the following advantages with white-on-black negative transparencies:

1. They are simple and inexpensive to prepare.
2. The use of negative transparencies eliminates the problem of brilliant projection beams which result in screen images too bright for comfortable viewing and which spotlight the speaker if he has to cross in front of the screen. (High contrast negative transparencies should be viewed with subdued lighting for maximum effectiveness and minimum eye strain.)
3. The predominantly black background of the negative transparency projection permits the very effective use of a flashlight-type pointer.

A METHOD FOR INSTALLATION OF ACCESS TUBES AND THE DEVELOPMENT OF FIELD EQUIPMENT FOR MEASURING SOIL MOISTURE BY NEUTRON SCATTER

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The neutron method of measuring soil moisture provides the research worker with a unique, accurate, and sensitive tool. The advantages of a nondestructive measurement are combined with that of a repetitive measurement in situ. Problems do exist, however, in the use of the neutron method. One of these is the proper, simple, and economical installation of the access tube. Unless the procedure is simple the advantages of the neutron procedure will be diminished. Furthermore, the cost of installation should be reasonable to gain the full advantages of the method. Another problem is the difficulty of getting the electronic scaler and the neutron probe with its shielding to the site of measurement in the field. Unless the equipment can be readily transported, on foot in the field, and with safety to the operator, the utility of the neutron method is decreased.

The equipment and method used successfully to install access tubes under north Mississippi soil conditions is described briefly below. The installation described is for the Troxler neutron probe, which has an outside diameter of 1.865 inches, i.e., a 2-inch O. D. (outside diameter) tube is used. The installation of access tubes, however, for any make of neutron probe is possible with this procedure.

Access tubes. Aluminum irrigation pipe is used because of its low cost and high resistance to corrosion over a long period of use in the soil. It is highly important that no moisture collect within the access tube as this would result in inaccurate readings and spurious soil moisture percentages. A number of methods were tested in the field to insure a water-tight seal at the bottom of the access tube. Access tubes with an aluminum disk welded to the end, which had been hydrostatically pressure-tested for leaks, proved satisfactory.

Drilling tools. A portable power soil sampler is used to drill the holes for the access tubes (Figure 1). A 2-inch auger is used with the drill. This auger is ground to fit inside the sections of steel tubing utilized as drill casing. The steel casing employed in installing aluminum access tubes is 2-inch O. D. steel tubing with a wall thickness of 0.065 inch. One end of each steel casing is sharpened with the bevel on the inside. Various casing lengths are employed to force the drill casing into the ground, and from the hole when desired, an oak-wood type shown in Figure 2 is needed.

Installation. The 2-inch-diameter auger, attached to the power unit, is used to excavate the soil...