MINISTRY OF SUPPLY D.L.R.D.(A)/R.A.E.

VALVE ELECTRONIC CV2135

Specification MOSA/CV2135
Issue 4 Dated 12.11.54
To be read in conjunction with B.S.448, B.S.1409 & K.1001

SECURITY	
Specification	Valve
UNCLASSIFIED	UNCLASSIFIED

→ Indicates a change

TYPE OF VALVE - Low Noise Low Microphony Amplifier Pentode

CATHODE - Indirectly Heated

ENVELOPE - Glass Unmetallised

PROTOTYPE - VX.7055

MARKING

See K.1001/4.

BASE

B.S.448/B9A.

RATING

			Note
Heater Voltage	(V)	6.3	
Heater Current	(A)	0.15	
Max. Anode Voltage	(V)	300	C
Max. Anode Dissipation	(W)	0.75	C
Anode Current	(mA)	2.1	A
Max. Screen Voltage	(V)	125	C
Max. Screen Dissipation	(W)	0.1	C
Screen Current	(mA)	0.6	A
Mutual Conductance	(mA/V)	1.25	A
Inner Amplification Factor		20	

CONNECTIONS

Pin	Electrode
1	NC
2	g1
3	k
4	h
5	h
6	s
7	a
8	g2
	g3

CAPACITANCES (pF)

		Note
C in (Nom.)	4.25	B
C out (Nom.)	4.0	B
Ca,g1 (Max.)	0.01	B

DIMENSIONS

See B.S.448/B9A/2.1. Size Ref. No. 2.

Dimensions (mm)	Min.	Max.
A seated height	-	49.0
C diameter	19.0	22.2
D overall length	-	56.0

NOTES

A. Measured at Va = 250; Vg2 = 100; Vg1 = -3.

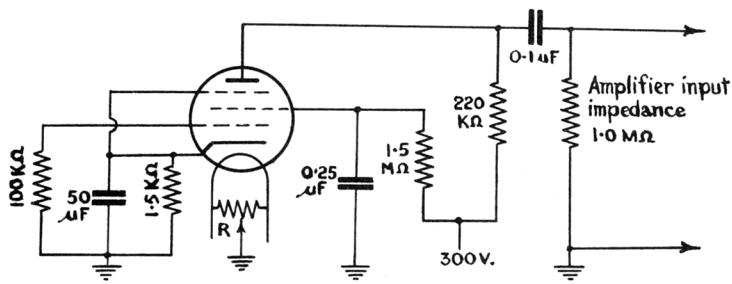
B. Measured without metal shield.

C. Absolute maximum values.

Z 8550 R.

To be performed in addition to those applicable in K.1001.

Test Conditions							Test	Limits		No. Tested	Note
								Min.	Max.		
a	See K.1001/A.III										
	Links to H.P.		Links to L.P.		Links to E.		CAPACITANCES (pF)				
	2		1,3,4,5, 6,8,9,10		7,TC1, TC2		C in	3.0	5.5	20 per week	1
	7		1,3,4,5, 6,8,9,10		2,TC1, TC2		C out	2.75	5.25		
	2		7		1,3,4,5,6 8,9,10. TC1, TC2		Ca,g1	-	0.01	T.A.	
	Vh	Va	Vg3	Vg2	Vg1						
b	6.3	0	0	0	0		Ih (A)	.138	.162	100% or S	
c	6.3	250	0	100	-3		Ia (mA)	1.3	2.9	100%	
d	6.3	250	0	100	-3		Ig2 (mA)	0.2	1.0	100%	
e	6.3	250	0	100	-3		Reverse Ig1 (μA)	-	1.0	100%	
f	6.3	250	0	100	-3		gm (mA/V)	0.9	1.6	100% or S	
g	6.3	250	0	100	-3		ra (MΩ)	1.2	-	T.A.	
h	6.3	250	0	100	-8		Ia (Tail) (μA)	-	140	100%	
j	6.3	30	30	30	30		Emission (mA)	30	-	100%	2
k	6.3	-	-	-	-		Hum (mV) R.M.S.	-	80	100%	3
m	6.3	-	-	-	-		Hiss (mV) R.M.S.	-	20	20 per week	4
n	6.3	-	-	-	-		A.F. Noise and Microphony	-	-	100%	5



NOTES

1. Measured without a metal screen.

2. Test Voltages to be applied only for sufficient time to obtain steady running.

3. The valve shall be tested in a circuit as shown above.

   The output shall be fed to a calibrated wide band amplifier which contains a filter network accepting frequencies up to 340 c.p.s. The output measuring circuit shall be a voltage meter or another suitable device.

