



OUTPUT PENTODE

An indirectly heated output pentode. It is suitable for use in Television Receivers as a Frame Time Base Output Valve, or an Audio Output Valve. Designed for use in series heater chains.

PHYSICAL DETAILS.

Base	...	...	B9A—Noval.
Max. Overall Length	...	...	78.5 mm. ($3\frac{1}{8}$ in.).
Max. Seated Height	...	...	71.5 mm. (3 in.).
Max. Diameter	...	...	22.2 mm. ($\frac{7}{8}$ in.).
Mounting Position	...	...	Any.

BASE CONNECTIONS.

Pin 1—Internal Connection.	Pin 5—Heater.
Pin 2—Control Grid.	Pin 6—Internal Connection.
Pin 3—Cathode.	Pin 7—Anode.
Pin 4—Heater.	Pin 8—Internal Connection.
	Pin 9—Screen Grid.

HEATER.

Heater Current	...	...	0.3 Amp.
Heater Voltage	...	...	15 volts.

RATINGS.

Max. D.C. Supply Voltage	...	550 volts.
Max. Anode Voltage	...	250 volts.
*Max. Positive Peak Anode Voltage	...	2 kV.
Max. Neg. Peak Anode Voltage	...	-500 volts.
Max. Anode Dissipation	...	12 watts.
Max. Screen Voltage	...	200 volts.
Max. Screen Dissipation	...	1.75 watts.
Max. Cathode Current	...	100 mA.
Max. V_{h-k}	...	200 volts.
Max. R_{h-k}	...	20 k Ω
§Max. R_{g1-k} (cathode bias)	...	1 M Ω

CHARACTERISTICS.

Anode Voltage	...	170	200	volts.
Screen Voltage	...	170	200	volts.
Control Grid Voltage	...	-12.5	-17.3	volts.
Anode Current	...	70	60	mA.
Screen Current	...	4.0	3.0	mA.
Mutual Conductance	...	11	8.8	mA/V.
Anode Impedance	...	24	28	k Ω
Inner μ (μ_{g1-g2})	...	8	8	

TYPICAL OPERATION.

As Frame Time Base Output.

To allow for tolerances and the spread of characteristics during life, it is recommended that the frame time base output circuit should be designed around the following values.

Anode Voltage	...	60	70	80	volts.
Screen Grid Voltage	...	170	200	220	volts.
Peak Anode Current	...	145	190	220	mA.

As Audio Output Valve (Class A).

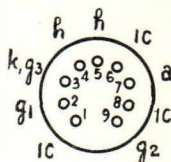
Anode Voltage	...	170	200	volts.
Screen Grid Voltage	...	170	—	volts.
Screen Grid Feed Resistor	...	—	470	ohms.
Control Grid Voltage	...	-12.5	-17.3	volts.
Anode Current	...	70	60	mA.
Screen Grid Current	...	4.0	3.1	mA.
Anode Load	...	2.4	2.4	k Ω
Input Voltage	...	7	7	volts (rms.).

Power Output ($D_{tot}=10\%$)	...	5.6	5.2	watts.
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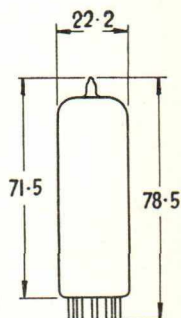
*Max. pulse duration 4% of one cycle, with a maximum of 800 μ secs.

§For frame output operation the max. value of R_{g1-k} may be 3.3 M Ω

PL84



Base Connections
Underside View of Base



All Dimensions shown are in millimetres (max.).

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TYPICAL OPERATION (cont.)

As Audio Amplifier (2 valves in Class AB push pull).

Anode Voltage	...	...	...	170 volts.
Screen Grid Voltage	...	...	...	170 volts.
*Cathode Bias Resistor	...	...	...	120 ohms.
Anode Current (Zero signal)	...	...	...	2×56 mA.
Anode Current (Max. signal)	...	...	...	2×57.5 mA.
Screen Grid Current (Zero signal)	...	...	...	2×3 mA.
Screen Current (Max. signal)	...	...	...	2×20.5 mA.
Input Voltage (g_1-g_1)	...	...	...	13.1 volts (rms.).
Optimum Load (Anode to Anode)	...	...	...	3.5 k Ω
†Power Output	...	...	...	13 watts.
Input Voltage ($P_{out} = 50$ mW)	...	...	...	450 mV. (rms.).

