SPECIAL QUALITY, LONG LIFE DOUBLE TRIODE for use as A.F. amplifier in circuits with high signal to noise ratio

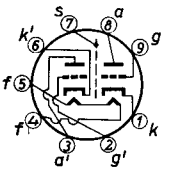
HEATING

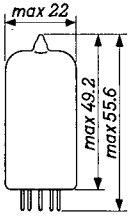
Indirect by A.C. or D.C.; parallel supply

Heater voltage	V_f = 6.3 V
Heater current	I_f = 330 mA

In order to obtain a prolonged tube life, the deviation of the heater voltage should not exceed 5 % of the nominal value

Dimensions in mm





Base: NOVAL

CAPACITANCES

Grid to all other elements except anode	$C_g = C_{g'}$	= 2.0 pF
Anode to all other elements except grid	$C_a = C_{a'}$	= 2.0 pF
Anode to grid	$C_{ag} = C_{a'g'}$	= 1.2 pF
Grid to heater	C_{gf}	< 0.01 pF
	$C_{g'f}$	< 0.02 pF
Grid to grid of other section	$C_{gg'}$	< 0.01 pF
Anode to anode of other section	$C_{aa'}$	< 0.1 pF
Anode to grid of other section	$C_{ag'}$	< 0.06 pF
	$C_{a'g}$	< 0.01 pF

CHARACTERISTICS

Column I: Setting of the tube and typical (average) measuring results of new tubes
II: Characteristics range values for equipment design
III: Data indicating the end point of life

Heater current		I	II	
Heater voltage	V_f =	6.3		V
Heater current	I_f =	330	313-347	mA

CHARACTERISTICS (continued)

Typical characteristics			I	II	III	
Anode voltage	V_a	=	250			V
Cathode resistor	R_k	=	1.6			kΩ
Anode current	I_a	=	1.25	1.1-1.4	0.8	mA
Mutual conductance	S	=	1.6	1.3-1.95	1.05	mA/V
Amplification factor	μ	=	100			
Internal resistance	R_i	=	62.5			kΩ
Negative grid current	$-I_g$	=		< 0.2	0.5	μA

			I	II	III	
Anode voltage	V_a	=	100			V
Cathode resistor	R_k	=	2			kΩ
Anode current	I_a	=	0.5			mA
Mutual conductance	S	=	1.25			mA/V
Amplification factor	μ	=	100			
Internal resistance	R_i	=	80			kΩ

Cut-off voltage			I	II	III	
Anode voltage	V_a	=	250			V
Anode current	I_a	=	20			μA
Grid voltage	$-V_g$	=		< 4		V

Grid current starting point			I	II	III	
Positive grid current	$+I_g$	=	0.3			μA
Negative grid voltage	$-V_g$	=		< 1		V

Insulation resistance			I	II	III	
Voltage between heater and cathode	V_{kf}	=	100			V
Insulation resistance	R_{isol}	=		> 20		MΩ
Voltage between anode and all other electrodes	V	=	300			V
Insulation resistance	R_{isol}	=		> 300		MΩ
Voltage between grid and all other electrodes	V	=	100			V
Insulation resistance	R_{isol}	=		> 300		MΩ

CHARACTERISTICS (continued)

Hum voltage. Measured with fully screened tube socket and centre tap of transfomer earthed

			I	II
Anode supply voltage	V_{ba}	=	250	V
Anode resistor	R_a	=	100	kΩ
Grid resistor	R_g	=	1	MΩ
Cathode resistor	R_k	=	3	kΩ
Cathode capacitor	C_k	=	1000	µF
Hum voltage (first triode section)	V_{ghum}	=		< 5 µV
Hum voltage (second triode section)	$V_{g'hum}$	=		< 15 µV

Vibrational noise (two systems in parallel)

			I	II
Anode supply voltage	V_{ba}	=	250	V
Anode resistor	R_a	=	5	kΩ
Grid voltage	V_g	=	-2	V
Vibrational frequency	f	=	25	c/s
Vibrational acceleration		=	2.5	g
Vibrational noise output	V_{noise}	=		< 10 mV[1]

Microphony

With respect to microphony the sensitivity of the circuit should not exceed 0.5 mV for 50 mW output of the output stage

LIFE EXPECTANCY: 10 000 hours

The data indicating the end point of life are given in column III under the heading "Characteristics"

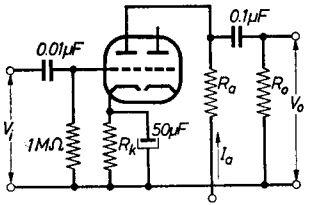
SHOCK RESISTANCE: acceleration 400 g [2])

