

R-F Power Amplifier Pentode

RCA-804 is a pentode transmitting tube of the thoriated-tungsten filament type for use as an r-f amplifier, frequency multiplier, oscillator, and suppressor, grid-, or plate-modulated amplifier. The plate connection is brought out through a separate seal at the top of the bulb to insure excellent insulation and low grid-plate capacitance. In adequately shielded circuits, neutralization to prevent feedback is generally unnecessary. The suppressor is connected to its individual base pin. RCA-804 may be operated at maximum ratings in all classes of service at frequencies as high as 15 megacycles. The 804 has a ceramic base.

CHARACTERISTICS

Filament Volts (a-c or d-c).....	7.5	Grid-Plate Capacitance (With	
Filament Amperes	3	external shielding)	0.01 max. μf
Transconductance (For plate current		Input Capacitance	16 μf
of 32 ma.) Micromhos.....	3250	Output Capacitance	14.5 μf

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

As R-F Power Amplifier Pentode—Class B Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C PLATE VOLTAGE	1250	max.	Volts
D-C SUPPRESSOR VOLTAGE (Grid No. 3)	200	max.	Volts
D-C SCREEN VOLTAGE (Grid No. 2)	300	max.	Volts
D-C PLATE CURRENT	50	max.	Milliamperes
PLATE INPUT	60	max.	Watts
SUPPRESSOR INPUT	5	max.	Watts
SCREEN INPUT	10	max.	Watts
PLATE DISSIPATION	40	max.	Watts

TYPICAL OPERATION:

D-C Plate Voltage	1000	1000	1250	Volts
D-C Suppressor Voltage	0	45	45	Volts
D-C Screen Voltage	300	300	300	Volts
D-C Grid Voltage (Grid No. 1)†	-20	-20	-20	Volts
Peak R-F Grid Voltage	30	30	27	Volts
D-C Plate Current	45	45	45	Milliamperes
D-C Screen Current	12	11.5	11	Milliamperes
D-C Grid Current (Approx.)	1	1	1	Milliampere
Driving Power (Approx.)†	0.35	0.3	0.25	Watt
Power Output (Approx.)	11	12	16	Watts

As Suppressor-Modulated R-F Power Amplifier—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C PLATE VOLTAGE	1250	max.	Volts
D-C SCREEN VOLTAGE (Grid No. 2)	300	max.	Volts
D-C GRID VOLTAGE (Grid No. 1)	-300	max.	Volts
D-C PLATE CURRENT	50	max.	Milliamperes
D-C GRID CURRENT	15	max.	Milliamperes
PLATE INPUT	60	max.	Watts
SCREEN INPUT	15	max.	Watts
PLATE DISSIPATION	40	max.	Watts

†, †: see end of tabulation.

TYPICAL OPERATION:

D-C Plate Voltage	1000	1250	Volts
D-C Suppressor Voltage (Grid No. 3)	-35	-50	Volts
D-C Grid Voltage [§]	-100	-100	Volts
Peak R-F Grid Voltage	140	140	Volts
Peak A-F Suppressor Voltage	60	70	Volts
D-C Plate Current	45	48	Milliamperes
D-C Screen Current	33.5	35.5	Milliamperes
D-C Grid Current (Approx.)	5.5	7	Milliamperes
Screen Resistor	21000	27000	Ohms
Grid Resistor	18000	15000	Ohms
Driving Power (Approx.)	0.7	0.85	Watt
Power Output (Approx.)	16	21	Watts

As Grid-Modulated R-F Power Amplifier Pentode—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

D-C PLATE VOLTAGE	1250 max.	Volts
D-C SUPPRESSOR VOLTAGE (Grid No. 3)	200 max.	Volts
D-C SCREEN VOLTAGE (Grid No. 2)	300 max.	Volts
D-C GRID VOLTAGE (Grid No. 1)	-300 max.	Volts
D-C PLATE CURRENT	50 max.	Milliamperes
PLATE INPUT	60 max.	Watts
SUPPRESSOR INPUT	5 max.	Watts
SCREEN INPUT	10 max.	Watts
PLATE DISSIPATION	40 max.	Watts

TYPICAL OPERATION:

D-C Plate Voltage	1000	1000	1250	Volts
D-C Suppressor Voltage	0	45	45	Volts
D-C Screen Voltage	300	300	300	Volts
D-C Grid Voltage [§]	-115	-115	-115	Volts
Peak R-F Grid Voltage	140	135	135	Volts
Peak A-F Grid Voltage	35	35	35	Volts
D-C Plate Current	45	45	45	Milliamperes
D-C Screen Current	15	11	11	Milliamperes
D-C Grid Current (Approx.)	2	2	2	Milliamperes
Driving Power (Approx.) [†]	1.1	0.85	0.85	Watts
Power Output (Approx.)	14	16	21	Watts

