

SPECIAL QUALITY DOUBLE TRIODE

E188CC

Special quality double triode with separate cathodes, for use as a cascode amplifier and in pulse circuits, where stability of characteristics and long life are required.

This data should be read in conjunction with GENERAL NOTES—SPECIAL QUALITY VALVES which precede this section of the handbook, and the index numbers are used to indicate where reference should be made to a specific note.

HEATER

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

V_h^1	6.3	V
I_h	335	mA

The maximum variation of heater current at $V_h = 6.3V$ is $\pm 17mA$.

CAPACITANCES² (unshielded)

	Minimum	Average	Maximum	
* C_{a-g}	1.2	1.4	1.6	pF
* C_{a-k}	140	180	220	mpF
* C_{a-s}	1.1	1.3	1.5	pF
$C_{a'-k'+h+s}$	1.55	1.75	1.95	pF
$C_{a''-k''+h+s}$	1.45	1.66	1.85	pF
$C_{a'-k'+h}$	0.4	0.5	0.6	pF
$C_{a''-k''+h}$	0.3	0.4	0.5	pF
* $C_{g-k+h+s}$	2.7	3.3	3.9	pF
* C_{g-k+h}	2.7	3.3	3.9	pF
$C_{a'-a''}$	—	25	45	mpF
$C_{g'-g''}$	—	—	5.0	mpF
$C_{a'-g''}$	—	—	5.0	mpF
$C_{a''-g'}$	—	—	5.0	mpF
$C_{g'-k''}$	—	—	5.0	mpF
$C_{g''-k'}$	—	—	5.0	mpF
$C_{k'-h}$	—	2.6	—	pF
$C_{k''-h}$	—	2.7	—	pF

Grounded-grid operation

$C_{a'-g'+h+s}$	2.7	3.0	3.3	pF
$C_{a''-g''+h+s}$	2.6	2.9	3.2	pF
* $C_{k-g+h+s}$	5.1	6.9	6.9	pF

*each section

CHARACTERISTICS³ (each section)

V_a	90	V
I_a	15	mA
V_g	-1.2	V
g_m	12.5	mA/V
μ	33	

EI88CC SPECIAL QUALITY DOUBLE TRIODE

OPERATING CONDITIONS AS R.F. AMPLIFIER (each section)

V_{a-e}	90	100	V
V_{g-e}	0	+9.0	V
R_k	120†	680	Ω
I_a	12	15	mA
g_m	11.5	12.5	mA/V
R_{eq} (r.f.)	—	300	Ω
r_{g1} ($f = 50\text{Mc/s}$)	—	6.0	k Ω
N.F. ($f = 200\text{Mc/s}$)	—	4.6	dB

†Recommended minimum value for $V_{a-e} = 90\text{V}$.

OPERATING CONDITIONS AS ADDITIVE MIXER

$V_{a(b)}$	60	90	150	V
R_a	0	1.0	3.9	k Ω
R_{g-k}	1.0	1.0	1.0	M Ω
$V_{osc}(r.m.s.)$	2.0	2.5	3.0	V
I_a	4.7	7.7	11	mA
g_c	2.9	3.5	4.1	mA/V
r_a	8.3	7.0	6.1	k Ω

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

	Average	Initial range	End of Life*	
Anode current	15	14.2 to 15.8	> 13.5	mA
$V_{a(b)} = 100\text{V}$, $V_{g(b)} = +9\text{V}$, $R_k = 680\Omega$				
Anode current	—	< 5.0	—	μA
$V_{a(b)} = 150\text{V}$, $V_g = -15\text{V}$				
Mutual conductance	12.5	10.5 to 14.5	> 9.0	mA/V
$V_{a(b)} = 100\text{V}$, $V_{g(b)} = +9\text{V}$, $R_k = 680\Omega$				
Negative grid current	—	< 0.1	< 1.0	μA
$V_{a(b)} = 100\text{V}$, $V_{g(b)} = +9\text{V}$, $R_k = 680\Omega$, $R_{g-k} = 1\text{M}\Omega$				
Insulation resistance between any two electrodes $V_{d.c.} = 200\text{V}$	—	> 100	> 20	M Ω
Heater-cathode insulation (I_{h-k})	—	< 6.0	< 12	μA
V_{h-k} (k positive = 120V) (k negative = 60V)				
Heater current	335	318 to 352	318 to 352	mA
$V_h = 6.3\text{V}$				