As Audio Amplifier (2 valves in Class B).

Anode Voltage	...	...	...	170 volts.
Screen Grid Supply Voltage	...	...	...	170 volts.
Control Grid Voltage	...	...	...	20.5 volts.
Anode Current (Zero signal)	...	...	...	2×15 mA.
Anode Current (Max. signal)	...	...	...	2×57.5 mA.
Screen Grid Current (Zero signal)	...	...	...	2×0.7 mA.
Screen Current (Max. signal)	...	...	...	2×20.5 mA.
Input Voltage (g_1-g_1)	...	...	...	14.5 volts (rms.).
Optimum Load (Anode to Anode)	...	...	...	3.5 k Ω
†Power Output	...	...	...	13.5 watts.

TRIODE CONNECTED. (Screen Grid connected to Anode).

As Audio Amplifier Class A.

Anode Voltage	...	...	...	170 volts.
Control Grid Voltage	...	...	...	-15 volts.
Anode Current	...	...	...	51 mA.
Anode Load	...	...	...	1.2 k Ω
Input Voltage	...	...	...	10.8 volts (rms.).
†Power Output	...	...	...	2.1 watts.
Input Voltage ($P_{out} = 50$ mW)	...	...	...	1.75 volts (rms.).

CAPACITANCES.

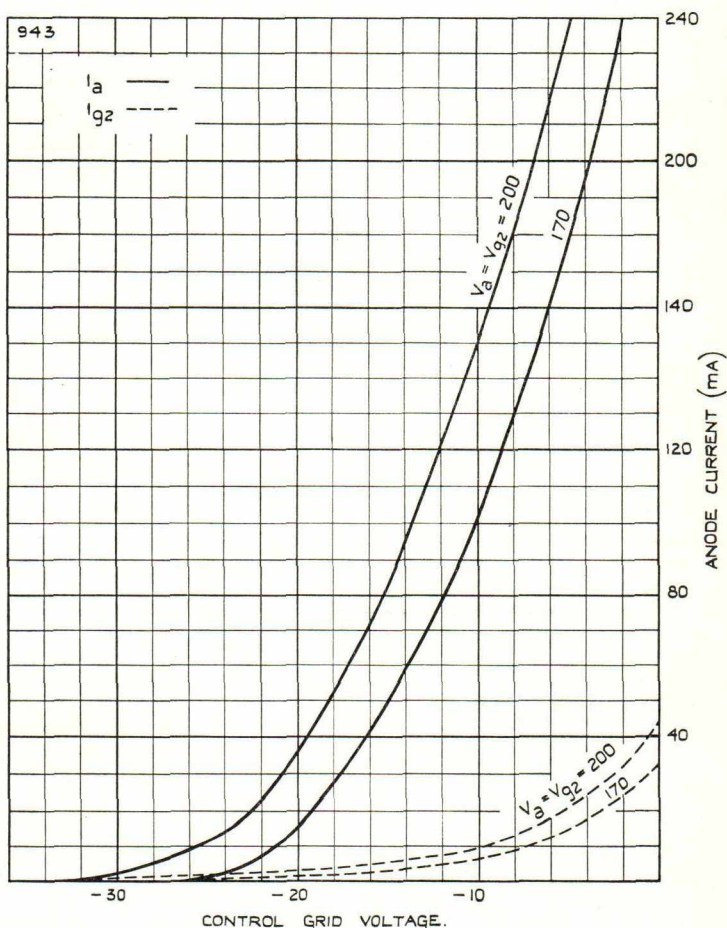
C_{in}	...	...	...	...	12 pF.
C_{out}	...	...	...	...	6 pF.
C_{a-g_1}	...	...	...	...	<0.6 pF.
C_{g_1-h}	...	...	...	...	<0.25 pF.