   With the valve removed from the test socket a signal of 6.4 mV (rms) shall be applied at 50 c.p.s. to the anode terminal and the amplifier gain adjusted to give 100 mV output. The residual hum output of the amplifier shall be less than 1 mV.

   During each test the hum balancing resistor R shall be adjusted for minimum hum.

4. The valve test circuit shall be as shown above except that the filter network shall accept frequencies up to 13 kc/s and its output measuring circuit shall consist of a thermal voltmeter.

   With the valve removed from the test socket apply a signal of 6.4 mV (rms) at 400 c.p.s. to the anode terminal and adjust the amplifier to give 100 mV output. The residual noise output of the amplifier shall be less than 1.0 mV.

   During the test the valve shall be heated with a direct current.

5. The valve test circuit shall be as shown above. The complete test equipment shall include - valve under test and its associated circuit - calibrated wide band amplifier 10 c/s to 250 kc/s. The output shall terminate in an agreed 12" diameter, 15 ohms loud speaker.

   The amplifier and output stage shall be adjusted to give a gain of 24 dB. The valve shall be mounted on sponge rubber at a distance of 1 foot from the centre point of the speaker cone. Except for the valve and its mounting the speaker shall face free space.

   During test the valve shall be tapped lightly and shall be rejected if audible extraneous noise or sustained regenerative feedback occur.

DATA SHEET

Valve Electronic Type CV 2135

Typical Operating Conditions

Pentode Connected (g_3 connected to cathode)

Anode Voltage	100	250	volts
Screen Voltage	100	100	volts
Grid Voltage	-3	-3	volts
Cathode Bias Resistor	1100	1100	ohms
Anode Current	2.0	2.1	mA
Screen Current	0.7	0.6	mA
Anode Impedance	1.5	2.4	Megohm
Mutual Conductance	1.1	1.25	mA/V
Inner Amplification Factor	20	20	
Grid Voltage for 1/100th of g_m at $V_g = -3$	-8	-9	volts

Triode Connected (g_2 connected to anode and g_3 connected to cathode)

Anode Voltage	250	volts
Grid Voltage	-8	volts
Anode Current	6.5	mA
Mutual Conductance	1.72	mA/V
Anode Impedance	11600	ohms
Amplification Factor	20	

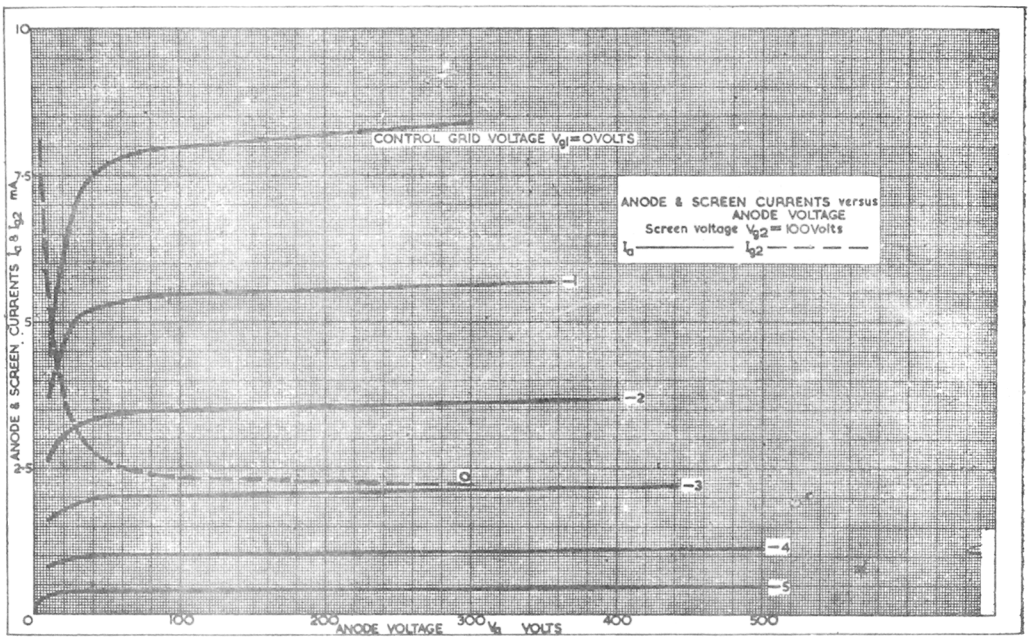
Resistance Capacity Coupled AF Amplifier

