U.H.F. BEAM POWER TETRODE

YL1110

TENTATIVE DATA

QUICK REFERENCE DATA

Forced-air cooled coaxial beam power tetrode. Intended for use as an u.h.f. amplifier or oscillator in common grid circuit.

	Class 'A' Amplifier for T.V. Translator Service	Class 'C' Telegraphy or F.M. Telephony		Class 'B' Linear Amplifier S.S.B.	
f	-	790	470	30	Mc/s
P_{out}	**55	590+30	765+25	*1000	W
f max.	1215	1215		1215	Mc/s
V_a max.	2.5	2.5		2.5	kV
p_a max.	600	700		600	W

*P.E.P_{out}

**P_{load}

To be read in conjunction with
GENERAL OPERATIONAL RECOMMENDATIONS - TRANSMITTING VALVES

CLASS 'B' LINEAR AMPLIFIER FOR SINGLE SIDEBAND OPERATION

Maximum operating conditions

f	30	Mc/s
P.E.P_{out}	1000	W
P.E.P_{load}	930	W
***d_3	27	dB
***d_5	30	dB
V_a	2.5	kV
V_{g2}	450	V
****$-V_{g1}$	43	V
$I_{a(o)}$	160	mA
$I_{g2(o)}$	0	mA

	Single tone	Double tone	
I_a	500	350	mA
I_{g2}	22.5	3.0	mA
I_{g1}	0.3	0	mA
$v_{in(pk)}$	42	42	V
$P_{load(driver)}$	2.0	2.0	W
p_a	250	375	W
η_a	80	57	%

***Maximum values encountered at any level of drive voltage referred to the amplitude of either of the two tones at that level. Third and fifth order intermodulation products.

****Adjust to give the stated values of $I_{a(o)}$.

CLASS 'C' TELEGRAPHY OR F.M. TELEPHONY

Maximum operating conditions (cathode drive)

f	790	470	Mc/s
†P_{out}	590 + 30	765 + 25	W
P_{load}	590	730	W
η_a	47	61	%
V_a	2.5	2.5	kV
I_a	500	500	mA
V_{g2}	400	400	V
I_{g2}	7.0	8.0	mA
$-V_{g1}$	45	35	V
I_{g1}	10	12	mA
$P_{load(driver)}$	60	35	W
p_a	660	485	W

†Includes power transferred from driver stage.

CLASS 'A' LINEAR AMPLIFIER FOR T.V. TRANSLATOR SERVICE SOUND + VISION

Maximum operating conditions

Bandwidth	6.5	Mc/s
P_{load}	55	W
V_a	2.5	kV
V_{g2}	1.2	kV
$-V_{g1}$	30	V
I_a	400	mA
I_{g2}	-10	mA
$P_{load(driver)}$	5.0	W

CLASS 'C' TELEPHONY ANODE AND SCREEN GRID MODULATION

Maximum operating conditions (cathode drive)

f	400	Mc/s
†P_{out}	670 + 25	W
P_{load}	600	W
η_a	67	%
V_a	2.0	kV
I_a	500	mA
V_{g2}	400	V
I_{g2}	8.0	mA
$-V_{g1}$	35	V
I_{g1}	12	mA
$P_{load(driver)}$	35	W
p_a	330	W
p_{g2}	3.2	W
For 100% modulation		
P_{mod}	500	W

†Includes power transferred from driver stage.

ABSOLUTE MAXIMUM RATINGS

	Class 'C' Telephony	Class 'C' Telegraphy	Class 'A' T.V.	Class 'B' S.S.B.	
V_a max.	2.0	2.5	2.5	2.5	kV
V_{g2} max.	1.2	1.2	1.2	1.2	kV
$-V_{g1}$ max.	250	250	250	250	V
I_k max.	600	600	600	600	mA
p_a max.	400	700	600	600	W
p_{g2} max.	17	25	25	25	W
I_{g1} max.	100	100	100	100	mA
R_{g1-k} max.	15	15	15	15	kΩ

CATHODE

Indirectly heated, oxide coated

V_h	6.3	V
I_h	7.9	A
t_{h-k} min.	120	s

CAPACITANCES

c_{k-all}	30	pF
c_{a-k}	0.01	pF
c_{a-all}	5.3	pF

CHARACTERISTICS

μ_{g1-g2} (measured at $V_a = V_{g2} = 225V$, $I_a = 100mA$)	13	
g_m (measured at $V_a = 2.5kV$, $V_{g2} = 400V$, $I_a = 240mA$)	22	mA/V

MOUNTING POSITION Any

COOLING

Forced-air

Maximum temperature

Anode and all seals	250	°C

Forced-air cooling will be required for the radiator and ceramic to metal seals.