*Common Bias Resistor.

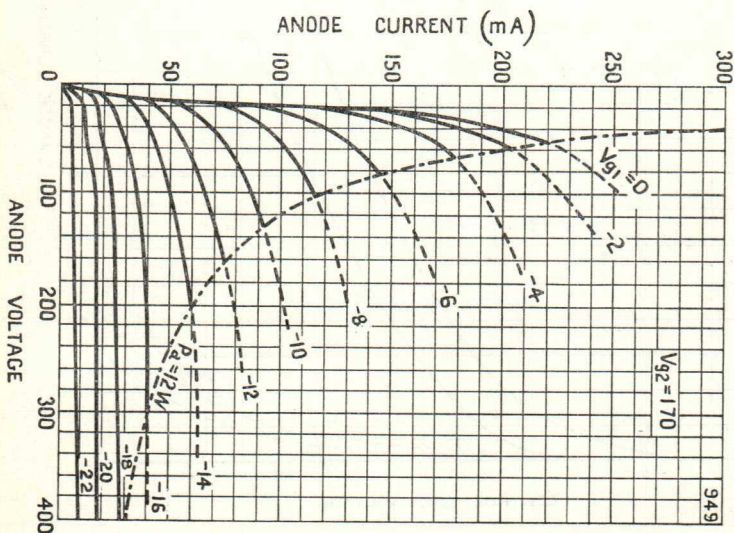
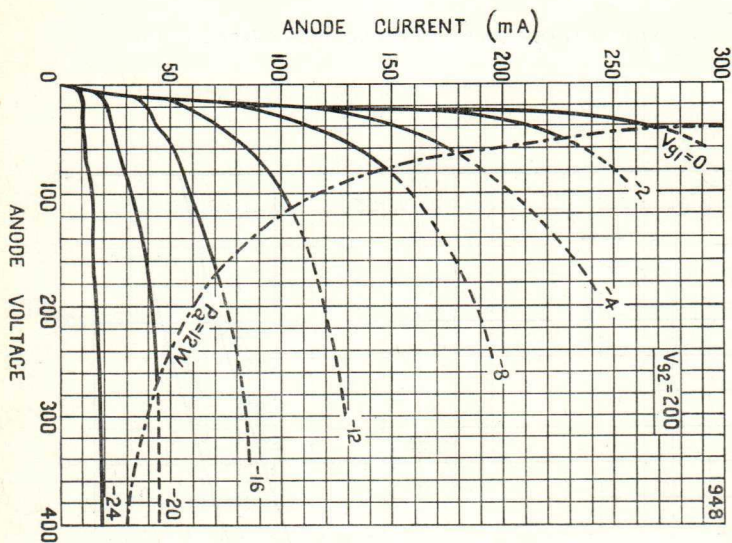
†Total Distortion 5%.

‡Total Distortion of 10%.

TYPICAL ANODE CURRENT/GRID VOLTAGE CHARACTERISTICS



TYPICAL ANODE CURRENT/ANODE VOLTAGE CHARACTERISTICS



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LINE OUTPUT PENTODE

An indirectly heated output pentode designed for use as a Line Time Base Output Valve in Television Receivers with series heater chains.

PHYSICAL DETAILS.

Base	...	...	...	B9D
Top Cap	...	...	...	CT1
Max. Overall Length	...	...	...	104.2 mm ($4\frac{3}{8}$ "
Max. Seated Height	...	...	...	95.5 mm ($3\frac{7}{8}$ "
Max. Diameter	...	...	...	30.2 mm ($1\frac{1}{8}$ "

BASE CONNECTIONS.

Pin 1—	Control Grid	Pin 6—	Screen Grid
Pin 2—		Pin 7—	
Pin 3—	Cathode,	Pin 8—	Cathode,
	Suppressor Grid		Suppressor Grid
Pin 4—	Heater	Pin 9—	Internal Connection
Pin 5—	Heater	T.C.—	Anode

HEATER.

