RADIOTRONICS

AMALGAMATED WIRELESS VALVE CO. PTY. LTD.

BOX No 2516BB, G.P.O., SYDNEY

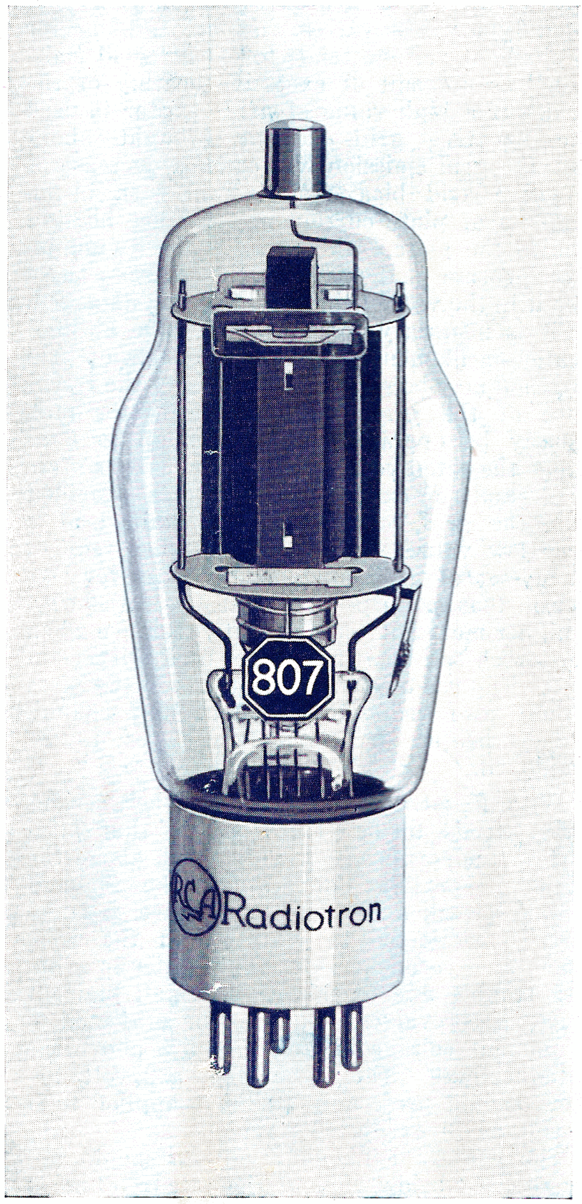
TECHNICAL BULLETIN No. 98 **23rd MAY, 1939**

In this issue:—

Radiotron 807, as illustrated in the adjoining column, is an indirectly heated 25 watt plate dissipation, U.H.F. Beam Power Tetrode, suitable for use as R.F. Amplifier, Frequency Multiplier, Oscillator, and Modulator.

As a result of the electrode structure, ceramic insulation and efficient screening employed, the 807 may be operated at maximum ratings up to frequencies of 60 Mc/s., while in R.F. applications neutralisation is usually unnecessary. Complete information of the characteristics and operating conditions of Radiotron 807 are available on request from the Unified Sales-Engnieering Service. It is expected that type 807 of Australian manufacture, will be available in the near future.

Nett Price £1/7/6



SIGNIFICANCE OF MAXIMUM RATINGS

HEATER AND FILAMENT VOLTAGE (OXIDE COATED CATHODES)

The rated heater or filament voltage of a valve is the voltage at which it is intended to be operated, and is usually the voltage at which the most satisfactory life can be obtained under normal operating conditions. In general, any large increase or decrease of heater or filament voltage will result in unsatisfactory life and performance. Where limits are not specifically given it may be taken that valves are capable of being operated with heater or filament voltages up to 10% above or below the rated values without giving serious trouble. It is advisable however to maintain **the average voltage** as closely as possible to the rated value and to reduce to a minimum the periods of time at which the heater or filament is operated above or below voltage.

