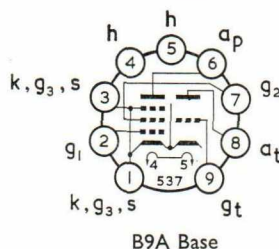


V.H.F. TRIODE PENTODE



GENERAL

This combined triode and variable-mu, frame grid pentode is for use as a frequency changer and I.F. amplifier at frequencies up to 200 Mc/s in television receivers.

Heater Current	I_h	0.3	A
Heater Voltage	V_h	8.5	V

RATINGS

		Triode	Pentode	
Maximum Anode Dissipation	$P_a(\max)$	1.5	2.0	W
Maximum Screen Grid Dissipation ($V_{g1}=0$ V)	$P_{g2}(\max)$	—	0.45†	W
Maximum Anode Supply Voltage	$V_a(b)\max$	550	550	V
Maximum Anode Voltage	$V_a(\max)$	125	250	V
Maximum Screen Grid Supply Voltage	$V_{g2}(b)\max$	—	550	V
Maximum Screen Grid Voltage	$V_{g2}(\max)$	—	250	V
Maximum Heater to Cathode Voltage	$V_{h-k}(\max)$	100*	100*	V
Maximum Negative Control Grid Voltage	$-V_{g1}(\max)$	50	50	V
Maximum Cathode Current	$I_k(\max)$	20	18	mA
Maximum Grid to Cathode Resistance	$R_{g-k}(\max)$	0.5	1.0	MΩ

* To fulfil hum requirements on A.M. sound it will be necessary for V_{h-k} to be less than 50 V r.m.s.

† For V_{g1} equal to or more negative than 5.2 V then $p_{g2}(\max) = 0.2$ W.

INTER-ELECTRODE CAPACITANCES (Shielded)

Pentode Input	$C_{in}(p)$	6.2	pF
Pentode Output	$C_{out}(p)$	3.7	pF
Pentode Anode to Grid 1	C_{ap-g1}	0.009	pF
Pentode Anode to Grid 1	C_{ap-g1}	<0.012	pF
Grid 1 to Grid 2	C_{g1-g2}	1.6	pF
Triode Input	$C_{in}(t)$	3.3	pF
Triode Output	$C_{out}(t)$	1.7	pF
Anode Triode to Grid Triode	C_{at-gt}	1.8	pF
Anode Pentode to Anode Triode	C_{ap-at}	<0.025	pF
Anode Pentode to Grid Triode	C_{ap-gt}	<0.010	pF
Grid 1 to Anode Triode	C_{g1-at}	<0.010	pF
Grid 1 to Grid Triode	C_{g1-gt}	<0.010	pF

CHARACTERISTICS

		Triode	Pentode	
Anode Voltage	V_a	100	170	V
Screen Grid Voltage	V_{g2}	—	120	V
Control Grid Voltage	V_{g1}	-3.0	-1.4	V
Anode Current	I_a	15	10	mA
Screen Grid Current	I_{g2}	—	3.0	mA
Mutual Conductance	g_m	9.0	11	mA/V
Valve Anode Resistance ($\delta V_a/\delta I_a$)	r_a	2.2	>350	kΩ
Inner Amplification Factor	μ_{g1-g2}	—	55	
Amplification Factor	μ	20	—	
Equivalent Grid Noise Resistance	R_{eq}	—	1.5	kΩ

TYPICAL OPERATION

Pentode as Frequency Changer

Anode Supply Voltage	$V_{a(b)}$	200	200	V
Screen Grid Supply Voltage	$V_{g2(b)}$	200	200	V
Anode Load Resistance	R_a	2.7	4.7	k Ω
Screen Grid Resistance	R_{g2}	27	27	k Ω
Control Grid Resistance	R_{g1}	0.1	1.0	M Ω
Anode Current	I_a	10	9.3	mA
Screen Grid Current	I_{g2}	3.0	2.9	mA
Control Grid Current	I_{g1}	8.0	2.3	μ A
Control Grid Supply Voltage	$V_{g1(b)}$	-1.4	0	V
R.M.S. Heterodyne Voltage	$V_{het(r.m.s.)}$	1.6	1.6	V
Conversion Conductance	g_c	5.0	4.7	mA/V

