

May 15, 1960

HIGH PRESSURE ION GAUGE TYPE 7676

The 7676 is a three electrode ionization type vacuum gauge designed to measure gas pressures in the range of 1×10^{-5} to 5×10^{-1} mm Hg. The operating filament is a thorium coated iridium wire. Filament burnout will not occur if the tube is accidentally let down to air during operation. The ion collector is a flat plate parallel to the operating filament. The other electrode, which is used as an electron emitter during outgassing and as an electron collector during operation, is a tungsten ribbon parallel to the ion collector on the opposite side of the operating filament.

ELECTRICAL:

Outgassing:

Cathode Tungsten Ribbon Filament
 Filament:
 Voltage (ac or dc) approx. 5 Volts
 Current 13 Amperes

Operating:

Cathode Thorium Coated Iridium Filament
 Filament:
 Voltage 2.0 Volts
 Current at 1×10^{-5} mm Hg. 2.25 Amperes

MECHANICAL:

Type of Cooling Air
 Tubulation:
 Glass Nonex, Code 7720
 Size $\frac{1}{2}$ " Diameter
 Mounting Position Any

MAXIMUM RATINGS:

Absolute Maximum Values

Outgassing: (DC voltages are with respect to Outgas-Filament-Electron-Collector Electrode)
 Ion collector Voltage 500 max. Volts
 Ion Collector DC Power Input 15 max. Watts
 Filament Voltage (ac or dc) 5.5 max. Volts
 Ambient Temperature 100 max. °C
 Operating: (DC voltages are with respect to Operate Filament)
 Ion Collector Voltage +65 max. Volts
 Outgas-Filament-Electron-Collector
 Electrode Voltage -65 max. Volts
 Filament Voltage (ac or dc) 2.0 max. Volts
 Ambient Temperature 100 max. °C
 Gas Pressure 1 max. mm Hg

OUTGASSING CONDITIONS

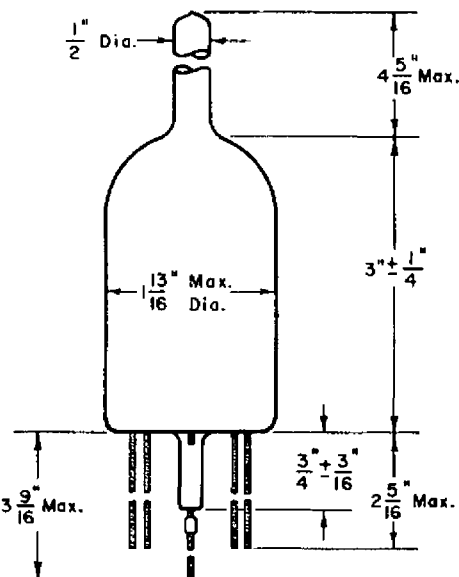
Ion Collector Voltage with respect to Outgas-Filament-Electron-Collector Electrode +300 Volts
 Operate-Filament* Connected to Outgas-Filament-Electron-Collector-Electrode
 Outgas-Filament:
 Voltage (ac or dc) 5.0 Volts
 Current 13 Amperes

OPERATING CONDITIONS

Ion Collector Voltage with respect to Operate-Filament -60 Volts
 Outgas-Filament-Electron-Collector Electrode Voltage with respect to Operate Filament +60 Volts
 Operate-Filament Conditions for 50 Microamperes Electron Current:
 Voltage (ac or dc)
 At 1×10^{-4} mm Hg. 1.1 Volts
 At 5×10^{-1} mm Hg. 1.8 Volts
 Electron Current:
 From 1×10^{-4} to 1×10^{-2} mm Hg. 1 Ma.
 From 1×10^{-3} to 1×10^{-1} mm Hg. 50 μ A.
 From 1×10^{-2} to Saturation 10 μ A.
 Sensitivity with Nitrogen
 $S = (i^+ / i^-) \times (1/P)$ 0.4 (mm Hg)^{-1}

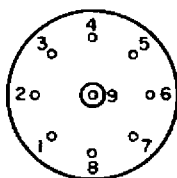
Pressure Measuring Range with Nitrogen (See Figure 1) 1×10^{-4} to 6×10^{-1} mm Hg

* Voltage must not be applied across operate filament during outgassing.



OUTGASSING (See Note)

Electrode	Lead
Outgas Filament (+)	1 & 3
Outgas Filament (-)	5 & 7
Collector	9
Tie Lead 2 or 6 to one side of outgas Filament.	



OPERATING

Electrode	Lead
Operate Filament (+)	2
Operate Filament (-)	6
Ion Collector	9
Electron Collector 1, 3, 5 or 7	

(Pins 4 & 8 are short leads.)

