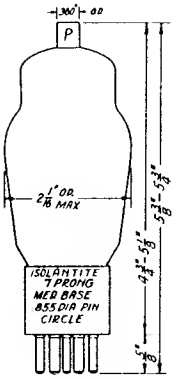
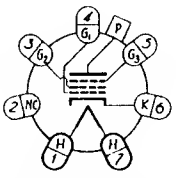
# RK-45
## PENTODE POWER AMPLIFIER OSCILLATOR




The RK-45 is a heater type pentode power amplifier tube having an isolantite base. It is designed for use as a power amplifier, oscillator or frequency multiplier. The RK-45 may also be used in circuits employing suppressor or control grid modulation.



BOTTOM VIEW OF SOCKET

### HEATER RATING

| | | |
|---|---|---|
| Heater Voltage | 12.6 | volts |
| Heater Current | 0.45 | amp |

### DIRECT INTERELECTRODE CAPACITANCES

| | | |
|---|---|---|
| Grid to Plate | 0.02 | μμf |
| Input | 10 | μμf |
| Output | 10 | μμf |

### R-F POWER AMPLIFIER OR OSCILLATOR—CLASS C

#### MAXIMUM RATINGS

| | | |
|---|---|---|
| D-C Plate Voltage—Telegraphy | 500 | volts |
| D-C Plate Voltage—Telephony With Control or Sup. Grid Modulation | 500 | volts |
| With Plate & Screen Mod. | 400 | volts |
| D-C Screen Voltage | 250 | volts |
| D-C Plate Current | 60 | ma |
| D-C Control Grid Current | 10 | ma |
| Plate Dissipation | 10 | watts |
| Screen Dissipation | 8 | watts |

#### TYPICAL OPERATION

| | Telephony Control Grid Modulation | | Telephony Suppressor Grid Modulation | Telephony Plate & Screen Modulation | Telegraphy | | |
|---|---|---|---|---|---|---|---|
| D-C Plate Voltage | 500 | 500 | 500 | 400 | 500 | 500 | volts |
| D-C Screen Voltage | 200 | 200 | 200 | 150 | 200 | 200 | volts |
| D-C Sup. Grid Voltage | 0 | +45 | −45 | 0 | 0 | +45 | volts |
| D-C Con. Grid Volt. | −125 | −125 | −90 | −90 | −90 | −90 | volts |
| D-C Plate Current | 32 | 34 | 31 | 43 | 50 | 55 | ma |
| D-C Screen Current | 20 | 20 | 39 | 30 | 40 | 38 | ma |
| D-C Con. Grid Current | 1.5 | 1.5 | 4 | 6 | 4 | 4 | ma |
| Screen Resistor | — | — | — | 8300‡ | — | — | ohms |
| Peak R-F Input Volt. | 150 | 150 | 135 | 145 | 135 | 135 | volts |
| R-F Driving Power | 1.2* | 1.3 * | 0.5 | 0.8 | 0.5 | 0.5 | watts |
| Carrier Power Output | 5.5 | 6.5 | 6 | 13.5 | 18 | 22 | watts |
| Peak A-F Volt.—Plate | — | — | — | 400 * | — | — | volts |
| Peak A-F Volt.—Grid | 45 * | 45 * | 75 * | 150 * | — | — | volts |
| A-F Modulating Power | 0.5* | 0.55* | 0.3* | 14.5 | — | — | watts |
| Peak Power Output | 22 * | 26 * | 24 * | 54 * | — | — | watts |

### R-F POWER AMPLIFIER—CLASS B—TELEPHONY

#### MAXIMUM RATINGS

| | | |
|---|---|---|
| D-C Plate Voltage | 500 | volts |
| D-C Screen Voltage | 250 | volts |
| D-C Plate Current (Carrier) | 35 | ma |
| Plate Dissipation (Carrier) | 10 | watts |
| Screen Dissipation (Carrier) | 8 | watts |

#### TYPICAL OPERATION

| | | |
|---|---|---|
| D-C Plate Voltage | 500 | volts |
| D-C Screen Voltage | 200 | volts |
| D-C Suppressor Grid Voltage | 0 | volts |
| D-C Control Grid Voltage | −38 | volts |
| D-C Plate Current | 30 | ma |
| D-C Screen Current | 12 | ma |
| Peak R-F Input Voltage | 80 * | volts |
| R-F Driving Power | 0.24* | watts |
| Carrier Power Output | 5 | watts |
| Peak Power Output | 20 * | watts |

*At the peak of the a-f cycle with 100% modulation.
‡Connected to plate end of modulation trans. and by-passed for r.f. only.

