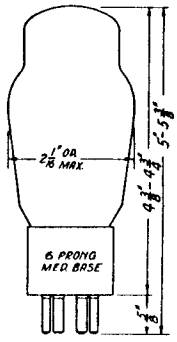
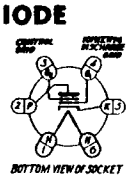


GASEOUS DISCHARGE TRIODE POWER AMPLIFIER OSCILLATOR



The RK-100 is a heater type gaseous discharge tube designed for use as a power amplifier or oscillator. The RK-100 differs from conventional tubes in that it contains mercury vapor and an auxiliary grid, number one grid, which acts as an anode for the ionizing discharge and as a virtual cathode for the amplifier section of the tube. In practice the actual cathode is used as the zero potential point for the circuit returns.

HEATER RATING

Heater Voltage	6.3	volts
Heater Current	0.9	amp

DIRECT INTERELECTRODE CAPACITANCES

Grid to Plate	19	μμf
Input	23	μμf
Output	3	μμf

A-F POWER AMPLIFIER—CLASS A

MAXIMUM RATINGS

D-C Plate Voltage	150	volts
D-C Plate Current	250	ma
D-C Control Grid Current	100	ma
D-C Ionizing Current	250	ma
Plate Dissipation	15	watts

TYPICAL OPERATION—SINGLE TUBE

D-C Plate Voltage	110	110	volts
D-C Control Grid Voltage	—1.6	—1.6	volts
D-C Ionizing Current	150	250	ma
D-C Plate Current (no signal)	50	65	ma
D-C Control Grid Current (max. signal)	7	8.5	ma
A-F Grid Voltage (RMS)	6	6	volts
Amplification Factor	40	40	
Plate Resistance	3600	2500	ohms
Transconductance	12000	16000	μmhos
Load Resistance	1600	1100	ohms
Power Output (10% Total Distortion)	3.2	4.2	watts

TYPICAL OPERATION—PUSH-PULL—TWO TUBES

D-C Plate Voltage	110	110	volts
D-C Control Grid Voltage	—1.6	—1.6	volts
D-C Ionizing Current (per tube)	150	250	ma
D-C Plate Current (no signal)	100	130	ma
D-C Control Grid Current (max. signal)	14	17	ma
A-F Grid Voltage (grid to grid) (RMS)	13	13	volts
Load Resistance (plate to plate)	2000	2000	ohms
Power Output (10% Total Distortion)	7	9	watts

R-F POWER AMPLIFIER OR OSCILLATOR—CLASS C

MAXIMUM RATINGS

D-C Plate Voltage	150	volts
D-C Plate Current	250	ma
D-C Control Grid Current	100	ma
D-C Ionizing Current	250	ma
Plate Dissipation	15	watts

TYPICAL OPERATION—R-F OSCILLATOR—CLASS C

D-C Plate Voltage	110	volts
D-C Ionizing Current	150	ma
D-C Plate Current	80	ma
D-C Control Grid Current	8	ma
Control Grid Resistor	500	ohms
Power Output	3.5	watts

TYPICAL OPERATION—R-F AMPLIFIER—CLASS C

D-C Plate Voltage	110	110	volts
D-C Ionizing Current	150	250	ma
D-C Plate Current	175	185	ma
D-C Control Grid Current	39	40	ma
Control Grid Resistor	500	500	ohms
Peak R-F Input Voltage	55	55	volts
Driving Power	2	2.1	watts
Power Output	11	12	watts

OPERATING NOTES

IONIZING DISCHARGE CIRCUIT

Under all conditions a separate current limiting resistor should be used in series with the number one grid of each tube in order to limit the discharge current to or under the rated value, as the voltage drop from the number one grid to the cathode is approximately 10 volts.

CIRCUIT OPERATION

The operation of the RK-100 is similar to that of a conventional high vacuum tube except for the ionizing discharge mentioned above and the markedly different values of tube parameters such as high transconductance and high grid current.

The internal impedance of the RK-100 is very low with a large signal on the grid. This makes it necessary to tap down on the output plate coil to match the low tube impedance. The input impedance is low so relatively few turns are required on the secondary of the driver transformer for optimum conditions. The above characteristics, low input and output impedances, make it difficult to obtain the same power from a self-excited oscillator as can be obtained from a driven amplifier. The power necessary to drive the tube may be obtained from conventional tubes such as the type 48 or one RK-100 will drive two RK-100 tubes.

IMPORTANT

When first placing the RK-100 in operation it should be allowed to warm up for about 15 minutes to insure that no drops of mercury are shorting the elements. Thereafter, this precaution need not be taken unless the tube has been handled in such a way as to get mercury on the elements.