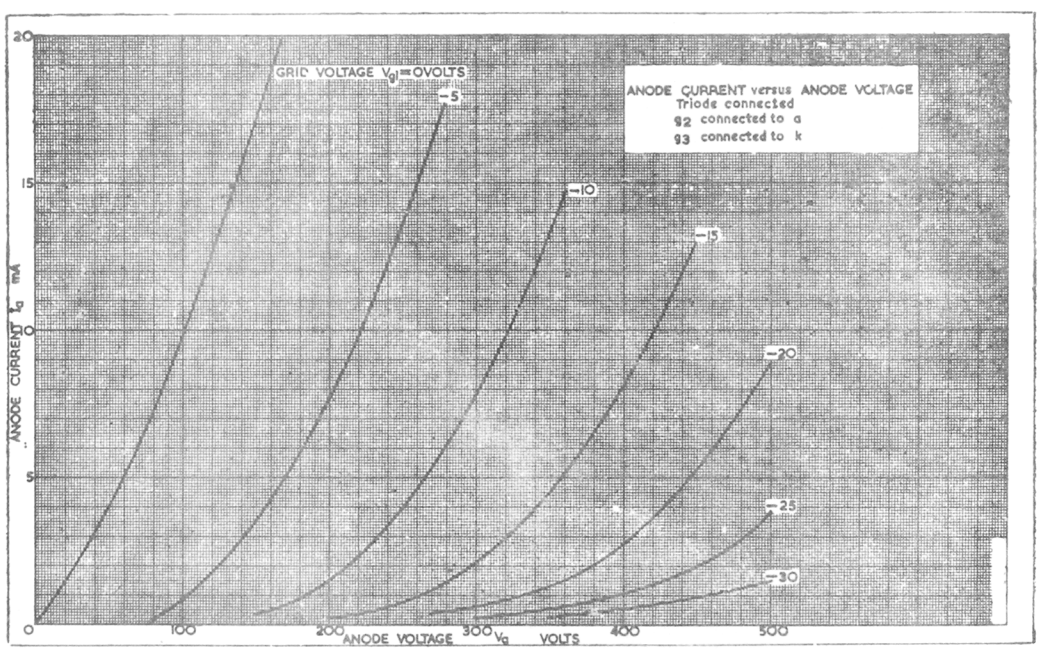
The following conditions yield an output with approximately 5% distortion.

Anode Supply Voltage		100			300		volts
Anode Load Resistor	100	220	470	100	220	470	kΩ
Cathode Bias Resistor	1.3	3.3	5.6	0.56	1.5	2.2	kΩ
Series Screen Resistor	0.47	1.5	2.8	0.47	1.5	2.8	MΩ
Succeeding Stage Grid Resistor	1.0	1.0	1.0	1.0	1.0	1.0	MΩ
Peak Output Voltage	21	28	31	70	92	100	volts
Voltage Gain	65	80	140	104	124	185	volts

NOTE This valve has been designed to have low hum, noise and microphony. It is especially suitable for use as a first stage audio amplifier. It may also be used in RF applications up to at least 20 Mc/s.

