

TRIODE PENTODE

ECL80

Combined triode and output pentode primarily designed for use in television receivers with the triode as a frame blocking oscillator and the pentode as a frame output valve. Other applications include the use of the triode as a line blocking oscillator, A.F. voltage amplifier or in multivibrator circuits and the operation of the pentode as an audio output valve or a synchronising pulse separator.

HEATER

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

V_h	6.3	V
I_h	300	mA

CAPACITANCES

C_{gt-ap}	<0.12	pF
C_{at-ap}	<1.2	pF
C_{gt-gl}	<0.2	pF
C_{at-gl}	<0.2	pF
C_{h-k}	3.7	pF←

Pentode Section

C_{in}	4.5	pF
C_{out}	5.0	pF
C_{a-gl}	<0.2	pF
C_{gl-h}	<0.25	pF

Triode Section

C_{gt-k}	2.0	pF
C_{at-k}	0.3	pF
C_{at-gt}	0.9	pF
C_{gt-h}	<0.05	pF

CHARACTERISTICS

Pentode Section

V_a	170	200	V
V_{g2}	170	200	V
V_{g3}	0	0	V
I_a	15	17.5	mA
I_{g2}	2.8	3.3	mA
V_{gl}	-6.7	-8.0	V
g_m	3.2	3.3	mA/V
r_a	150	150	k Ω
μ_{gl-g2}	14	14	

Triode Section

V_{at}	100	V
I_{at}	4.0	mA
V_{gt}	-2.3	V
g_m	1.4	mA/V
r_a	12.5	k Ω
μ	17.5	

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TRIODE SECTION AS A.F. VOLTAGE AMPLIFIER

Operating Conditions

V_b (V)	R_a (k Ω)	I_{at} (mA)	$-V_{gt}$ (V)	$\frac{V_{out}}{V_{in}}$	V_{out}^* (V _{r.m.s.})	D_{tot}^* (%)	$R_{g1}^\dagger$ (k Ω)
170	47	1.8	3.5	9.5	22	8.7	150
170	400	1.0	3.5	10.5	24	7.6	330
170	220	0.5	3.5	11	24.5	6.5	680
200	47	2.2	4.2	9.5	27	9.0	150
200	100	1.2	4.2	10.5	29	8.0	330
200	220	0.6	4.2	11	30	6.5	680

* Output voltage and distortion at the start of positive grid current. At lower output voltages the distortion is approximately proportional to the voltage.

† Grid resistor of the following valve.

LIMITING VALUES

Pentode Section

$V_{a(b)}$ max.	550	V
$V_{a(pk)}$ max.	1.2	kV
V_a max.	400	V
p_a max.	3.5	W
$V_{g2(b)}$ max.	550	V
V_{g2} max.	250	V
p_{g2} max.	1.2	W ←
I_k max.	25	mA
* $I_{k(pk)}$ max.	350	mA ←
V_{g1} max. ($I_{g1} = +0.3 \mu A$)	-1.3	V
R_{g1-k} max. ($I_k = 12$ mA) (frame output valve)	2.2	M Ω
R_{g1-k} max. ($I_k = 20$ mA) (audio output valve)	1.0	M Ω
R_{h-k} max.	20	k Ω
V_{h-k} max.	150	V

* Max. pulse duration 10% of one cycle, with a maximum of 2 m secs.

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PENTODE SECTION AS FRAME OUTPUT VALVE

Typical Data

V_a	170	200	V
V_{g2}	170	200	V
V_{g3}	0	0	V
V_{g1}	-9.0	-10.6	V
$I_{a(o)}$	8.5	10	mA
$I_{g2(o)}$	1.6	1.9	mA

Circuit Design

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

V_a	50	60	V
V_{g2}	170	200	V
I_a	26	31	mA

PENTODE SECTION AS SYNCHRONISING PULSE SEPARATOR

Typical Data

V_a	20	V
V_{g2}	15	V
V_{g3}	0	V
V_{g1} ($I_a = 100 \mu A$)	-1.4	V
I_a ($V_{g1} = 0$)	2.0	mA

