

## TRIODE-OUTPUT PENTODE

The triode section is intended for use as frame oscillator and A.F. amplifier. The pentode section is intended for use as frame output tube and A.F. power amplifier.

QUICK REFERENCE DATA		
<u>Triode section</u>		
Anode current	$I_a$	3.5 mA
Transconductance	$S$	2.2 mA/V
Amplification factor	$\mu$	70 -
<u>Pentode section</u>		
Anode peak voltage	$V_{ap}$	max. 2.5 kV
Anode current	$I_a$	41 mA
Transconductance	$S$	7.5 mA/V
Amplification factor	$\mu_{g2g1}$	9.5 -
Output power	$W_o$	3.5 W

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

Heater voltage

$V_f$  6.3 V

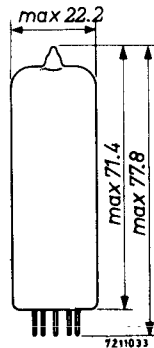
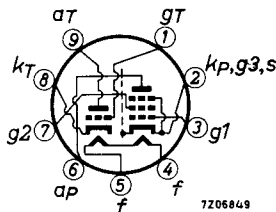
Heater current

$I_f$  780 mA

### DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval



**CAPACITANCES**

Triode section

Anode to all except grid	$C_{a(g)}$	4.3	pF
Grid to all except anode	$C_{g(a)}$	2.7	pF
Anode to grid	$C_{ag}$	4.4	pF
Grid to heater	$C_{gf}$	max. 0.1	pF

Pentode section

Anode to all except grid No.1	$C_{a(g_1)}$	8.0	pF
Grid No.1 to all except anode	$C_{g_1(a)}$	9.3	pF
Anode to grid No.1	$C_{ag_1}$	max. 0.3	pF
Grid No.1 to heater	$C_{g_1f}$	max. 0.3	pF

Between triode and pentode sections

Anode triode to grid No.1 pentode	$C_{aTg_1P}$	max. 0.02	pF
Grid triode to anode pentode	$C_{gTaP}$	max. 0.02	pF
Grid triode to grid No.1 pentode	$C_{gTg_1P}$	max. 0.025	pF
Anode triode to anode pentode	$C_{aTaP}$	max. 0.25	pF

**TYPICAL CHARACTERISTICS**

Triode section

Anode voltage	$V_a$	100	V
Grid voltage	$V_g$	0	V
Anode current	$I_a$	3.5	mA
Transconductance	$S$	2.2	mA/V
Amplification factor	$\mu$	70	-

Pentode section

Anode voltage	$V_a$	170	V
Grid No.2 voltage	$V_{g_2}$	170	V
Grid No.1 voltage	$V_{g_1}$	-11.5	V
Anode current	$I_a$	41	mA
Grid No.2 current	$I_{g_2}$	9	mA
Transconductance	$S$	7.5	mA/V
Amplification factor	$\mu_{g_2g_1}$	9.5	-
Internal resistance	$R_i$	16	k $\Omega$

## OPERATING CHARACTERISTICS

Triode section as A.F. amplifier

A. Signal source resistance	$R_s$	0.22			$M\Omega$
Grid resistor	$R_g$	3			$M\Omega$
Grid resistor of next stage	$R_g$	0.68			$M\Omega$
Supply voltage	$V_b$	200	170	V	
Cathode resistor	$R_k$	2.2	2.7	$k\Omega$	
Anode resistor	$R_a$	220	220	$k\Omega$	
Anode current	$I_a$	0.52	0.43	mA	
Voltage gain	$V_o/V_i$ <sup>1)</sup>	52	51	-	
Max. output voltage	$V_o$ max	26	25	$V_{RMS}$	
Distortion	$d_{tot}$ <sup>2)</sup>	1.6	2.3	%	

B. Signal source resistance	$R_s$	0.22				$M\Omega$
Grid resistor	$R_g$	22				$M\Omega$
Grid resistor of next stage	$R_g'$	0.68				$M\Omega$
Supply voltage	$V_b$	200	200	170	170	V
Cathode resistor	$R_k$	0	0	0	0	$\Omega$
Anode resistor	$R_a$	100	220	100	220	$k\Omega$
Anode current	$I_a$	1.05	0.61	0.86	0.50	$M\Omega$
Voltage gain	$V_o/V_i$ <sup>1)</sup>	50	55	49	53	-
Max. output voltage	$V_o$ max	24	25	19	20	$V_{RMS}$
Distortion	$d_{tot}$ <sup>3)</sup>	1.5	1.4	1.4	1.4	%

## MICROPHONY AND HUM

The triode section can be used without special precautions against microphony and hum in circuits in which an input voltage of minimum 10 mV<sub>RMS</sub> is required for an output of 50 mW of the output stage.  $Z_g(50 \text{ Hz}) = 0.25 M\Omega$ .