Note: Both leads of each terminal of outgas filament must be used during outgassing to prevent damage to the tube.

Special Devices Section

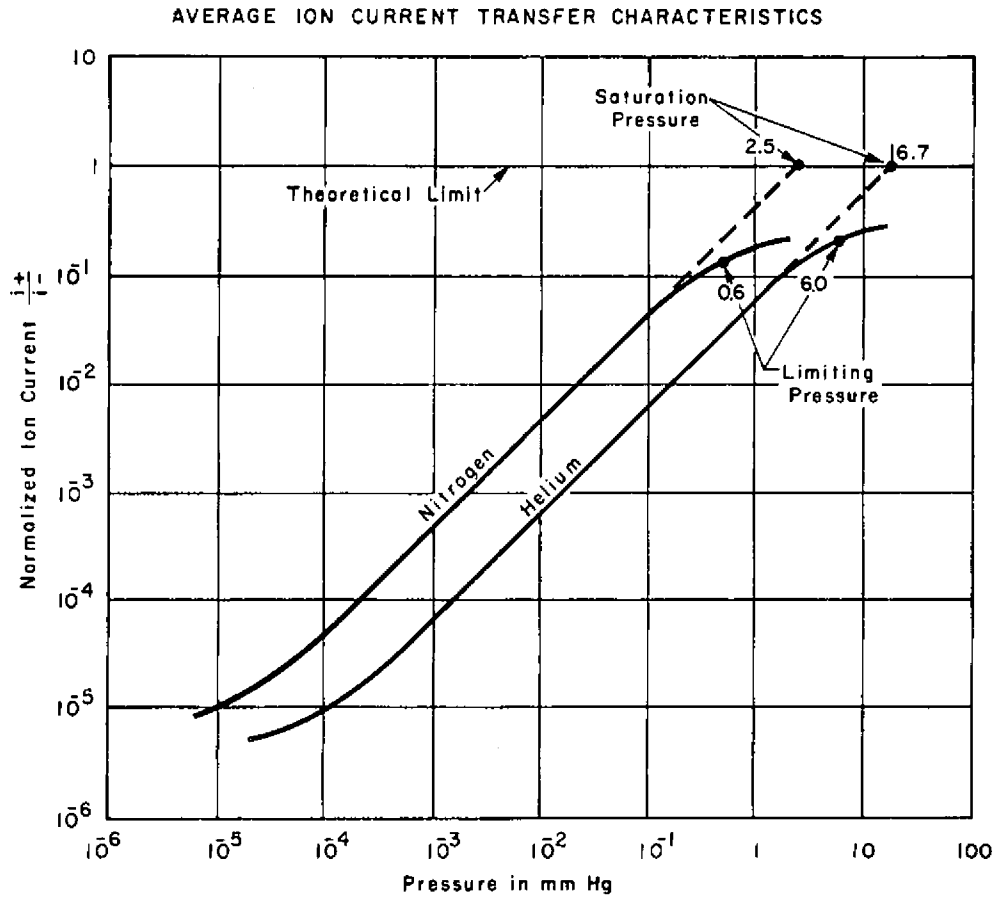


FIGURE 1

CE-A1572

GAUGE CHARACTERISTICS FOR DIFFERENT GASSES

	N ₂	CO	He	H ₂
Sensitivity in (mmHg) ⁻¹	0.4	0.42	0.06	0.21
Saturation Pressure in mmHg.	2.5	2.6	16.7	4.8
Limiting Pressure in mmHg.	0.6	0.6	6.0	0.6