PENTODE SECTION AS AUDIO OUTPUT VALVE

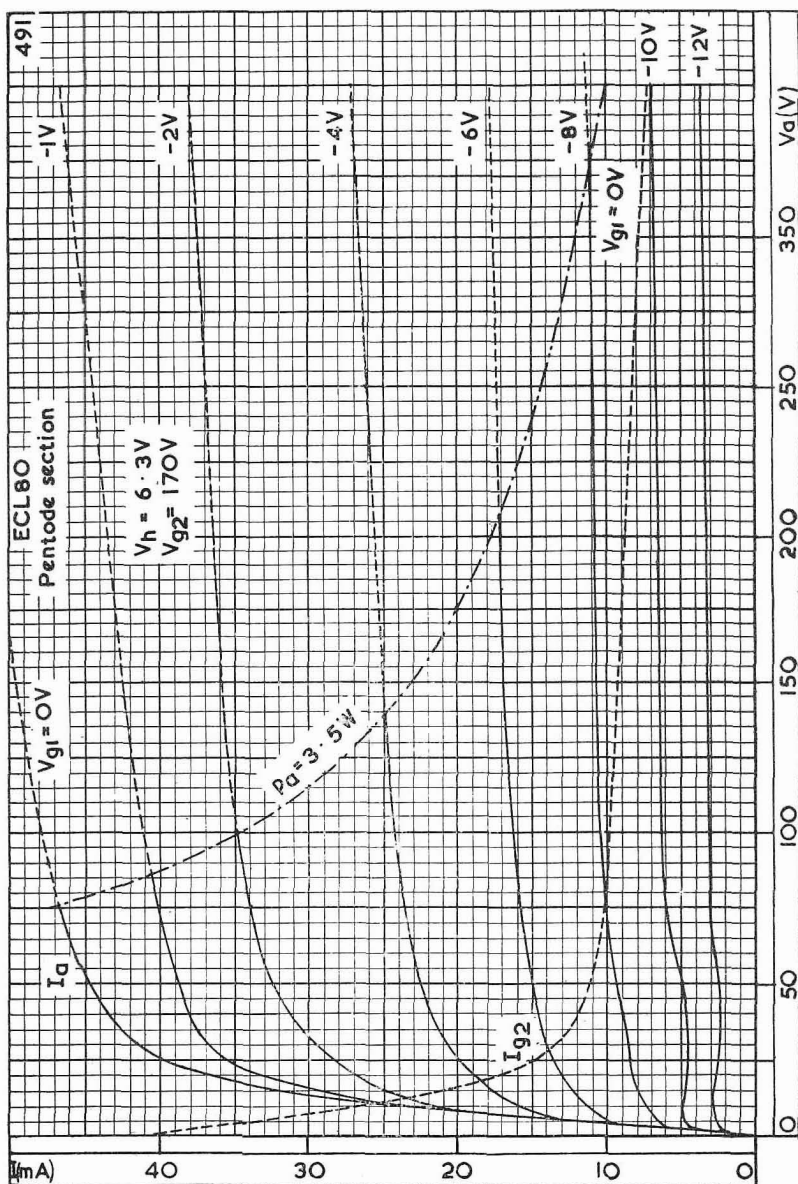
Operating Conditions

V_a	170	200	V
V_{g2}	170	200	V
V_{g3}	0	0	V
V_{g1}	-6.7	-8.0	V
R_a	11	11	k Ω
$I_{a(o)}$	15	17.5	mA
$I_{g2(o)}$	2.8	3.3	mA
V_{in} (r.m.s.) ($P_{out} = 50$ mW)	0.7	0.7	V
V_{in} (r.m.s.) ($D_{tot} = 10\%$)	3.5	4.0	V
P_{out} ($D_{tot} = 10\%$)	1.0	1.4	W
V_{in} (r.m.s.) (up to $\eta = 50\%$)	4.1	4.7	V
P_{out} (r.m.s.) (up to $\eta = 50\%$)	1.27	1.75	W
D_{tot} (r.m.s.) (up to $\eta = 50\%$)	12	12	%

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ANODE CURRENT AND SCREEN-GRID CURRENT OF PENTODE SECTION PLOTTED AGAINST ANODE VOLTAGE, FOR SCREEN-GRID VOLTAGE OF 170 V

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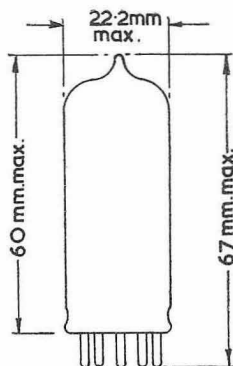
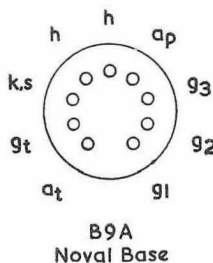
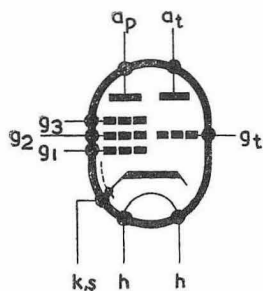
LIMITING VALUES