1) Measured at small input voltage.

2) At lower output voltages the distortion is proportionally lower.

3) At lower output voltages down to 5 V<sub>RMS</sub> the distortion is approximately constant. At values below 5 V<sub>RMS</sub> the distortion is approximately proportional to  $V_o$ .

**OPERATING CHARACTERISTICS**

Pentode section

A.F. power amplifier, class A (measured with  $V_k$  constant)

Supply voltage	$V_{ba} = V_{bg2}$	200	272	V
Grid No.2 series resistor (non-decoupled)	$R_{g2}$	470	2200	$\Omega$
Cathode resistor	$R_k$	330	650	$\Omega$
Load resistance	$R_{a\sim}$	4.5	8	k $\Omega$
Grid No.1 driving voltage	$V_i$	0 0.66 6.7	0 0.9 9.5	$V_{RMS}$
Anode current	$I_a$	35 37	28 27	mA
Grid No.2 current	$I_{g2}$	7.8 13.3	6.5 10.8	mA
Output power	$W_o$	0 0.05 3.3	0 0.05 3.5	W
Distortion	$d_{tot}$	- - 10	- - 10	%

A.F. power amplifier, class AB, two tubes in push-pull

Anode supply voltage	$V_{ba}$	200	250	V
Grid No.2 supply voltage	$V_{bg2}$	200	200	V
Common cathode resistor	$R_k$	170	220	$\Omega$
Load resistance	$R_{aa'\sim}$	4.5	10	k $\Omega$
Grid No.1 driving voltage	$V_i$	0 14.2	0 12.5	$V_{RMS}$
Anode current	$I_a$	2x35 2x42.5	2x28 2x31	mA
Grid No.2 current	$I_{g2}$	2x8 2x16.5	2x5.8 2x13	mA
Output power	$W_o$	0 9.3	0 10.5	W
Distortion	$d_{tot}$	- 6.3	- 4.8	%

Frame output application

The circuit should operate satisfactorily with a peak anode current  $I_{ap} = 85$  mA at  $V_a = 50$  V,  $V_{g2} = 170$  V,  $V_f = 6.3$  V. The minimum available  $I_{ap}$  at end of life is;

- 70 mA at  $V_a = 50$  V,  $V_{g2} = 170$  V,  $V_f = 5.5$  V
- 80 mA at  $V_a = 50$  V,  $V_{g2} = 190$  V,  $V_f = 5.5$  V.

**LIMITING VALUES** (Design centre rating system)Triode section

Anode voltage	$V_{a0}$	max. 550 V
	$V_a$	max. 300 V
Anode peak voltage	$V_{ap}$	max. 600 V <sup>1)</sup>
Anode dissipation	$W_a$	max. 1 W
Cathode current, average	$I_k$	max. 15 mA
peak	$I_{kp}$	max. 100 mA <sup>1)</sup>
Grid resistor for fixed bias	$R_g$	max. 1 M $\Omega$
for automatic bias	$R_g$	max. 3 M $\Omega$
Grid impedance at 50 Hz	$Z_g$	max. 0.5 M $\Omega$
Cathode to heater voltage	$V_{kf}$	max. 100 V

Pentode section

Anode voltage	$V_{a0}$	max. 550 V
	$V_a$	max. 300 V
Anode peak voltage, positive	$V_{ap}$	max. 2.5 kV <sup>1)</sup>
negative	$-V_{ap}$	max. 500 V
Anode dissipation for frame output application	$W_a$	max. 5 W
for A.F. output application	$W_a$	max. 7 W
Grid No.2 voltage	$V_{g20}$	max. 550 V
	$V_{g2}$	max. 300 V
Grid No.2 dissipation, average	$W_{g2}$	max. 2 W
peak	$W_{g2p}$	max. 3.2 W
Cathode current	$I_k$	max. 50 mA
Grid No.1 resistor for fixed bias	$R_{g1}$	max. 1 M $\Omega$
for automatic bias	$R_{g1}$	max. 2 M $\Omega$
Cathode to heater voltage	$V_{kf}$	max. 150 V

For curves of the ECL82 please refer to PCL82

<sup>1)</sup> Max. pulse duration 4% of a cycle with a maximum of 0.8 msec.

# PHILIPS

Data handbook



Electronic  
components  
and materials

## ECL82

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