As Plate-Modulated R-F Power Amplifier—Class C Telephony

Carrier conditions per tube for use with a max. modulation factor of 1.0

	Pentode Connection	Tetrode Connection	
D-C PLATE VOLTAGE	1000 max.	1000 max.	Volts
D-C SUPPRESSOR VOLTAGE (Grid No. 3)	200 max.	—	Volts
D-C SCREEN VOLTAGE***	300 max.	200 max.	Volts
D-C GRID VOLTAGE (Grid No. 1)	-300 max.	-300 max.	Volts
D-C PLATE CURRENT	80 max.	80 max.	Milliamperes
D-C GRID CURRENT	15 max.	15 max.	Milliamperes
PLATE INPUT	80 max.	80 max.	Watts
SUPPRESSOR INPUT	5 max.	—	Watts
SCREEN INPUT	10 max.	15 max.	Watts
PLATE DISSIPATION	27 max.	27 max.	Watts

TYPICAL OPERATION:

D-C Plate Voltage	1000	1000	Volts
D-C Suppressor Voltage	50	—	Volts
D-C Screen Voltage	220	155	Volts
D-C Grid Voltage [§]	-90	-80	Volts
Peak R-F Grid Voltage	130	145	Volts

§, †, ***, ‡: see end of tabulation.

D-C Plate Current	75	75	Milliamperes
D-C Screen Current	21	28	Milliamperes
D-C Grid Current (Approx.)	6	8	Milliamperes
Screen Resistor	37000†	30000**	Ohms
Grid Resistor	15000	10000	Ohms
Driving Power (Approx.)	0.65	1.1	Watts
Power Output (Approx.)	50	50	Watts

As R-F Power Amplifier and Oscillator—Class C Telegraphy

Key-down conditions per tube without modulation††

	Pentode Connection	Tetrode Connection	
D-C PLATE VOLTAGE	1250 max.	1250 max.	Volts
D-C SUPPRESSOR VOLTAGE (Grid No. 3)	200 max.	—	Volts
D-C SCREEN VOLTAGE***	300 max.	200 max.	Volts
D-C GRID VOLTAGE (Grid No. 1)	-300 max.	-300 max.	Volts
D-C PLATE CURRENT	95 max.	95 max.	Milliamperes
D-C GRID CURRENT	15 max.	15 max.	Milliamperes
PLATE INPUT	120 max.	120 max.	Watts
SUPPRESSOR INPUT	5 max.	—	Watts
SCREEN INPUT	15 max.	15 max.	Watts
PLATE DISSIPATION	40 max.	40 max.	Watts
TYPICAL OPERATION:			
D-C Plate Voltage	1250	1250	Volts
D-C Suppressor Voltage	0	45	Volts
D-C Screen Voltage	300	300	Volts
D-C Grid Voltage§	-100	-100	Volts
Peak R-F Grid Voltage	145	150	Volts
D-C Plate Current	80	92	Milliamperes
D-C Screen Current	33	23	Milliamperes
D-C Grid Current (Approx.)...	7	8	Milliamperes
Screen Resistor	Not recommended		
Grid Resistor	14300	12500	Ohms
Driving Power (Approx.)	0.9	1.2	Watts
Power Output (Approx.)	64	80	Watts

§ Grid voltages are given with respect to the mid-point of filament operated on a.c. If d.c. is used, each stated value of grid voltage should be decreased by 5 volts and the circuit returns made to the negative end of the filament.

† At crest of audio-frequency cycle with modulation factor of 1.0.

*** For pentode connection, grid No. 2 is screen; for tetrode connection, grids No. 2 and 3 are connected together.

‡ Connected to modulated supply.

** Connected to unmodulated plate-voltage supply.

†† Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 11½% of the carrier conditions.

INSTALLATION AND APPLICATION

The base pins of the 804 fit the standard 5-contact socket which should be installed to hold the tube in a vertical position with the base down. If it is necessary to mount the tube in a horizontal position, the socket should be mounted with the filament-pin openings one vertically above the other so that the plate will be in a vertical plane (on edge). The plate connection of the 804 is made to the cap at the top of the bulb.