VIBRATION RESISTANCE: vibrational acceleration of 2.5 g at a frequency of 50 c/s [2])

[1]) Measured in the frequency range from 20 to 5000 c/s

[2]) These test conditions are only given for evaluation of the ruggedness of the tube and should by no means be interpreted as suitable operating conditions

OPERATING CHARACTERISTICS for use as A.F. amplifier

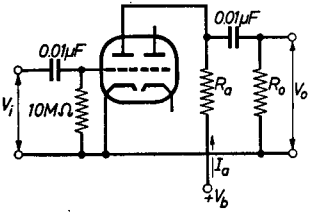


V_b (V)	R_a (kΩ)	R_k (Ω)	R_o (kΩ)	I_a (mA)	V_o [1] (V,RMS)	$\frac{V_o}{V_i}$	d_{tot} [2] (%)
200	47	1500	150	0.86	18	34	8.5
250	47	1200	150	1.18	23	37.5	7.0
300	47	1000	150	1.55	26	40	5.0
350	47	820	150	1.98	33	42.5	4.4
400	47	680	150	2.45	37	44	3.6
200	100	1800	330	0.65	20	50	4.8
250	100	1500	330	0.86	26	54.5	3.9
300	100	1200	330	1.11	30	57	2.7
350	100	1000	330	1.40	36	61	2.2
400	100	820	330	1.72	38	63	1.7
200	220	3300	680	0.36	24	56	4.6
250	220	2700	680	0.48	28	66.5	3.4
300	220	2200	680	0.63	36	72	2.6
350	220	1500	630	0.85	37	75.5	1.6
400	220	1200	680	1.02	38	76.5	1.1

[1]) Output voltage at grid current starting point

[2]) The distortion is about proportional to the output voltage

OPERATING CHARACTERISTICS for use as A.F. amplifier (continued)

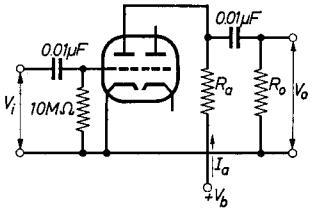


Input source resistance = 100 Ω

V_b (V)	R_a (kΩ)	R_o (kΩ)	I_a (mA)	V_o (V,RMS)	$\frac{V_o}{V_i}$	d_{tot}[2] (%)
200	47	150	1.02	18	37	5.6
250	47	150	1.45	23	39	4.2
300	47	150	2.02	26	41	2.9
350	47	150	2.50	33	44	2.7
400	47	150	3.10	37	45	2.5
200	100	330	0.70	20	50	3.9
250	100	330	1.00	26	51	2.6
300	100	330	1.29	30	54	2.0
350	100	330	1.62	36	56	1.8
400	100	330	1.95	38	58	1.6
200	220	680	0.39	24	58	4.6
250	220	680	0.56	28	62	2.7
300	220	680	0.74	36	66	2.2
350	220	680	0.88	37	67	1.7
400	220	680	1.09	38	68	1.4

[2]) The distortion is about proportional to the output voltage

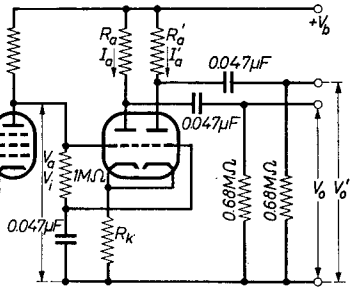
OPERATING CHARACTERISTICS for use as A.F. amplifier (continued)



Input source resistance = 330 kΩ

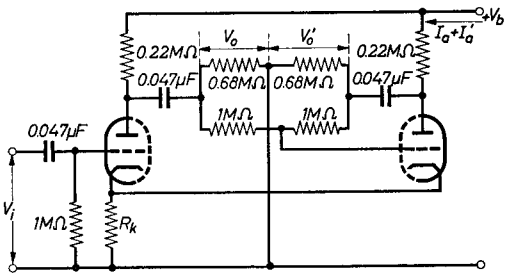
V_b (V)	R_a (kΩ)	Ro (kΩ)	I_a (mA)	$\frac{V_o}{V_i}$	dtot (%)		
					V_o=2 V	V_o=4 V	V_o=6 V
100	47	150	0.35	25	1.7	2.1	6.0
150	47	150	0.84	33	2.5	4.6	5.2
200	47	150	1.40	34	2.4	4.7	5.6
250	47	150	1.95	36	2.3	4.6	5.6
300	47	150	2.52	38	2.2	4.5	5.5
350	47	150	3.19	40	2.2	4.2	5.5
400	47	150	3.80	41	2.1	4.2	5.4
100	100	330	0.24	34	1.6	2.3	2.5
150	100	330	0.56	43	1.9	3.0	4.7
200	100	330	0.88	46	1.9	3.8	5.1
250	100	330	1.23	48	1.8	3.8	5.1
300	100	330	1.58	50	1.8	3.6	5.0
350	100	330	1.92	51	1.8	3.6	4.9
400	100	330	2.29	52	1.7	3.5	4.8
100	220	680	0.14	42	1.6	2.5	3.2
150	220	680	0.32	51	1.7	3.0	4.4
200	220	680	0.49	54	1.7	3.0	4.4
250	220	680	0.67	57	1.6	2.9	4.4
300	220	680	0.85	58	1.6	2.9	4.4
350	220	680	1.05	59	1.6	2.8	4.3
400	220	680	1.23	60	1.6	2.7	4.2

