

DOUBLE TRIODE

ECC83

High μ double triode, having separate cathodes, primarily intended for use as a resistance-coupled amplifier or phase inverter.

HEATER

Suitable for series or parallel operation, a.c. or d.c.

The heater is centre-tapped and the two sections may be operated in series or in parallel with one another.

Series

V_h applied between pins 4 and 5

Parallel

V_h applied between pin 9 and pins 4 and 5 connected together

	Series	Parallel	
V_h	12.6	6.3	V
I_h	150	300	mA

CAPACITANCES

$C_{out'}$	330	mpF
$C_{out''}$	230	mpF
* C_{in}	1.6	pF
* C_{a-g}	1.6	pF
$C_{a'-a''}$	<1.2	pF
$C_{a''-g'}$	<100	mpF
$C_{a'-g''}$	<110	mpF
$C_{g'-g''}$	<10	mpF
* C_{g-h}	<150	mpF

*Each section

CHARACTERISTICS (each section)

V_a	100	250	V
I_a	0.5	1.2	mA
V_g	-1.0	-2.0	V
g_m	1.25	1.6	mA/V
μ	100	100	
r_a	80	62.5	k Ω
V_g max. ($I_g = +0.3\mu A$)		-0.9	V

OPERATING CONDITIONS AS RESISTANCE COUPLED A.F.← AMPLIFIER with grid current bias ($R_g = 10M\Omega$)

V_b (V)	R_a (k Ω)	R_g^{**} (k Ω)	I_a (mA)	$Z_s = 0k\Omega$		$Z_s = 220k\Omega$	
				$\frac{V_{out}}{V_{in}}$	$V_{out(r.m.s.)}^*$ (V)	$\frac{V_{out}}{V_{in}}$	$V_{out(r.m.s.)}^\dagger$ (V)
400	47	150	3.4	47	43	38	46
350	47	150	2.8	46	36	37	38
300	47	150	2.2	44	29	36	30
250	47	150	1.7	42	22	34	24
200	47	150	1.2	39	15	32	17
400	100	330	2.1	61	59	49	62
350	100	330	1.75	60	49	48	52
300	100	330	1.4	58	39	47	42
250	100	330	1.1	56	30	46	33
200	100	330	0.8	54	21	43	23
400	220	680	1.2	73	71	58	75
350	220	680	1.0	72	59	57	63
300	220	680	0.8	70	47	56	52
250	220	680	0.6	68	36	54	40
200	220	680	0.45	65	25	52	29

*Output voltage measured at $D_{tot} = 5\%$.

$\frac{V_{out}}{V_{in}}$ measured with $V_{in(r.m.s.)} = 100mV$

**Grid resistor of following valve.

†When operating this valve with grid current bias and a high source impedance, the second harmonic distortion rises to a peak at quite low levels of output (about $10V_{r.m.s.}$) and then falls with increasing drive. The third harmonic then begins to rise, and D_{tot} finally reaches 5% at a much higher output level than with zero source impedance. The maximum value of this distortion peak varies inversely with the anode load, being about 5.5% with $R_a = 47k\Omega$, 4.5% with $R_a = 100k\Omega$ and 4% with $R_a = 220k\Omega$.

**OPERATING CONDITIONS AS RESISTANCE COUPLED A.F. ←
AMPLIFIER with cathode bias**

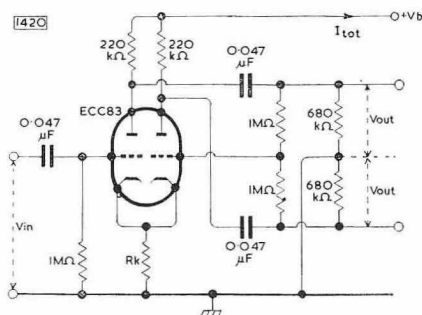
V_b (V)	R_a (k Ω)	I_a (mA)	R_k (k Ω)	$\frac{V_{out}}{V_{in}}$	$V_{out(r.m.s.)}^*$ (V)	D_{tot}^* (%)	$R_g^\dagger$ (k Ω)
400	47	2.2	1.0	43	40.5	5.0	150
350	47	1.7	1.2	42	31	5.0	150
300	47	1.3	1.5	40	22	5.0	150
250	47	0.9	2.2	36	12.5	5.0	150
400	100	1.4	1.5	59	59	5.0	330
350	100	1.1	1.8	57	45	5.0	330
300	100	0.88	2.2	55	32.5	5.0	330
250	100	0.6	3.3	50	18.5	5.0	330
400	220	0.88	2.2	71	63	3.7	680
350	220	0.7	2.7	69	60	5.0	680
300	220	0.5	3.9	65	38.5	5.0	680
250	220	0.38	4.7	62	27	5.0	680

*Output voltage measured at $D_{tot} = 5\%$ or at start of positive grid current. At lower output voltages the distortion is approximately proportional to the output voltage.