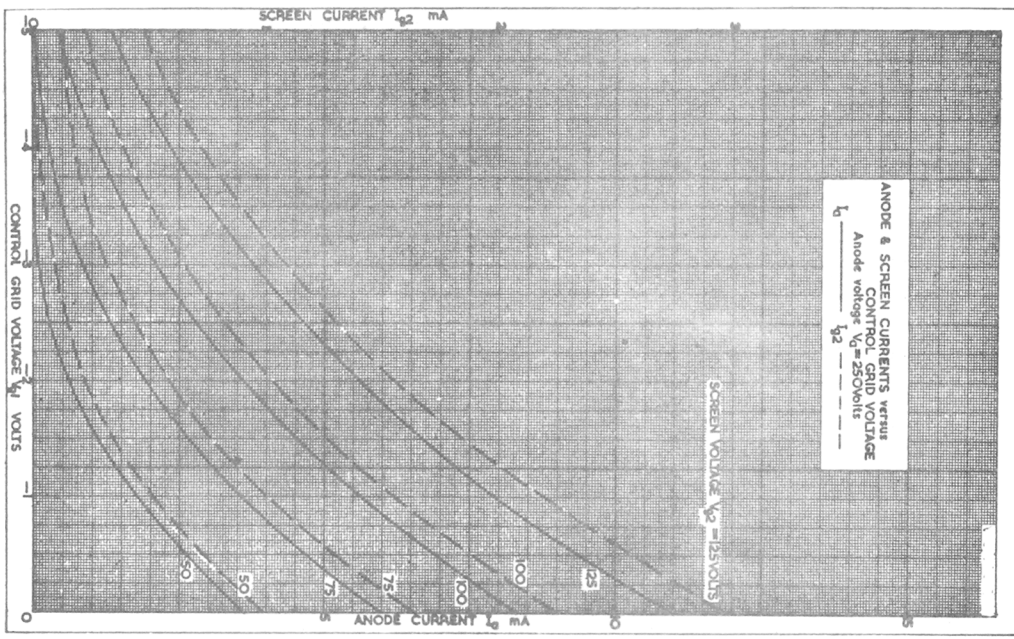
Mounting Position - Any.

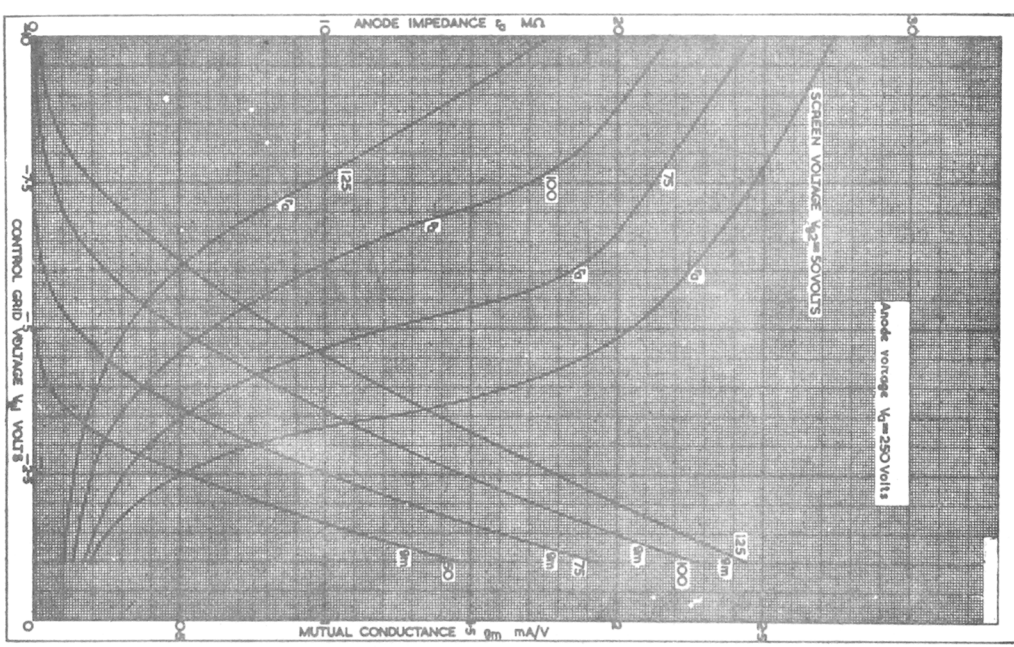

CONTROL GRID VOLTAGE V_{g1} = 0 VOLTS
ANODE & SCREEN CURRENTS versus ANODE VOLTAGE
Screen voltage V_{g2} = 100 Volts
I_a ——— I_{g2} — — — —
-1
-2
-3
-4
-5
ANODE & SCREEN CURRENTS I_a & I_{g2} mA
ANODE VOLTAGE V_a VOLTS
10
7.5
5
2.5
0
100
200
300
400
500