OPERATING CHARACTERISTICS for use as phase inverter



Va should be adjusted to the specified value of Ia+Ia'

Vb (V)	Va (V)	Rk (kΩ)	Ra;Ra' (kΩ)	Ia+Ia' (mA)	Vo / Vi	Vo [1] (V,RMS)	dtot [2] (%)
250	65	68	100	1.0	25	20 7	1.8 0.6
350	90	82	150	1.2	27	35 10	1.8 0.5



Vb (V)	Rk (Ω)	Ia+Ia' (mA)	Vo / Vi	Vo [1] (V,RMS)	dtot [2] (%)
250	1200	1.08	58	35 7	5.5 1.1
350	820	1.7	62	45 9	3.5 0.7

[1]) Output voltage at grid current starting point

[2]) The distortion is about proportional to the output voltage

LIMITING VALUES (Absolute limits; each system)

Anode voltage in cold condition	V_{ao}	= max. 600 V
Anode voltage	V_a	= max. 300 V
Anode dissipation	W_a	= max. 1.2 W
Negative grid voltage	$-V_g$	= max. 55 V
Positive grid voltage	$+V_g$	= max. 0.5 V
Grid circuit resistance with fixed bias	R_g	= max. 1.2 MΩ
Grid circuit resistance with automatic bias	R_g	= max. 2.2 MΩ
Grid circuit resistance in case of grid current bias	R_g	= max. 25 MΩ
Cathode current	I_k	= max. 9 mA
Voltage between heater and cathode	V_{kf}	= max. 200 V
Circuit resistance between heater and cathode	R_{kf}	= max. 20 kΩ [1]
Bulb temperature	t_{bulb}	= max. 170 °C

[1]) In a phase inverter circuit immediately preceding the output stage the maximum permissible value of R_{kf}=135 kΩ

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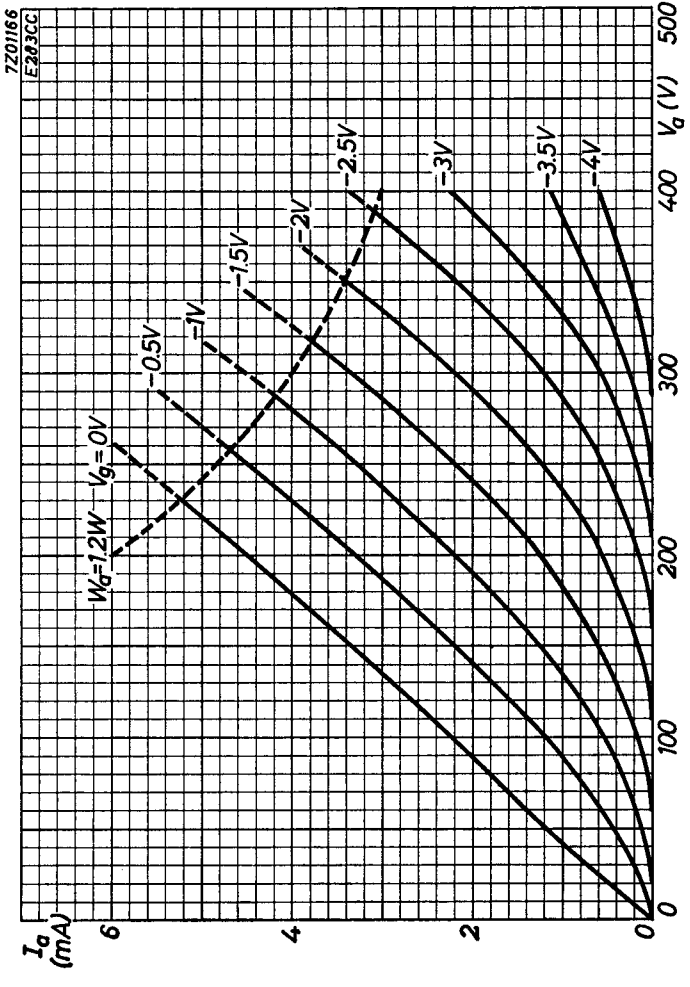

