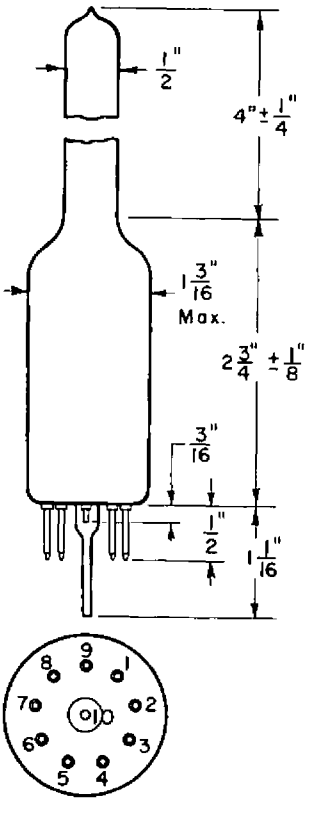
IONIZATION GAUGE TUBE TYPE 7904

The 7904 is an ionization type vacuum gauge for measurement of gas pressure in the range from 1×10^{-3} to 1×10^{-9} mm of mercury. The tube has a hard glass bulb with a one-half inch diameter pyrex tubulation.

The 7904 is a triode of the Bayard-Alpert inverted geometry design with three tungsten filaments. The filaments may be operated one at a time with two spares, two filaments in series or parallel with one spare, or three filaments in parallel. The grid structure is operated at a positive potential with respect to the filament while the ion collector is at a negative potential. As electrons are accelerated from the filament to the grid, they bombard and ionize gas molecules, and the resultant positive ions are attracted to the collector. The ratio of the collector current to the grid current is proportional to the gas pressure.

Outgassing of metal and glass parts is accomplished by connecting grid and collector together and passing a high current through the tube. Sufficient emission current for outgassing is obtained by adjusting filament voltage.



INDEX TO TERMINALS

1. Filament 1
2. Filament Common
3. Grid
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6. Grid
7. Filament 3
8. Filament Common
9. Short Index Pin (NC)
10. Collector

ELECTRICAL:

Filament Material	Tungsten	
Filament:		
Voltage (ac or dc) (Approx.)	4	Volts
Current	1.5	Amperes

MECHANICAL:

Cooling Method	Free Air Convection
Bulb Diameter	1-3/16 Max.
Tubulation: (Note 1)	
Glass	Pyrex Corning Code 7740
Size	1/2" Diameter
Mounting Position	Vertical

MAXIMUM RATINGS:

Absolute Maximum Values

Ion Collector Voltage	−100	max.	Volts
Grid Voltage	+500	max.	Volts
Ambient Temperature	100	max.	°C
Gas Pressure (Power Applied)	1×10^{-3}	max.	mm Hg.

TYPICAL OPERATION: (Note 2)

Ion Collector Voltage	−30	Volts
Grid Voltage	+150	Volts
Grid Current	10	Ma.
Sensitivity	$1\ \mu a/10^{-5}$	mm Hg.

CONDITIONS FOR OUTGASSING ELEMENTS:

Ion Collector	Connected to Grid		
Grid Voltage	+500	max.	Volts
Filament:			
Series (Two Filaments)	10	max.	Volts
Parallel	5	max.	Volts
Grid and Collector Power	30	max.	Watts

1. Other ion gauges, similar to type 7904 but having different sizes and materials of tubulation, are available under different numbers.

2. The type 7904 is similar in construction to the type 5966. For a detailed description of the operation and application of Bayard-Alpert ion gauges, refer to 5966 data sheet.

Figure 1 is an example of a control circuit, using a thermocouple gauge, which prevents application of power to ion gauge when pressure is too high. Figure 2 is a simple ion gauge power supply which requires an adjustment every time a pressure reading is taken.