The amount of forced-air cooling of the anode at an air inlet temperature of 25°C is given in the table below:-

Anode dissipation p_a(W)	Minimum air flow q min. (m^3/min. ft^3/min.)	Pressure p_{in} (mm water)
100	0.06, 2.12	2.0
300	0.12, 4.24	4.0
600	0.32, 11.30	17
700	0.46, 16.25	25

PHYSICAL DATA

	oz	g
Weight of valve only	12	340

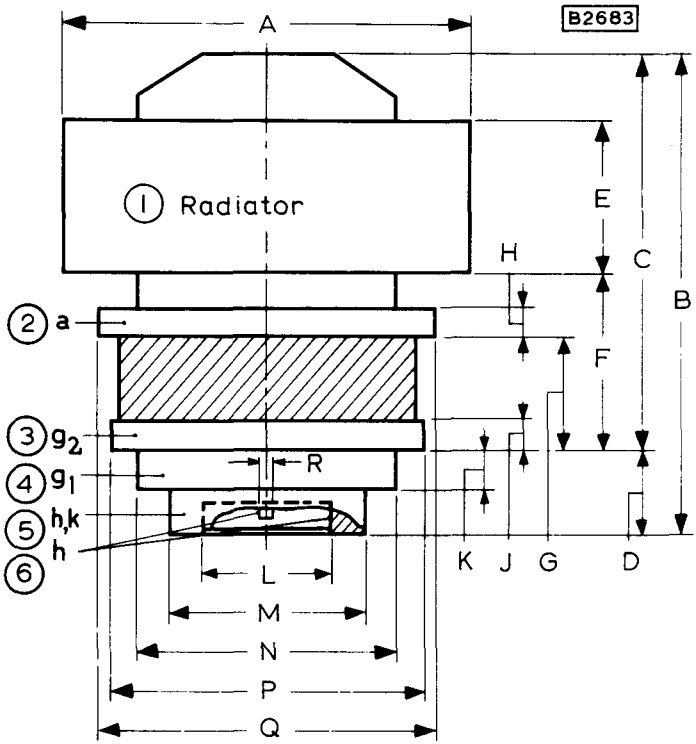
DIMENSIONS

	Inches	Millimetres	
A	2.059±0.031	52.3±0.8	
B	2.400	60.95	max.
C	1.941±0.039	49.3±1.0	
D	0.402±0.020	10.2±0.5	
E	0.756±0.020	19.2±0.5	
F	0.894±0.035	22.7±0.9	
G	0.575±0.020	14.6±0.5	
H	0.146	3.7	min.
J	0.150	3.8	min.
K	0.201±0.020	5.1±0.5	
L	0.669	17	max.
M	0.992	25.2	min.
N	1.291	32.8	min.
P	1.591	40.4	min.
Q	1.744	44.3	min.
R	0.063	1.6	max.

Inch dimensions derived from original millimetre dimensions.