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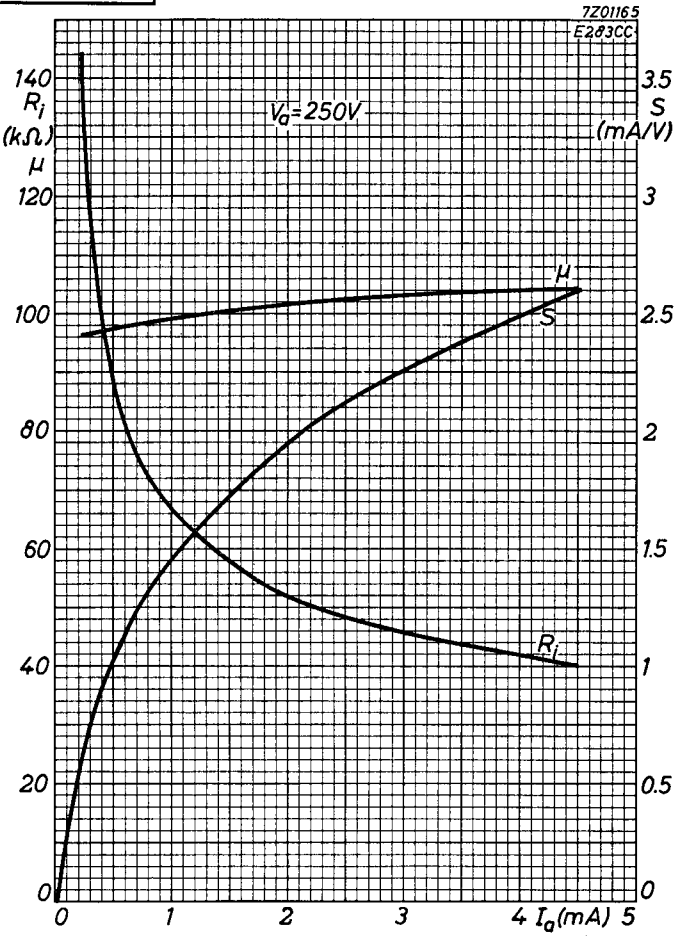

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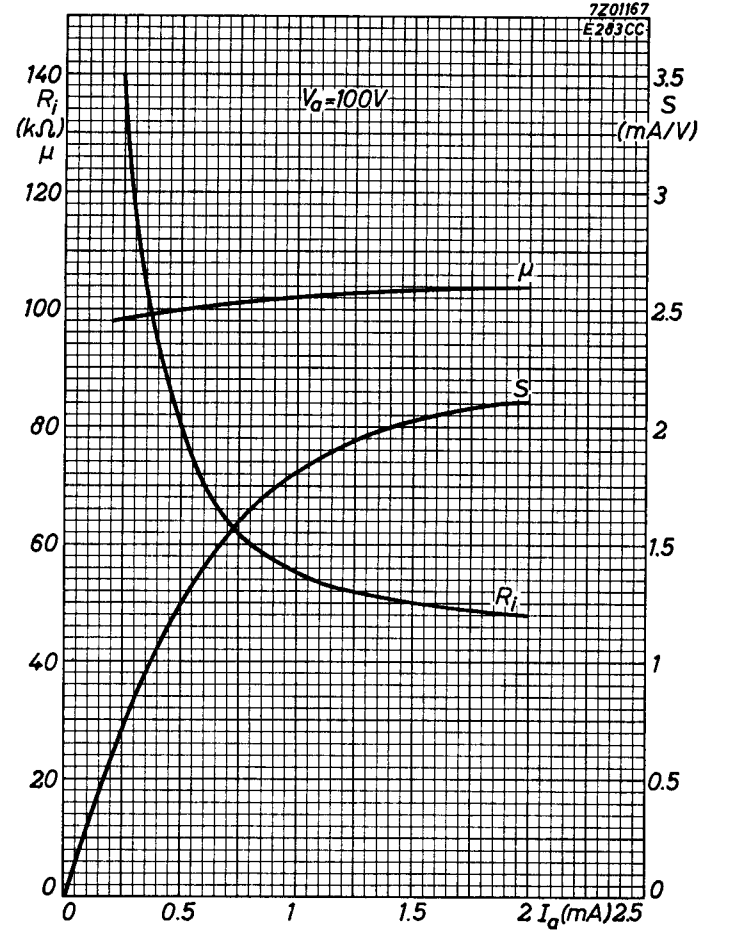

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PHILIPS

Electronic Tube

HANDBOOK

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