VOLTAGE AMPLIFYING PENTODE

UF86

Low-noise pentode intended for use as r.c. coupled a.f. voltage amplifier, particularly in the early stages of high-gain audio amplifiers and microphone preamplifiers with series connected heaters.

HEATER

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

I_h	100	mA
V_h	12.6	V

CAPACITANCES (measured without an external screen) ←

C_{out}	5.3	pF
C_{in}	3.8	pF
C_{a-g1}	<50	mpF
C_{g1-h}	<2.5	mpF

CHARACTERISTICS

V_a	200	V
V_{g3}	0	V
V_{g2}	140	V
I_a	3.0	mA
I_{g2}	600	μA
V_{g1}	−2.0	V
g_m	2.0	mA/V ←
r_a	2.5	MΩ
μ_{g1-g2}	38	
V_{g1} max. (I_{g1} = +0.3μA)	−1.3	V

OPERATING CONDITIONS AS R.C. COUPLED A.F. AMPLIFIER ←

Pentode connection

V_b (V)	R_a (kΩ)	R_{g2} (MΩ)	R_k (kΩ)	I_a (mA)	I_{g2} (μA)	$\frac{V_{out}}{V_{in}}$	V_{out}* ($V_{r.m.s.}$)	R_{g1}** (kΩ)
200	100	0.39	1.0	1.35	280	115	38	330
150	100	0.47	1.5	0.8	180	104	26	330
100	100	0.47	1.8	0.5	100	90	12	330
200	220	1.0	2.2	0.7	120	188	37	680
150	220	1.0	2.7	0.5	100	165	26	680
100	220	1.0	3.3	0.3	80	130	15	680

$\frac{V_{out}}{V_{in}}$ measured with an input voltage of 100mV.

*Output voltage at D_{tot} = 5%.

**Grid resistor of following valve.

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

V_b (V)	R_a (kΩ)	I_a (mA)	R_k (kΩ)	$\frac{V_{out}}{V_{in}}$	V_{out}* ($V_{r.m.s.}$)	D_{tot}* (%)	R_{g1}† (kΩ)
200	47	1.8	1.2	25.8	26.5	3.9	150
150	47	1.2	1.5	24	22	5.8	150
100	47	0.67	2.2	22	15	8.8	150
200	100	1.0	2.2	30	31	4.0	330
150	100	0.7	2.7	28	25	5.5	330
100	100	0.4	3.3	26	16.5	6.5	330
200	220	0.55	3.9	32	31	3.7	680
150	220	0.4	3.9	31	24	4.1	680
100	220	0.25	4.7	30	13	3.8	680

$\frac{V_{out}}{V_{in}}$ measured with an input voltage of 100mV.

*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 following valve.

LIMITING VALUES

$V_{a(b)}$ max.	550	V
V_a max.	250	V
p_a max.	1.0	W
$V_{g2(b)}$ max.	550	V
V_{g2} max.	200	V
p_{g2} max.	200	mW
I_k max.	6.0	mA
R_{g1-k} max. ($p_a > 200mW$)	3.0	MΩ
R_{g1-k} max. ($p_a < 200mW$)	10	MΩ
V_{h-k} max. (cathode positive)	150	V
V_{h-k} max. (cathode negative)	100	V
*R_{h-k} max.	20	kΩ

*When used as a phase inverter immediately preceding the output stage, R_{h-k} max. may be 120kΩ.

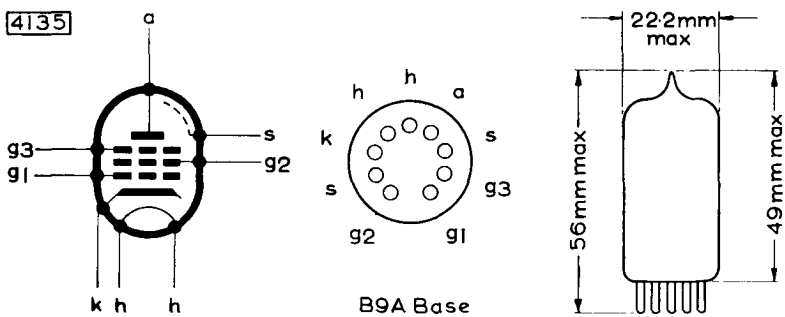
OPERATING NOTES

1. Hum

When used as a normal voltage amplifier with a line voltage of 200V, an anode load of 100kΩ and a grid resistor of 470kΩ the maximum hum level of the valve alone is 12μV, the average value being about 8μV when operated with one side of the heater earthed. The low level of hum attained with this valve can be completely masked by that due to an unsuitable valveholder, in which excessive leakage and capacitive coupling between pins will introduce considerable hum. The hum will be increased if the valve is not operated at the bottom of the chain.

2. Noise

The low-frequency noise generated by a valve is most conveniently specified as an equivalent voltage on the control grid for a specific bandwidth. For the UF86 under normal conditions, i.e. line voltage of 200V and an anode load of 100kΩ, the equivalent noise voltage is approximately 2μV for a frequency range 25 to 10,000c/s.

3. Microphony

Care in the design of the valve, to ensure that the electrode structure and its mounting are as rigid as possible, has reduced the microphony of the UF86 to a very low level. There are no appreciable internal resonances at frequencies below 1000c/s. At higher frequencies the effect of vibration is usually negligible on account of the damping provided by the chassis and the valveholder. In high-gain applications, such as tape recording, care should be taken in siting the valve, particularly when a loudspeaker is present in the same cabinet or when a motor is mounted on the same chassis. In such cases a flexible mounting for the valveholder or a separate weighted sub-chassis is advisable.