

TECHNICAL DATA ON  
RESITRON BAYARD - ALPERT IONIZATION  
GAUGE TYPE R-6981

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## TECHNICAL DATA

on

### RESITRON 6981 IONIZATION GAUGE

#### DESCRIPTION:

The Resitron 6981 is a Bayard type ionization gauge which bears a directly heated, thoria coated cathode, which is not damaged by repeated exposures when operated at 1500° C (brightness) to air at atmospheric pressure. This is made possible by means of a special electron emitter made of an iridium-rhodium alloy\* which is extremely resistant to oxidation even at elevated visible temperatures. Repeated exposures to air do not alter the work function of such a cathode, and emission decay is only accompanied by loss of thoria from the emitter surface. This type of cathode is capable of sufficient electron emission in oxygen pressures as high as  $10^{-2}$  mm Hg in contrast to the pure emitter types which become "poisoned" due to oxygen contamination, even at pressures in the order of  $10^{-3}$  mm Hg.

In addition to the non-poisoning and non-burn out feature, the ability of the 6981 gauge to operate at the higher pressures is of great advantage in cases where it is necessary to monitor the ion gas currents at the higher pressures. The versatility of the gauge is further enhanced by the utilization of the Bayard\*\* triode configuration which makes it possible to extend the low pressure range of the device to pressures substantially below  $10^{-9}$  mm Hg. This is made possible by means of the geometry of the internal gauge elements and small physical size of the ion collector. In gauges of standard geometry, x-rays are generated by electrons striking the grid or accelerator electrode at high velocities. These x-rays, on striking the ion collector electrode, cause it to emit electrons creating a response which cannot be isolated from that produced by ions impinging upon the same electrode. In the Bayard design, the amount of x-radiation intercepted by the ion collector electrode may be made extremely small by making the ion collector size as small as is practicable. In this manner, the accurate determination of ion currents at very low pressures is possible as such measurements are not altered by the deleterious effects of x-radiation. This is an important contribution to the field of high vacuum physics, as it makes possible pressure measurements at least 200 times lower than have heretofore been possible, providing, of course, that proper instrumentation is available to measure these minute ion currents.

\* Patent applied for.

\*\* U. S. Patent 2,605,431.

## RL-6981 OPERATING CHARACTERISTICS

|                     |   |
|---------------------|---|
| Filament Voltage:   | 3.0 - 6.0V, A. C. or D. C.  |
| Filament Current:   | 3.0 - 6.0 Amperes   |
| Grid Voltage        | 150V, D. C. Positive  |
| Collector Voltage   | 22-1/2V, D. C. Negative   |
| Sensitivity:        | 100 microamperes per micron when grid current is 10 milliamperes. |
| Outgassing of Grid: | 7.0V at 10 Amperes for 120 seconds (See Note 1)                   |
| Pressure Range:     | $10^{-2}$ to $5 \times 10^{-12}$ mm Hg                            |

### Operating Suggestions:

Note 1. For operation at low gas pressures, it is essential to completely outgas the gauge envelope and elements. The Nonex glass envelope may be outgassed with a soft gas flame or baked in evacuation oven at 400° C while simultaneously passing a current through pins 4 and 5 (see base diagram). The grid temperature should be elevated to 800° C and operated at this value for 120 seconds while the bulb is at its maximum bake-out temperature. This is only necessary when the gauge has been accidentally exposed to atmosphere during operation.

Note 2. Make certain that the base of the RL-6981 is dry and free from carbon and other deposits prior to making very small ion current measurements. This is particularly important around the ion collector pin 3. It is also essential that the lead connecting the ion collector pin 3, to the high gain amplifier be suitably shielded and grounded.