Triode Section

$V_{at(b)}$ max.	550	V
V_{at} max.	200	V
p_{at} max.	1.0	W
I_k max.	8	mA ←
* $i_{k(pk)}$ max.	200	mA
V_{gt} max. ($I_{gt} = +0.3 \mu A$)	-1.3	V
R_{gt-k} max.	3	M Ω
R_{h-k} max.	20	k Ω
V_{h-k} max.	150	V

* Max pulse duration 10% of one cycle, with maximum of 2 m secs.

When the triode section is used in amplifier circuits, where the input voltage, for an output of 50 mW is less than 50 mV, no special precautions need be taken against microphonic effects.

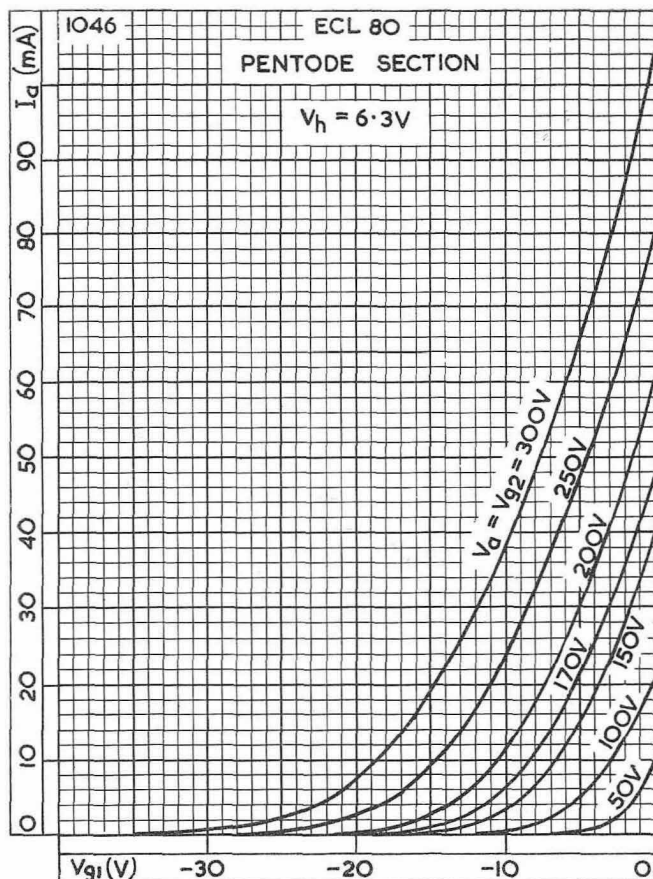


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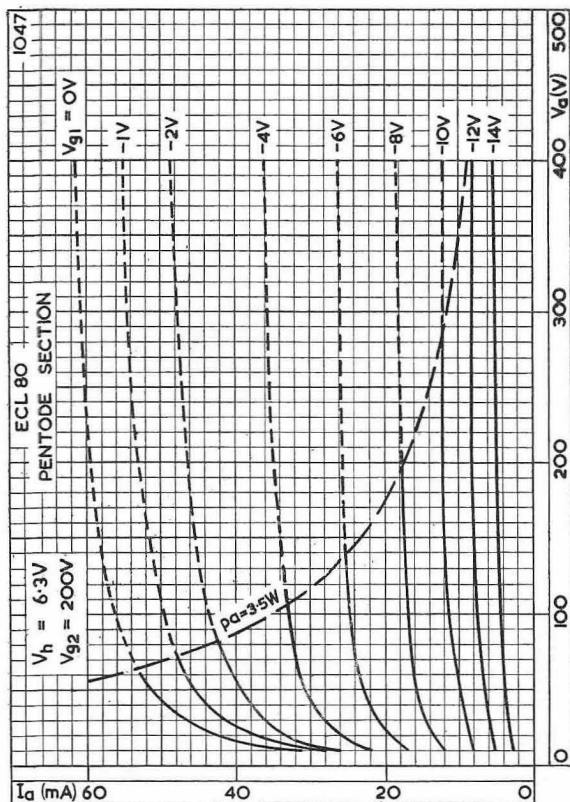