With all types of valves, and in particular with all indirectly heated valves and also filament type power valves, an increase of heater or filament voltage tends to cause "grid emission" as a result of excessive heating of the grid. If a high value of grid resistor is used the negative grid current brought about through grid emission will cause a decrease of effective grid bias, resulting in turn in an increase of plate current and further heating due to the plate. This tends to be a cumulative process and may in the extreme case result in the valve being permanently damaged. If it is necessary to operate a valve at high heater or filament voltage, the effects of grid emission may be reduced by reducing the resistance of the grid circuit. The heater may usually be operated at voltages up to 20% above the rated voltage before the valve suffers as a result of excessively short life, provided that the grid resistance is maintained at a very low value. The use of self-bias reduces the effect of grid emission and it is for this reason that many power valves are rated with a higher maximum grid circuit resistance when used with self-bias than when used with fixed bias. The use of a high resistance in the plate circuit also reduces the effect and enables higher heater or filament voltages to be employed.

With filament type valves another serious effect needs to be considered in that at a certain temperature, not very much above the normal operating temperature, the filament becomes weak and likely to fracture, particularly if subjected to vibration at the same time. It is recommended that in order to avoid any trouble due to this cause, small filament type battery valves should not be subjected to a filament voltage in excess of 5% above the rated voltage. This means that a 2 volt filament should preferably not have applied to it a voltage in excess of 2.1 volts.

The heater or filament voltage should not be reduced below 90% of the rated voltage if the characteristics of the valve are desired to remain normal. Certain types of valves are capable of considerably greater drop in heater or filament voltage before serious effects on the characteristics become apparent, but there is danger in operating valves with low heater voltages in that variations from valve to valve and from period to period become very pronounced. It is therefore possible to make tests on one valve and find that it operates on a certain voltage and to find at some other time that a valve of the same type and manufacture will not operate satisfactorily at that voltage. A further effect is that at low heater or filament voltages the valve is less able to evaporate from the surface of the cathode any deposits of material which are harmful to emission. During the operation of the valve it is possible for certain materials, occluded in the electrodes, to be released and vaporised and later deposited on the cathode surface. With normal operating temperatures these would be evaporated during the operation of the valve and the performance of the valve would not therefore be impaired. If the cathode, however, is operated at a much reduced temperature the evaporation may not take place and the cathode may be "poisoned" and so lose emission.

If it is desired to operate valves with voltages more than 10% above or below the rated voltage, in the absence of specific published data, it is suggested that an enquiry be addressed to the Unified Sales-Engineering Service.

Plate Voltage

The plate voltage refers to the D.C. voltage between plate and cathode. The maximum plate voltage for all types of valves is given in the published data. It should be noted that **there is no tolerance whatever on these maximum ratings of voltages.** With power valves it frequently happens that a higher maximum plate voltage is given for over-biased operation intended for push-pull amplifiers. This higher voltage is only permissible when used in conjunction with the recommended bias and load resistance.

The maximum rated plate dissipation should not be exceeded, but attention is directed to the fact that the dissipation is not the only factor. It is also important that the maximum voltage and maximum current ratings should individually not be exceeded. Ratings refer to valves operating under typical conditions with sine-wave input and do not apply to cases where the wave form is such that the plate voltage remains at the peak value for appreciable lengths of time, as would occur with a low frequency square topped wave form.

With resistance coupling the supply voltage may be made twice the rated plate voltage, due to the drop in the load resistance.

Screen Voltage and Dissipation

The maximum rated screen voltage should not be exceeded. In cases where a maximum screen dissipation rating is given, this also should not be exceeded. If no screen dissipation rating is given it may be taken as being equal to the product of the maximum rated voltage and the maximum published screen current under typical operating conditions. These calculated ratings of screen dissipation refer to average valves and, unless specifically covered by maximum screen ratings, it may be assumed that the normal manufacturing tolerances on the screen current will not result in short valve life.