*To allow for valve deterioration during life, circuits should be designed to function with a valve in which one or more of the characteristics have changed to the values stated.

SHOCK AND VIBRATION

The E188CC can withstand vibrations of 2.5g and 50c/s for 96 hours and is proof against impact accelerations of approximately 500g.

ABSOLUTE MAXIMUM RATINGS⁴ (each section)

$V_{a(b)}$ max.	550	V
V_a max.	250	V
p_a max.	1.65	W
$p_{a'}$ max. ($p_{a'} + p_{a''} \leq 2.2W$)	2.0	W
$p_{a''} + p_{a''}$ max.	3.3	W
p_g max.	30	mW
$-V_g$ max.	110	V
$*-V_{g(pk)}$ max.	200	V
I_k max.	22	mA
$i_{k(pk)}$ max.	110	mA
V_{h-k} max. (k positive)	150	V
V_{h-k} max. (k negative)	100	V
R_{k-k} max.	500	k Ω
T_{bulb} max.	165	$^{\circ}C$
V_h max.	6.6	V
V_h min.	6.0	V

*Maximum duty factor 0.1, maximum pulse duration = 200 μ s.

OPERATING NOTES**1. Hum**

The hum voltage referred to g has a maximum value of 50 μ V and is measured with the centre tap of the heater earthed, at a supply frequency of 50c/s (including 3% at 500c/s), with a fully screened valve holder and a straight response curve filter under the following conditions:

V_b	90	V
I_a	15	mA
R_k	80	Ω
C_k	1000	μ F
R_{g-k}	500	k Ω

2. Microphony

The microphonic noise voltage measured at the anode has a maximum value of 100mV over the frequency range 10 to 50c/s under the following conditions:

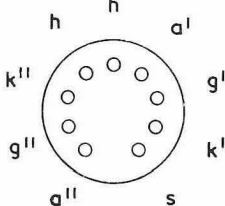
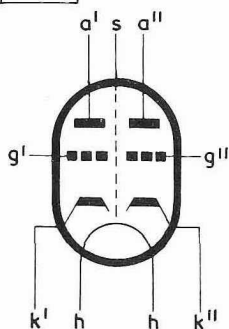
V_h	6.3	V
V_b	100	V
$V_{g(b)}$	+9.0	V
R_a	2.0	k Ω
R_k	680	Ω
C_k	1000	μ F
Peak acceleration	2.5	g

EI88CC SPECIAL QUALITY DOUBLE TRIODE

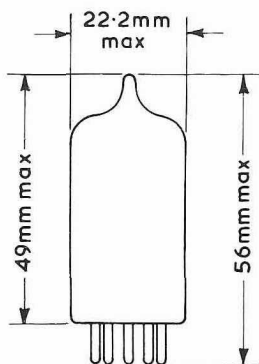
The microphonic noise voltage measured at the anode has a maximum value of 140mV over the frequency range 50 to 5000c/s under the following conditions:

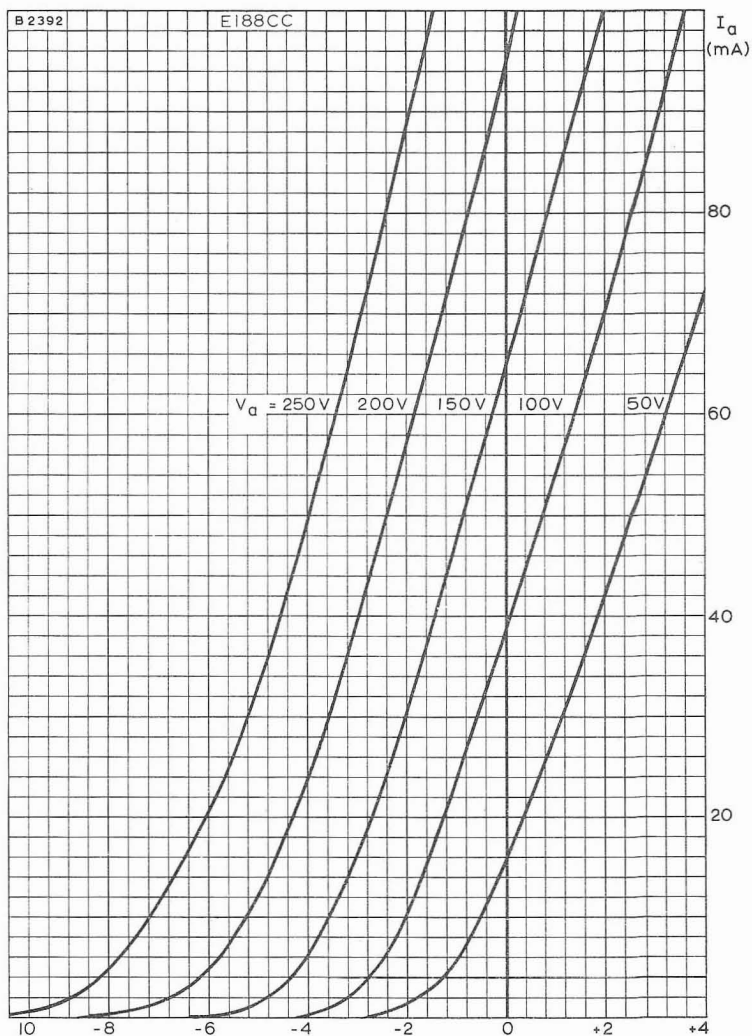
V_h	6.3	V
V_b	270	V
R_a	18	k Ω
R_{g-k}	1.0	M Ω
R_k	180	Ω
C_k	50	μ F
Peak acceleration	0.5	g