### OPERATING NOTES

**CHARACTERISTIC CURVES**
For average characteristic curves refer to the type RK-25. The characteristics of the RK-45 and RK-25 are the same except for the heater rating.

**FREQUENCY RANGE**
The RK-45 may be operated at the maximum ratings at frequencies up to 30 megacycles. Above 30 megacycles the reduced efficiency realized requires that the plate voltage be lowered to prevent the plate dissipation from exceeding the maximum rated value.

**EXCITATION**
The Class C amplifier characteristic curves show the power output, plate current and screen current plotted vs. excitation as denoted by the d-c control grid current in milliamperes. The power output flattens off around 4 or 5 ma. of grid current with very little gained beyond these values. The screen dissipation increases with excitation and for this reason the excitation should be kept at a reasonable value.

**SHIELDING**
Shielding of the grid input tuning system from the plate tuning apparatus is desirable and will provide improved stability. If a shield is applied to the RK-45 it should enclose the base and extend to the lower internal shield and should clear the glass bulb by at least 1/16".

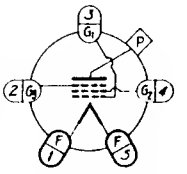
**BIAS**
At least 25 volts of fixed bias should be used with 500 volts on the plate to protect the tube in case of failure of the bias or excitation. Additional bias may be obtained by the use of a grid or cathode resistor.

**CRYSTAL OSCILLATOR**
Using crystal control, 20 watts of r-f power output may be obtained without overheating the crystal.

**PLATE TEMPERATURE**
The plate of the RK-45 will not show color when operated at the rated plate dissipation. Dissipations above the rated value should be avoided.

# RK-46
## PENTODE POWER AMPLIFIER OSCILLATOR

The RK-46 is a pentode type power amplifier tube having a thoriated tungsten filament, a molybdenum plate, a hard glass bulb and an isolantite base. It is designed for use as a power amplifier, oscillator or frequency multiplier. The RK-46 may also be used in circuits employing suppressor or control grid modulation.



BOTTOM VIEW OF SOCKET

### FILAMENT RATING

| | | |
|---|---|---|
| Filament Volt. | 12.6 | volts |
| Filament Cur. | 2.5 | amp |

### DIRECT INTERELECTRODE CAPACITANCES

| | | |
|---|---|---|
| Grid to Plate | 0.1 | μμf |
| Input | 14 | μμf |
| Output | 12 | μμf |

### R-F POWER AMPLIFIER OR OSCILLATOR—CLASS C

#### MAXIMUM RATINGS

| | | |
|---|---|---|
| D-C Plate Voltage—Telegraphy | 1250 | volts |
| D-C Plate Voltage—Telephony With Control or Sup. Grid Modulation | 1250 | volts |
| With Plate & Screen Mod. | 1000 | volts |
| D-C Screen Voltage | 300 | volts |
| D-C Plate Current | 92 | ma |
| D-C Control Grid Current | 15 | ma |
| R-F Control Grid Current | 5 | amp |
| Plate Dissipation | 40 | watts |
| Screen Dissipation | 15 | watts |

