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A STABILIZED ION GAUGE CONTROL UNIT

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ABSTRACT

An ion gauge control unit is described which is similar to the Distillation Products type HG-200 but is constructed from readily available components. The control unit is intended for use with the VG1A gauge but may be adapted for other types of triode ionization gauges.

A STABILIZED ION GAUGE CONTROL UNIT

Description

The control unit consists of three main sections, a gas-tube stabilized power supply providing the electrode voltage for the gauge tube, a d-c amplifier for reading the ion current, and a control circuit for maintaining the electron current constant by electronic control of the gauge filament voltage. The circuit is shown in Fig. 1.

The power supply provides the following electrode potentials,

$$V_g = +187.5 \text{ volts}$$

$$V_a = -12.5 \text{ volts}$$

and the gauge tube is normally operated at $I_g = 5$ ma.

The d-c amplifier for the measurement of ion current is provided with a zero adjustment and a gain control. Provision is made for checking the gain of the amplifier against a reference voltage from a gas tube.

Operating Instructions

The gauge filament should not be switched on until the pressure in the system is less than 10^{-3} mm. After a two-minute warm-up period with both the range switch and the READ-CAL switch set to CAL, the GAUGE-SENSITIVITY knob is turned until the meter reads 50, with the GAUGE-AMP switch set to GAUGE. This operation switches on the filament and sets the electron current to 5 ma.

The range selector switch is then set to 1 and the GAUGE - AMP switch moved to AMP. The zero adjustment is then made.

The range selector switch is next turned to CAL and the AMP-SENSITIVITY control adjusted until the meter reads 90. The range switch is then turned to 1 and the READ-CAL switch set to READ. The meter now reads the ion current in the gauge tube when the meter reading is multiplied by the range switch factor. The pressure may be found by reference to Fig. 2 when a VG1A gauge tube is used, or by reference to the sensitivity (in microamperes per micron) of the gauge tube used.

The setting of the amplifier sensitivity control and the zero set should be checked from time to time during operation.

The grid of the gauge tube may be degassed by moving the DEGAS-AMP switch to DEGAS. The filament current should be reduced during degassing. Degassing is only necessary on insertion of a new gauge tube, or after the vacuum system has been exposed to air or contaminants.

A grid-anode leak may be detected by measuring the leakage current on the most sensitive position of the range switch with the filament turned off. If this current is not negligible it must be subtracted from the ion current reading.

To detect grid-filament leakage, the filament is turned off and the leakage current measured with the GAUGE-AMP switch set to GAUGE. This type of leakage can usually be removed by sparking the grid leads with a Tesla coil.