†Grid resistor of following valve.

At lower values of V_b , grid current bias should be used.

OPERATING CONDITIONS AS A PHASE INVERTER



V_b (V)	I_{tot} (mA)	R_k (kΩ)	$V_{out(r.m.s.)}^*$ (V)	$\frac{V_{out}}{V_{in}}$
350	1.3	1.5	44	65
250	0.8	2.2	23	60

*Output voltage measured at $D_{tot}=5\%$.

LIMITING VALUES (each section)

V_a max.	300	V
p_a max.	1.0	W
I_k max.	8.0	mA
$-V_g$ max.	50	V
R_{g-k} max. (fixed bias)	1.0	MΩ
V_{h-k} max.	180	V
$\dagger R_{h-k}$ max.	20	kΩ

$\dagger$ When used as a phase inverter immediately preceding the output stage, R_{h-k} max. may be 150kΩ.

OPERATING NOTES

1. Microphony

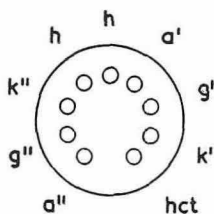
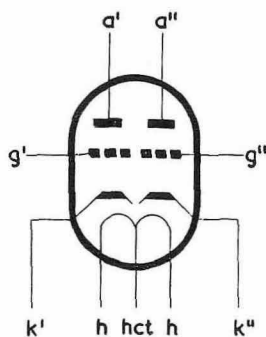
This valve may be used without special precautions against microphony in equipment where the input voltage is not less than 5mV for an output of 50mW (or 50mV for 5W output).

2. Hum

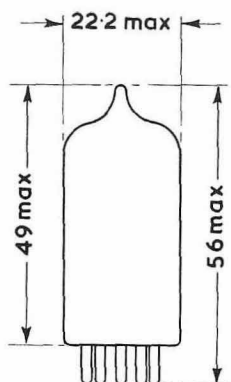
With V_b applied between pin 9 and pins 4 and 5 connected together and the centre tap of the heater transformer earthed, the section connected to pins 6, 7 and 8 is the most favourable with regard to hum, and should be used for the input section when the two sections are used in cascade.

When used as a normal voltage amplifier with $V_b = 250V$, $R_a = 100k\Omega$, $R_g = 330k\Omega$, $R_k = 1.5k\Omega$ (suitably decoupled), the maximum hum level of the input triode is $10\mu V$, the average value being $6\mu V$. If one side of the heater is earthed, rather than the centre tap, it is preferable to earth pins 4 and 5. The average value of hum under these conditions may be $50\mu V$.