A screen dropping resistor, in cases where this is used, may be designed on the basis of the required drop in voltage and the published screen current. Valves drawing slightly high screen current will cause a greater voltage drop in the resistor, thus obtaining protection.

Under normal conditions the screen current of power pentodes or tetrodes rises as the output power increases. In such cases screen dropping resistors are generally unsatisfactory and the screens should be supplied from a source of nearly constant voltage. The load resistance should not be greater than the recommended load, otherwise the screen current will rise rapidly as full output is approached and the screen dissipation may be exceeded under these conditions.

Grid Bias

With power valves the grid bias should preferably be as given in the published data under "typical operating conditions". If no operating data are available for the required conditions it is necessary for the grid bias to be so adjusted that the maximum plate current and maximum plate dissipation are not exceeded. In R.F. pentodes, converters and mixers a "minimum grid voltage" rating is frequently given. This rating is to prevent the plate and screen currents and dissipation from exceeding safe values. In certain cases, particularly with converter valves, decreased grid voltage may result in less satisfactory operation. In all cases where it is desired to use unusual operating conditions it is suggested that an enquiry be addressed to the Unified Sales-Engineering Service.

With power valves the plate current tends to rise towards full output, particularly in the case of overbiased operation as is usual in push-pull amplifiers, and the self-bias resistor should be adjusted so that the plate dissipation is not exceeded either at zero signal or at maximum signal input. In certain cases where typical operating conditions are given for fixed bias operation it is not possible to obtain similar results with self-bias owing to the variation of cathode current from no signal to full signal. In all cases the use of a low impedance grid circuit is desirable, and under no conditions should the resistance exceed the maximum rating.

Maximum Values of Grid Resistors Power Amplifier Valves

Type	Max. Grid Resistor* (megohm) Self Bias	Fixed Bias
1F5-G	1.0	0.5
1G5-G	1.0	0.5
1L5-G	1.0	1.0
2A3	0.5	0.05
45	1.0	0.1
50	0.01	0.01
6F6-G	0.5	0.05
6L6-G	0.5	0.1
6V6-G	0.5	0.05

* For conditions under which the heater voltage does not rise more than 10% above the rated voltage.

CRITICAL HEATER VOLTAGE

Types 6K8-G and 6V6-G

Some types of valves are more critical than others as regards the heater voltage. Resistance coupled stages require, in general, smaller emission from the cathode and therefore may be used with lower cathode temperature. Valves which operate with high cathode currents or with high dissipation in any electrode are in general more critical than others as regards low heater voltage. While every type of valve should be operated as closely as possible to its rated heater or filament voltage, this is particularly true in the case of power amplifier valves, converter valves, and indirectly heated rectifier valves. Of these types the 6K8-G and the 6V6-G are somewhat more critical than others and every effort should be made to maintain their average voltage at the rated value. Normal fluctuations of the supply voltages cannot be avoided, but if the heater voltage is lower than 6.3 volts when the mains voltage is normal the effect of a drop in the mains voltage will be more pronounced. Both types 6K8-G and 6V6-G operate with somewhat lower cathode temperature and both have a high value of emission per watt of heating power.

It should not be inferred from what has been stated that either of these types is unsatisfactory in any way since extensive life tests prove that both types when used under the correct conditions give very satisfactory long life. If special applications involve the use of average voltages below or above 6.3 volts or if instantaneous fluctuations exceed 10% below or above 6.3 volts it is suggested that an enquiry be addressed to the Unified Sales-Engineering Service.

SCREEN BYPASSING

DERIVATION OF MATHEMATICAL FORMULA

When a screen dropping resistor is used, as is frequently the case with resistance coupled pentode valves, the capacitance of the screen bypass has an effect on the low frequency response. For complete design purposes it is necessary to be able to calculate the required capacitance for a certain frequency and for given operating conditions. An approximate formula was given in Radiotronics 76 (26th May, 1937, page 39) which may be used with a high degree of accuracy. The mathematical derivation is given below and the formula is given in a convenient form for ordinary use. This derivation is believed to be original and should therefore be of particular interest.