ANODE CURRENT OF PENTODE SECTION PLOTTED AGAINST CONTROL-GRID VOLTAGE, FOR ANODE AND SCREEN-GRID VOLTAGES BETWEEN 50V AND 300V

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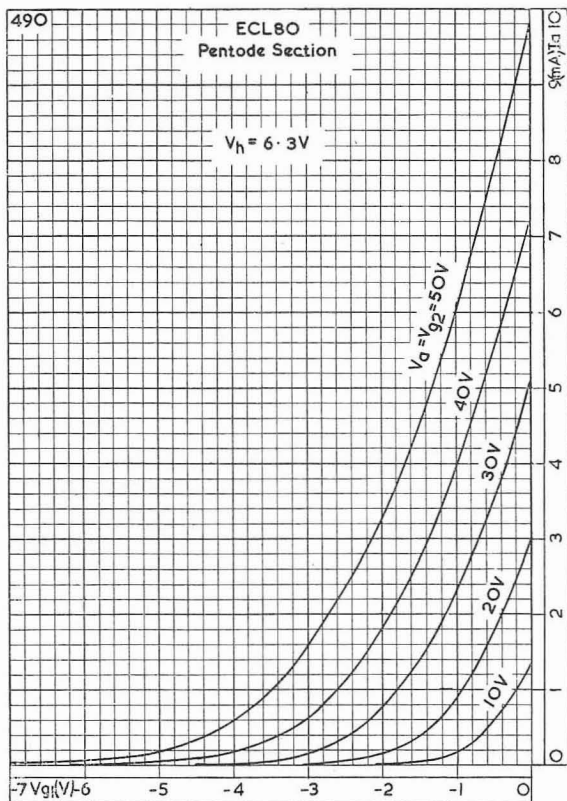


ANODE CURRENT AND SCREEN-GRID CURRENT OF PENTODE SECTION
PLOTTED AGAINST ANODE VOLTAGE, FOR SCREEN-GRID VOLTAGE
OF 200V

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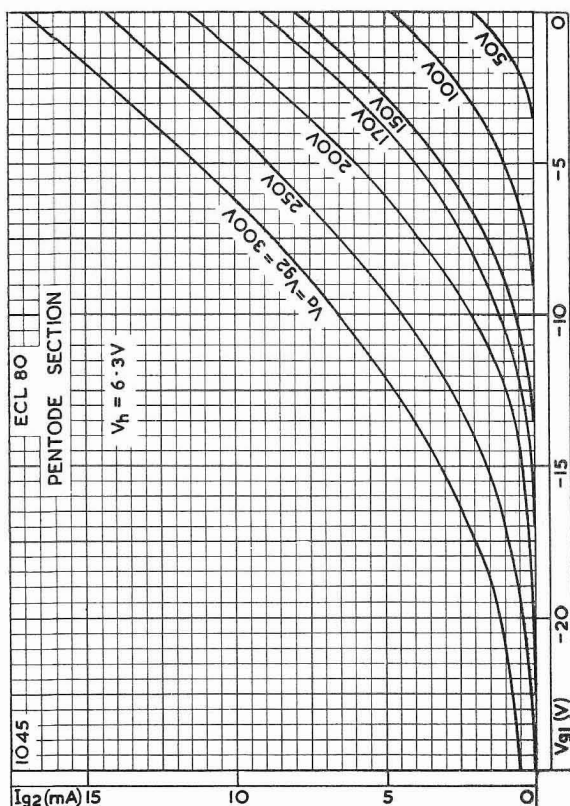


ANODE CURRENT OF PENTODE SECTION PLOTTED AGAINST CONTROL-GRID VOLTAGE, FOR ANODE AND SCREEN-GRID VOLTAGES BETWEEN 10V AND 50V