Heater Current	...	...	...	0.3 amp
Heater Voltage	...	...	...	27 volts

RATINGS.

Max. DC. Supply Voltage	...	...	550 volts
Max. Anode Voltage	...	...	250 volts
Max. Peak Anode Voltage	...	...	7 kV
Max. Screen Grid Voltage	...	...	250 volts
*Max. Anode Dissipation (p_a)	...	...	12 watts
*Max. Screen Grid Dissipation (p_{g2})	...	...	5 watts
*Max. $p_a + p_{g2}$	...	...	13 watts
Max. Cathode Current	...	...	250 mA
Max. R_{g1-k} (Fixed Bias)	...	...	500 kΩ
Max. R_{g1-k} (Line Timebase)	...	...	2.2 mΩ

CHARACTERISTICS.

Anode Voltage	...	...	...	75 volts
Screen Grid Voltage	...	...	...	200 volts
Control Grid Voltage	...	...	...	-10 volts
Anode Current	...	...	...	440 mA
Screen Grid Current	...	...	...	30 mA

TYPICAL OPERATION. As Line Output Valve.

Stabilised Circuits (operation above the knee)

V_b	...	...	...	170	200	230	volts					
$\dagger R_{g2}$	...	...	...	1.2	1.5	2.2	kΩ					
V_{g2}	...	...	...	130	150	170	190					
$\pm V_a$	...	...	...	62	66	65	69	73	72	76	80	volts
$\$V_{g1}$	...	...	...	-6	-7	-6	-7	-8	-7	-8	-9	volts
$i_a(pk)$	...	...	...	250	310	250	310	360	310	360	420	mA

To allow for valve spread and deterioration and 10% mains voltage fluctuation, the values of $i_a(pk)$ shown should not be exceeded at nominal mains voltage.

Non Stabilised Circuits (operation below the knee)

V_b	...	...	...	190	230	volts
$R_{g2} (min)$	...	...	...	2.2	2.2	kΩ
$\$V_{g1}$	...	...	...	+1.0	+1.0	volt
$i_a(pk)$	...	...	...	230	320	mA

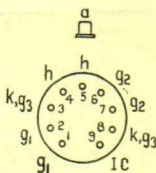
*See Graph overleaf.

$\dagger$ This is the minimum value of R_{g2} necessary to prevent excessive screen grid dissipation during warm up.

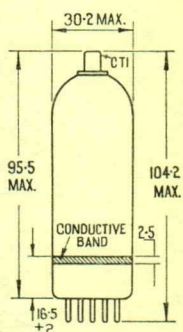
$\ddagger$ The minimum anode voltage at end of scan at nominal mains voltage. The valve will still operate above the knee at a mains voltage 10% below nominal.

$\$$ At end of scan the nominal V_{g1} for cut off during the flyback period is -120 volts.

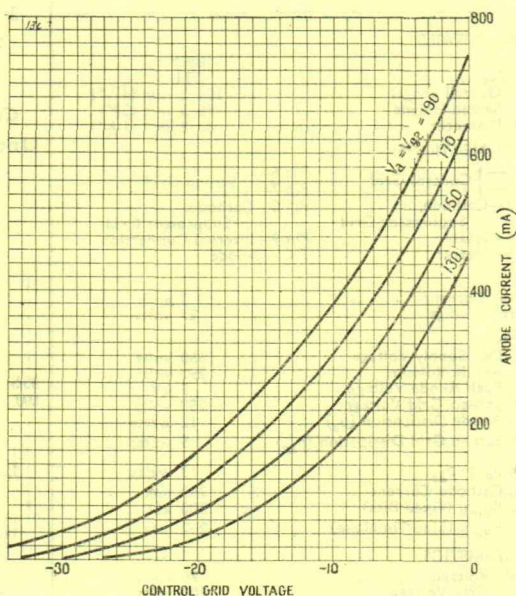
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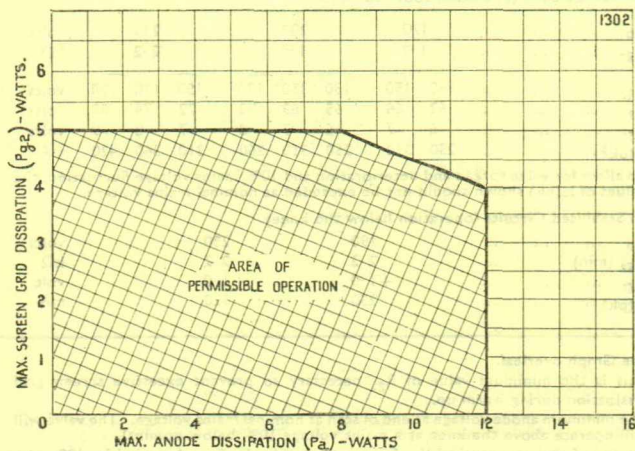
Base Connections
Underside View of Base