For convenience of reference the symbols to be used are given below:

e_g = the control-grid voltage relative to the cathode.
e_s = the screen voltage relative to the cathode.
e_p = the plate voltage relative to the cathode.
i_s = the screen current.
i_p = the plate current.
r_s = the internal resistance of the cathode-screen space.
r_p = the internal resistance of the cathode-plate space.
R_s = the screen resistor.
C_s = the screen by-pass condenser.
Z_s = the screen load impedance $= 1/(1/R_s + j\omega C_s)$.
Z_L = the plate load impedance.
$g_m = \partial i_p/\partial e_g$, $g_s = \partial i_p/\partial e_s$, $g_p = \partial i_p/\partial e_p$.
$G_m = \partial i_s/\partial e_g$, $G_s = \partial i_s/\partial e_s$, $G_p = \partial i_s/\partial e_p$.
M = the stage gain with the screen completely bypassed.
M′ = the stage gain with the screen partially bypassed.

As the plate and screen currents depend upon e_g, e_s and e_p, it follows that

$$di_p = g_m\,de_g + g_s\,de_s + g_p\,de_p \quad \ldots \quad (1)$$

and

$$di_s = G_m\,de_g + G_s\,de_s + G_p\,de_p \quad \ldots \quad (2)$$

Moreover,

$$de_p = -Z_L\,di_p \quad \ldots \quad (3)$$

and

$$de_s = -Z_s\,di_s. \quad \ldots \quad (4)$$

Using equations (3) and (4) in order to eliminate de_p and de_s from equations (1) and (2) respectively, it follows that

$$(1 + g_p Z_L)\,di_p + g_s Z_s\,di_s - g_m\,de_g = 0$$

$$G_p Z_L\,di_p + (1 + G_s Z_s)\,di_s - G_m\,de_g = 0$$

Therefore,

$$di_p/de_g = \frac{\begin{vmatrix} g_s Z_s, & -g_m \\ 1 + G_s Z_s, & -G_m \end{vmatrix}}{\begin{vmatrix} 1 + Z_L g_p, & g_s Z_s \\ Z_L G_p, & 1 + G_s Z_s \end{vmatrix}}$$

$$= \frac{g_m (1 + G_s Z_s) - g_s G_m Z_s}{(1 + Z_L g_p)(1 + G_s Z_s) - g_s G_p Z_L Z_s}$$

$$= M'/Z_L,$$

where M′ is the stage gain.

Let M denote the stage gain when $Z_s = 0$, that is when the screen is completely by-passed. Then it is clear that:

$$M'/M = \frac{1 + G_s Z_s - g_s G_m Z_s/g_m}{1 + G_s Z_s - g_s G_p Z_L Z_s/(1 + Z_L g_p)}$$

Making the assumption, generally justified in practice, that

$$G_s/g_s = G_m/g_m = G_p/g_p,$$

it follows that

$$M'/M = 1 - Z_s/(Z_s + r_s + r_s Z_L/r_p)$$

$$= 1 - 1/[1 + (r_s/Z_s)(1 + Z_L/r_p)] \quad (5)$$

where

$$r_s = (\partial i_s/\partial e_s)^{-1}$$

The quantity r_s can be conveniently determined from (i_s, e_s) curves.

The theoretical results obtained by means of the formula (5) have been found to agree well with experimental values.

This result may be expressed in a form which is more convenient in practice since it involves only valve constants which are readily available:—

$$\frac{M'}{M} = 1 - \frac{1}{1 + \dfrac{\mu_t}{Z_s . g_m} \cdot \dfrac{i_p}{i_s} \cdot \dfrac{1 + Z_L/r_p}{1 - \mu_t/\mu}} \quad \ldots \quad (6)$$

where μ_t = the triode amplifications factor,
g_m = the pentode mutual conductance,
r_p = the pentode plate resistance,
and μ = the pentode amplification factor.