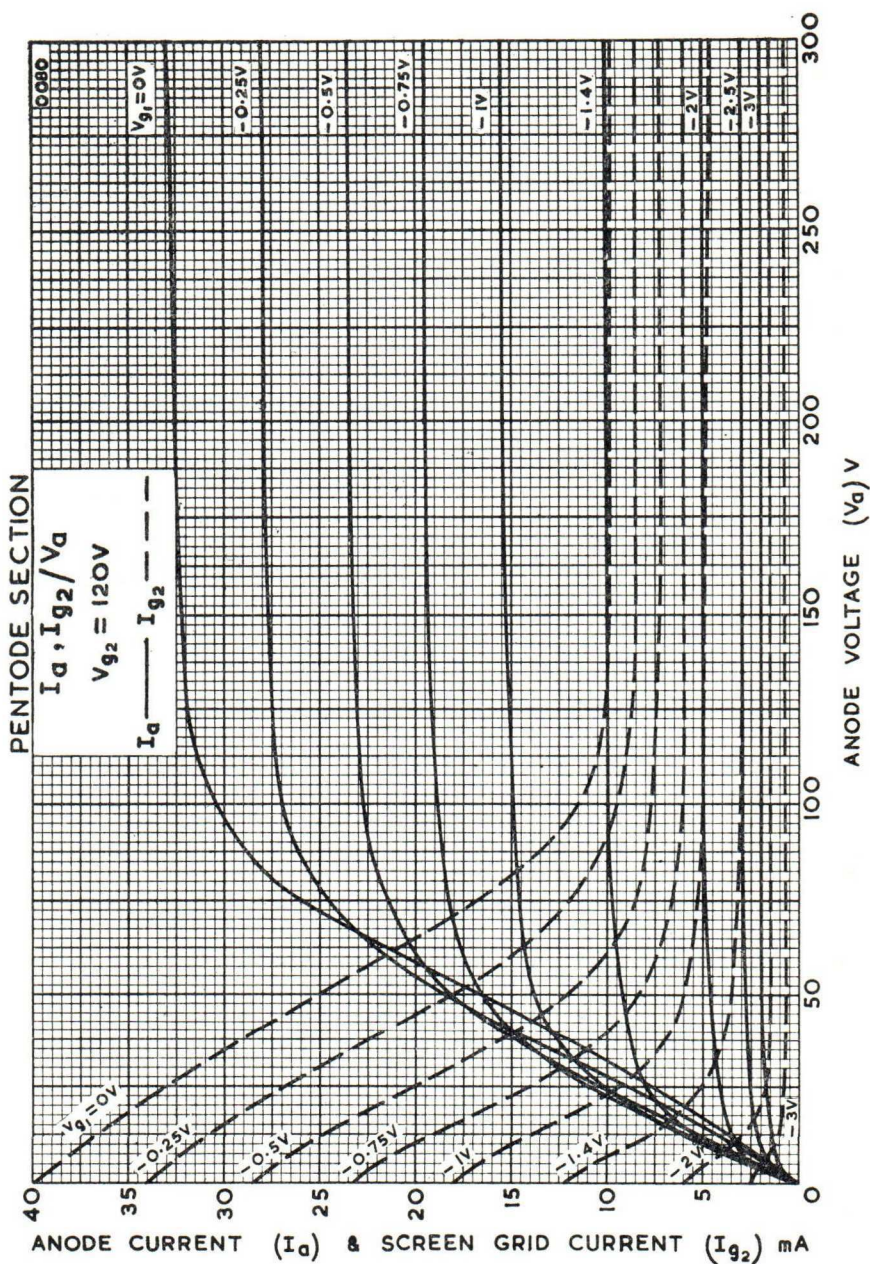
Pentode as I.F. Amplifier

Anode Supply Voltage	$V_{a(b)}$	200	200	V
Screen Grid Supply Voltage	$V_{g2(b)}$	200	200	V
Anode Load Resistance	R_a	2.7	4.7	k Ω
Screen Grid Resistance	R_{g2}	27	27	k Ω
Control Grid Resistance	R_{g1}	0.1	1.0	M Ω
Anode Current	I_a	10	13	mA
Screen Grid Current	I_{g2}	3.0	3.9	mA
Control Grid Supply Voltage	$V_{g1(b)}$	-1.4	0	V
Mutual Conductance	g_m	11	14.5	mA/V
Control Grid Voltage for $g_m = 0.11$ mA/V	V_{g1}	-12	—	V
Input Resistance at 50 Mc/s	R_{in}	10	10	k Ω

Triode as Oscillator

Anode Supply Voltage	$V_{a(b)}$	200	200	V
Anode Load Resistance	R_a	8.2	12	k Ω
Grid Resistance	R_g	10	10	k Ω
R.M.S. Heterodyne Voltage	$V_{het(r.m.s.)}$	4.5	3.3	V
Anode Current	I_a	16	12	mA
Mutual Conductance	g_m	3.7	3.7	mA/V

