

Power Amplifier Pentode

Illustrated on page 46

RCA-802 is a pentode transmitting tube of the heater-cathode 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 maintain low grid-plate capacitance. Neutralization to prevent feedback is generally unnecessary in adequately shielded circuits. The suppressor and the special internal shield are connected to individual base pins. The 802 may be operated at maximum rated input at frequencies as high as 30 megacycles.

CHARACTERISTICS

Heater Volts (a-c or d-c).....	6.3	Grid-Plate Capacitance (With	
Heater Amperes	0.9	external shielding)	0.15 max. μf
Transconductance (For plate current		Input Capacitance	12 μf
of 20 ma.) Micromhos	2250	Output Capacitance	8.5 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	500 max. Volts
D-C SUPPRESSOR VOLTAGE (Grid No. 3)	200 max. Volts
D-C SCREEN VOLTAGE (Grid No. 2)	250 max. Volts
D-C PLATE CURRENT	30 max. Milliamperes
PLATE INPUT	15 max. Watts
SUPPRESSOR INPUT	2 max. Watts
SCREEN INPUT	4 max. Watts
PLATE DISSIPATION	10 max. Watts

TYPICAL OPERATION:

D-C Plate Voltage	400	500	Volts
Suppressor [†]	Connected to cathode at socket		
D-C Screen Voltage	150	200	Volts
D-C Grid Voltage (Grid No. 1)	-22	-28	Volts
Peak R-F Grid Voltage	35	32	Volts
Internal Shield	Connected to cathode at socket		
D-C Plate Current	25	25	Milliamperes
D-C Screen Current	6.5	7	Milliamperes
D-C Grid Current (Approx.)	1	0	Milliampere
Driving Power (Approx.) [†]	0.5	0.18	Watt
Power Output (Approx.)	2.75	3.5	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	500 max. Volts
D-C SCREEN VOLTAGE (Grid No. 2)	200 max. Volts
D-C GRID VOLTAGE (Grid No. 1)	-200 max. Volts
D-C PLATE CURRENT	30 max. Milliamperes
D-C GRID CURRENT	7.5 max. Milliamperes
PLATE INPUT	15 max. Watts
SCREEN INPUT	6 max. Watts
PLATE DISSIPATION	10 max. Watts

TYPICAL OPERATION:

D-C Plate Voltage	400	500	500	Volts
D-C Suppressor Voltage (Grid No. 3)	-40	-53	-45	Volts
D-C Grid Voltage	-85	-90	-90	Volts
Peak R-F Grid Voltage	125	125	125	Volts

†. †: see end of tabulation.

Peak A-F Suppressor Voltage	40	53	65	Volts
Internal Shield	Connected to cathode at socket			
D-C Plate Current	18	20	22	Milliamperes
D-C Screen Current	28	28	28	Milliamperes
D-C Grid Current (Approx.)	7.5	5	4.5	Milliamperes
Screen Resistor	9000	10700	10700	Ohms
Grid Resistor	11300	18000	20000	Ohms
Driving Power (Approx.)	0.9	0.6	0.5	Watt
Power Output (Approx.)	2	3	3.5	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	500 max.	Volts
D-C SUPPRESSOR VOLTAGE (Grid No. 3)	200 max.	Volts
D-C SCREEN VOLTAGE (Grid No. 2)	250 max.	Volts
D-C GRID VOLTAGE (Grid No. 1)	-200 max.	Volts
D-C PLATE CURRENT	30 max.	Milliamperes
PLATE INPUT	15 max.	Watts
SUPPRESSOR INPUT	2 max.	Watts
SCREEN INPUT	4 max.	Watts
PLATE DISSIPATION	10 max.	Watts

TYPICAL OPERATION:

D-C Plate Voltage	400	500	Volts
Suppressor [†]	Connected to cathode at socket		
D-C Screen Voltage	150	200	Volts
D-C Grid Voltage	-105	-130	Volts
Peak R-F Grid Voltage	125	145	Volts
Peak A-F Grid Voltage	40	50	Volts
Internal Shield	Connected to cathode at socket		
D-C Plate Current	25	25	Milliamperes
D-C Screen Current	7.5	8	Milliamperes
D-C Grid Current (Approx.)	2	1	Milliamperes
Driving Power (Approx.) [†]	1	0.8	Watt
Power Output (Approx.)	3	4	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	400 max.	400 max.	Volts
D-C SUPPRESSOR VOLTAGE (Grid No. 3)	200 max.	—	Volts
D-C SCREEN VOLTAGE***	200 max.	200 max.	Volts
D-C GRID VOLTAGE (Grid No. 1)	-200 max.	-200 max.	Volts
D-C PLATE CURRENT	40 max.	40 max.	Milliamperes
D-C GRID CURRENT	7.5 max.	7.5 max.	Milliamperes
PLATE INPUT	16 max.	16 max.	Watts
SUPPRESSOR INPUT	2 max.	—	Watts
SCREEN INPUT	4 max.	6 max.	Watts
PLATE DISSIPATION	6.7 max.	6.7 max.	Watts

TYPICAL OPERATION:

D-C Plate Voltage	400	400	Volts
D-C Suppressor Voltage	40	—	Volts
D-C Screen Voltage***	195	85	Volts
D-C Grid Voltage	-40	-120	Volts
Peak R-F Grid Voltage	55	160	Volts
Internal Shield	Connected to cathode at socket		
D-C Plate Current	35	35	Milliamperes

†, ††, ***: see end of tabulation.