The factor

$$\frac{1 + Z_L/r_p}{1 - \mu_t/\mu}$$

is approximately unity, and the formula may be reduced to the approximation which was given in Radiotronics 76 (26th May, 1937, page 39). Since this is in a vector form it is necessary to obtain the modulus before it can be used directly for numerical calculations.

(*continued on page 35.*)

THE USE OF GASEOUS VOLTAGE REGULATORS

This article is particularly intended to simplify the application of the two new Radiotron Gaseous Voltage Regulators, Types VR105-30 and VR150-30.

Each of these types is rated at a tube current between 5 mA. (minimum) and 30 mA. (maximum). The approximate voltage drop across the regulator tube is given by the first number in the type designation (105 and 150 volts respectively).

These regulators are intended for operation on D.C. circuits only. The usual circuit arrangement is shown in Fig. 1 where R represents a series dropping resistor, and R_L represents the resistance of the load.

Fig. 2 shows the circuit arrangement where it is necessary to operate two or more regulator tubes in series to obtain higher output voltages.

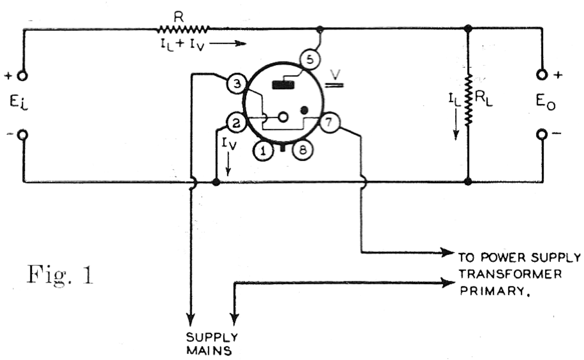


Fig. 1

If R_L is a load of varying resistance, or if the whole device be regarded as a source of approximately constant voltage for any load, the minimum value of R may readily be calculated. If there is no load current (i.e., R_L is open circuited), the whole current must pass through the tube and is therefore limited to 30 mA.

$$\therefore R_{min} = \frac{E_i - E_o}{.03} \text{ ohms.}$$

If E_i = 250 volts, and type VR105-30 is employed, E_o will be approximately 105 volts,

$$\therefore R_{min} = \frac{250-105}{.03} = 4{,}833 \text{ ohms.}$$

The load current may be between 0 and 25 mA., since the total current must not exceed 30 mA. and the tube current must not be less than 5 mA. The minimum value of load resistance is given by

$$R_{L\,min} = \frac{E_o}{I_L} = \frac{105}{.025} = 4{,}200 \text{ ohms for type VR105-30}$$

If a higher value of dropping resistor (R) is adopted, the maximum load current will be decreased and will be equal to

$$I_L = \frac{E_i - E_o}{R} - 0.005 \text{ ampere.}$$

For example, if E_i = 250 volts, R = 10,000 ohms, with type VR105-30

$$I_L = \frac{250-105}{10{,}000} - 0.005 \text{ ampere}$$

$$= 14.5 - 5 \text{ mA.} = 9.5 \text{ mA.}$$

Optimum values of R are given in the following tables, in which the dissipation (W) in the resistor R is also shown:—

Case 1. One type VR105-30.

E_i max.	180	250	350
E_o	105	105	105
R	2500	4833	8160
W	2.25	4.35	7.35

Case 2. One type VR150-30.

E_i max.	180	250	350
E_o	150	150	150
R	1000	3333	6666
W	0.9	3.0	6.0

(continued on page 36.)