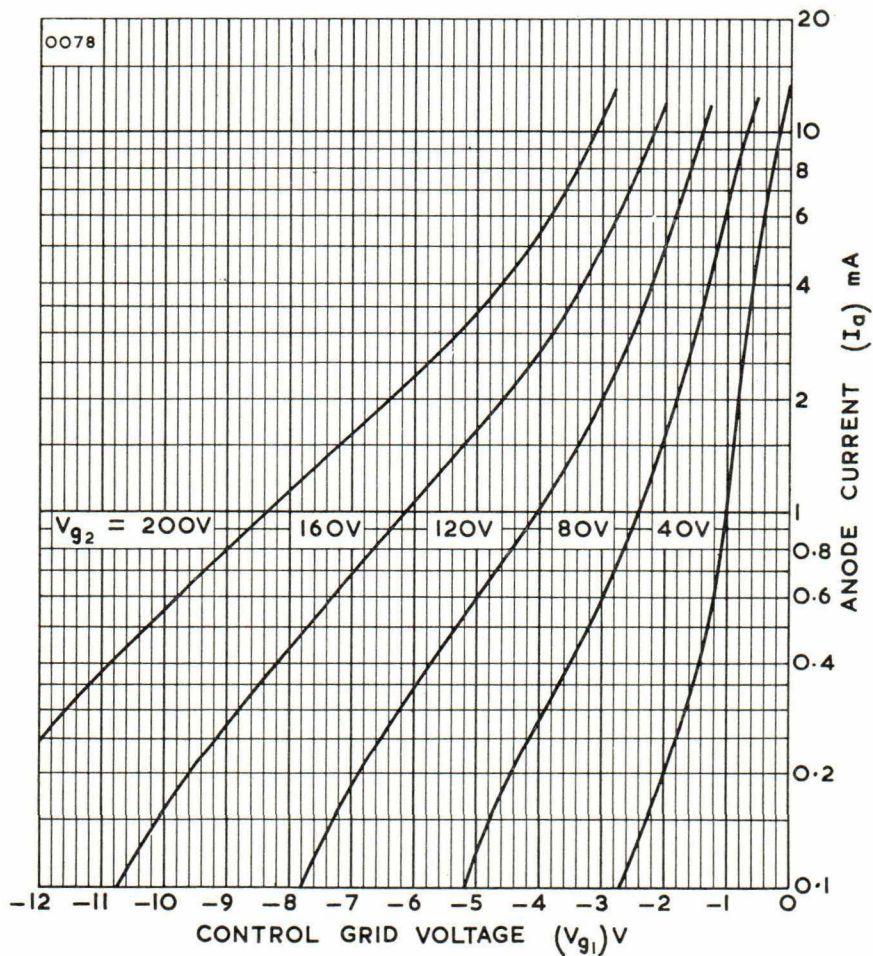
MOUNTING POSITION—Unrestricted



PENTODE SECTION

$$I_a/V_{g_1}$$

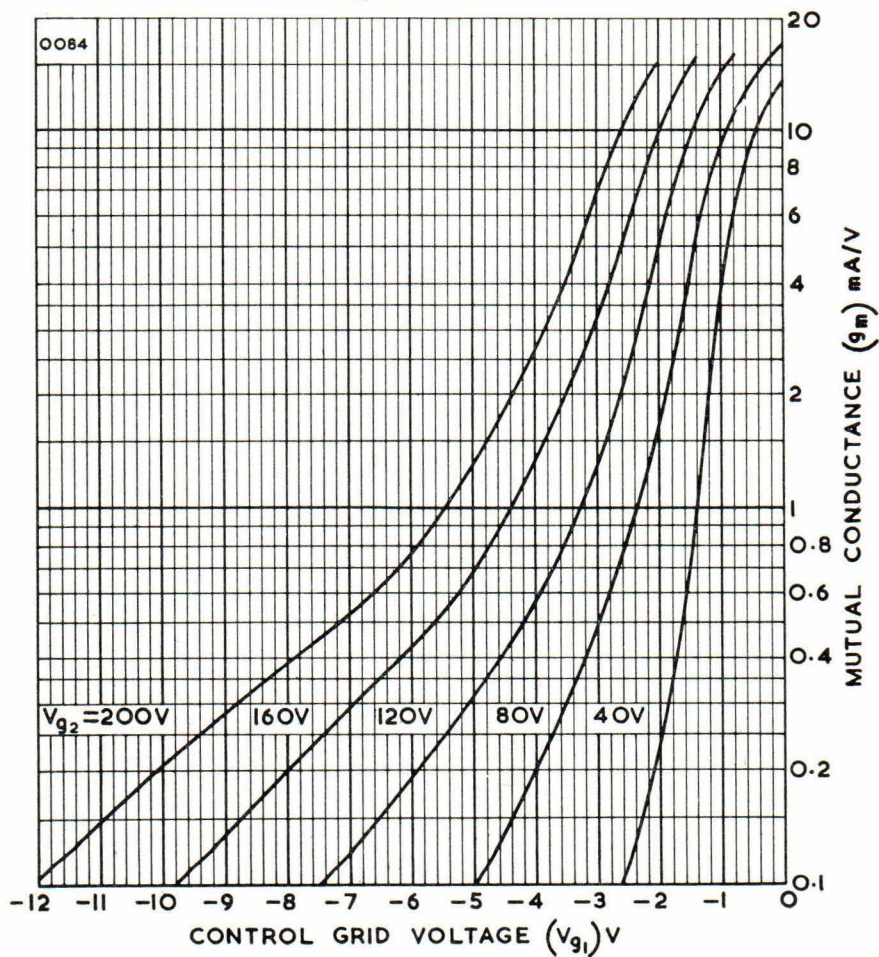
$$V_a = 170V$$



PENTODE SECTION

$$g_m / V_{g_1}$$

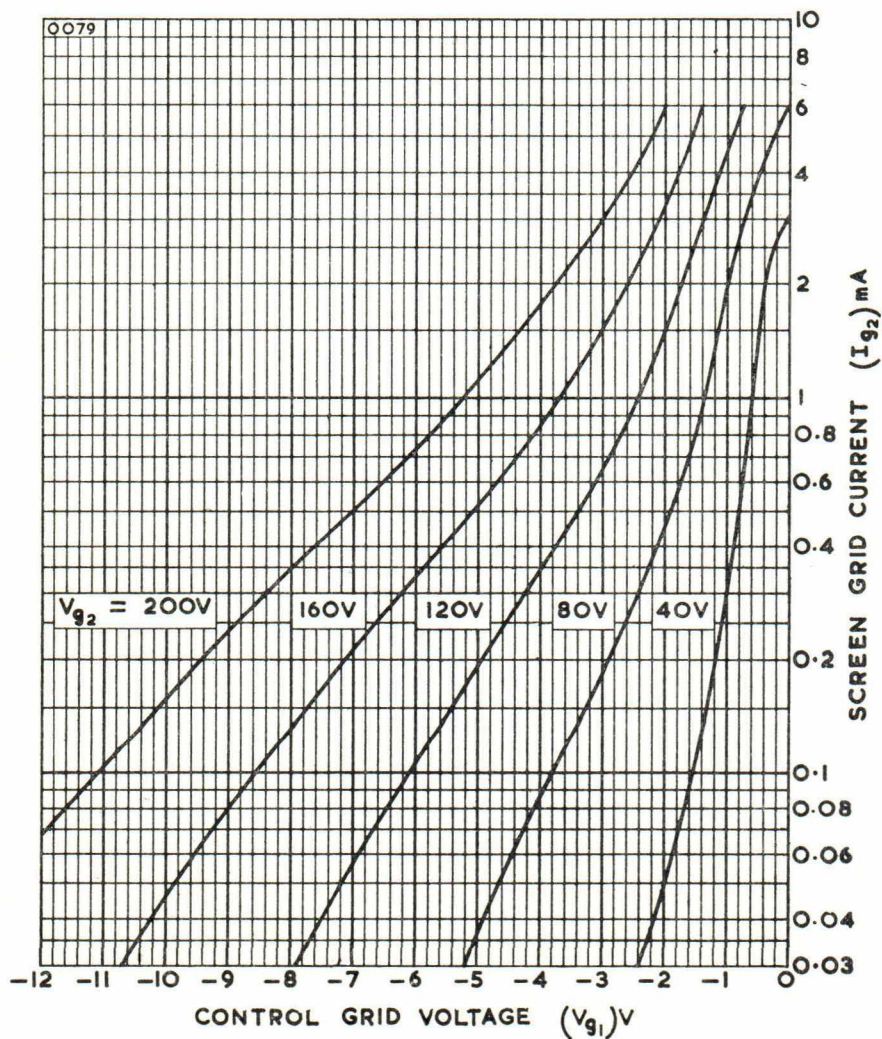
$$V_a = 170V$$

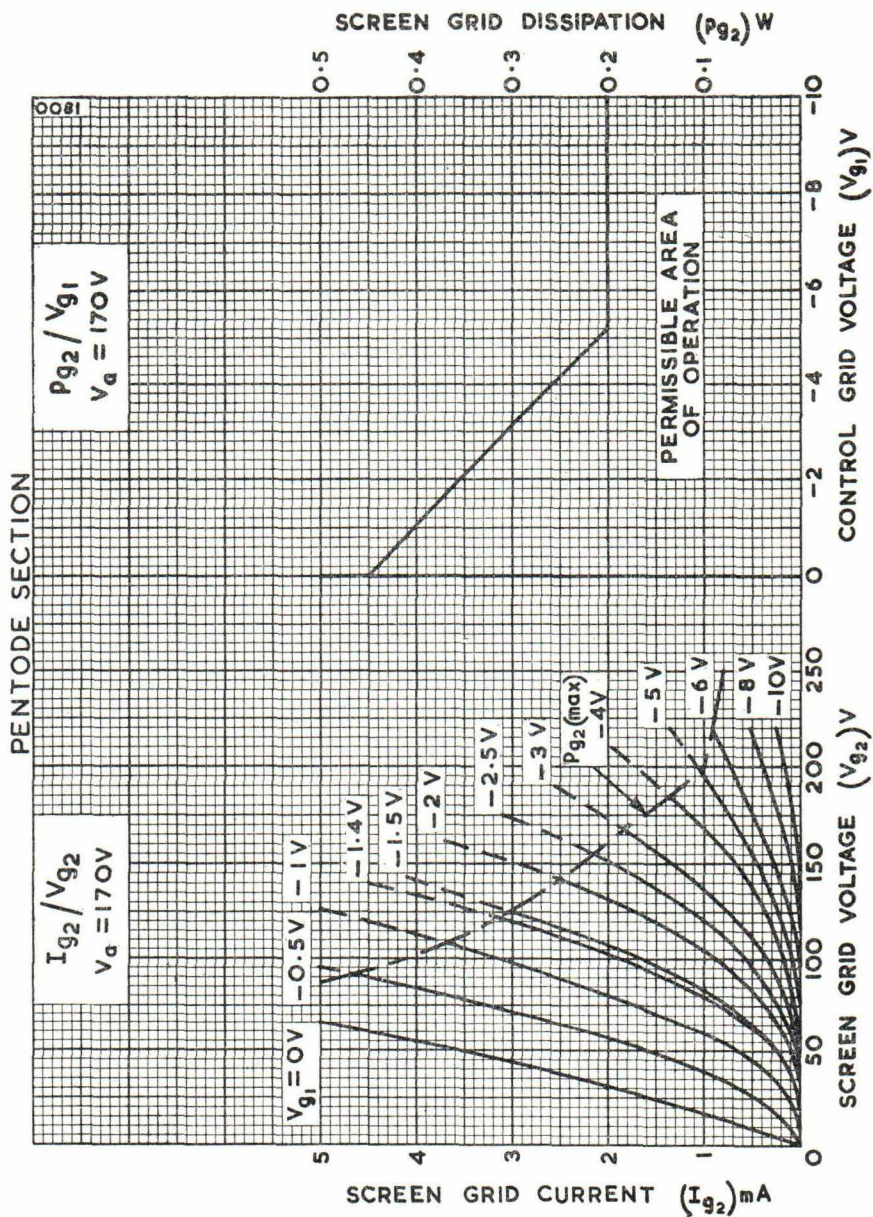


PENTODE SECTION

$$I_{g2} / V_{g1}$$

$$V_a = 170V$$




$$I_{g2}/V_{g2}$$
$$V_g = 170V$$

SCREEN GRID CURRENT (I_{g_2}) mA

SCREEN GRID DISSIPATION (P_{g2}) W

SCREEN GRID VOLTAGE (V_{g2}) V

CONTROL GRID VOLTAGE (V_{g1}) V

PERMISSIBLE AREA
OF OPERATION

$V_a = 0V$	$-0.5V$	$-1V$
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0.5V - 1V

