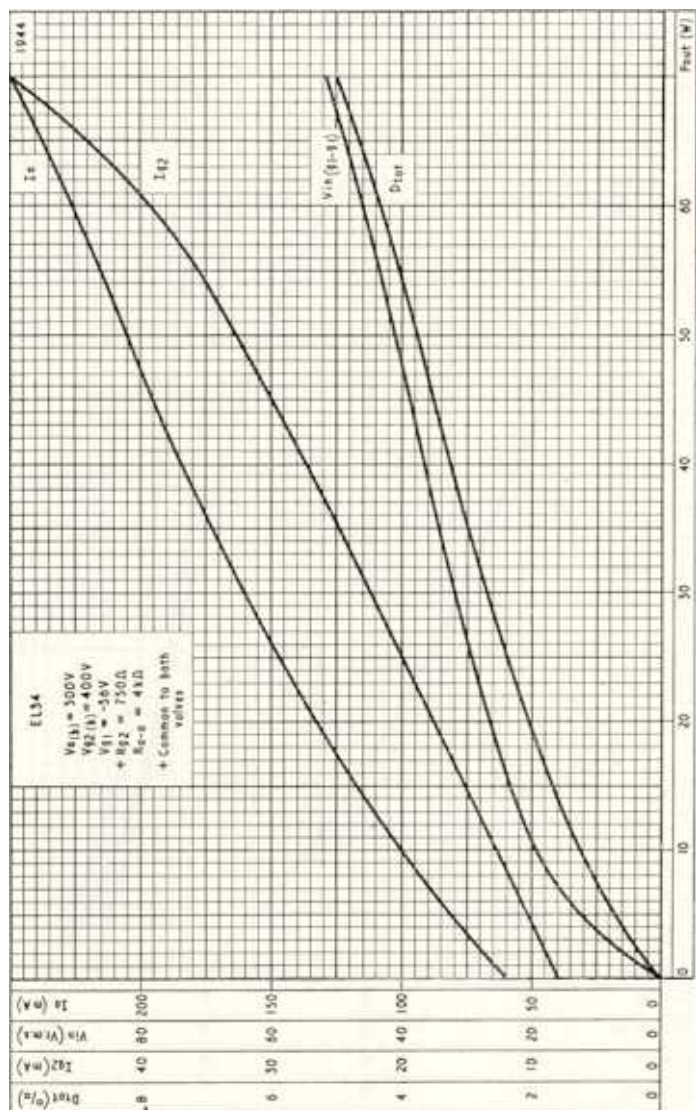
PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH FIXED BIAS AND $V_b=425V$



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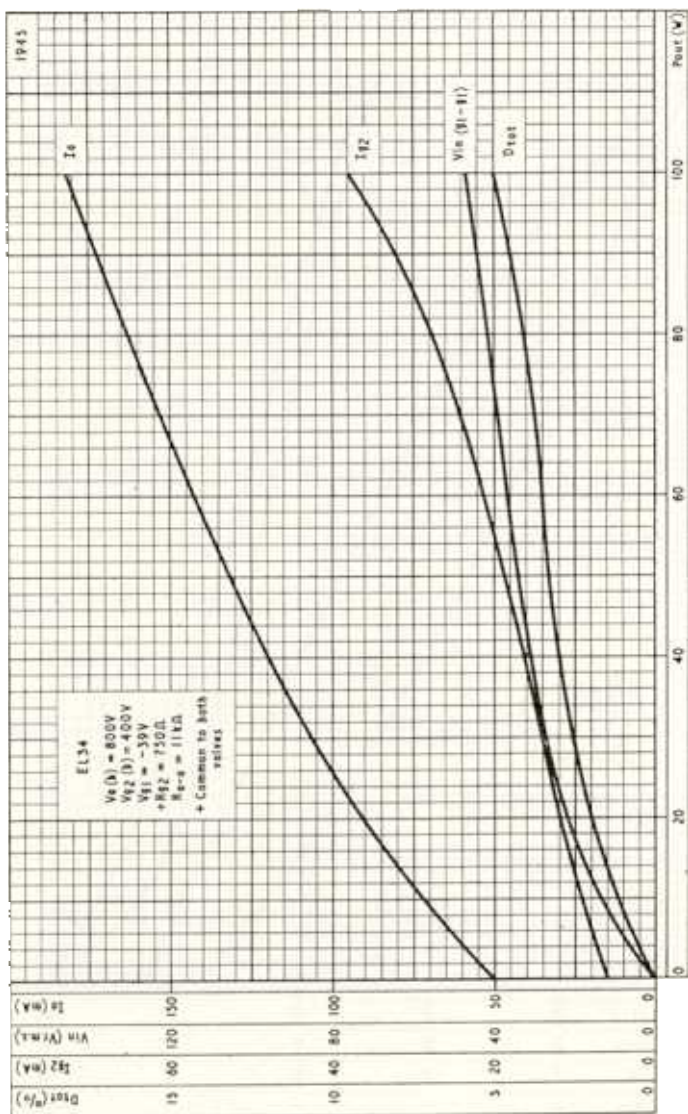
Output pentode rated for 25W anode dissipation, intended for use in a.c. mains operated equipment.



PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH SEPARATE ANODE AND SCREEN-GRID VOLTAGE SUPPLIES AND FIXED BIAS $V_{a(b)} = 500V$, $V_{g2(b)} = 400V$



Output pentode rated for 25W anode dissipation, intended for use in a.c. mains operated equipment.

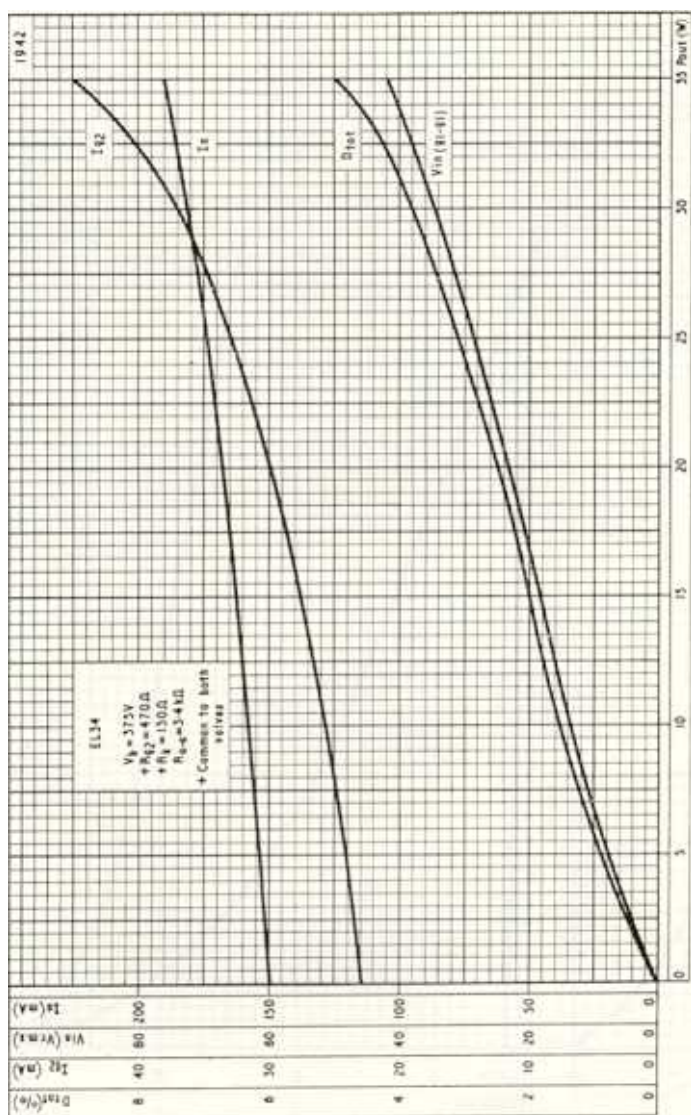


PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH SEPARATE ANODE AND SCREEN-GRID VOLTAGE SUPPLIES AND FIXED BIAS $V_{a(b)}=800V$, $V_{g2(b)}=400V$