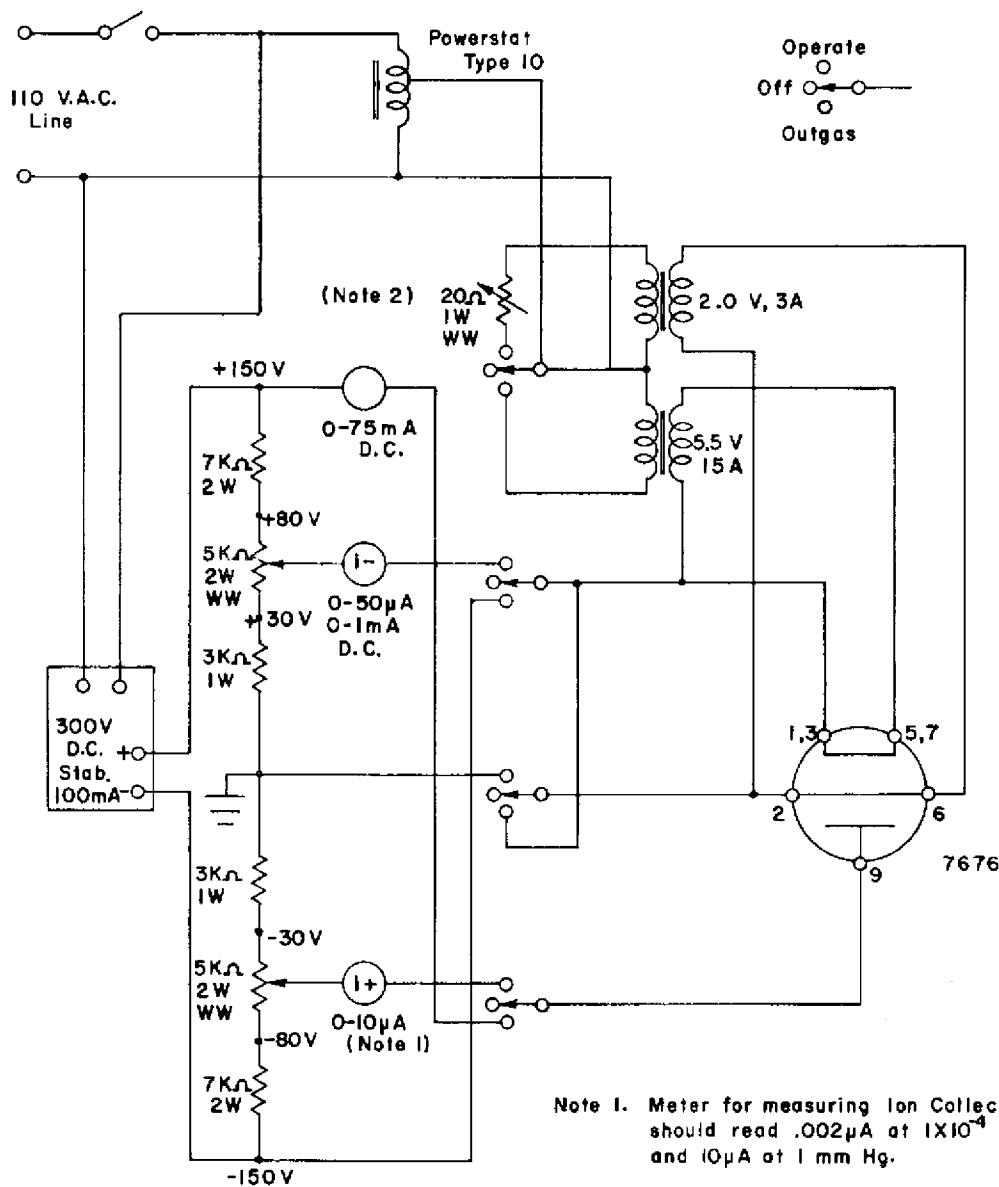
APPLICATION DATA

The circuitry for operation of the tube consists of suitable 60 V DC. power supplies for each collecting electrode and a variable voltage filament supply. A meter with ranges from 10⁻⁵ to 10⁻³ ampere is required for measuring electron current and a sensitive microammeter with ranges from 10⁻⁸ to 10⁻⁵ amperes is required in the ion collector circuit. The filament power required is 2 volts at 2.5 amperes for operation and 5.5 volts at 13 amperes for outgassing. A circuit incorporating these features is shown in Figure 2. In this circuit, a 300 volt, 100 milliamperes stabilized power supply is used.

For outgassing the full 300 V is used, the outgassing current being set by the outgassing filament temperature. The outgas filament voltage is adjusted by a variable auto-transformer.

During operation, the operating filament is connected to the center of a resistance chain across the power supply. The electron collector and ion collector are connected to potentiometers in the resistance chain, so that the ion collector is approximately 60 volts negative, and the electron collector approximately 60 volts positive with respect to the operate filament. The operate filament supply is controlled by a variable auto-transformer, with a series variable resistance which acts as a fine control.

7676 GAUGE POWER SUPPLY



Note 1. Meter for measuring Ion Collector should read .002 μ A at 1×10^{-4} mm Hg. and 10 μ A at 1 mm Hg.

Note 2. Fine control for filament voltage will give 2% variation.

FIGURE 2

CE - B1577

Since pressures over a wide range are to be covered, the cooling effect by the residual gas on the filament can be considerable, resulting in changes in electron current. An operate circuit with an automatic filament control, in which a change in electron current will be compensated by a change in filament voltage, is shown in Figure 3.