B560



B9A Base

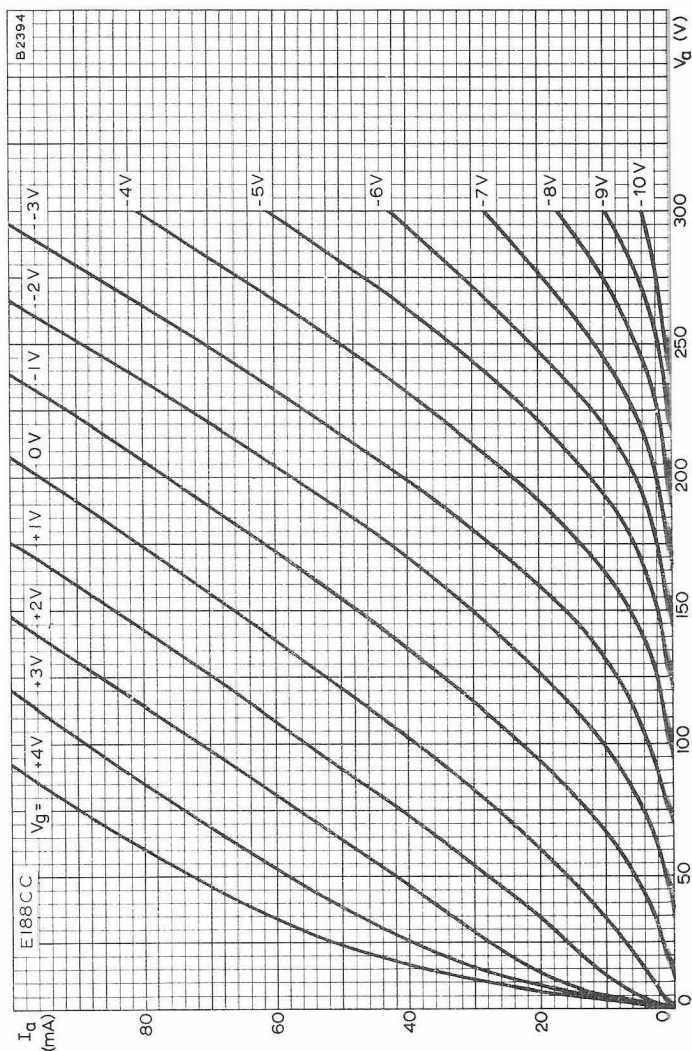




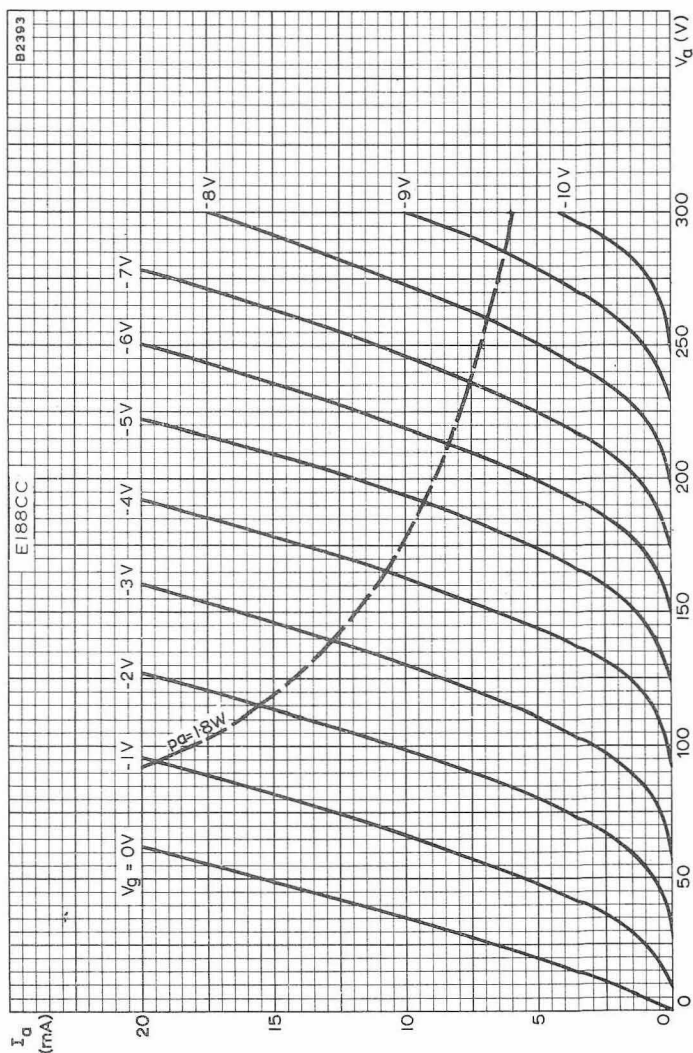
ANODE CURRENT PLOTTED AGAINST GRID VOLTAGE WITH ANODE VOLTAGE AS PARAMETER

EI88CC

SPECIAL QUALITY DOUBLE TRIODE