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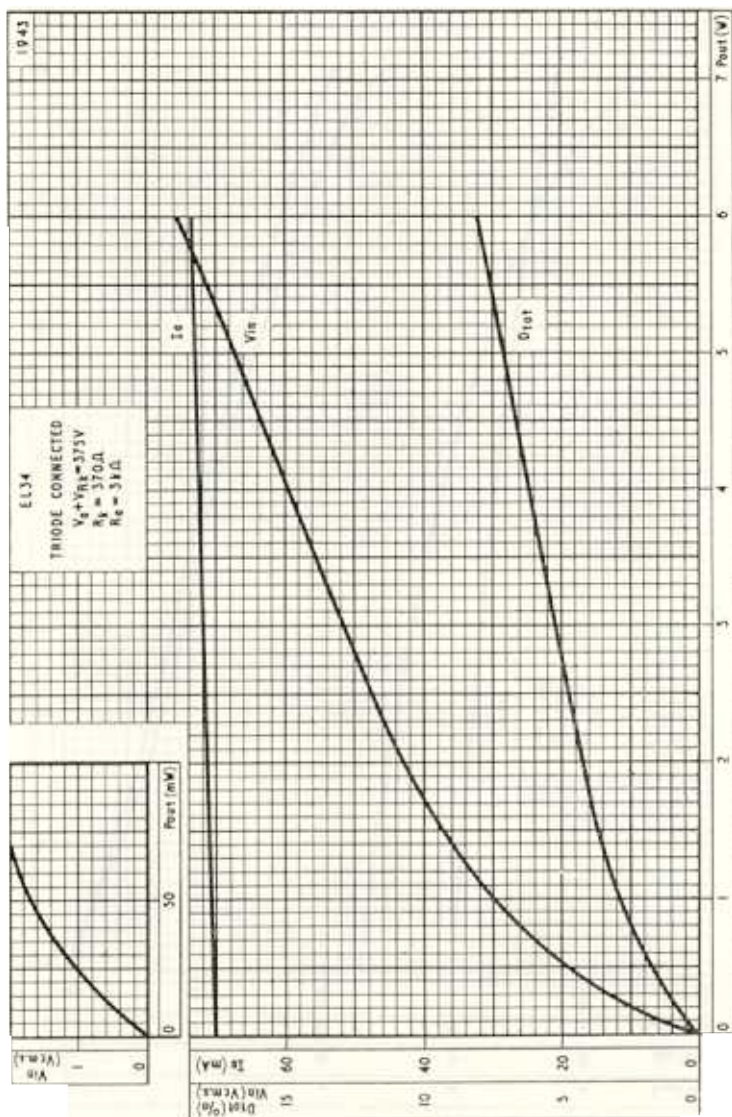


PERFORMANCE OF TWO EL34 IN PUSH-PULL WITH CATHODE BIAS AND $V_b=375V$

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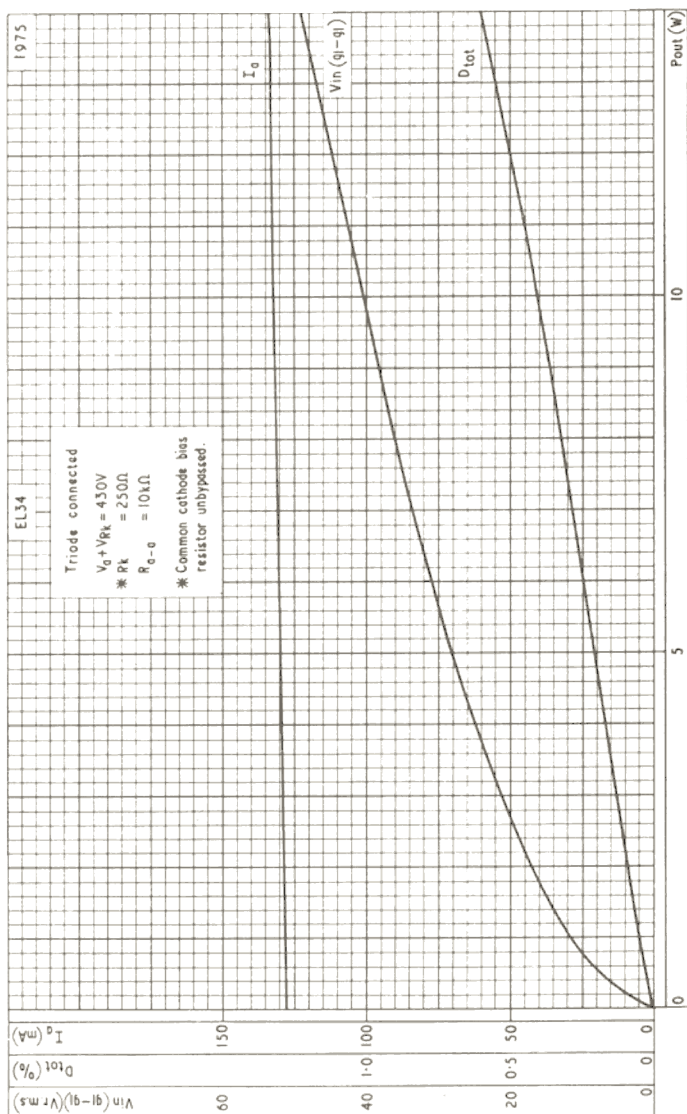


PERFORMANCE OF SINGLE EL34 TRIODE CONNECTED

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PERFORMANCE OF TWO EL34 IN PUSH-PULL TRIODE CONNECTED