SCREEN BYPASSING

DERIVATION OF MATHEMATICAL FORMULA

(continued from page 34.)

$$\text{Let } a = \frac{\mu_t}{g_m} \cdot \frac{i_p}{i_s} \cdot \frac{1 + Z_L/r_p}{1 - \mu_t/\mu}$$

$$\therefore \frac{M'}{M} = 1 - \frac{1}{1 + a/Z_s} = \frac{a/Z_s}{1 + a/Z_s} = \frac{a}{Z_s + a}$$

$$= \frac{a\,(1/R + j\omega C)}{1 + a/R + ja\omega C}$$

$$\therefore \left|\frac{M'}{M}\right|^2 = \frac{(a/R)^2 + a^2\omega^2C^2}{(1 + a/R)^2 + a^2\omega^2C^2}$$

$$\text{or } \left|\frac{M'}{M}\right| = \sqrt{\frac{a^2 + a^2R^2\omega^2C^2}{(a+R)^2 + a^2R^2\omega^2C^2}} \quad \ldots \text{ (7)}$$

$$\text{where } a = \frac{\mu_t}{g_m} \cdot \frac{i_p}{i_s} \cdot \frac{1 + Z_L/r_p}{1 - \mu_t/\mu}$$

$$= \frac{\mu_t}{g_m} \cdot \frac{i_p}{i_s} \text{ approximately.}$$

Equation (7) is in a form which may be used in numerical calculations.

THE USE OF GASEOUS VOLTAGE REGULATORS

(*continued from page* 35)

Case 3. Two type VR105-30 in series.

E_i max.	250	350	500
E_o (total)	210	210	210
E_o (tapping)	105	105	105
R	1333	4666	9666
W	1.20	4.20	8.70

Case 4. Two type VR150-30 in series.

E_i max.	350	400	500	600
E_o (total)	300	300	300	300
E_o (tapping)	150	150	150	150
R	1660	3333	6666	10000
W	1.5	3.0	6.0	9.0

Case 5. Three type VR105-30 in series.

E_i max.	350	400	500	600
E_o (total)	315	315	315	315
E_o (tap 1)	105	105	105	105
E_o (tap 2)	210	210	210	210
R	1166	2833	6166	9500
W	1.05	2.55	5.55	8.55

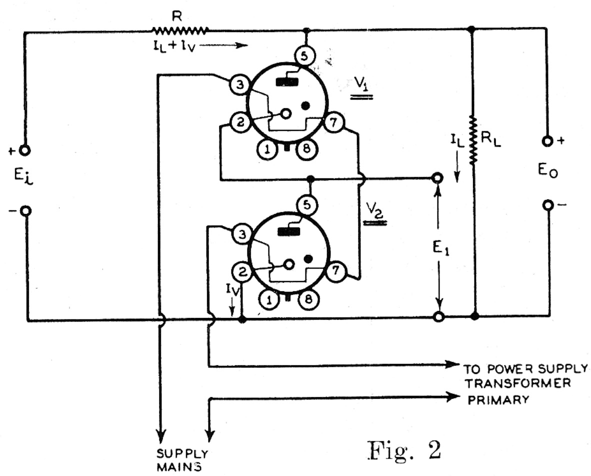


Fig. 2

RADIOTRON 1G4-G
GENERAL PURPOSE TRIODE
(TENTATIVE DATA)

FILAMENT VOLTAGE (D.C.)*	1.4	Volts
FILAMENT CURRENT	0.05	Ampere
MAXIMUM OVERALL LENGTH	4″	
MAXIMUM DIAMETER	$1\frac{3}{16}$″	
BULB	T-9	
BASE	Small Shell Octal 7-Pin	

CLASS A AMPLIFIER

OPERATING CONDITIONS and CHARACTERISTICS:

Filament Voltage	1.4	Volts
Plate Voltage	90 max.	Volts
Grid Voltage	–6	Volts
Amplification Factor	8.8	
Plate Resistance	10700	Ohms
Transconductance	825	Micromhos
Plate Current	2.3	Milliamperes

PIN CONNECTIONS

Pin 1 — No connection
Pin 2 — Filament +
Pin 3 — Plate
Pin 4 — No connection
Pin 5 — Grid
Pin 7 — Filament –
Pin 8 — No connection

(Pin numbers are according to RMA System)

OPERATING POSITION

Preferably vertical but horizontal operation is permissible if Pins # 2 and # 7 are in a vertical plane.

