TRIODE-HEPTODE

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

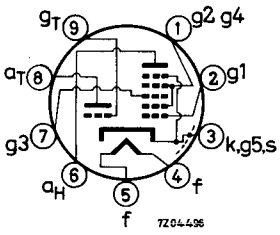
QUICK REFERENCE DATA			
Triode section			
Anode current	I_a	13.5	mA
Transconductance	S	3.7	mA/V
Amplification factor	μ	22	-
Heptode section			
Anode current	I_a	11	mA
Transconductance	S	4.5	mA/V
Amplification factor	$\mu_{g_2g_1}$	25	-

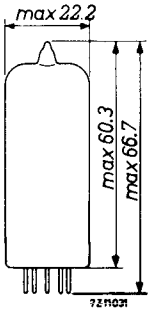
HEATING: Indirect by A.C. or D.C.; series or parallel supply

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	$C_{a_Ha_T}$	0.20	pF
Anode heptode to grid triode	$C_{a_Hg_T}$	max. 0.09	pF
Grid No.1 heptode to anode triode	$C_{g_1Ha_T}$	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_{a_H/g_Tg_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_{g_3}	0	V
Grids No.2 and 4 voltage	$V_{g_{2+4}}$	100	V
Grid No.1 current	I_{g_1}	0.5	μA
Grid No.1 voltage	V_{g_1}	-0.5	V
Anode current	I_a	11	mA
Grids No.2 and 4 current	$I_{g_{2+4}}$	7	mA
Transconductance	S	4.5	mA/V
Amplification factor	$\mu_{g_2g_1}$	25	-

OPERATING CHARACTERISTICS

Heptode section as mixer [1])

Supply voltage	V_b	250		V
Anode resistor	R_a	8.2		kΩ
Grids No.2 and 4 resistor	R_{g_2+4}	22		kΩ
Grid triode + grid No.3 resistor	$R_{g_T+g_3}$	47		kΩ
Grid triode + grid No.3 current	$I_{g_T+g_3}$	200		μA
Grid No.1 current	I_{g_1}	0.5	–	μA [2])
Grid No.1 voltage	V_{g_1}	–	−28	V
Anode voltage	V_a	225	240	V
Grids No.2 and 4 voltage	V_{g_2+4}	78	235	V
Anode current	I_a	3.3	–	mA
Grids No.2 and 4 current	I_{g_2+4}	7.8	–	mA
Conversion conductance	S_c	1100	11	μA/V
Internal resistance	R_i	0.8	min. 3	MΩ
Equivalent noise resistance	R_{eq}	30	–	kΩ

[1]) Triode operating with V_b = 250 V, R_a = 33 kΩ, V_{osc} = 8 V_{RMS}.

2) Grid current bias obtained with R_{g_1} = 1 MΩ 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		kΩ
Grid No.3 voltage	V_{g_3}	0		V
Grids No.2 and 4 resistor	$R_{g_{2+4}}$	22		kΩ
Grid No.1 current	I_{g_1}	0.5	–	μA
Grid No.1 voltage	V_{g_1}	–	−35	V [1]
Anode voltage	V_a	160	248	V
Grids No.2 and 4 voltage	$V_{g_{2+4}}$	96	245	V
Anode current	I_a	11	–	mA
Grids No.2 and 4 current	$I_{g_{2+4}}$	7	–	mA
Transconductance	S	4500	45	μA/V
Internal resistance	R_i	0.24	min. 10	MΩ
Amplification factor	$\mu_{g_2g_1}$	25	–	-
Equivalent noise resistance	R_{eq}	4.5	–	kΩ

Triode section as oscillator

Supply voltage	V_b	250	V
Anode resistor	R_a	33	kΩ
Grid triode + grid No.3 resistor	R_{gT+g_3}	47	kΩ
Grid triode + grid No.3 current	I_{gT+g_3}	200	μA
Anode current	I_a	4.5	mA
Effective transconductance	S_{eff}	0.65	mA/V

[1] Grid current bias obtained with R_{g_1} = 1 MΩ 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_{a_o}	max. 550	V
	V_a	max. 300	V
Anode dissipation	W_a	max. 2.0	W
Grids No.2 and 4 voltage	$V_{g_{2+4_o}}$	max. 550	V
	$V_{g_{2+4}}$	max. 125	V
Grids No.2 and 4 voltage (I_a max. 1 mA)	$V_{g_{2+4}}$	max. 300	V
Grids No.2 and 4 dissipation	$W_{g_{2+4}}$	max. 0.8	W
Cathode current	I_k	max. 18	mA
Grid No.1 resistor	R_{g_1}	max. 3	MΩ
Grid No.3 resistor	R_{g_3}	max. 20	kΩ
Grid No.3 resistor grid No.3 directly connected to grid triode	R_{g_3}	max. 3	MΩ
Cathode to heater voltage	V_{kf}	max. 100	V

Triode section

Anode voltage	V_{a_o}	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	MΩ
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