D-C Screen Current	17	21	Milliamperes
D-C Grid Current (Approx.)	1.5	6	Milliamperes
Screen Resistor	12000†	15000**	Ohms
Grid Resistor	26700	20000	Ohms
Driving Power (Approx.)	0.1	0.9	Watt
Power Output (Approx.)	8	8	Watts

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

Key-down conditions per tube without modulation††

	Pentode Connection	Tetrode Connection	
D-C PLATE VOLTAGE	500 max.	500 max.	Volts
D-C SUPP. VOLT. (Grid No. 3)	200 max.	—	Volts
D-C SCREEN VOLTAGE***	250 max.	200 max.	Volts
D-C GRID VOLT. (Grid No. 1)	-200 max.	-200 max.	Volts
D-C PLATE CURRENT	60 max.	60 max.	Milliamperes
D-C GRID CURRENT	7.5 max.	7.5 max.	Milliamperes
PLATE INPUT	25 max.	25 max.	Watts
SUPPRESSOR INPUT	2 max.	—	Watts
SCREEN INPUT	6 max.	6 max.	Watts
PLATE DISSIPATION	10 max.	10 max.	Watts

TYPICAL OPERATION:

D-C Plate Voltage	500	500	400	500	Volts
D-C Suppressor Voltage	0	40	—	—	Volts
D-C Screen Voltage***	200	250	100	100	Volts
D-C Grid Voltage	-100	-100	-60	-60	Volts
Peak R-F Grid Voltage	155	155	90	90	Volts
Internal Shield	Connected to cathode at socket				
D-C Plate Current	45	45	45	45	Milliamperes
D-C Screen Current	22	12	15	15	Milliamperes
D-C Grid Current (Approx.)	6	2	7	6	Milliamperes
Screen Resistor	13600	20800	20000	27000	Ohms
Grid Resistor	16200	50000	8600	10000	Ohms
Driving Power (Approx.)	0.9	0.25	0.7	0.5	Watt
Power Output (Approx.)	14	16	10	12	Watts

† Applying a positive voltage of not more than 40 volts to the suppressor gives slightly increased output.

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

** Connected to unmodulated plate-voltage supply.

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

‡ Connected to modulated plate-voltage supply.

†† Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

INSTALLATION AND APPLICATION

The base pins of the 802 fit the 7-contact (0.855-inch pin-circle diameter) socket which may be mounted to hold the tube in any position.

When the heater is operated from a d-c source, the cathode circuit is tied to the negative heater supply lead. In circuits where the cathode is not directly connected to the heater, the potential difference between them should not exceed 100 volts.

The internal shield should be tied to a terminal operating at zero r-f and/or a-f potential. In most cases, this connection will be made to the cathode or suppressor terminal.

Adequate shielding and isolation of the input circuit and the output circuit are necessary if optimum results are to be obtained. If an external shield is employed with the 802, it should be designed to enclose the base end of the tube and extend up to a point level with the bottom of the internal shield.

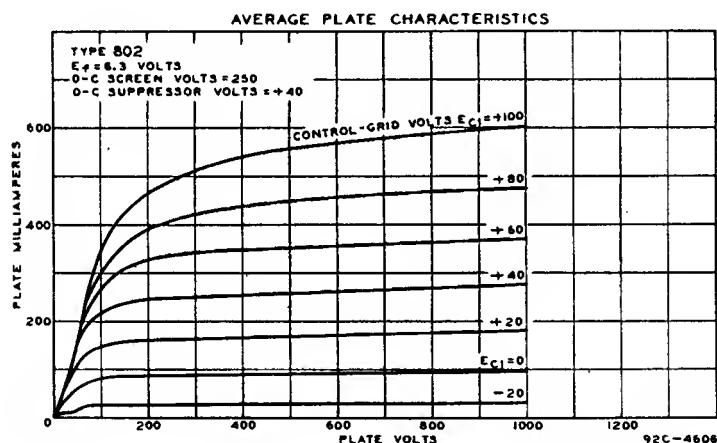
Clearance between the glass bulb and external shield should be at least $\frac{1}{8}$ ". The impedance between the screen and cathode must be kept as low as possible by the use of a by-pass condenser.

The plate of the 802 shows no color at the maximum plate-dissipation rating for each class of service. The screen should not be allowed to show more than a barely perceptible red color.

As a pentode or tetrode oscillator (crystal or self-excited), the 802 may be operated under the conditions shown for class C telegraph services. Because the internal shielding in this tube is unusually effective, it generally is necessary to introduce external feed-back in those circuits which depend on the control-grid-to-plate capacity for oscillation. This may be done by the use of a small condenser not larger than 2 to 3 μf connected between control grid and plate.

For high-frequency operation above 30 megacycles, see page 144.

For additional information, see chapters on INSTALLATION and APPLICATION.



Top View of Socket Connections