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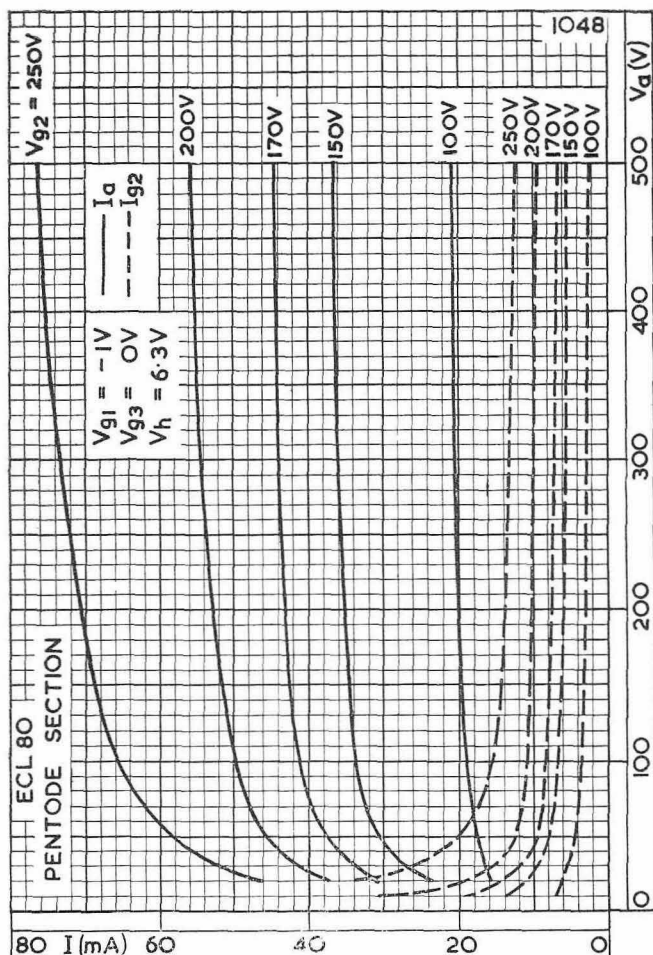


SCREEN-GRID CURRENT OF PENTODE SECTION PLOTTED AGAINST CONTROL-GRID VOLTAGE, FOR ANODE AND SCREEN-GRID VOLTAGES BETWEEN 50V AND 300V

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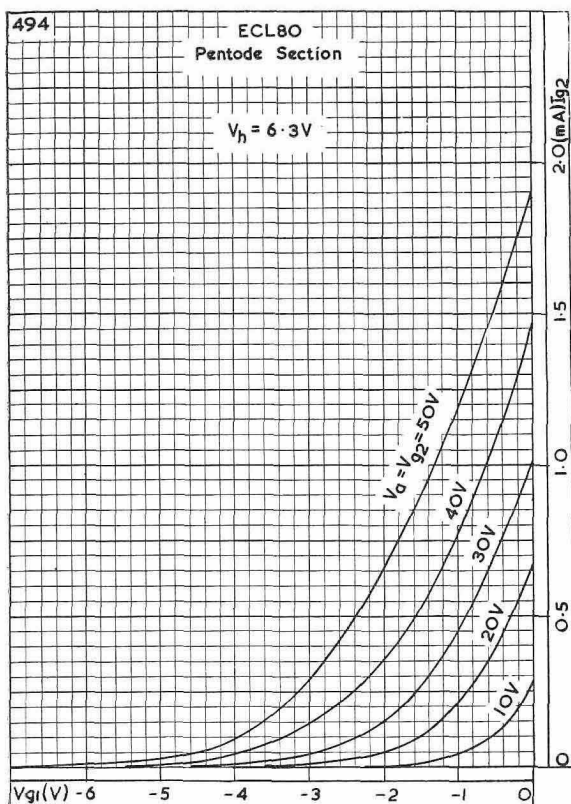


ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE, WITH CONTROL-
GRID VOLTAGE AT $-1V$