### Interchangeability:

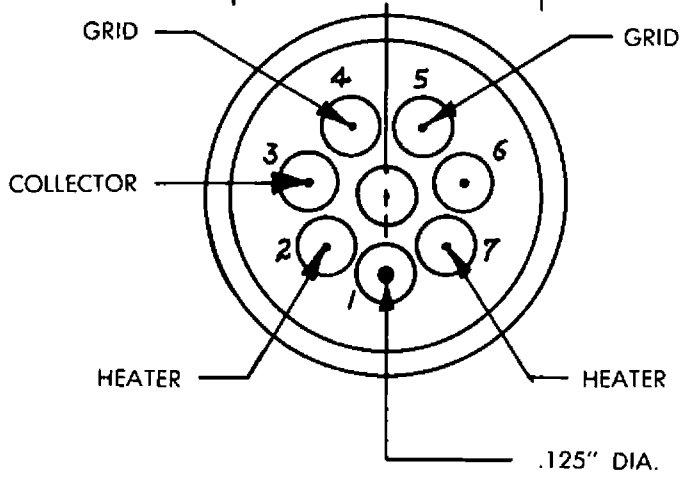
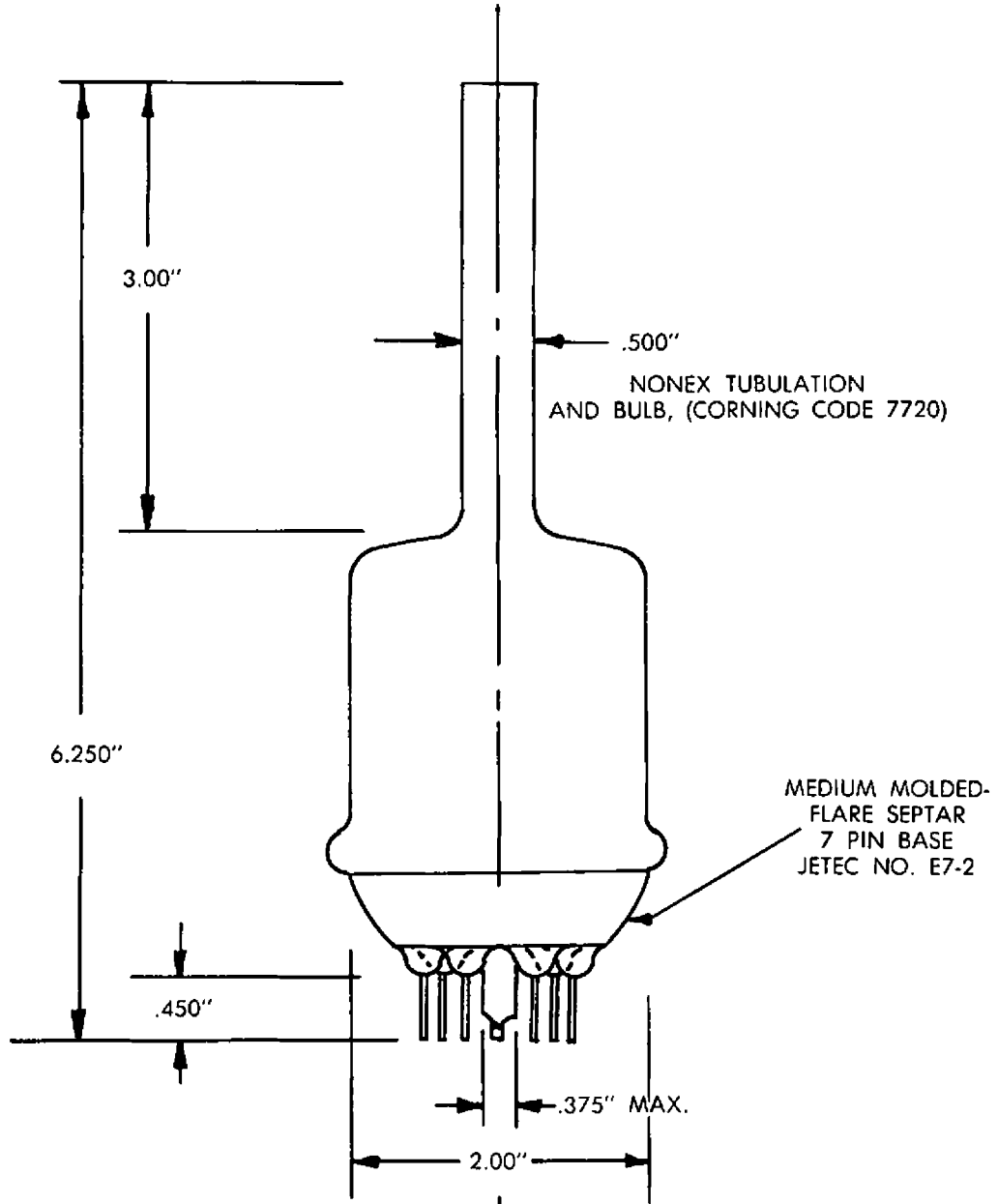
The RL-6981 can be operated in any commercial gauge circuit, if the calibration of the gauge is taken into consideration.

### Operation at very low pressures:

For operation at very low pressures it is often desirable to operate the filament at reduced power to prevent undue outgassing of the bulb. Sensitivity, of course, is proportional to grid current.

Mounting Position: Vertical, with base either up or down.

# GAUGE DIMENSIONS



BASE CONNECTIONS  
Bottom View