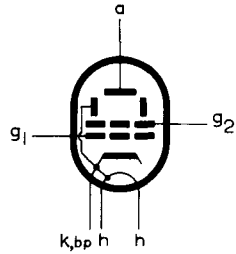
U.H.F. BEAM POWER TETRODE

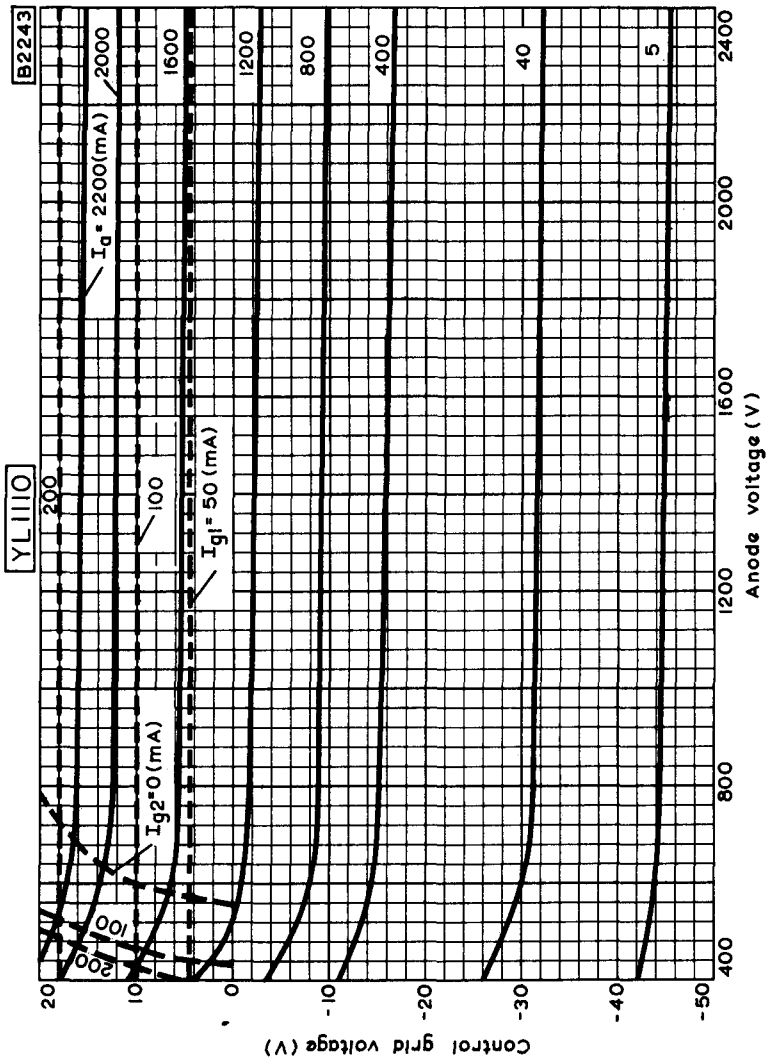
YL1110



The radiator and connections lie inside or outside concentric circles with the following diameters

1.	2.108 in	53.54 mm	inside
2.	1.799 in	45.69 mm	inside
3.	1.609 in	40.87 mm	inside
4.	1.319 in	33.50 mm	inside
5.	1.019 in	25.88 mm	inside
6.	0.619 in	15.72 mm	outside
	0.099 in	2.51 mm	inside





CONSTANT CURRENT CHARACTERISTICS

U.H.F. BEAM POWER TETRODE

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TENTATIVE DATA

QUICK REFERENCE DATA

Forced-air cooled coaxial beam power tetrode intended for use as u.h.f. amplifier or oscillator at frequencies up to 1215Mc/s.

	Amplifier for TV Translator Service, Class 'A'	Telegraphy or F.M. Telephony, Class 'C'		Linear Amplifier S.S.B. Class 'B'	
f	-	790	470	30	Mc/s
P_{out}	**55	590 + 30	765 + 25	*680	W
f max.	1215	1215		1215	Mc/s
V_a max.	2.5	2.5		2.5	kV
p_a max.	600	700		600	W

*P.E.P_{out} **P_{load}

To be read in conjunction with
GENERAL OPERATIONAL RECOMMENDATIONS - TRANSMITTING VALVES

LINEAR AMPLIFIER FOR SINGLE SIDEBAND OPERATION, CLASS 'B'

OPERATING CONDITIONS ←

f	30		Mc/s
$P.E.P_{out}$	680		W
$P.E.P_{load}$	610		W
$*d_3$	-31		dB
$*d_5$	-36		dB
V_a	2.5		kV
V_{g2}	450		V
$**-V_{g1}$	37		V
$I_{a(o)}$	160		mA
$I_{g2(o)}$	0		mA
	Single Tone	Double Tone	
I_a	500	350	mA
I_{g2}	22.5	2.5	mA
I_{g1}	0	0	mA
$v_{in(pk)}$	36	36	V
$P_{load(driver)}$	1.0	1.0	W
p_a	530	535	W
η_a	54	39	%

*Maximum values encountered at any level of drive voltage referred to the amplitude of either of the two tones at that level. Third and fifth order intermodulation products.

