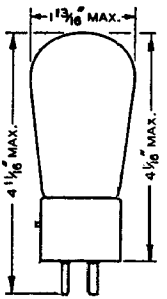
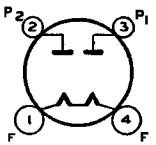


RCA-82

FULL-WAVE MERCURY-VAPOR RECTIFIER



The 82 is a full-wave mercury-vapor rectifier tube of the hot-cathode type for use in suitable rectifying devices designed to supply d-c power of uniform voltage to receivers in which the direct-current requirements are subject to considerable variation. The excellent voltage-regulation characteristic of the 82 is due to its low and practically constant tube voltage drop (only about 15 volts) for any current drain up to the full emission of the filament (see page 8).

CHARACTERISTICS

Filament Voltage (A. C.)	2.5	Volts
Filament Current	3.0	Amperes
A-C Voltage Per Plate (RMS)	500 *max.*	Volts
Peak Inverse Voltage	1400 *max.*	Volts
D-C Output Current (Continuous)	125 *max.*	Milliamperes
Peak Plate Current	400 *max.*	Milliamperes
Tube Voltage Drop (Approximate)	15	Volts
Bulb		S-14
Base		Medium 4-Pin

MERCURY-VAPOR RECTIFIER CONSIDERATIONS

The 82 has very low internal resistance, so that the current it delivers depends on the resistance of the load and the regulation of the power transformer. Sufficient protective resistance or reactance must always be used with this tube to limit its current to the recommended maximum value. If this value is exceeded, the tube voltage drop will increase rapidly and may permanently damage the filaments.

It is characteristic of mercury-vapor rectifiers that no appreciable plate current will flow until the plate voltage reaches a certain critical positive value. At this point the plate current rises steeply to a high value in a small fraction of a second This surge of current re-occurring each time either plate becomes positive may excite circuits in the vicinity of the tube to damped oscillation and thus cause noisy radio receiver operation. It is usually necessary, therefore, to provide small radio-frequency chokes in series with each plate lead so that the slope of the current wave front to the filter is reduced sufficiently to eliminate impact excitation.

INSTALLATION

The **base** pins of the 82 fit the standard four-contact socket, which should be installed to hold the tube in a vertical position with the base down. Only a socket making very good filament contact and capable of carrying 3 amperes continuously should be used. Poor contact at the filament pins will cause overheating at the pins and socket, lowered filament voltage, and high internal tube drop with consequent injury to the tube.

The **bulb** becomes hot during continuous operation. Provision should be made for adequate natural ventilation to prevent overheating, especially if shielding is employed.

The coated **filament** is intended for a-c operation from one of the secondary windings of a power transformer. This winding, provided with a center-tap or center-tap resistor, should supply at the filament terminals the rated operating voltage of 2.5 volts when average rated voltage is applied to the primary. The high current taken by the filament and the possibility of damage caused by applying plate voltage to the tube with its filament insufficiently heated make it imperative that all connections in the filament circuit be of low resistance and of adequate current-carrying capacity.

The **plate supply** is obtained from a center-tapped high-voltage winding designed so that the maximum a-c input voltage per plate will not exceed 500 volts RMS under varying conditions of supply-line voltage. The resistance of the transformer windings should, of course, be low if full advantage of the excellent regulation capabilities of this mercury-vapor rectifier is to be obtained. Since the drop through the tube is practically constant, any reduction in rectified voltage when the load is increased is due to the drop in the transformer and/or the filter windings. The return-lead from the plates, i.e., the positive bus of the filter and load circuit, should be connected to the center-tap of the filament winding.

Shielding of this tube, particularly in sensitive receivers, may be necessary to eliminate objectionable noise. Radio-frequency choke coils, connected in series with each plate lead and placed within the shielding if used, are usually necessary in receivers having high sensitivity. The inductance of the chokes should be one millihenry or more.

A **fuse** having a rating approximately 50% in excess of normal load requirements should be inserted in the primary of the power transformer to prevent damage in case of excessive current which may flow under abnormal conditions.

It is recommended that the entire equipment be disconnected from the a-c power supply whenever the 82 is removed from or installed in its socket.

APPLICATION

As a **full-wave rectifier,** the 82 is recommended for supplying d-c power to receivers, particularly those in which the direct-current requirements cause considerable variation in the load impressed on the rectifier tube.

As a **half-wave rectifier,** the 82 may be operated with plates connected in parallel. For example, two 82's so arranged in a full-wave circuit can supply twice the output current of a single tube. When the 82's plates are operated in parallel, a resistor of not less than 100 ohms should be connected in series with each plate in order that each plate will carry its proper share of the total load.

Filter circuits (page 37) of either the condenser-input or the choke-input type may be employed provided the maximum voltages and currents tabulated under CHARACTERISTICS are not exceeded. The choke-input type of circuit is to be preferred from the standpoint of obtaining the maximum continuous d-c output current from the 82 under the most favorable conditions.

Under operating conditions, the 82 has a bluish-white glow filling the space within the plates and extending to some degree into the surrounding space outside the plates. This glow, caused by the mercury vapor, is an inherent operating characteristic of the 82.