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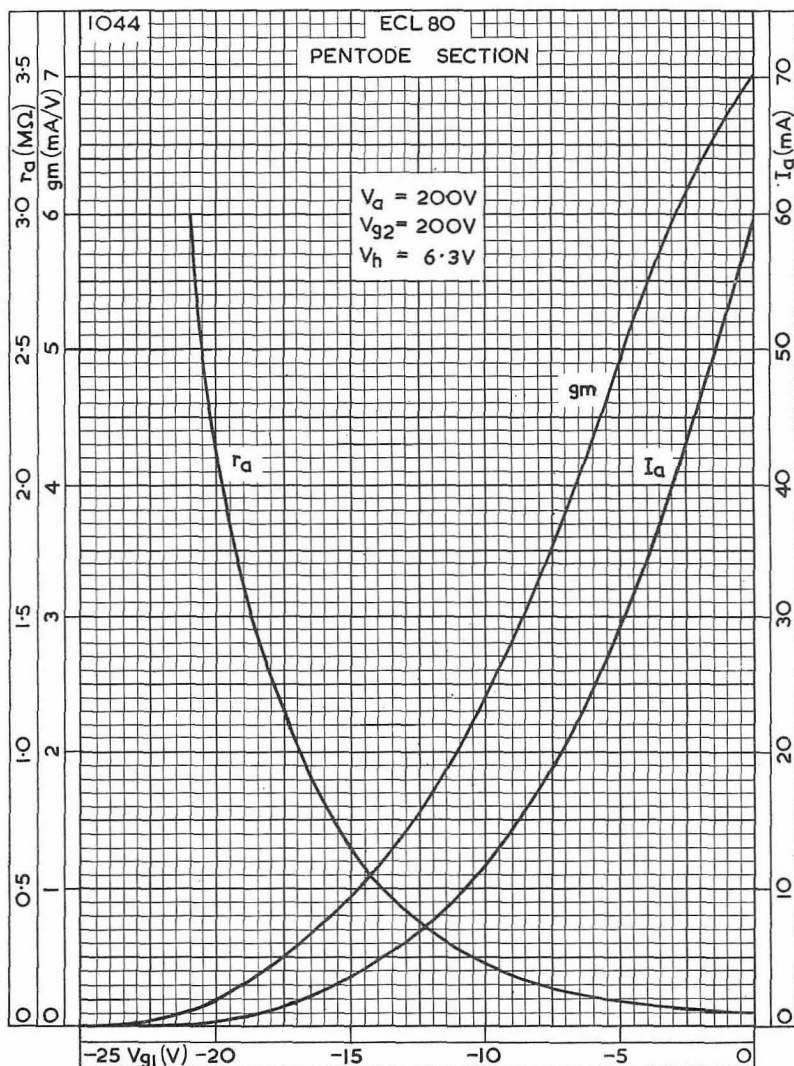


SCREEN-GRID CURRENT OF PENTODE SECTION PLOTTED AGAINST CONTROL-GRID VOLTAGE, FOR ANODE AND SCREEN-GRID VOLTAGES BETWEEN 10V AND 50V

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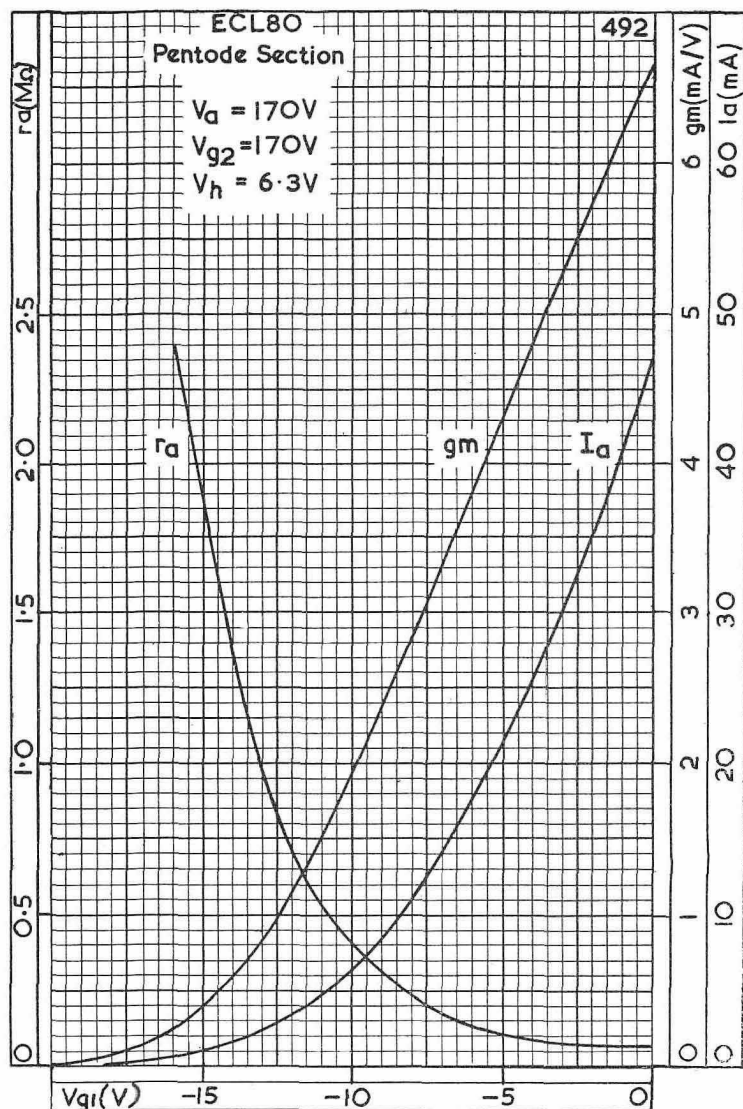


