

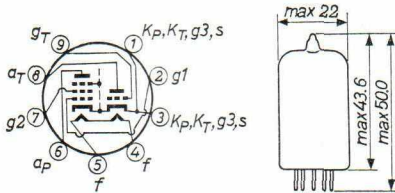
Combined high slope FRAME GRID TRIODE AND R.F. PENTODE for use as frequency changer in V.H.F. television tuners

HEATING

Indirect by A.C. or D.C.; series supply

Heater current $I_f = 0.3 \text{ A}$

Heater voltage $V_f = 8.5 \text{ V}$



Base: NOVAL. (Dimensions in mm)

CAPACITANCES

Pentode section (with external shield)

Grid No.1 to all other elements except anode	$C_{g1} = 6.2 \text{ pF}$
Anode to all other elements except grid No.1	$C_a = 3.5 \text{ pF}$
Anode to grid No.1	$C_{ag1} = 0.009 \text{ pF}$ $C_{ag1} < 0.012 \text{ pF}$
Grid No.1 to grid No.2	$C_{g1g2} = 1.5 \text{ pF}$

Triode section

Grid to all other elements except anode	$C_g = 3.3 \text{ pF}$
Anode to all other elements except grid	$C_a = 1.7 \text{ pF}$
Anode to grid	$C_{ag} = 1.8 \text{ pF}$

Between pentode and triode sections

Pentode anode to triode anode	$C_{aP-aT} < 0.025 \text{ pF}$
Pentode anode to triode grid	$C_{aP-gT} < 0.010 \text{ pF}$
Pentode grid to triode anode	$C_{g1P-aT} < 0.010 \text{ pF}$
Pentode grid to triode grid	$C_{g1P-gT} < 0.010 \text{ pF}$

TYPICAL CHARACTERISTICSPentode section

Anode voltage	V_a	=	170 V
Grid No.2 voltage	V_{g2}	=	120 V
Grid No.1 voltage	V_{g1}	=	-1.2 V
Anode current	I_a	=	10 mA
Grid No.2 current	I_{g2}	=	3 mA
Mutual conductance	S	=	11 mA/V
Internal resistance	R_i	>	350 k Ω
Amplification factor of grid No.2 with respect to grid No.1	μ_{g2g1}	=	55
Equivalent noise resistance	R_{eq}	=	1.5 k Ω
Grid No.1 current	I_{g1}	=	+0.3 μ A
Negative grid No.1 voltage	$-V_{g1}$	$\leq$	1.3 V

Triode section

Anode voltage	V_a	=	100 V
Grid voltage	V_g	=	-3 V
Anode current	I_a	=	15 mA
Mutual conductance	S	=	9 mA/V
Amplification factor	μ	=	20
Grid current	I_g	=	+0.3 μ A
Negative grid voltage	$-V_g$	$\leq$	1.3 V

OPERATING CHARACTERISTICS of the triode section as oscillator

Anode supply voltage	V_{ba}	=	200	V
Grid resistor	R_g	=	10	k Ω
Anode resistor	R_a	=	8.2	12 k Ω
Oscillator voltage	V_{osc}	=	4.5	3.3 V(RMS)
Anode current	I_a	=	16	12 mA
Effective mutual conductance 1)	S_{eff}	=	3.7	3.7 mA/V

¹⁾ Without higher harmonics

OPERATING CHARACTERISTICS of the pentode section as mixer

Anode supply voltage	$V_{ba} =$	200	V
Grid No.2 supply voltage	$V_{bg2} =$	200	V
Grid No.2 resistor	$R_{g2} =$	27	k Ω
Anode resistor	$R_a =$	2.7	4.7 k Ω
Grid No.1 supply voltage	$V_{bg1} =$	-1.2	0 V
Grid No.1 resistor	$R_{g1} =$	0.1	1 M Ω
Oscillator voltage	$V_{osc} =$	1.6	1.6 V(RMS)
Anode current	$I_a =$	10	9 mA
Grid No.2 current	$I_{g2} =$	3.0	2.8 mA
Grid No.1 current	$I_{g1} =$	10	2.3 μ A
Conversion conductance	$S_c =$	5	4.7 mA/V

OPERATING CHARACTERISTICS of the pentode section as I.F. amplifier

Anode supply voltage	$V_{ba} =$	200	V
Grid No.2 supply voltage	$V_{bg2} =$	200	V
Grid No.2 resistor	$R_{g2} =$	27	k Ω
Anode resistor	$R_a =$	2.7	4.7 k Ω
Grid No.1 supply voltage	$V_{bg1} =$	-1.2	0 V
Grid No.1 resistor	$R_{g1} =$	0.1	1 M Ω
Anode current	$I_a =$	10	12.5 mA
Grid No.2 current	$I_{g2} =$	3.0	3.7 mA
Mutual conductance	$S =$	11	14 mA/V
Input resistance at 50 Mc/s	$r_{g1} =$	10	10 k Ω
{ Grid No.1 voltage	$V_{g1} =$	-12	- V
{ Mutual conductance	$S =$	0.11	- mA/V

LIMITING VALUES of the pentode section (Design centre limits)

Anode voltage in cold condition	V_{a0}	= max.	550 V
Anode voltage	V_a	= max.	250 V
Anode dissipation	W_a	= max.	2.0 W
Grid No.2 voltage in cold condition	V_{g20}	= max.	550 V
Grid No.2 voltage	V_{g2}	= max.	250 V
Grid No.2 dissipation			
at $-V_{g1} < 1.5$ V	W_{g2}	= max.	0.45 W
at 1.5 V $< -V_{g1} < 2$ V	W_{g2}	= max.	0.4 W
at $-V_{g1} > 2$ V	W_{g2}	= max.	0.3 W
Negative grid No.1 voltage	$-V_{g1}$	= max.	50 V
Grid No.1 resistor with fixed bias	R_{g1}	= max.	1 M Ω
Grid No.1 resistor with automatic bias	R_{g1}	= max.	2.2 M Ω
Cathode current	I_k	= max.	18 mA
Voltage between heater and cathode	V_{kf}	= max.	100 V ¹⁾

LIMITING VALUES of the triode section (Design centre limits)

Anode voltage in cold condition	V_{a0}	= max.	550 V
Anode voltage	V_a	= max.	125 V
Anode dissipation	W_a	= max.	1.5 W
Negative grid voltage	$-V_g$	= max.	50 V
Grid resistor	R_g	= max.	0.5 M Ω
Cathode current	I_k	= max.	20 mA
Voltage between heater and cathode	V_{kf}	= max.	100 V ¹⁾

¹⁾ To fulfil the modulation hum requirements in inter-carrier receivers, the voltage between heater and cathode should not exceed 100 V (RMS)

With respect to modulation hum in A.M. sound receivers the voltage between heater and cathode should not exceed 50 V (RMS)