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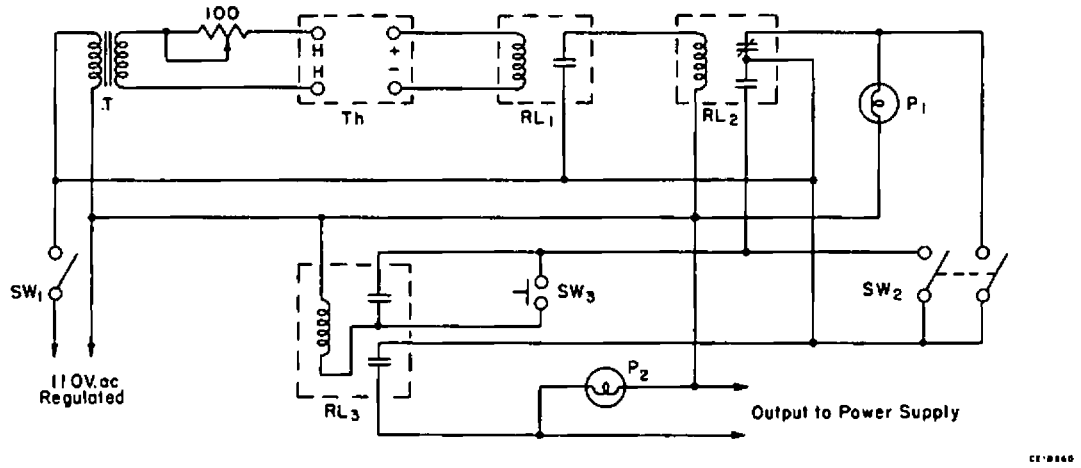

FIGURE 1

Resistor value in ohms

Th – Thermocouple: Type 7677 or equivalent
RL_1 – Sensitrol or equivalent
RL_2 – Weston 712 relay or equivalent
RL_3 – 115-volt relay
P_1 – 115-volt pilot lamp, red
P_2 – 115-volt pilot lamp, green
SW_1 – Switch
SW_2 – DPST switch
SW_3 – Manual start-reset (normally open push button)
T – Transformer: 110v primary; 6.3v, 1a. secondary

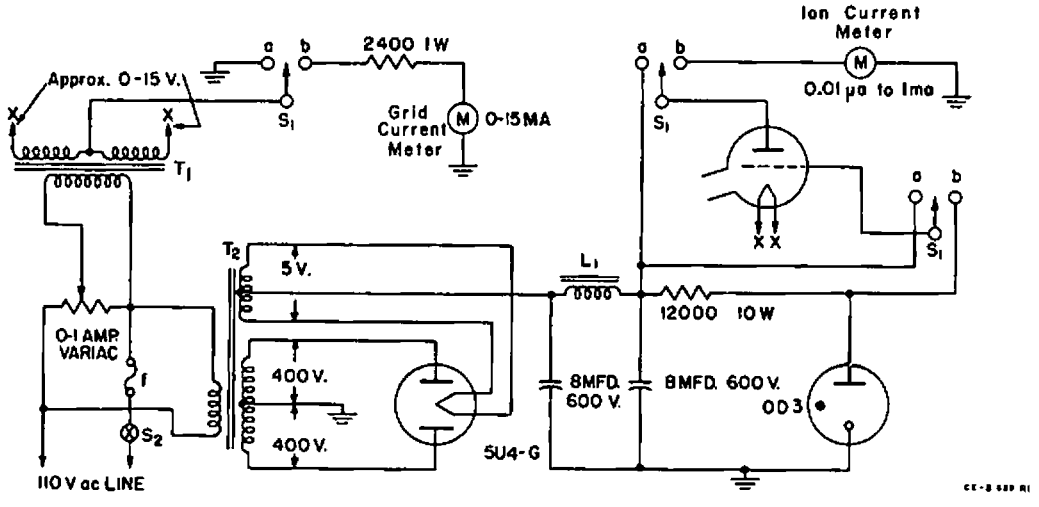

FIGURE 2

Resistor value in ohms

L_1 – Stancor C-1721 or equivalent
T_1 – UTC S70 or equivalent
T_2 – Stancor PM8412 or equivalent
S_1 – 3PDT switch (position a to outgas, position b to operate)