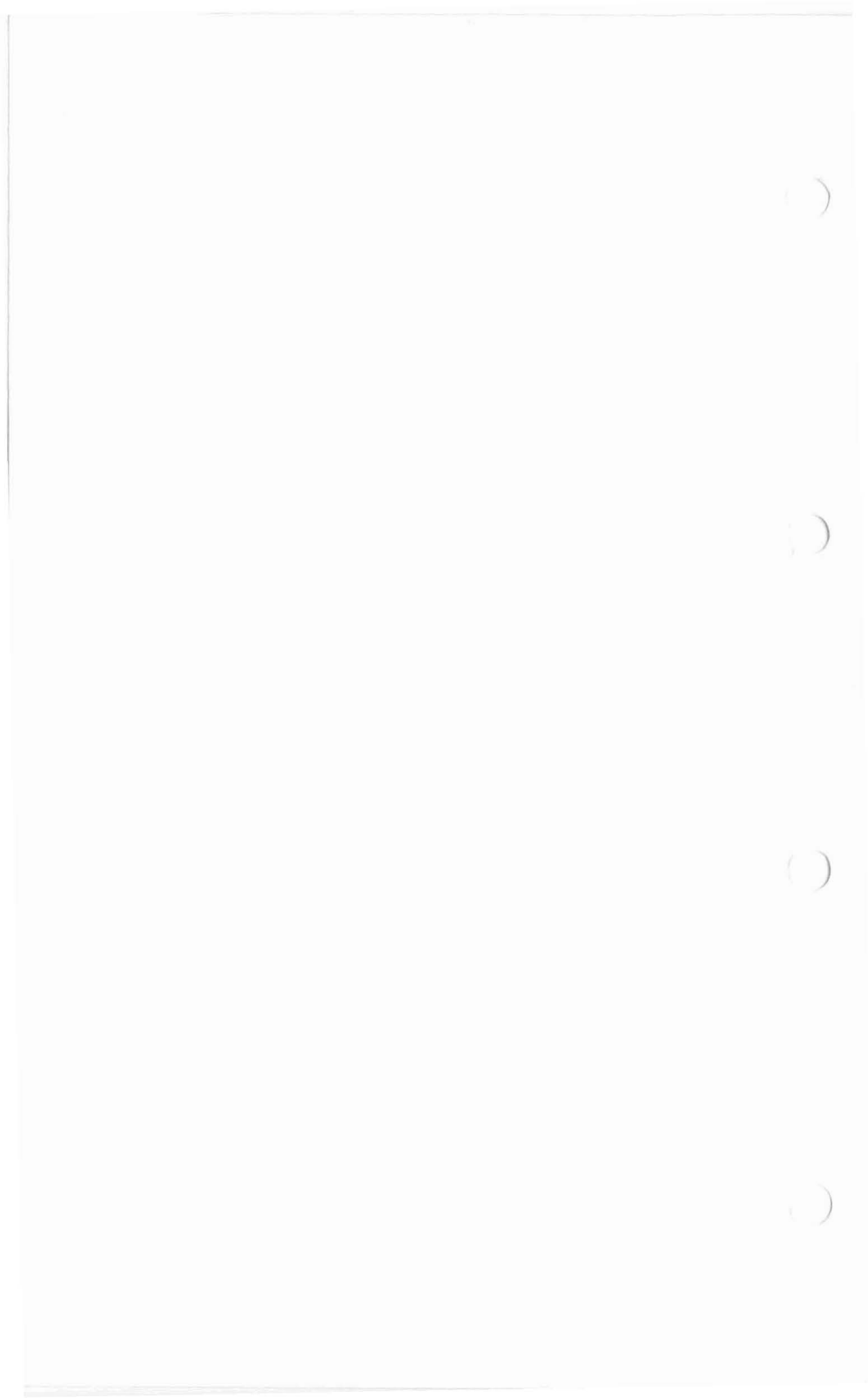
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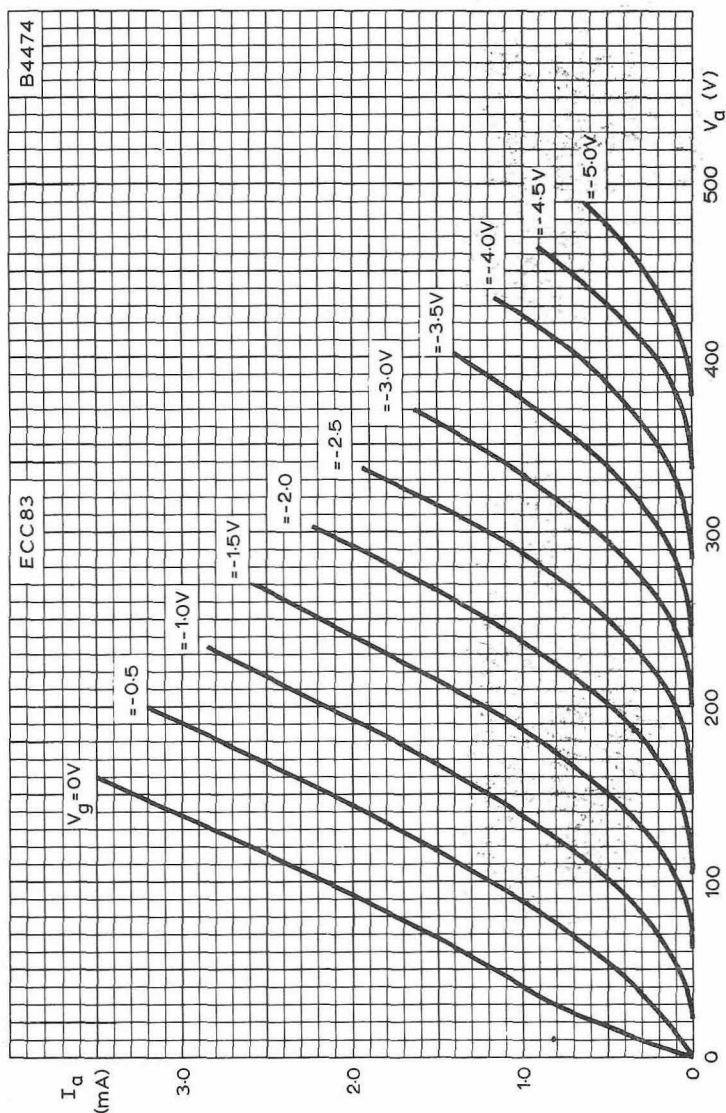