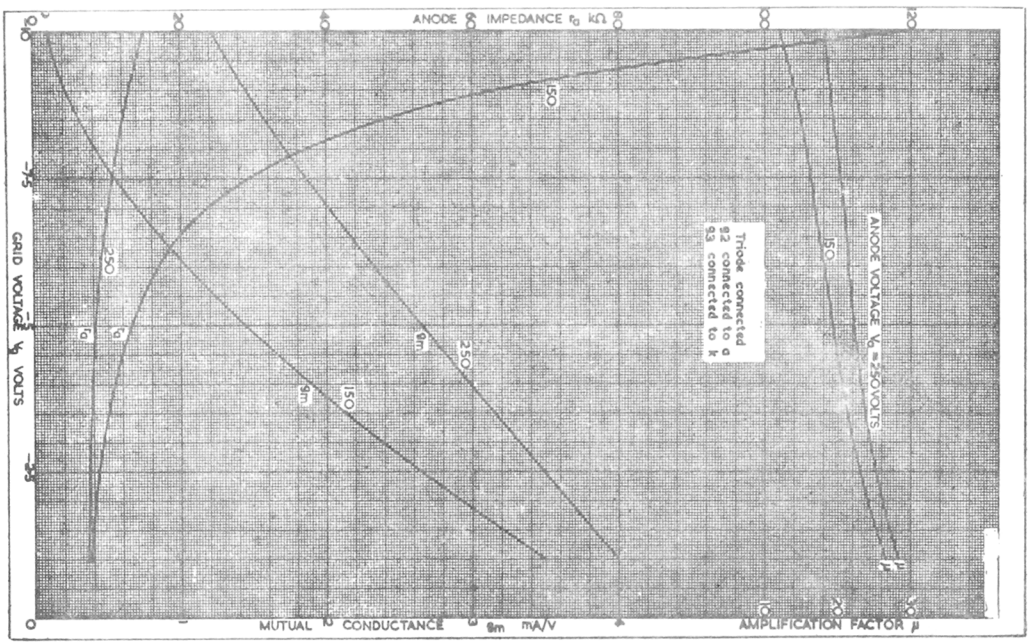

GRID VOLTAGE V_{g1} = 0 VOLTS
ANODE CURRENT versus ANODE VOLTAGE
Triode connected
g2 connected to a
g3 connected to k
-5
-10
-15
-20
-25
-30
ANODE CURRENT I_a mA
ANODE VOLTAGE V_a VOLTS
20
15
10
5
0
100
200
300
400
500