- 1 v

-1.4V

-1.5V

-2 V

REV

$P_{a_2}(\max)$

AV

-5 V

-6 V

— 8 V —

-lov

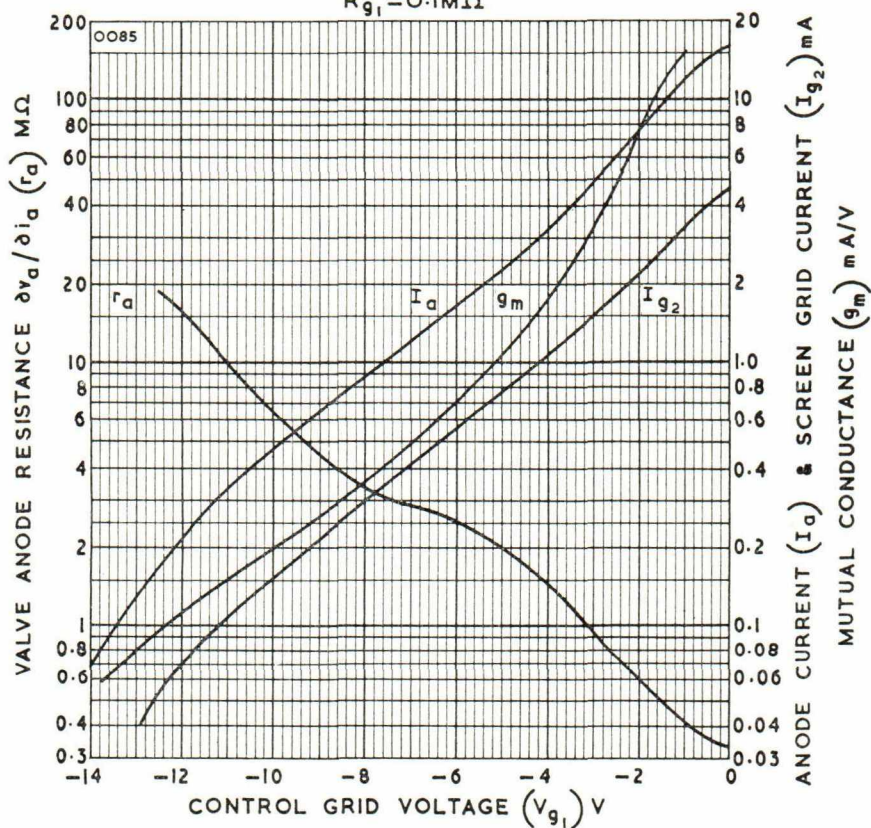
PENTODE SECTION