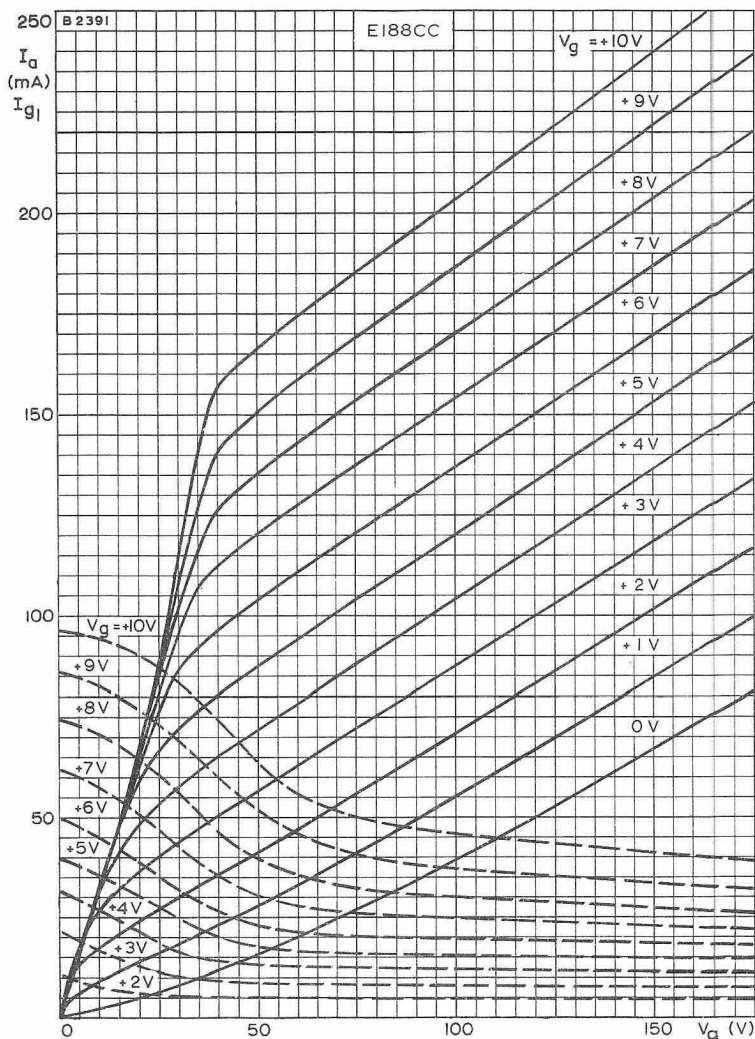
ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH GRID VOLTAGE AS PARAMETER



ANODE CURRENT PLOTTED AGAINST ANODE VOLTAGE WITH GRID VOLTAGE AS PARAMETER IN THE REGION OF THE ORIGIN.