* The maximum voltage applied to the filament should not exceed 1.54 volt.

RADIOTRON 1G6-G
CLASS B TWIN AMPLIFIER
(TENTATIVE DATA)

FILAMENT VOLTAGE (D.C.)*	1.4	Volts
FILAMENT CURRENT	0.1	Ampere
MAXIMUM OVERALL LENGTH	4″	
MAXIMUM DIAMETER	$1\frac{3}{16}$″	
BULB	T-9	
BASE	Small Shell Octal 8-Pin	

RADIOTRON 1G6-G

(continued).

CLASS B POWER AMPLIFIER

PLATE VOLTAGE	90 max.	Volts
PEAK PLATE CURRENT (per unit)	20 max.	Milliamperes

TYPICAL OPERATION:

Unless otherwise specified, values are for the two units

Plate-Supply Impedance	0	0▭	Ohms
Effective Grid-Circuit Impedance (per unit)	0	516▭▭	Ohms
Filament Voltage	1.4	1.4	Volts
Plate Voltage	90	90	Volts
D-C Grid Voltage	0	0	Volts
Peak A-F Grid-to-Grid Voltage**	42	48	Volts
Zero-Signal D-C Plate Current	2	2	Milliamperes
Max.-Signal D-C Plate Current	14	14	Milliamperes
Peak Grid Current (per unit)	5	6	Milliamperes
Effective Load Resistance (plate to plate)	12000	12000	Ohms
Total Distortion	3	5	Per Cent.
Power Output (approx.)	675	675	Milliwatts

▭ Battery supply.

▭▭ At 400 cycles for Class B stage in which the effective resistance per grid circuit is 500 ohms, and the leakage reactance of the coupling transformer is 50 millihenrys. The driver stage should be capable of supplying the grids of the Class B stage with the specified values at low distortion.

** For power output shown.

CLASS A AMPLIFIER

Each Triode Unit

CHARACTERISTICS:

Filament Voltage	1.4	Volts
Plate Voltage	90	Volts
Grid Voltage	0	Volts
Amplification Factor	30	
Plate Resistance (approx.)	45000	Ohms
Transconductance	675	Micromhos
Plate Current	1	Milliampere

PIN CONNECTIONS

Pin 1 — No Connection
Pin 2 — Filament +
Pin 3 — Plate (Triode T_2)
Pin 4 — Grid (Triode T_2)
Pin 5 — Grid (Triode T_1)
Pin 6 — Plate (Triode T_1)
Pin 7 — Filament −
Pin 8 — No Connection

(Pin numbers are according to RMA System)

OPERATING POSITION

Preferably vertical but horizontal operation is permissible if Pins # 2 and # 7 are in a horizontal plane.

* The maximum voltage applied to the filament should not exceed 1.54 volt.

RADIOTRON 83V AND 5V4-G CHARACTERISTICS

It has been found that the D.C. voltages delivered by an average 83V or 5V4-G valve are slightly below the published curves for these valves. When accurate determination of the transformer voltage for a specified D.C. voltage is required, it is suggested that the value be measured experimentally. As a rough approximation it may be taken that the D.C. voltage with a current drain of 130 mA. is 12 volts below the value given by the curves.

