using a diaphragm diameter of 1 1/4 inches, figure 2 shows that the thinnest diaphragm which could be used is 3 mils. If values of (a) and (t) are substituted into Timoshenko’s (5) original equation the deflection per unit of applied hydrostatic pressure is obtained. By knowing the magnitude of the unit deflection and the total range to be measured, an electrical displacement sensor, providing maximum sensitivity over the range to be measured, can be selected. The transducer must be calibrated against known pressures before installation. Figure 3, where the electrical output is a function of applied pressure, is a typical calibration curve.

Electrical Displacement Sensors

Commercial transducers are available, however, these are designed primarily for aerospace applications and are not readily adaptable to subsurface field applications. Most of these use either strain gauge or linearly variable differential transformers (LVDT) as the deflection sensor. In this study strain gauges, semiconductor force transducers, and LVDT's were closely examined. The LVDT was superior in this application.

The LVDT is an electromechanical transducer which produces an electrical output linearly proportional to the displacement of a separate movable core. An LVDT has numerous features that make it particularly suited for use in the water pressure transducers. Most notable of these are mechanical simplicity, high sensitivity and high output level. Also, it is relatively insensitive to small temperature fluctuation if a high frequency input voltage is used.

The transformer core and its mounting shaft (diaphragm follower) are accurately positioned at the center of the diaphragm with a Teflon transformer support and follower guide as shown in figure 1. The unit must be used in a vertical position so that the follower will remain in contact with the face of the diaphragm. The standard model LVDT tube voltmeter was used in obtaining output (0.5 to 1.5 v ac.). With these instruments pressure could be described to within 0.2 in Hg of the indicated pressure.

Figure 3—Typical calibration curve for a water pressure transducer.

LITERATURE CITED


ANALYSIS OF ETHYLENE DIBROMIDE IN SOILS
BY GAS CHROMATOGRAPHY

P

Previous studies in this laboratory in the extraction and determination of the ethylene dibromide (EDB) resulted in an analytical technique, consisting of vacuum distillation of EDB from the soil, followed by catalytic oxidation of the bromide ion and subsequent analysis for Br. This procedure gave excellent recoveries in dry soils but moisture adversely affected the percentages recovered.

The development of gas chromatography facilitated the analytical aspects of soil fumigations. Recently, Smith and Shigenaga extracted fumigants from a moist soil with either ethyl or o-xylene for chromatographic analysis. Recovery from 44% for methyl bromide to 93% for dibromo-3-chloropropene. Recovery of EDB varied from 82 to 87% when the dosage varied between 400 to 4,000 ppm in the soil. A promising method for fumigations from a moist soil is again using vacuum distillation, but followed by gas chromatography with a flame ionization detector in order to eliminate effects of moisture, is reported in this paper.

A 25-g, air-dried soil sample is added to a 125-ml Erlenmeyer or round-bottom flask with a 24/40 taper. From an aqueous standard a given amount of fumigant is added.