MINISTRY OF AIRCRAFT PRODUCTION (DCD)

VALVE ELECTRONIC **CV1104** (VT104)

Specification MAP/CV1104/Issue 4 Dated 8.1.46. To be read in conjunction with K1001.	SECURITY	
	Specification	Valve
	RESTRICTED	RESTRICTED

→ Indicates a change

TYPE OF VALVE - Pentode
CATHODE - Directly heated oxide coated.
ENVELOPE - Glass - unmetallised
PROTOTYPE - PT15

MARKING

See K1001/4 ←

RATING		Note
Filament Voltage (V)	6.0	A
Filament Current (A)	1.3	
Max. Anode Voltage (V)	1250	
Max. Screen Voltage (V)	300	
Max. Anode Dissipation (W)	30	
Mutual Conductance (mA/V)	3.1	B
CAPACITANCES (pF)		
Cae	14.0	
Cge	21.7	
Cag (max.)	0.11	

BASE - (See Note C)
B.5. (ceramic)

Pin	Electrode
1	Screen grid
2	Control grid
3	Filament
4	Filament
5	Suppressor grid
T.C.	Anode

PLUG TOP CAP
See K1001/AI/D5.1

DIMENSIONS
See K1001/AI/D1

Dimension		Min.	Max.
A	(mm)	180	187
B	(mm)	50	53

NOTES

A:- Valve shall be capable of satisfactory operation over a filament voltage range of 5.9V. to 7.8V.

B:- At Va = 1000, Vg2 = 300, Ia = 40mA.

C:- Any insulating sleeving used for base connections shall be glass tubing.

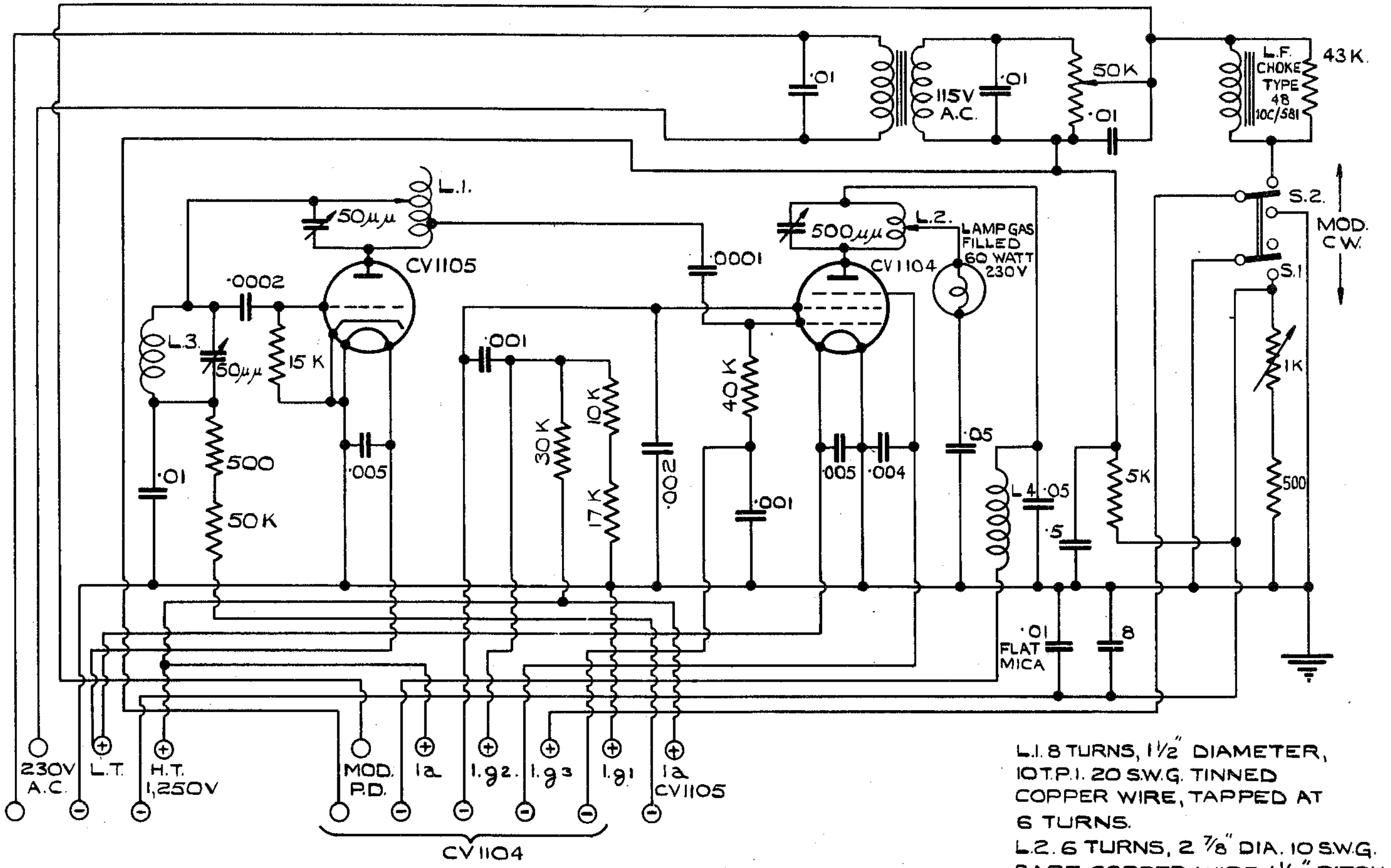
To be performed in addition to those applicable in K1001