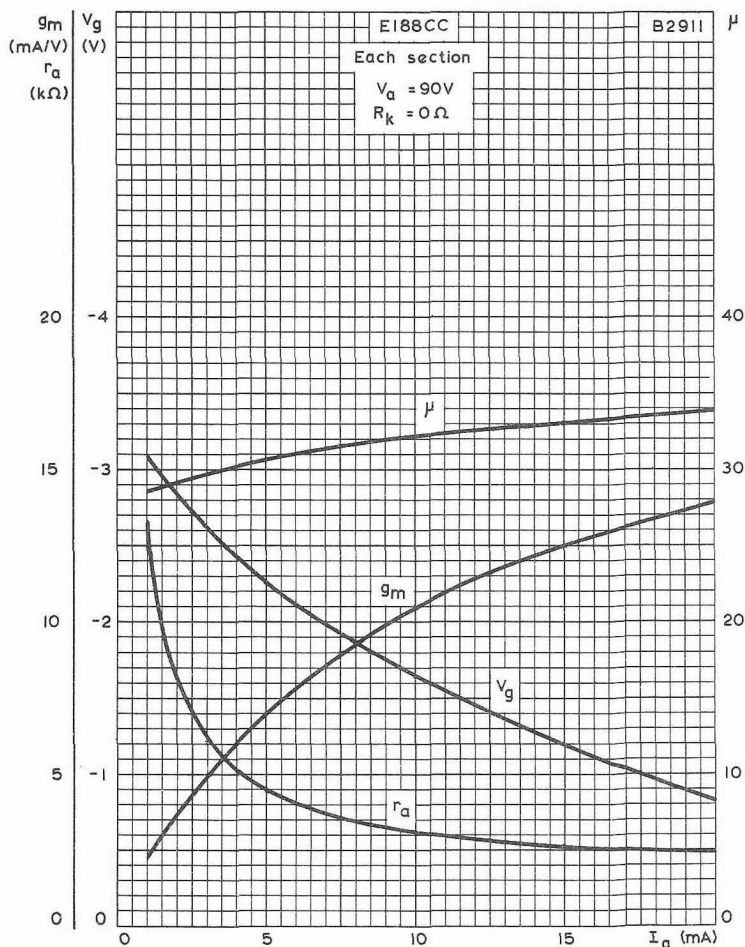
E188CC

SPECIAL QUALITY DOUBLE TRIODE



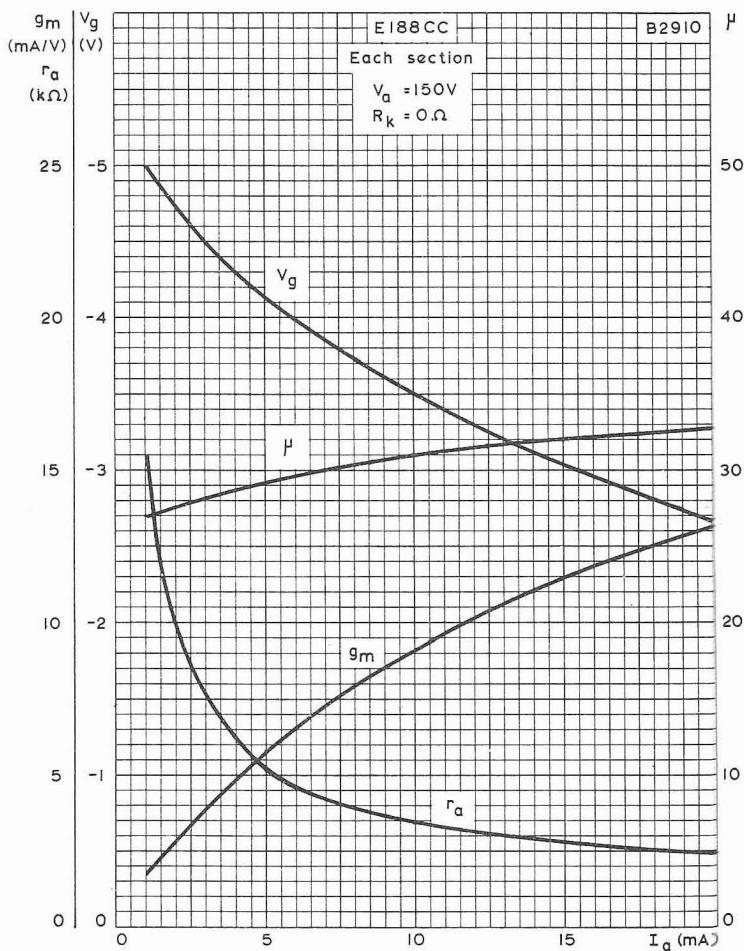
ANODE AND GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE
WITH POSITIVE GRID VOLTAGE AS PARAMETER

SPECIAL QUALITY DOUBLE TRIODE **EI88CC**



AMPLIFICATION FACTOR, MUTUAL CONDUCTANCE AND GRID VOLTAGE
PLOTTED AGAINST ANODE CURRENT. $V_a = 90V$

EI88CC SPECIAL QUALITY DOUBLE TRIODE



AMPLIFICATION FACTOR, MUTUAL CONDUCTANCE AND GRID VOLTAGE
PLOTTED AGAINST ANODE CURRENT. $V_a = 150V$