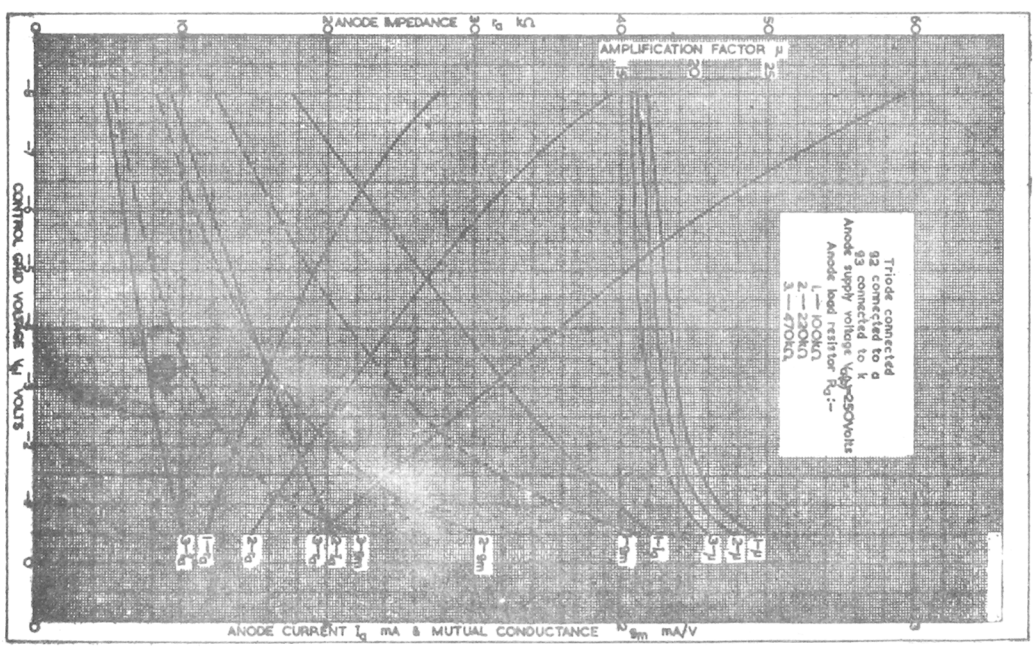
DATA SHEET

CV 2135



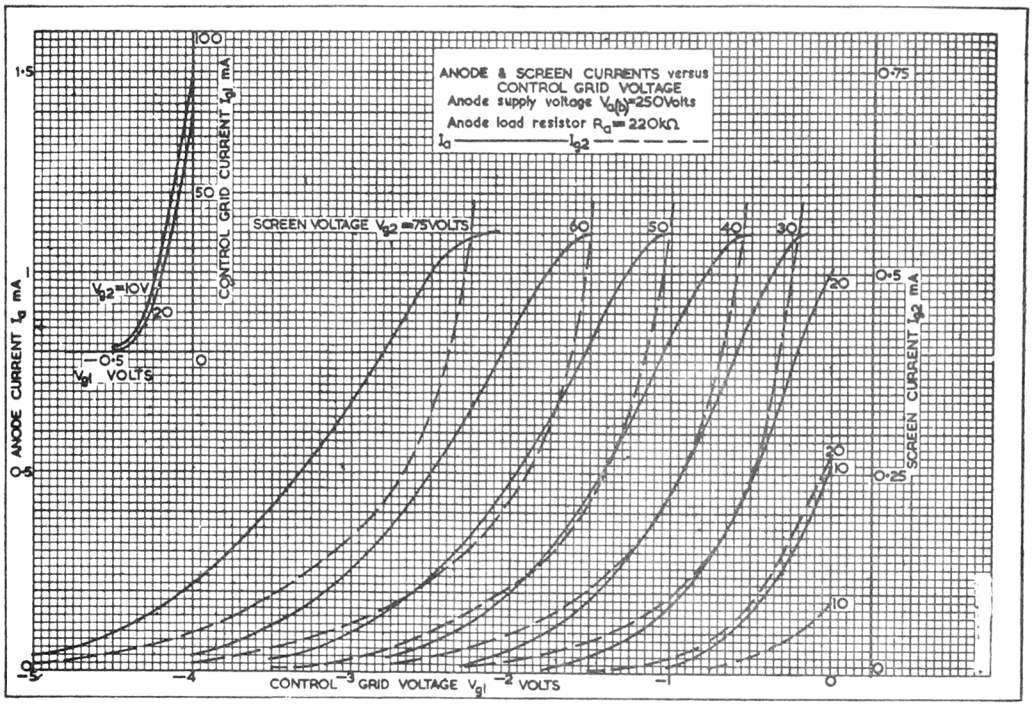


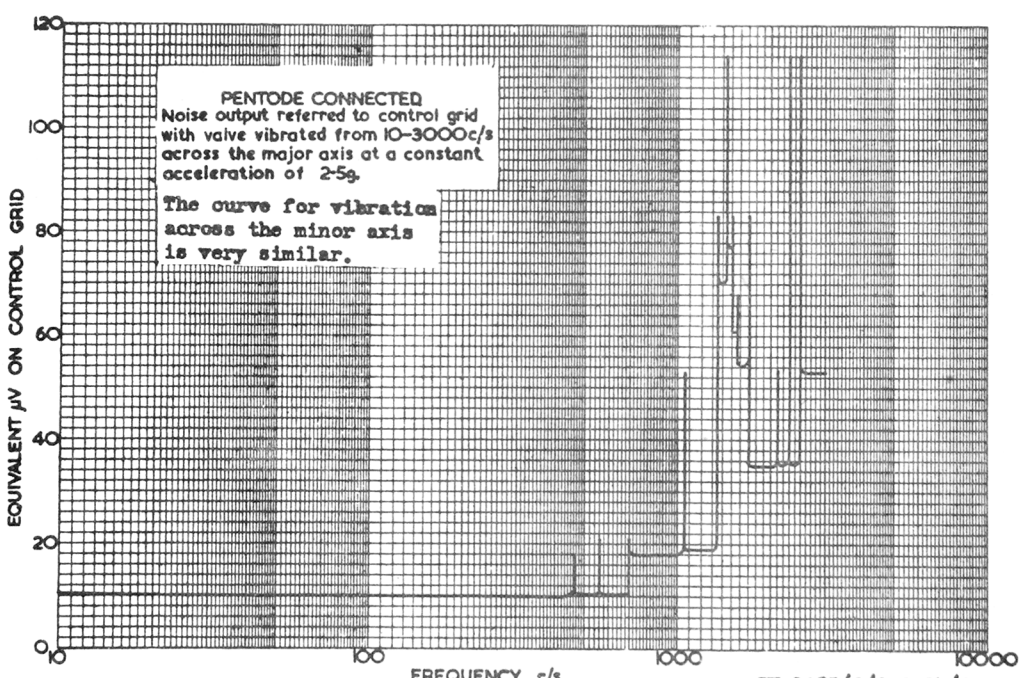

ANODE IMPEDANCE r_a kΩ
GRID VOLTAGE V_g VOLTS
MUTUAL CONDUCTANCE S_m mA/V
AMPLIFICATION FACTOR μ
ANODE VOLTAGE V_a = 250 VOLTS
Triode connected
g2 connected to a
g3 connected to k
250
150
r_a
μ
S_m


ANODE IMPEDANCE r_a kΩ
AMPLIFICATION FACTOR μ
CONTROL GRID VOLTAGE V_g VOLTS
ANODE CURRENT I_a mA & MUTUAL CONDUCTANCE S_m mA/V
Triode connected
g2 connected to a
g3 connected to k
Anode supply voltage V_a = 250 Volts
Anode load resistor R_g :-
1 — 100kΩ
2 — 220kΩ
3 — 470kΩ