	Test Conditions						Test	Limits Min.	Limits Max.	No. Tested	Note
a	See K1001/AIII						CAPACITANCES (pF)				
	Links to H.P.		Links to L.P.		Links to E.						
	T.C.1.		1,3,4,5,		2,6,7,8,9, 10,T.C.2.		1. Cae	12.3	16.7	6 per week	1
	2		1,3,4,5,		6,7,8,9,10, T.C.1,T.C.2.		2. Cge	18.5	25.0		
	T.C.1.		2		1,3,4,5,6, 7,8,9,10, T.C.2.		3. Cag	-	0.11	T.A.	
	Vf	Va	Vg2	Vg1	Vg3	Ia(mA)					
b	6.0	0	0	0	0	-	If (A)	1.17	1.43	100% or S	
c	6.0	1000	300	-	0	40	Vg1 (V)	-18.0	-35.0	100%	
d	6.0	1000	300	-	0	40	Ig2 (mA)	-	6.5	100%	
e	6.0	1000	300	-	0	40	gm (mA/V)	2.5	3.7	100%	
	Peak grid swing ±1.0V.max.										
f	6.0	1000	300	-	0	1.0	Vg1 (V)	-	-60	100%	
g	6.0	1000	300	-	0	40	Reverse Ig1 (/uA)	-	10.0	100%	
h	Valve shall be tested in a chassis with a circuit as shown on page 3. The test chassis used shall be of an approved construction and calibrated against a reference chassis held at the Royal Aircraft Establishment, Farnborough. The test shall be made under the following conditions:- Vf = 5.9V. H.T.feed to CV1104 not greater than 60mA. Drive such that the grid current of the CV1104 does not exceed 3mA.						OPERATIONAL TEST Output Power (W)	36	-	100%	
j	Conditions as in test clause (h) except that the input H.T. voltage is increased to 1500V., and the value of the screen resistance is increased to give Ia = 50 mA. max. Ig2 = 22 mA. max.						OVER VOLTAGE TEST There shall be no sparking between electrodes or other signs of breakdown over a period of 2 mins.			5% (5)	2
k	At the conclusion of test (j) a voltage of -50V.D.C. plus 70V. RMS at a frequency of 50 cps shall be applied to G3						SUPPRESSOR CONTROL TEST Change in Ia (mA)	12	-	100%	

NOTES

1:- Capacitances shall be measured with valve screened by a cylinder 65mms. high and 55mms. dia.

2:- Alternatively the test may be carried out on 100% of the valves, when the test period may be reduced to 30 secs.



L.1. 8 TURNS, 1½" DIAMETER, 10 T.P.I. 20 S.W.G. TINNED COPPER WIRE, TAPPED AT 6 TURNS.
L.2. 6 TURNS, 2 ⅞" DIA. 10 S.W.G. BARE COPPER WIRE, 1½" PITCH.
L.3. & L.4. 1" DIA, 1½" LENGTH, 36 S.W.G D.S.C.