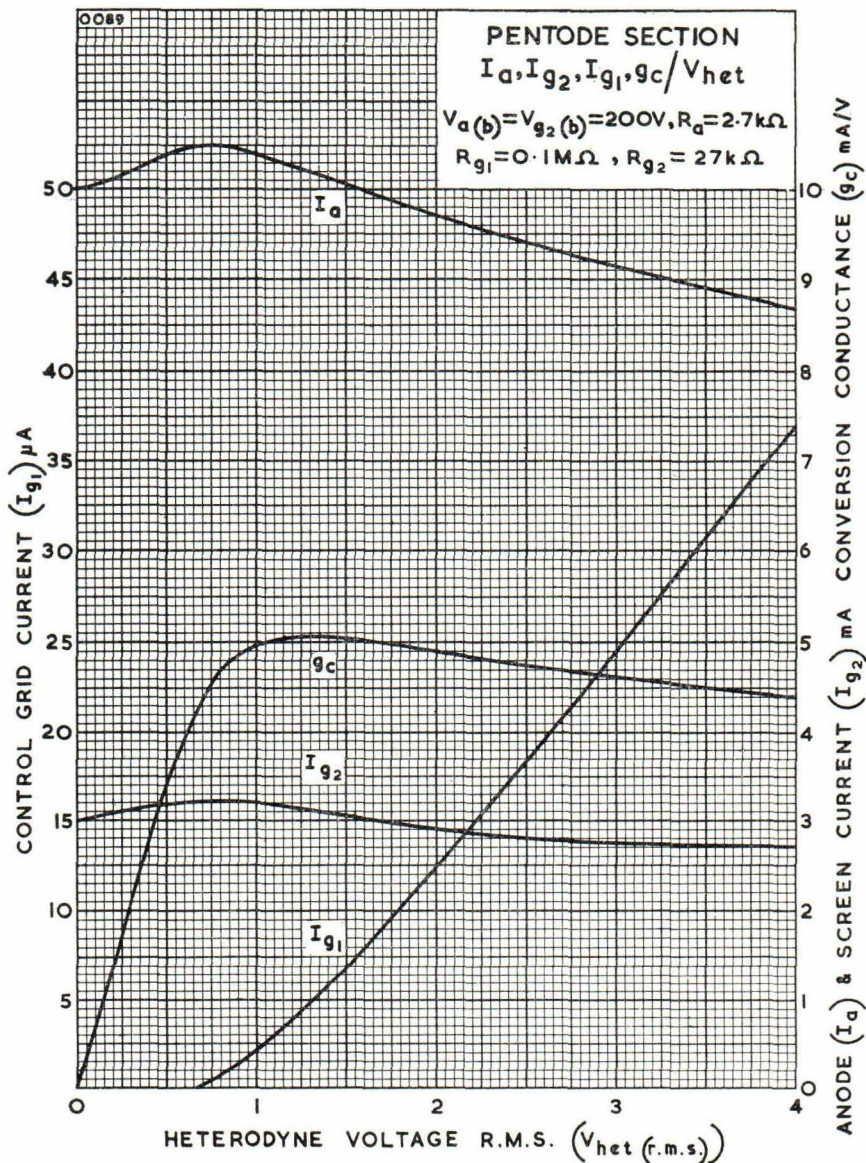
$$r_a, g_m, I_a, I_{g_2}/V_{g_1}$$

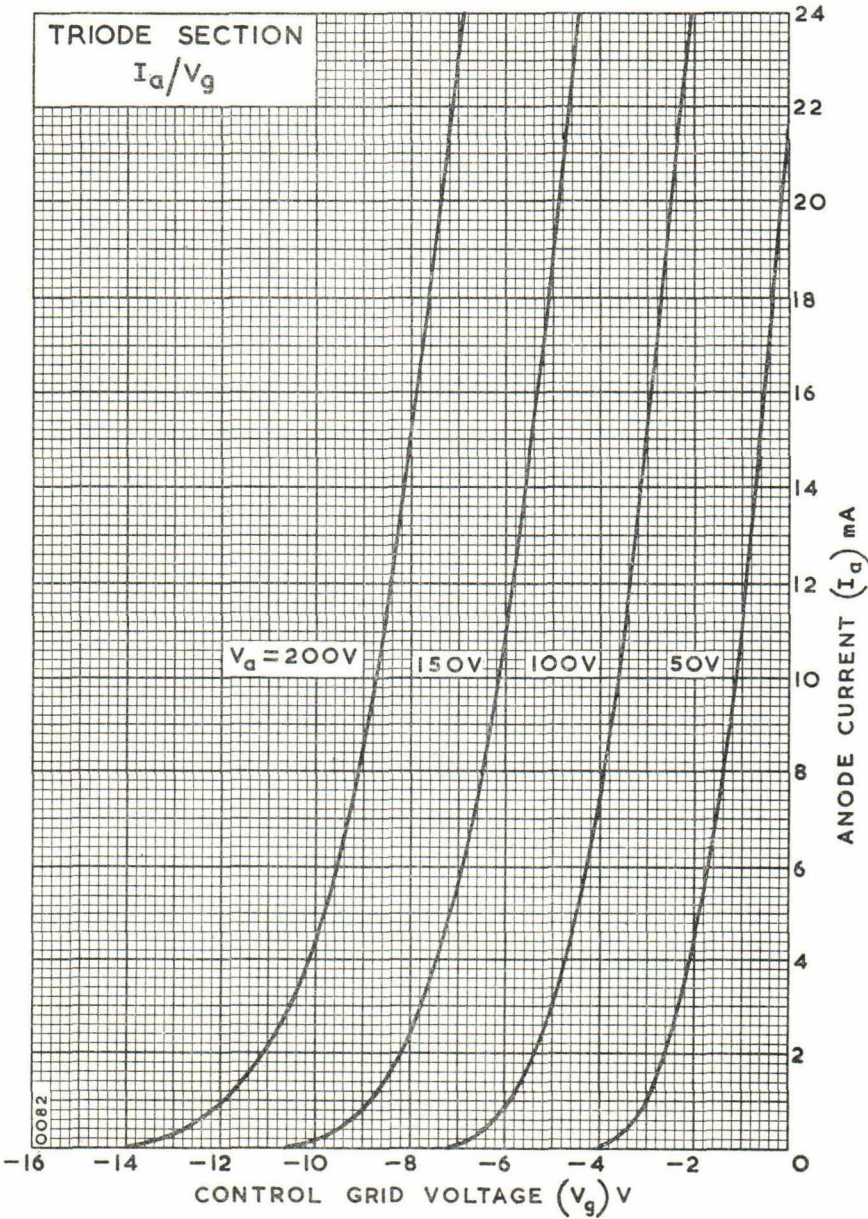
$$V_a(b) = 200V \quad R_a = 2.7k\Omega$$