ANODE CURRENT, MUTUAL CONDUCTANCE AND INTERNAL RESISTANCE OF PENTODE SECTION PLOTTED AGAINST CONTROL-GRID VOLTAGE, FOR SCREEN-GRID VOLTAGE OF 200V

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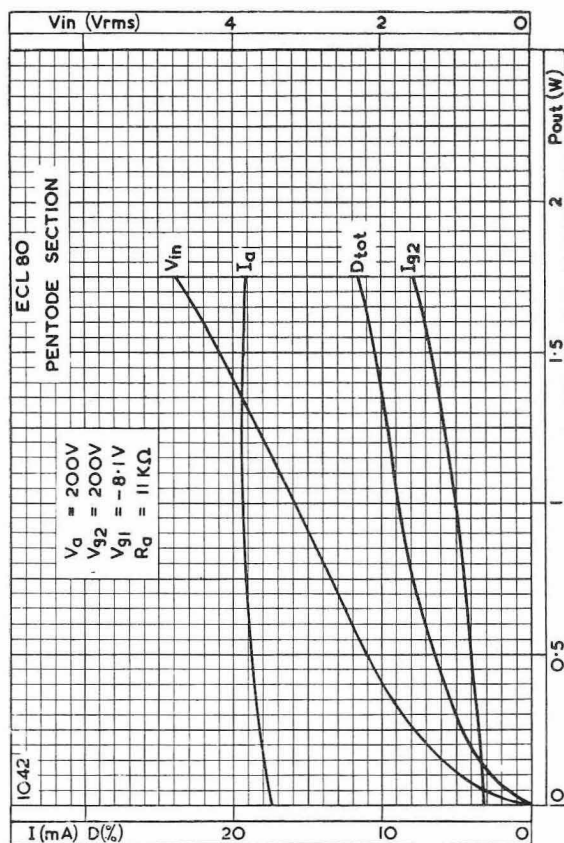


ANODE CURRENT, MUTUAL CONDUCTANCE AND INTERNAL RESISTANCE OF PENTODE SECTION PLOTTED AGAINST CONTROL-GRID VOLTAGE FOR SCREEN-GRID VOLTAGE OF 170V

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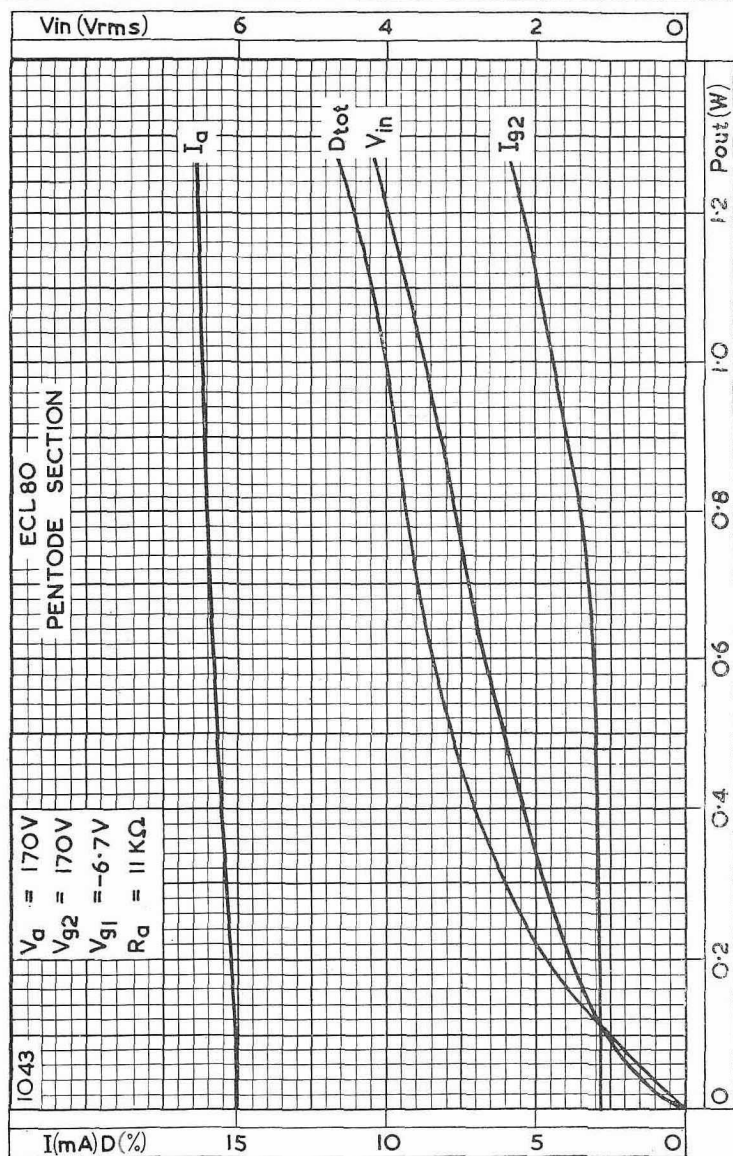
ANODE CURRENT, SCREEN-GRID CURRENT, INPUT VOLTAGE AND TOTAL DISTORTION PLOTTED AGAINST POWER OUTPUT, FOR SCREEN-GRID VOLTAGE OF 200V