**Adjust to give the stated values of $I_{a(o)}$.

TELEGRAPHY OR F.M. TELEPHONY, CLASS 'C'

OPERATING CONDITIONS for valve in common grid circuit.

f	790	470	Mc/s
†P_{out}	590 + 30	765 + 25	W
P_{load}	590	730	W
η_a	47	61	%
V_{a-g1}	2.5	2.5	kV
I_a	500	500	mA
V_{g2-g1}	400	400	V
I_{g2}	7.0	8.0	mA
V_{k-g1}	45	35	V
I_{g1}	10	12	mA
$P_{load(driver)}$	60	35	W
p_a	660	485	W

†Includes power transferred from driver stage.

LINEAR AMPLIFIER FOR TELEVISION TRANSLATOR SERVICE, CLASS 'A'

Sound and vision.

OPERATING CONDITIONS

Bandwidth (-1dB)	>6.5	Mc/s
P_{load}	55	W
*Intermodulation products	-51	dB
V_a	1.4	kV
V_{g2}	0.4	kV
$-V_{g1}$	30	V
I_a	400	mA
I_{g2}	-10	mA
$P_{load(driver)}$	5.0	W

*The intermodulation product in the passband of the output signal is measured with reference to peak envelope output.

TELEPHONY, ANODE AND SCREEN GRID MODULATION, CLASS 'C'

OPERATING CONDITIONS (cathode drive) ←

f	400	Mc/s
†P_{out}	640	W
P_{load}	600	W
η_a	64	%
V_a	2.0	kV
I_a	500	mA
V_{g2}	400	V
I_{g2}	8.0	mA
$-V_{g1}$	35	V
I_{g1}	12	mA
$P_{load(driver)}$	35	W
p_a	360	W
p_{g2}	3.2	W
For 100% modulation		
P_{mod}	502	W

†Includes power transferred from driver stage.

RATINGS (ABSOLUTE MAXIMUM SYSTEM)

	Telephony Class 'C'	Telegraphy Class 'C'	TV Class 'A'	S.S.B. Class 'B'	
V_a max.	2.0	2.5	2.5	2.5	kV
V_{g2} max.	1.2	1.2	1.2	1.2	kV
$-V_{g1}$ max.	250	250	250	250	V
I_a max.	500	500	500	500	mA
p_a max.	400	700	600	600	W
p_{g2} max.	17	25	25	25	W
I_{g1} max.	100	100	100	100	mA
R_{g1-k} max.	15	15	15	15	kΩ

CATHODE ←

Indirectly heated, oxide coated, matrix type.

V_h	6.3	V
I_h	7.85	A
t_{h-k} min.	120	s

The heater has been designed to accept temporary fluctuations of supply voltage of ±10%.

The heater voltage must be reduced depending on operating conditions and frequency.

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CAPACITANCES

c_{a-g1}	<0.11	pF
c_{g1-k+h}	29	pF
c_{a-k+h}	<0.011	pF
c_{g1-g2}	37	pF
c_{g2-k+h}	<1.1	pF

CHARACTERISTICS

μ_{g1-g2} (measured at $V_a = V_{g2} = 225V$, $I_a = 100mA$)	13	
g_m (measured at $V_a = 2.5kV$, $V_{g2} = 400V$, $I_a = 240mA$)	22	mA/V

MOUNTING POSITION

Any

COOLING

Forced-air cooling will be required for the radiator and ceramic to metal seals.

Maximum temperature of anode and all seals 250 °C

The amount of forced-air cooling of the anode at an air inlet temperature of 25°C is given in the table below:-

Anode dissipation (W)	Minimum rate of air flow (m^3/min)	(ft^3/min)	Pressure (mm water)
100	0.06	2.12	2.0
300	0.12	4.24	4.0
600	0.32	11.30	17
700	0.46	16.25	25

A low velocity air flow is required for all other electrodes and seals.