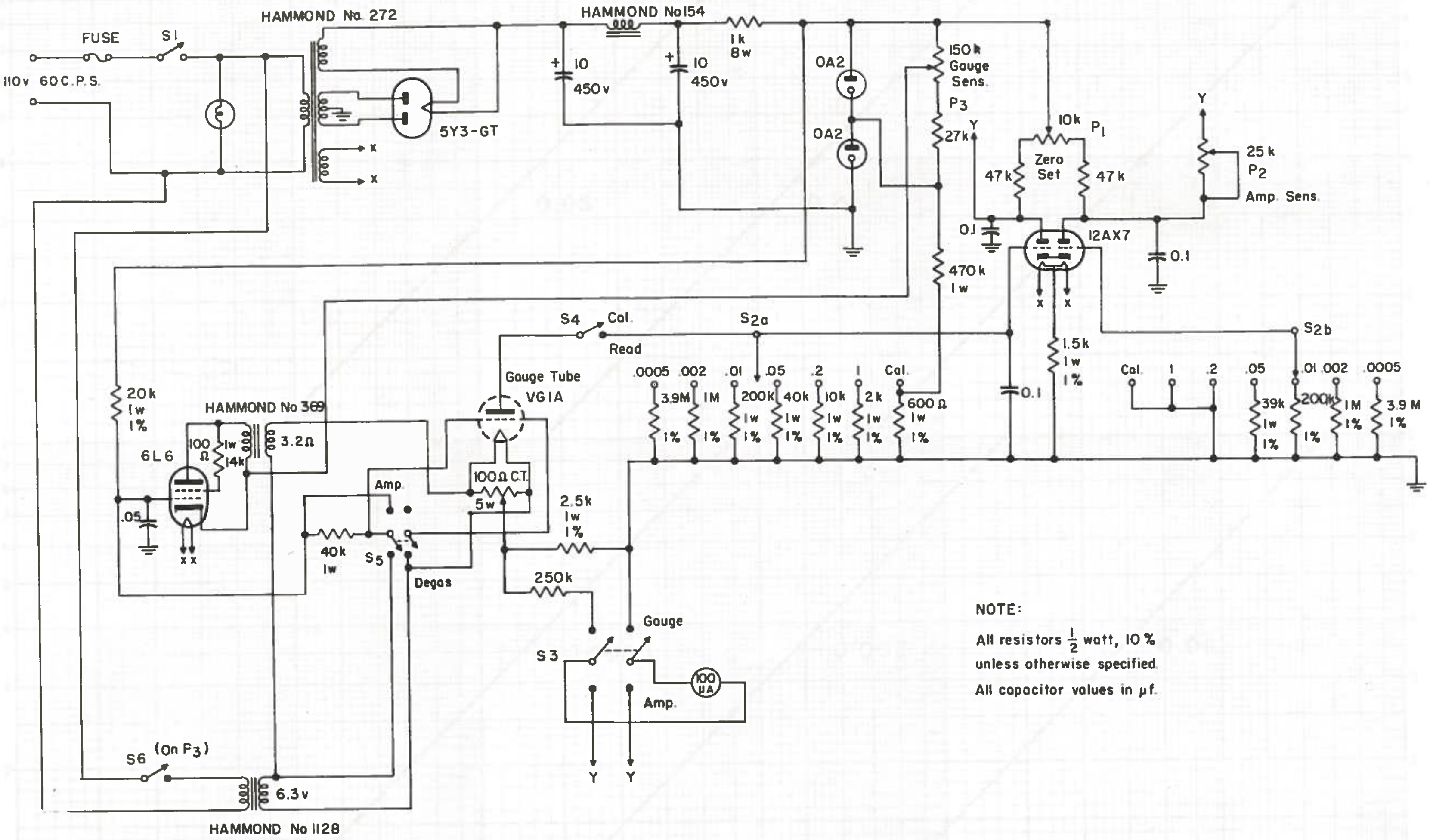

FIG. 1

CIRCUIT DIAGRAM

OF

STABILIZED ION GAUGE CONTROL UNIT

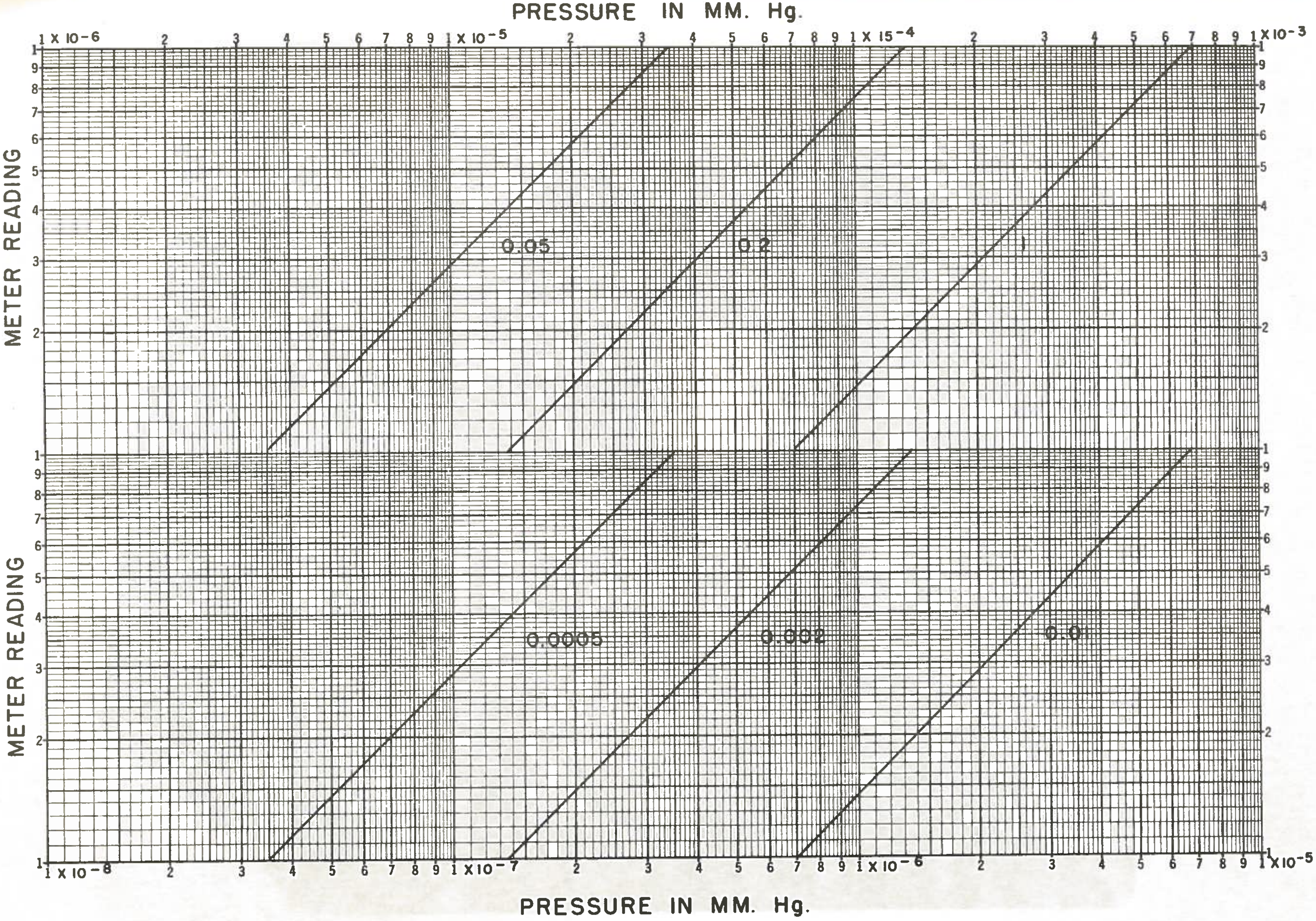

FIG. 2

CALIBRATION CURVES FOR USE WITH VGIA GAUGE

FIG. 3
STABILIZED ION GAUGE CONTROL UNIT