

TRIODE-HEPTODE

Triode-heptode. Heptode section intended for use as mixer, R.F. - or I.F. amplifier. Triode section intended for use as oscillator in A.M./F.M. receivers.

QUICK REFERENCE DATA			
<u>Triode section</u>			
Anode current	I_a	13.5	mA
Transconductance	S	3.7	mA/V
Amplification factor	μ	22	-
<u>Heptode section</u>			
Anode current	I_a	11	mA
Transconductance	S	4.5	mA/V
Amplification factor	$\mu_{g_2g_1}$	25	-

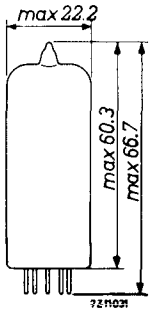
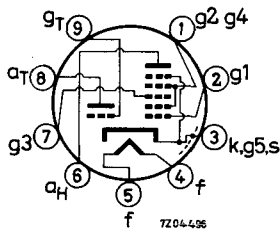
HEATING: Indirect by A.C. or D.C.; series or parallel supply

Heater voltage	V_f	6.3	V
Heater current	I_f	300	mA

DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval



CAPACITANCES

Triode section

Grid to all except anode	$C_{g(a)}$	2.6 pF
Anode to all except grid	$C_{a(g)}$	2.1 pF
Anode to grid	C_{ag}	1.0 pF
Grid to heater	C_{gf}	max. 0.02 pF

Heptode section

Grid No.1 to all except anode	$C_{g_1(a)}$	4.8 pF
Anode to all except grid No.1	$C_{a(g_1)}$	7.9 pF
Anode to grid No.1	C_{ag_1}	max. 0.006 pF
Grid No.1 to heater	C_{g_1f}	max. 0.17 pF
Grid No.3 to all	C_{g_3}	6 pF
Grid No.1 to grid No.3	$C_{g_1g_3}$	max. 0.3 pF
Grid No.3 to heater	C_{g_3f}	max. 0.06 pF

Between heptode and triode sections

Anode heptode to anode triode	C_{aH^aT}	0.20 pF
Anode heptode to grid triode	C_{aHgT}	max. 0.09 pF
Grid No.1 heptode to anode triode	$C_{g_1H^aT}$	max. 0.06 pF
Grid No.1 heptode to grid triode	C_{g_1HgT}	max. 0.17 pF
Grid No.1 heptode to grid triode + grid No.3	C_{g_1H/gTg_3}	max. 0.45 pF
Anode heptode to grid triode + grid No.3	C_{aH/gTg_3}	max. 0.35 pF

TYPICAL CHARACTERISTICS

Triode section

Anode voltage	V_a	100 V
Grid voltage	V_g	0 V
Anode current	I_a	13.5 mA
Transconductance	S	3.7 mA/V
Amplification factor	μ	22 -

Heptode section

Anode voltage	V_a	160 V
Grid No.3 voltage	V_{g3}	0 V
Grids No.2 and 4 voltage	V_{g2+4}	100 V
Grid No.1 current	I_{g1}	0.5 μ A
Grid No.1 voltage	V_{g1}	-0.5 V
Anode current	I_a	11 mA
Grids No.2 and 4 current	I_{g2+4}	7 mA
Transconductance	S	4.5 mA/V
Amplification factor	μ_{g2g1}	25 -

OPERATING CHARACTERISTICS

Heptode section as mixer ¹⁾

Supply voltage	V_b	250	V
Anode resistor	R_a	8.2	k Ω
Grids No.2 and 4 resistor	R_{g2+4}	22	k Ω
Grid triode + grid No.3 resistor	R_{gT+g3}	47	k Ω
Grid triode + grid No.3 current	I_{gT+g3}	200	μA
Grid No.1 current	I_{g1}	0.5	- μA ²⁾
Grid No.1 voltage	V_{g1}	-	-28 V
Anode voltage	V_a	225	240 V
Grids No.2 and 4 voltage	V_{g2+4}	78	235 V
Anode current	I_a	3.3	- mA
Grids No.2 and 4 current	I_{g2+4}	7.8	- mA
Conversion conductance	S_c	1100	11 $\mu A/V$
Internal resistance	R_i	0.8	min. 3 M Ω
Equivalent noise resistance	R_{eq}	30	- k Ω

1) Triode operating with $V_b = 250$ V, $R_a = 33$ k Ω , $V_{osc} = 8$ V_{RMS}.

2) Grid current bias obtained with $R_{g1} = 1$ M Ω and with zero volts a.g.c. voltage; resulting grid one voltage: -0.5 V.

OPERATING CHARACTERISTICS (continued)

Heptode section as R.F. or I.F. amplifier

Supply voltage	V_b	250	V
Anode resistor	R_a	8.2	$k\Omega$
Grid No.3 voltage	V_{g3}	0	V
Grids No.2 and 4 resistor	R_{g2+4}	22	$k\Omega$
Grid No.1 current	I_{g1}	0.5	μA
Grid No.1 voltage	V_{g1}	-	-35 V ¹⁾
Anode voltage	V_a	160	248 V
Grids No.2 and 4 voltage	V_{g2+4}	96	245 V
Anode current	I_a	11	~ mA
Grids No.2 and 4 current	I_{g2+4}	7	~ mA
Transconductance	S	4500	45 $\mu A/V$
Internal resistance	R_i	0.24	min. 10 $M\Omega$
Amplification factor	μ_{g2g1}	25	- -
Equivalent noise resistance	R_{eq}	4.5	- $k\Omega$

Triode section as oscillator

Supply voltage	V_b	250	V
Anode resistor	R_a	33	$k\Omega$
Grid triode + grid No.3 resistor	R_{gT+g3}	47	$k\Omega$
Grid triode + grid No.3 current	I_{gT+g3}	200	μA
Anode current	I_a	4.5	mA
Effective transconductance	S_{eff}	0.65	mA/V

¹⁾ Grid current bias obtained with $R_{g1} = 1 M\Omega$ and with zero volts a.g.c. voltage; resulting grid No.1 voltage: -0.5 V.

LIMITING VALUES (Design centre rating system)

Heptode section

Anode voltage	V_{a0}	max. 550 V
	V_a	max. 300 V
Anode dissipation	W_a	max. 2.0 W
Grids No.2 and 4 voltage	V_{g2+40}	max. 550 V
	V_{g2+4}	max. 125 V
Grids No.2 and 4 voltage (I_a max. 1 mA)	V_{g2+4}	max. 300 V
Grids No.2 and 4 dissipation	W_{g2+4}	max. 0.8 W
Cathode current	I_k	max. 18 mA
Grid No.1 resistor	R_{g1}	max. 3 M Ω
Grid No.3 resistor	R_{g3}	max. 20 k Ω
Grid No.3 resistor grid No.3 directly connected to grid triode	R_{g3}	max. 3 M Ω
Cathode to heater voltage	V_{kf}	max. 100 V

Triode section

Anode voltage	V_{a0}	max. 550 V
	V_a	max. 250 V
Anode dissipation	W_a	max. 0.8 W
Cathode current	I_k	max. 6.5 mA
Grid resistor	R_g	max. 3 M Ω
Cathode to heater voltage	V_{kf}	max. 100 V

PHILIPS

Data handbook



**Electronic
components
and materials**

ECH81

page	sheet	date
1	1	1969.12
2	2	1969.01
3	3	1969.01
4	4	1969.01
5	5	1969.01
6	6	1969.01
7	FP	1999.08.15