COILS FOR RADIOTRON 6K8-G

It appears that many users of 6K8-G valves have obtained disappointing results through the use of incorrect coils. Data on suitable coils were given in Radiotronics 92 (November, 1938) and complete satisfaction may be obtained with such coils. Other types of coils may be used provided that the correct oscillator grid current is obtained. The oscillator grid leak for the 6K8-G should be 50,000 ohms and the grid current preferably should not exceed the limits 100-200 μA., except that at wavelengths above 50 metres the maximum current may be increased to 250 μA. provided that good shielding and layout are adopted. Should the oscillator grid current drop below 80 μA. the valve is likely to be damaged permanently due to excessive screen dissipation. Should the oscillator grid current exceed the top limit as stated, there is a likelihood of various forms of unsatisfactory operation taking place. These effects include "spilling over" and loss of sensitivity over portion of the wave-band.

The voltages applied to the electrodes are rather more critical than with other types of converters, and it is strongly recommended that both the screen and the oscillator plate should be supplied through a common dropping resistor of 15,000 ohms from a 250 volt supply. The lower end of this resistor should be bypassed to earth by means of an 8 μF. electrolytic and a small mica condenser in parallel so as to by-pass both audio and radio frequencies. If these electrodes are supplied from a voltage divider the voltage should not exceed 100 volts on the screen grid and 125 volts on the oscillator plate. There is greater likelihood of flutter and frequency drift occurring when the supply is from a voltage divider than from a dropping resistor.

It is recommended that in every case where a receiver has been constructed the oscillator grid current should be measured in order to determine whether suitable coils have been used. This measurement may be done with the aid of a 0-1 milliammeter which should be inserted by breaking the connection between the cathode and the 50,000 ohm oscillator grid leak. The positive terminal of the milliammeter should be connected to the cathode and the negative terminal to the grid leak. A reading of between .1 and .2 mA. corresponds with 100-200 μA. If the reading of grid current is too high over the whole band it may be reduced by reducing the coupling or the number of turns on the primary of the oscillator coil or by reducing the voltage applied to the oscillator plate. The latter arrangement should not be adopted unless a voltage divider is used, since the screen voltage should be maintained at 100 volts.

Provided that the oscillator grid current is within the recommended limits the operation of the 6K8-G should be extremely satisfactory, particularly at wave-lengths below 20 metres where its extreme sensitivity is of particular advantage. The 6K8-G does not offer any appreciable advantage over the 6A8-G on the broadcast band, and the use of the 6A8-G is recommended in receivers covering the broadcast band only.

RADIOTRON NEWS

Radiotron 1G4-G is a general purpose triode having a 1.4 volt filament. See data elsewhere in this issue.

Radiotron 1G6-G is a Class B twin triode having a 1.4 volt filament. See data elsewhere in this issue.

Radiotron 6AB7/1853 is the new designation of the type formerly known as the 1853, a single ended metal television pentode. No change has been made in the characteristics.

Radiotron 6AC7/1852 is the new designation of the type formerly known as the 1852, a single ended metal television super-control pentode. No change has been made in the characteristics.

New Bantam* Type Releases.

Radiatron 6F5-GT has characteristics similar to those of type 6F5-G.

Radiotron 6J5-GT has characteristics similar to those of type 6J5-G.

Radiotron 6J7-GT has characteristics similar to those of type 6J7-G.

Radiotron 6K6-GT has characteristics similar to those of type 6K6-G.

Radiotron 12J7-GT has characteristics similar to those of type 6J7-G, but having a 12.6 volt heater.

Radiotron 35Z5-GT is a half-wave high vacuum rectifier having a 35 volt .15A. heater, similar to the 35Z4-GT, but having a tapped heater across which it is intended to place the pilot light so as to prevent surges passing through the pilot light when the voltage is applied initially.

* A Bantam Valve is one mounted in a small parallel-sided glass envelope and fitted with an octal base.

ICONOSCOPES.

Radiotron 1849 is an Iconoscope for television transmitters, intended primarily for pick-up from motion-picture film.

Radiotron 1850 is an Iconoscope for television transmitters, designed with high sensitivity for direct pick-up of the scene to be transmitted.

SUBSCRIPTIONS

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