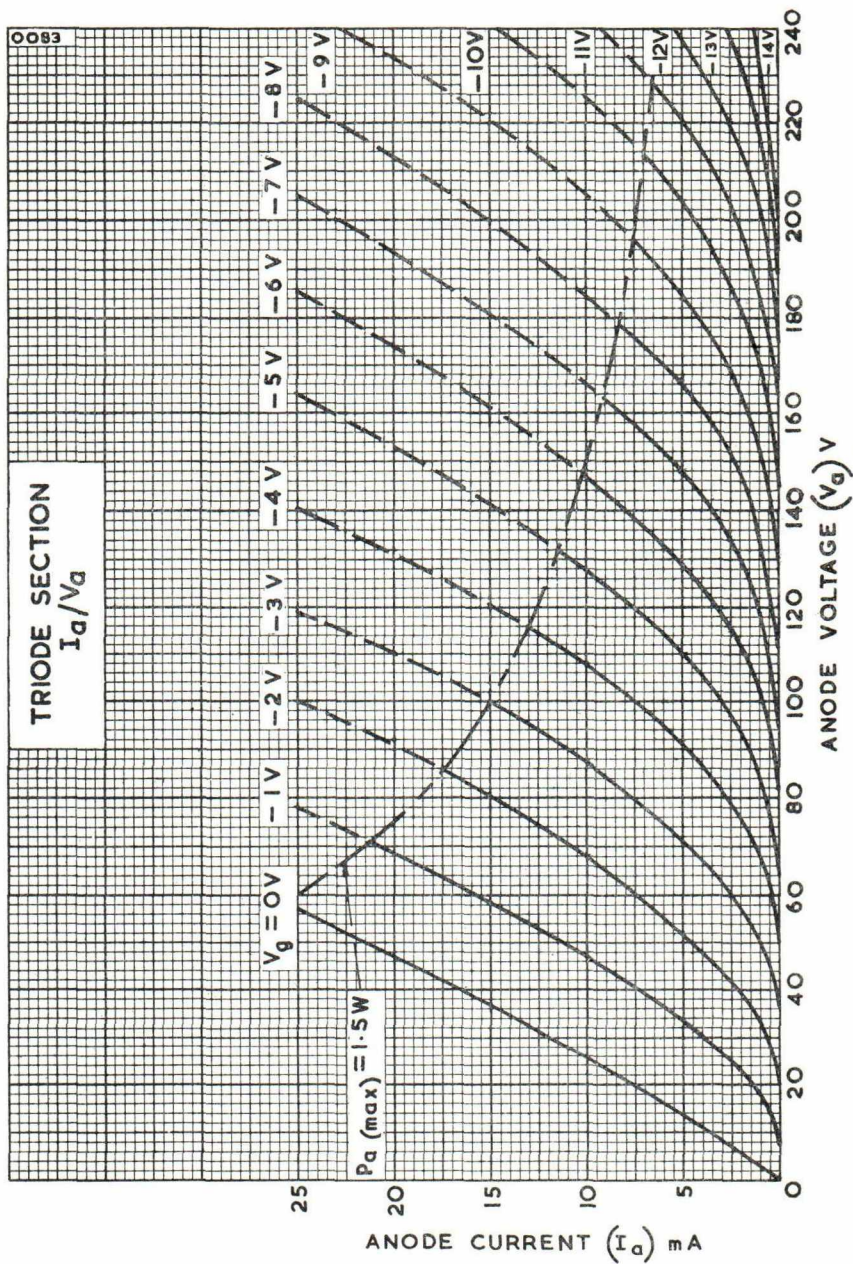
$$V_{g_2}(b) = 200V \quad R_{g_2} = 27k\Omega$$