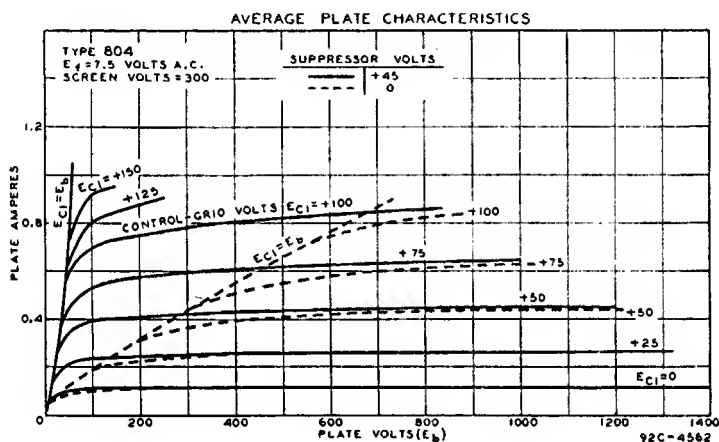
Adequate shielding and isolation of the input and the output circuit are necessary if optimum results are to be obtained. If an external shield is employed with the 804, it should be designed to enclose the base end of the tube and extend up to a position ¼ inch above the lowest edge of the internal shielding.

Clearance between the glass bulb and external shield should be at least $\frac{1}{8}$ ". The impedance between the screen and filament must be kept as low as possible by the use of a by-pass condenser. When screen voltage is obtained from a series resistance, the screen by-pass condenser should have a voltage breakdown rating high enough to withstand the full plate voltage of the tube.

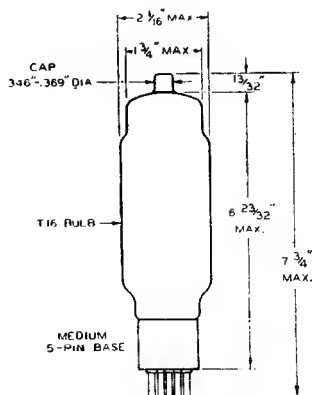
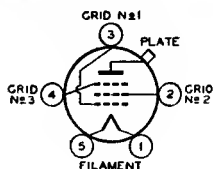
The plate of the 804 shows no color when the tube is operated at its maximum plate-dissipation rating for each class of service. The screen should not be allowed to show more than a barely perceptible red color.

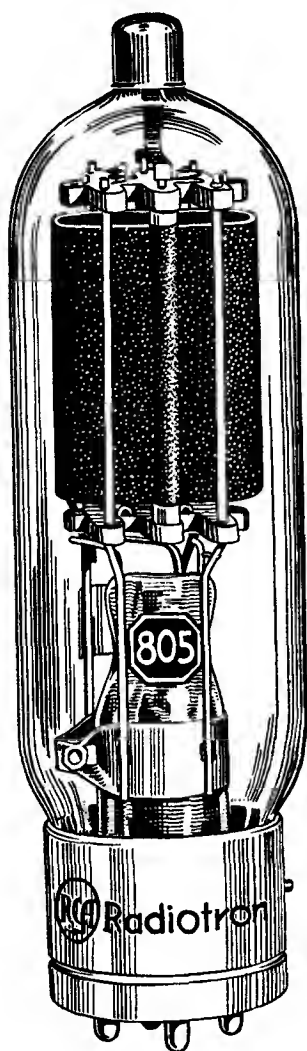
For high-frequency operation above 15 megacycles, see page 144.

For additional information, see chapters on INSTALLATION and APPLICATION.



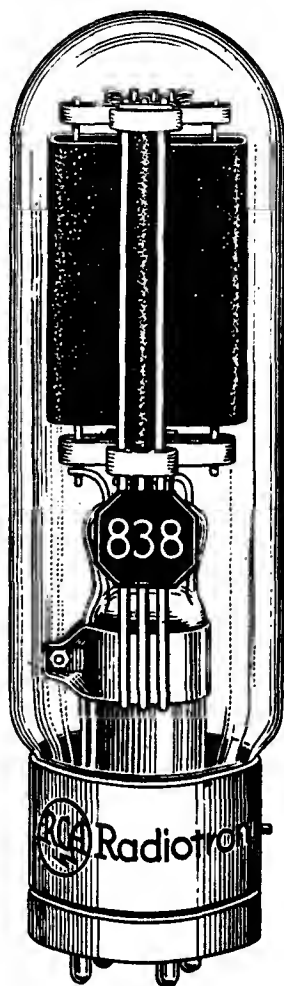
Top View of Socket Connections





RCA-805

A husky, carbon-anode triode—excellent zero-bias, class B modulator—125 watts plate dissipation—full input to 30 megacycles.



RCA-838

Carbon-anode triode particularly suited for zero-bias class B modulator applications requiring up to 260 watts of audio power.

The 203-A, 211, and 845—all of the popular so-called 50-watt class—are similar in appearance to the 838. All now have 100-watt plate dissipation rating.