B9A Base

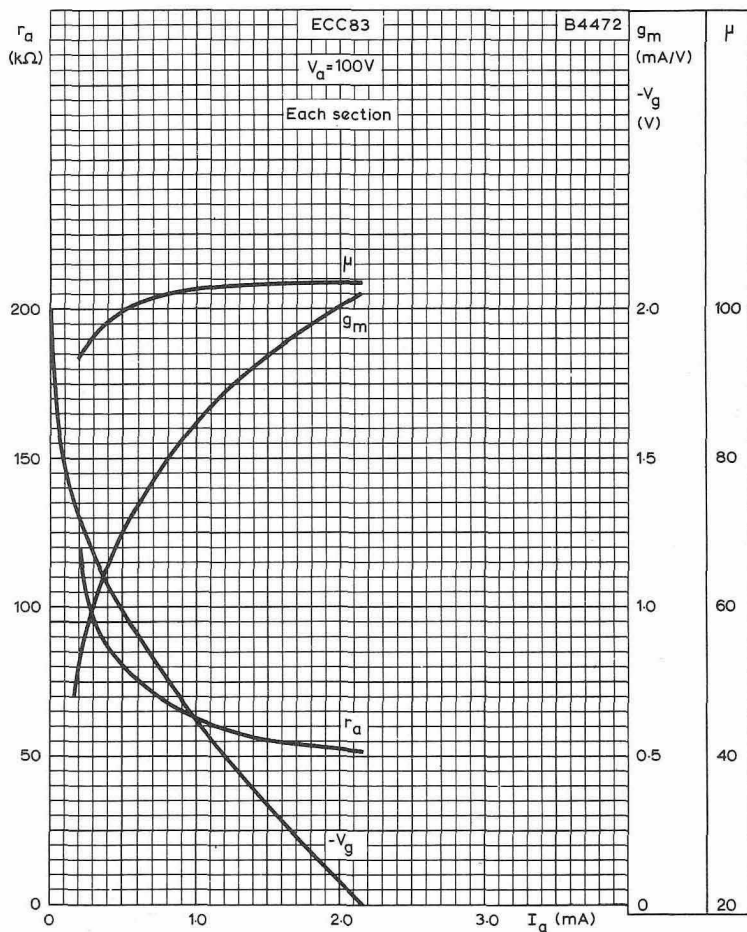


All dimensions in mm



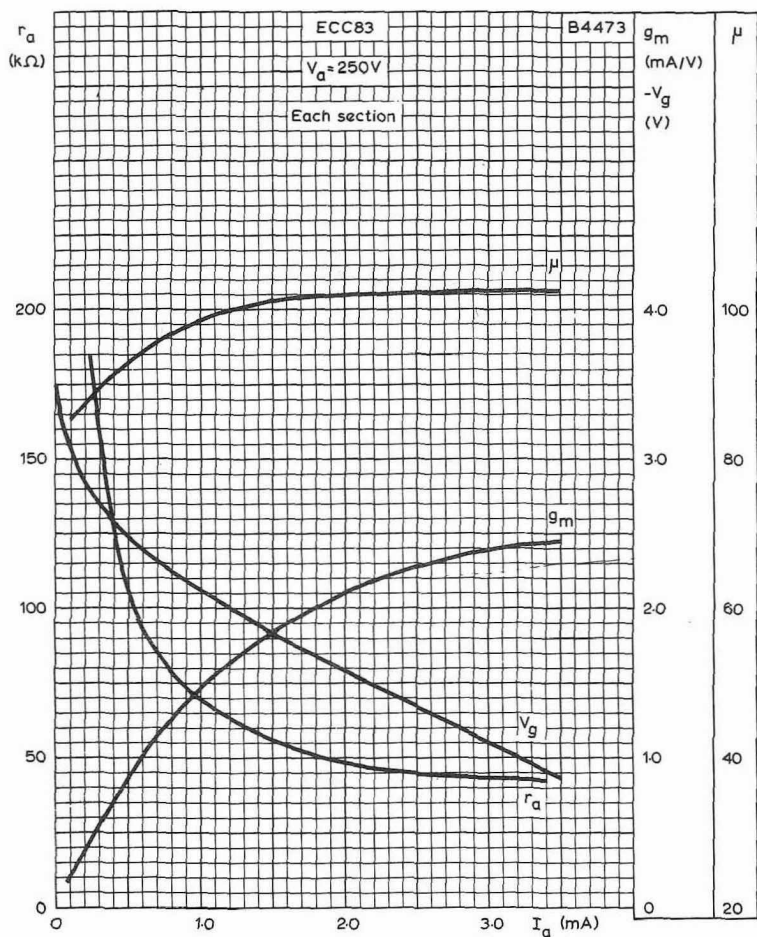


ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH GRID VOLTAGE AS PARAMETER (each section)



MUTUAL CONDUCTANCE, ANODE IMPEDANCE, AMPLIFICATION FACTOR
 AND GRID VOLTAGE PLOTTED AGAINST ANODE CURRENT.

$V_a = 100V$



MUTUAL CONDUCTANCE, ANODE IMPEDANCE, AMPLIFICATION FACTOR
 AND GRID VOLTAGE PLOTTED AGAINST ANODE CURRENT.

$V_a = 250V$