TEST CIRCUIT.

CV 1104

VT.104.
DATA SHEET.

TRANSMITTING PENTODE

(Carbonised Nickel Anode)

Type PT15 is a Radio Frequency Transmitting Pentode fitted with an oxide coated dull emitter filament. It has a maximum permissible anode dissipation of 30 watts.

It is suitable for use as an oscillator, amplifier or frequency multiplier. It is also suitable for suppressor modulation.

The anode is brought out separately through the top of the bulb to ensure low inter-electrode capacities, so that neutralising is not normally necessary. It is advisable however to shield the anode from the grid circuit.

The figures quoted for maximum permissible ratings apply to operation at wavelengths down to 20 metres. At lower wavelengths the anode voltage must be reduced and curves are given showing the maximum permissible anode voltage against wavelength.

As the efficiency falls with decrease of wavelength the input must be reduced in order to avoid exceeding the permissible anode dissipation.

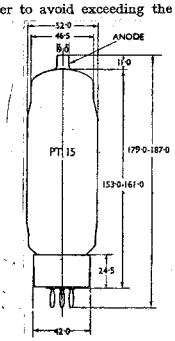
CHARACTERISTICS.

Filament Voltage	6·0 volts
Filament Current	1·3 amps.
Mutual Conductance at Ea—1000, Es—300, Wa—30w.	2·8 mA/volt
Mutual Conductance at ½ Peak Space Current*	7·0 mA/volt
Peak Space Current*	0·7 amp.

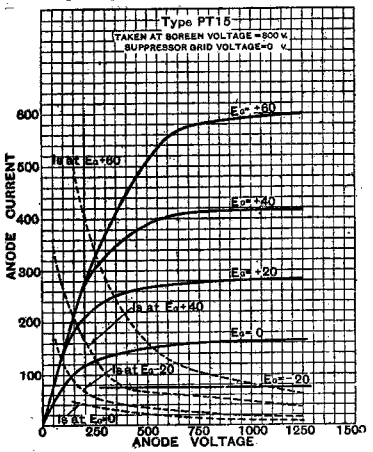
* No attempt must be made to measure this figure statically.

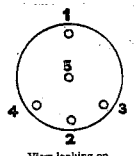
Interelectrode Capacities.

Grid-Anode	0·05 mmfd. (shielded)
Input Capacity, Grid-All other Electrodes	21·5 mmfd.
Output Capacity, Anode-All other Electrodes	14·25 mmfd.



All dimensions are in m/m and are max. except where otherwise stated.



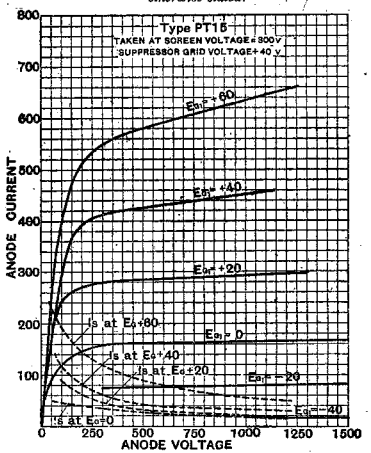


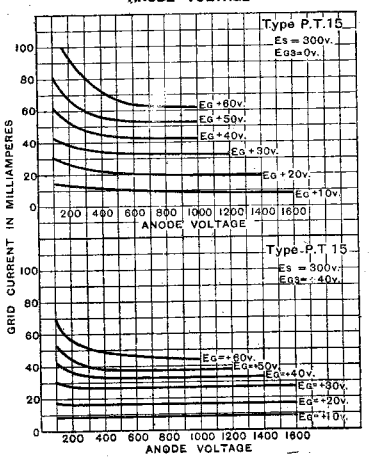
View looking on underside of base.