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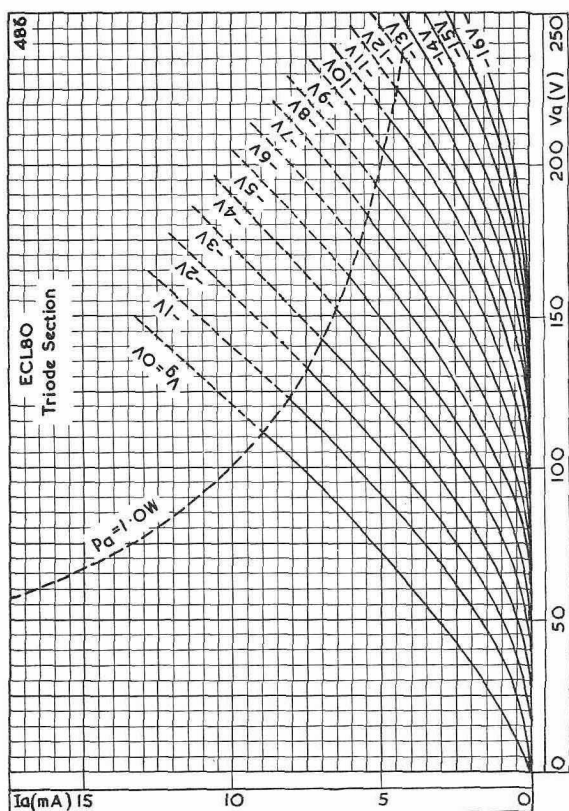
ANODE CURRENT, SCREEN-GRID CURRENT, INPUT VOLTAGE AND TOTAL DISTORTION PLOTTED AGAINST POWER OUTPUT, FOR SCREEN-GRID VOLTAGE OF 170V



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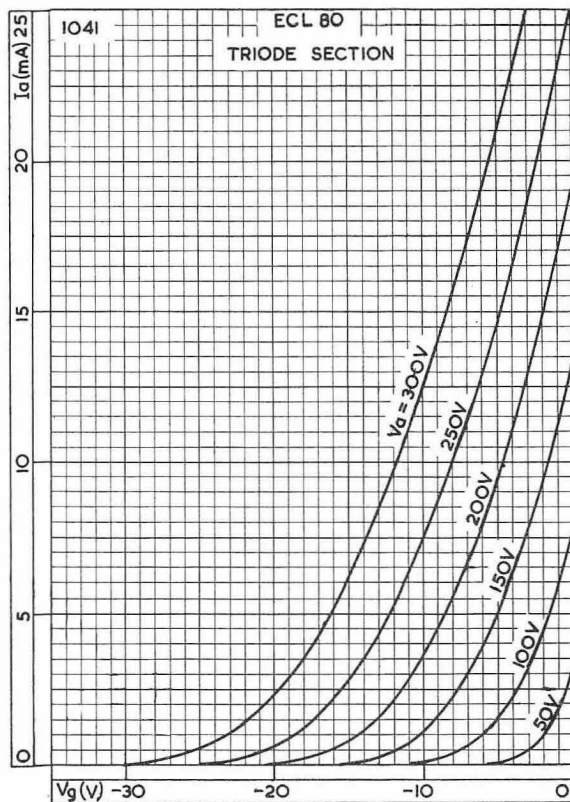


ANODE CURRENT OF TRIODE SECTION PLOTTED AGAINST ANODE VOLTAGE, WITH GRID VOLTAGE AS PARAMETER

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ANODE CURRENT OF TRIODE SECTION PLOTTED AGAINST GRID VOLTAGE, WITH ANODE VOLTAGE AS PARAMETER