PHYSICAL DATA

	oz	g
Weight of valve only	12	340

DIMENSIONS

	Inches	Millimetres	
A	$2.059\ ^{+0.031}_{-0.027}$	$52.3\ ^{+0.8}_{-0.7}$	
B	2.399	60.95	max.
C	1.941 ± 0.039	49.3 ± 1.0	
D	0.402 ± 0.020	10.2 ± 0.5	
E	0.756 ± 0.020	19.2 ± 0.5	
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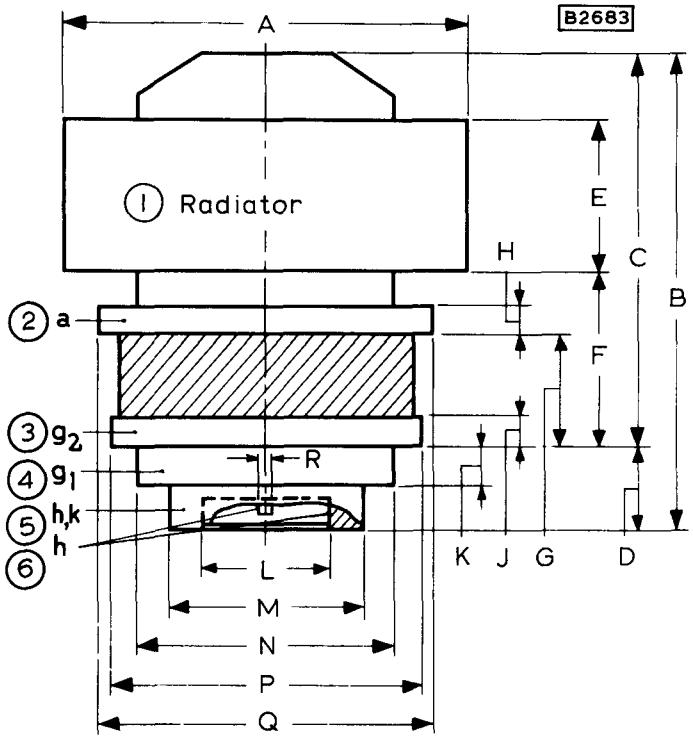

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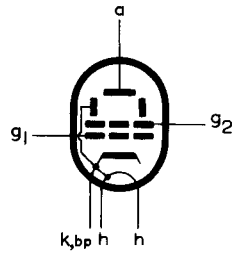

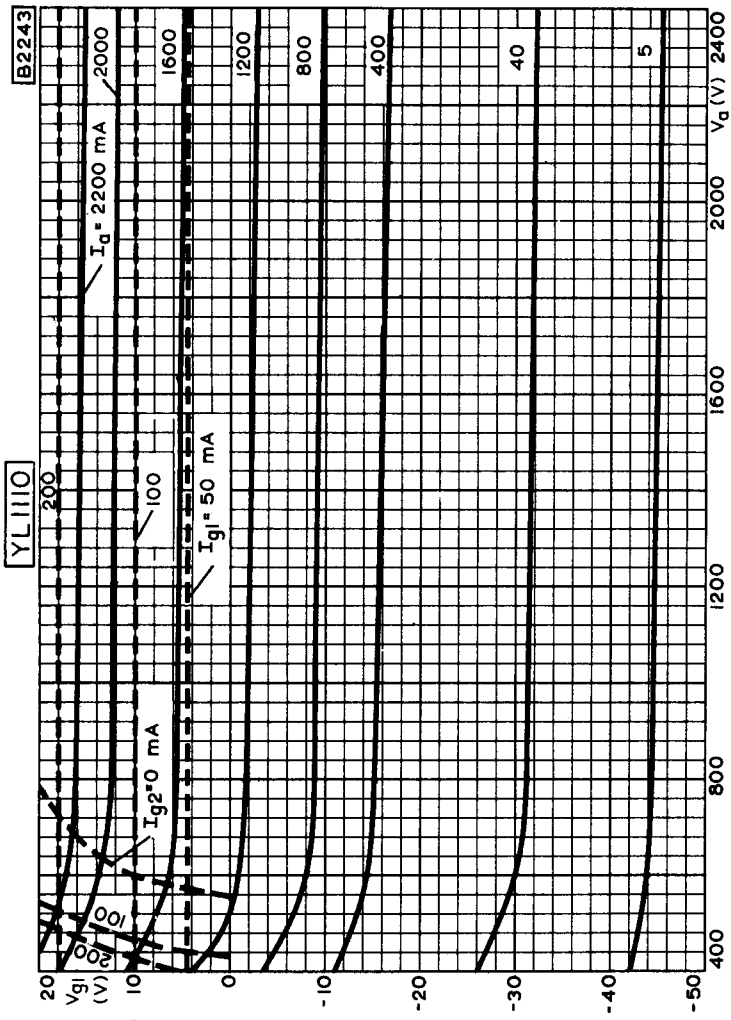

CONSTANT CURRENT CHARACTERISTICS