#### TYPICAL OPERATION

| | Telephony Control Grid Modulation | | Telephony Suppressor Grid Modulation | Telephony Plate & Screen Modulation | Telegraphy | | |
|---|---|---|---|---|---|---|---|
| D-C Plate Voltage | 1250 | 1250 | 1250 | 1000 | 1250 | 1250 | volts |
| D-C Screen Voltage | 300 | 300 | 300 | 300 | 300 | 300 | volts |
| D-C Sup. Grid Volt. | 0 | +45 | −45 | 0 | 0 | +45 | volts |
| D-C Con. Grid Volt. | −142 | −142 | −100 | −100 | −100 | −100 | volts |
| D-C Plate Current | 40 | 40 | 48 | 75 | 80 | 92 | ma |
| D-C Screen Current | 7 | 7 | 44 | 30 | 43 | 36 | ma |
| D-C Con. Grid Current | 1.8 | 1.8 | 11.5 | 10 | 11.5 | 11.6 | ma |
| Screen Resistor | — | — | — | 23000‡ | — | — | ohms |
| Peak R-F Input Volt. | 160 | 160 | 140 | 145 | 155 | 155 | volts |
| R-F Driving Power | 1.5* | 1.5* | 1.5 | 1.3 | 1.6 | 1.6 | watts |
| Carrier Power Output | 17 | 20 | 21 | 52 | 64 | 84 | watts |
| Peak A-F Volt.—Plate | — | — | — | 1000* | — | — | volts |
| Peak A-F Volt.—Grid | 30 * | 30 * | 75 * | 300 * | — | — | volts |
| A-F Modulating Power | 0.3* | 0.3* | 0.36* | 52 | — | — | watts |
| Peak Power Output | 68 * | 80 * | 84 * | 208 * | — | — | watts |

### R-F POWER AMPLIFIER—CLASS B—TELEPHONY

#### MAXIMUM RATINGS

| | | |
|---|---|---|
| D-C Plate Voltage | 1250 | volts |
| D-C Screen Voltage | 300 | volts |
| D-C Plate Current (Carrier) | 70 | ma |
| Plate Dissipation (Carrier) | 40 | watts |
| Screen Dissipation (Carrier) | 15 | watts |

#### TYPICAL OPERATION

| | | |
|---|---|---|
| D-C Plate Voltage | 1250 | volts |
| D-C Screen Voltage | 300 | volts |
| D-C Suppressor Grid Voltage | 0 | volts |
| D-C Grid Voltage | −30 | volts |
| D-C Plate Current | 43 | ma |
| D-C Screen Current | 15 | ma |
| Peak R-F Input Voltage | 70 * | volts |
| R-F Driving Power | 0.5* | watts |
| Carrier Power Output | 16 | watts |
| Peak Power Output | 64 * | watts |

*At the peak of the a-f cycle with 100% modulation.
‡Connected to plate end of modulation trans. and by-passed for r.f. only.

### OPERATING NOTES

**CHARACTERISTIC CURVES**
For average characteristic curves refer to the type RK-20A. The characteristics of the RK-46 and RK-20A are the same except for the filament rating.

**FREQUENCY RANGE**
The RK-46 may be operated at the maximum ratings at frequencies up to 30 megacycles. At frequencies between 30 megacycles and 60 megacycles the maximum d-c plate voltage should not exceed 900 volts. The operation of the tube at frequencies higher than 60 megacycles is not recommended.

**EXCITATION**
The Class C amplifier characteristic curves show the power output, plate current and screen current plotted vs. excitation as denoted by the control grid current in milliamperes. The power output flattens off around 11 or 12 ma. of grid current with very little gained beyond these values. The screen dissipation increases with excitation and for this reason the excitation should be kept at a reasonable value.

**SHIELDING**
Shielding of the grid input tuning system from the plate tuning apparatus is desirable and will provide improved stability. If a shield is applied to the RK-46 it should enclose the base and extend to the lower internal shield and should clear the glass bulb by at least 1/16".

**BIAS**
Battery bias, or at least partial battery bias on the control grid is recommended. Additional bias may be obtained by placing a resistor in series with the battery.

**CRYSTAL OSCILLATOR**
Using crystal control, 50 watts of r-f power output may be obtained without overheating the crystal.

**PLATE TEMPERATURE**
The plate of the RK-46 will not show color when operated at the rated plate dissipation. Dissipations above the rated value should be avoided.