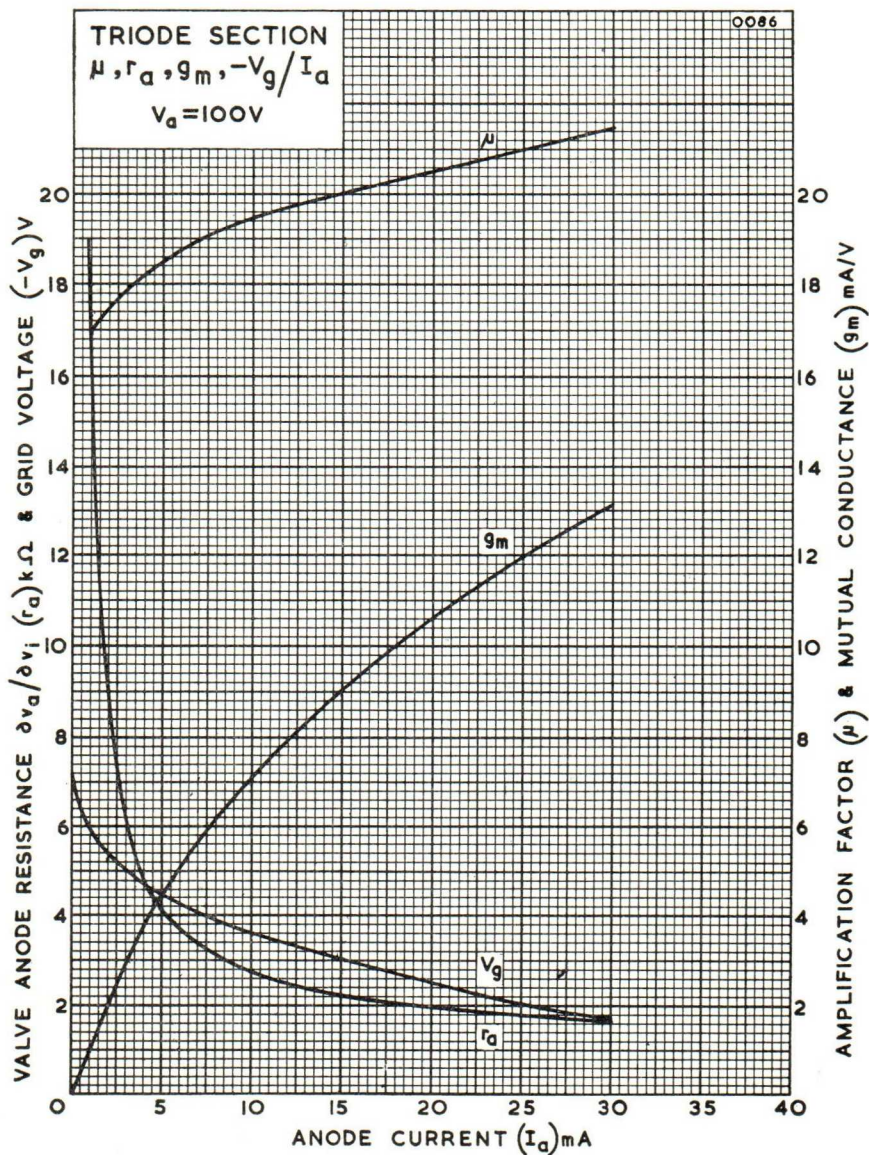
$$R_{g_1} = 0.1M\Omega$$

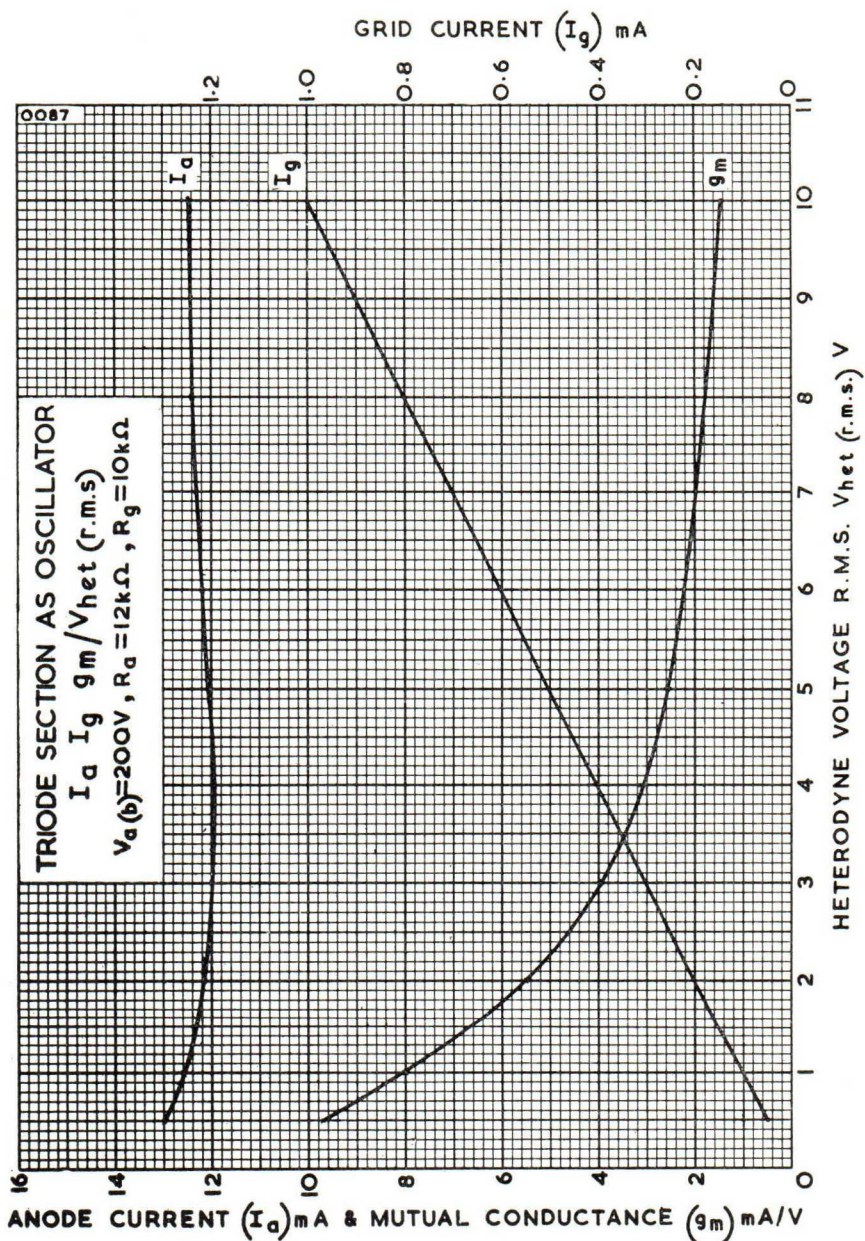












CROSS MODULATION
 $V_a(b) = 200V$ $R_a = 2.7k\Omega$
 $V_{g2(b)} = 200V$ $R_{g2} = 27k\Omega$
 $R_{g1} = 0.1M\Omega$