AUTOMATIC CONTROL CIRCUIT

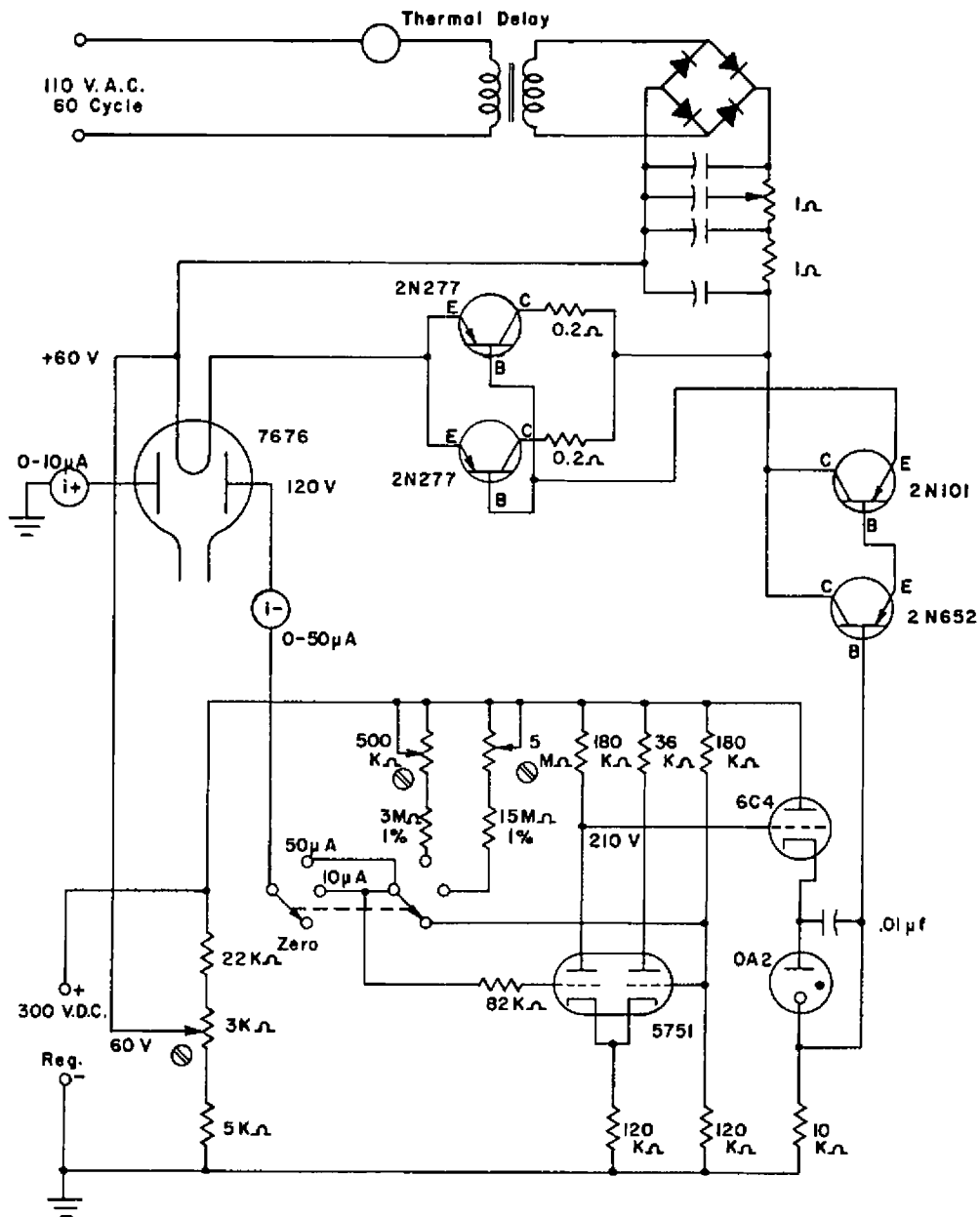
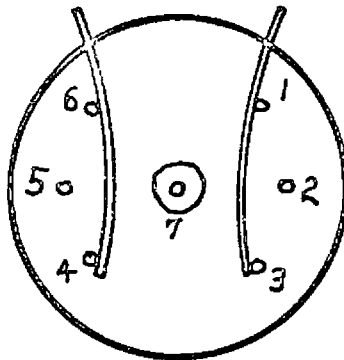


FIGURE 3

CE-B1578

NEW TYPE 7676 CONNECTIONS



CONNECTIONS

OUTGASSING	Pin
Outgas Filament +(Note 1)	1&3 (Tied Together)
Outgas Filament -(Note 1)	4&6 (Tied Together)
Collector	7
Operate Filament	Tie Pin 2 or 5 to Pin 1&3 or 4&6

OPERATING	
Operate Filament +	2
Operate Filament -	5
Ion Collector	7
Electron Collector	1&3 or 4&6

NOTE

1. Filament tie straps have a 1/8" hole drilled at one end to receive connector screws.