Dimensions in millimetres

TYPICAL i_a/v_g CHARACTERISTICS

ANODE AND SCREEN GRID DISSIPATION RATINGS

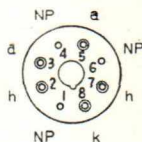


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FULL WAVE RECTIFIER

An indirectly heated half wave rectifier with a 0.3 amp. heater designed for series connected heater operation in Television Receivers.

PY33



PHYSICAL DETAILS.

Base	...	...	...	...	Octal
Max. Overall Length	...	...	...	...	112 mm. (4.41")
Max. Seated Height	...	...	...	...	98 mm. (3.86")
Max. Diameter	...	...	...	...	37 mm. (1.46")
Mounting Position	...	...	...	...	Any

BASE CONNECTIONS.

Pin 1—No Pin	Pin 5—Anode
Pin 2—Heater	Pin 6—No Pin
Pin 3—Anode	Pin 7—Heater
Pin 4—No Pin	Pin 8—Cathode

HEATER.

Heater Current	...	...	...	0.3 amps
Heater Voltage	...	...	...	29 volts

RATINGS.

Max. Peak Inverse Voltage	...	700 volts
Max. R.M.S. Anode Voltage	...	250 volts
Max. Rectified Current	...	325 mA
Max. Peak Anode Current	...	2.6 amps
Max. Surge Anode Current	...	9.5 amps
*Max. V_h-k (pk) (Heater negative)	...	625 volts
Max. Reservoir Capacitor	...	200 μF

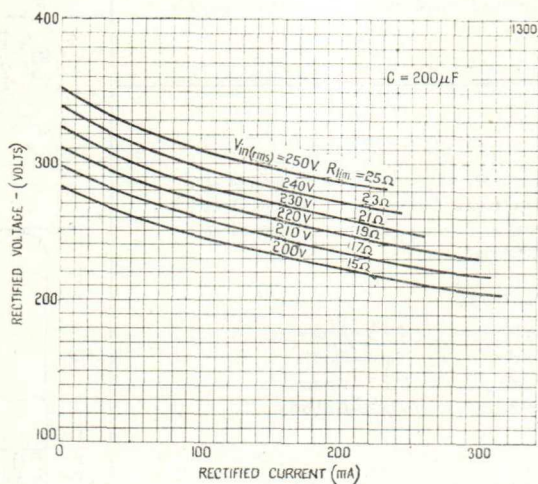
TYPICAL OPERATING CONDITIONS.

R.M.S. Input Voltage per Anode	200	210	220	230	240	250	volts
Supply Impedance per Anode	15	17	19	21	23	25	ohms
Reservoir Capacitor	...	200	200	200	200	200	μF
Rectified Current	...	325	325	295	270	240	mA
DC. Output Voltage	...	209	219	234	249	264	volts

To choose the required value of limiting resistor when a constant output voltage is required at different input voltages, as in Television Receivers, the graph overleaf should be consulted.

*Mains voltage of not more than 250V. r.m.s., plus a maximum DC. component of 275 volts.

REGULATION CURVES



TO DETERMINE THE VALUE OF LIMITING RESISTOR WHEN A CONSTANT OUTPUT VOLTAGE IS REQUIRED.