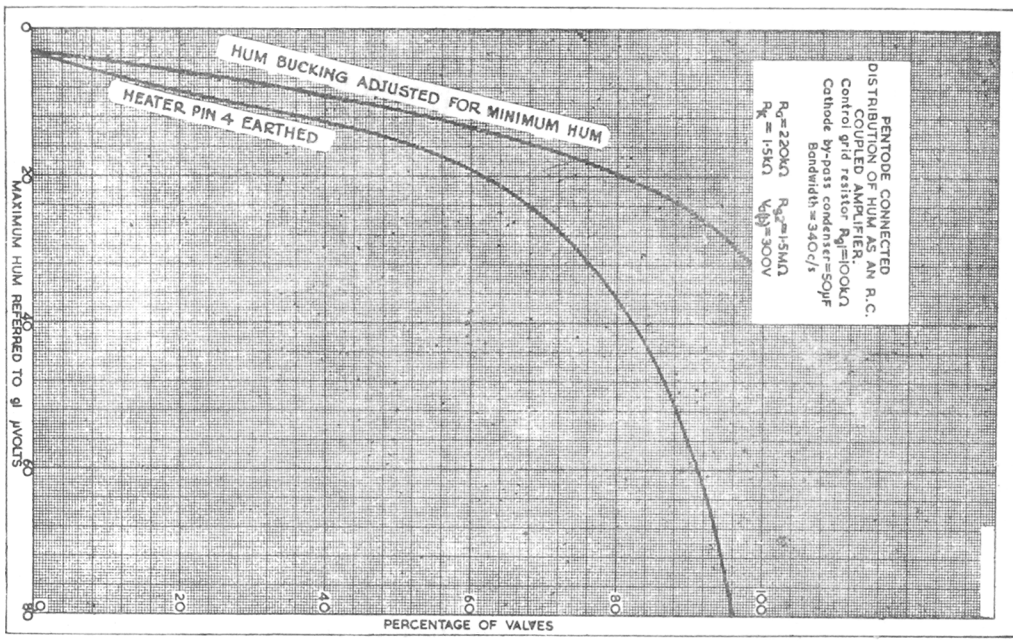
DATA SHEET

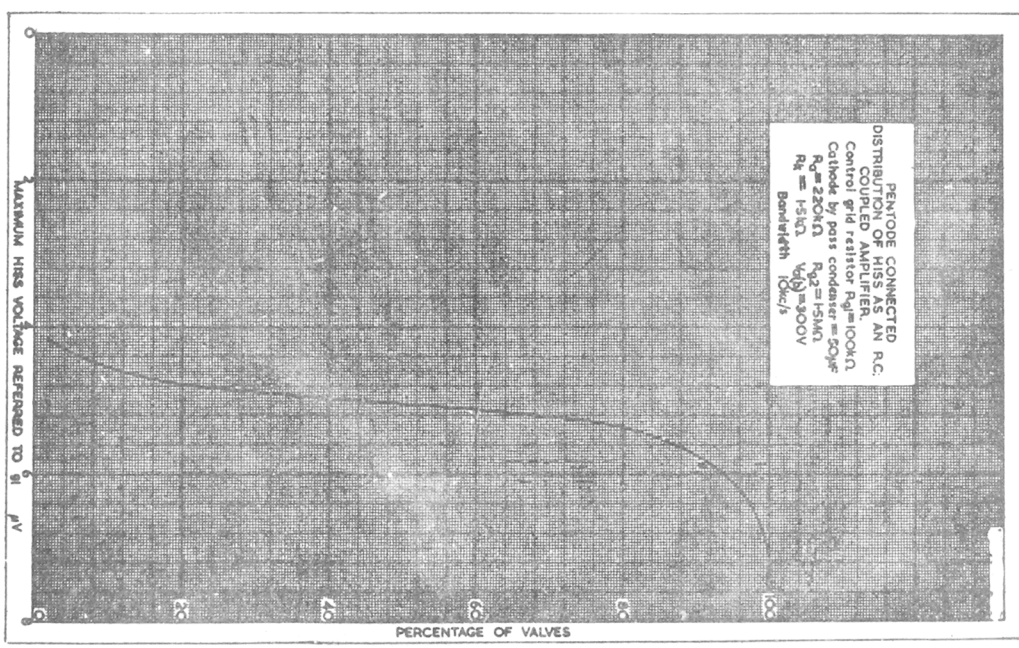
CV 2135





CV.2135/d/2.2.54/5.


PENTODE CONNECTED
DISTRIBUTION OF HUM AS AN R.C.
COUPLED AMPLIFIER.
Control grid resistor R_{g1}=100kΩ
Cathode by-pass condenser=50μF
Bandwidth=340c/s
R_a=220kΩ R_{g2}=1·5MΩ
R_k = 1·5kΩ $V_{b(b)}$=300V
HUM BUCKING ADJUSTED FOR MINIMUM HUM
HEATER PIN 4 EARTHED
MAXIMUM HUM REFERRED TO g1 μVOLTS
PERCENTAGE OF VALVES


PENTODE CONNECTED
DISTRIBUTION OF HISS AS AN R.C.
COUPLED AMPLIFIER
Control grid resistor R_{g1}=100kΩ
Cathode by pass condenser = 50μF
R_a= 220kΩ R_{g2}=1·5MΩ
R_k = 1·5kΩ $V_{b(b)}$=300V
Bandwidth 10kc/s
MAXIMUM HISS VOLTAGE REFERRED TO g1 μV
PERCENTAGE OF VALVES