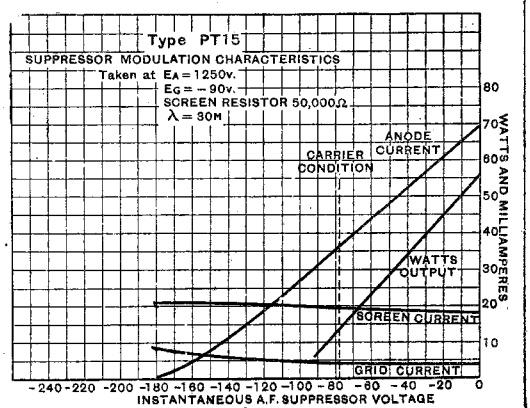
BASE 5-PIN.

1 : Grid No. 2
2 : Grid No. 1
3 : Filament
4 : Filament
5 : Grid No. 3

Top Cap : Anode







Source of information: Osram Catalogue.

VT104/a/i.

VT104.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

1. H.F. Power Amplifier and Oscillator. Class C Telegraphy.
(Unmodulated. Key down conditions. One valve.)

Maximum Permissible Ratings.

D.C. Anode Voltage	1,250 volts
D.C. Anode Current	100 mA
Input	(Eg$_2$ + 40v. 115 watts. (Eg$_2$ 0v. 90 watts.
D.C. Grid Current	10 mA
D.C. Screen Voltage	300 volts
Screen Dissipation	10 watts
Anode Dissipation	30 watts

Typical Operation.

D.C. Anode Voltage	1,250	1,000	750	1,250	1,000 volts
D.C. Anode Current	90	100	95	70	70 mA
D.C. Screen Voltage	290	290	290	290	290 volts
D.C. Screen Current	25	30	30	18	25 mA
Screen Dissipation	7·3	8·7	8·7	5·2	7·3 watts
D.C. Suppressor Voltage	+40	+40	+40	0	0 volts
D.C. Grid Voltage	−90	−90	−90	−90	−90 volts
‡D.C. Grid Current	7·0	7·5	7·0	4·6	5·0 mA
Grid Leak Resistance	12,500	12,500	12,500	20,000	20,000 ohms
H.F. Drive Peak Voltage	140	150	148	129	132 volts
‡Driving Power	1·0	1·2	1·1	0·6	0·65 watts
Anode Load Impedance	6,600	4,500	3,600	7,600	5,800 ohms
Anode Dissipation	30	30	21·4	29·5	28 watts
Output	82·5	70	50	58	42 watts

2. Class C., H.F. Power Amplifier—Grid Modulated.
(Carrier conditions (one valve). Permissible modulation 100%).

Maximum Permissible Ratings.

D.C. Anode Voltage	1,250 volts
D.C. Anode Current	60 mA
Input	(Eg$_2$ + 40v. 48 watts. (Eg$_2$ 0v. 45 watts.
D.C. Grid Current	10 mA
D.C. Screen Voltage	300 volts
Screen Dissipation	10 watts
Anode Dissipation	30 watts

Typical Operation.

D.C. Anode Voltage	1,250	1,000	1,250	1,000 volts
D.C. Anode Current	37	46	36	36 mA
D.C. Screen Voltage	300	300	300	300 volts
D.C. Screen Current	5·5	6·0	5·0	5·0 mA
Screen Dissipation	1·7	1·8	1·5	1·5 watts
D.C. Suppressor Voltage	+40	+40	0	0 volts
D.C. Grid Voltage	−62	−63	−65	−65 volts
‡D.C. Grid Current	0·25	0·75	0	0 mA
H.F. Drive Peak Voltage	66	73	65	65 volts
‡*Driving Power	0·4	0·4	0·4	0·4 watts
†Peak Modulating Voltage	25	26	28	28 volts
†Audio Modulation Power	0·06	0·08	0·08	0·08 watts
Impedance into which Modulator stage must be designed to work	5,600	4,400	5,400	5,400 ohms
Anode Load Impedance	8,300	5,200	8,000	5,900 ohms
Anode Dissipation	29·8	30	30	25 watts
Output	16·5	16	15	11 watts

3. Class C., H.F. Power Amplifier—Anode modulated.
(Carrier conditions (one valve). Permissible modulation 100%).

Maximum Permissible Ratings.

D.C. Anode Voltage	1,000 volts
D.C. Anode Current	80 mA
Input	(Eg$_2$ + 40v. 80 watts. (Eg$_2$ 0v. 60 watts.
D.C. Grid Current	10 mA
D.C. Screen Voltage	300 volts
Screen Dissipation	7·5 watts.
Anode Dissipation	20 watts

Typical Operation.

D.C. Anode Voltage	1,000	750	1,000	750 volts
D.C. Anode Current	80	80	60	60 mA
D.C. Screen Voltage	300	300	300	270 volts
Screen Dropping Resistance	30,000	20,000	30,000	20,000 ohms
D.C. Screen Current	23	22·5	23	24 mA
Screen Dissipation	6·9	6·75	6·9	6·5 watts
D.C. Suppressor Voltage	+40	+40	0	0 volts
D.C. Grid Voltage	−70	−70	−70	−70 volts
‡D.C. Grid Current	6·0	6·0	4·5	5·0 mA
H.F. Drive Peak Voltage	115	120	108	110 volts
‡Driving Power	0·7	0·75	0·5	0·6 watts
†Audio Modulation Power	40	30	30	22·5 watts
Impedance into which modulator stage must be designed to work	9,900	7,300	12,000	9,000 ohms
Anode Load Impedance	6,300	4,700	7,600	5,600 ohms
Anode Dissipation	20	15	19	15 watts
Output	60	45	41	30 watts

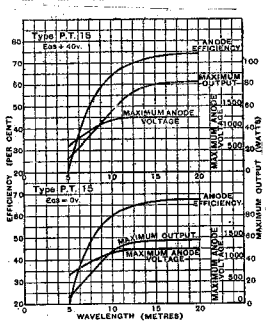
4. H.F. Power Amplifier—Suppressor modulated.
(Carrier conditions (one valve). Permissible modulation 100%).

Maximum Permissible Ratings.

D.C. Anode Voltage	1,250 volts
D.C. Anode Current	50 mA
Input	45 watts
D.C. Grid Current	10 mA
D.C. Screen Voltage	300 volts
Screen Dissipation	10 watts
Anode Dissipation	30 watts

Typical Operation.

D.C. Anode Voltage	1,250 volts
D.C. Anode Current	35 mA
D.C. Screen Voltage	275 volts
Screen Dropping Resistance	50,000 ohms
D.C. Screen Current	19·5 mA
Screen Dissipation	5·4 watts
D.C. Suppressor Voltage	−78 volts
D.C. Grid Voltage	−90 volts
‡D.C. Grid Current	4·5 mA
Grid Leak Resistance	20,000 ohms
H.F. Drive Peak Voltage	135 volts
‡Driving Power	0·7 watts
†Peak Modulating Voltage	78 volts
†Audio Modulation Power	Negligible
Anode Load Impedance	7,600 ohms
Anode Dissipation	30 watts
Output	14 watts



CHARACTERISTIC CURVE OF AVERAGE VALVE

H.F. Power Amplifier—Class B Telephony.
(Carrier conditions (one valve). Permissible modulation 100%).

Maximum Permissible Ratings.

D.C. Anode Voltage	1,250 volts
D.C. Anode Current	60 mA
Input	45 watts at (Eg$_2$ + 40v. (Eg$_2$ = 0v.
D.C. Screen Voltage	300 volts
Screen Dissipation	10 watts
Anode Dissipation	30 watts

Typical Operation.

D.C. Anode Voltage	1,250	1,000	750	1,250	1,000 volts
D.C. Anode Current	35	45	56	35	42 mA
D.C. Screen Voltage	300	300	300	300	300 volts
D.C. Screen Current	3	6	7	3	6 mA
Screen Dissipation	0·9	1·8	2·1	0·9	1·8 watts
D.C. Suppressor Voltage	+40	+40	+40	0	0 volts
D.C. Grid Voltage	−35	−35	−33	−35	−35 bolts
‡D.C. Grid Current	0	0	0·25	0	0 mA
H.F. Drive Peak Voltage	27	28	35	27	29 volts
‡*Driving Power	0·2	0·25	0·5	0·2	0·3 watts
Anode Load Impedance	9,800	6,000	3,600	9,200	5,500 ohms
Anode Dissipation	29	30	28	30	30 watts
Output	15	15	14	14	12 watts

‡ *Subject to wide variation. The figures given are approximate only.*
* *At crest of audio cycle with* 100% *modulation.*
† 100% *modulation.*