located to the positive terminal of the microammeter, and both are attached to the output binding posts of the moisture bridge with phone-tip plugs.

Although the microammeter is overloaded in this application it is used for its high sensitivity to low current. Gypsum blocks have a low resistance in wet soils and the moisture bridge imposes milliamperage loads on the microammeter movement. In drier soils the current output is less but is greater than the microammeter rating. Until the balancing potentiometer approaches a null point the microammeter needle is continuously deflected against the upper stop. A low-hysteresis core is used in the microammeter armature and the upper pointer-stop was adjusted to allow the armature to assume an attitude normal to the magnet poles which reduces hysteresis heating of the core. When the electrical circuit is balanced there is no current flow in the resistance bridge and the microammeter needle drops to zero. If the resistance of the moisture block is greater than the resistance range of the moisture bridge, the needle of the microammeter cannot be brought to zero on a harmonic while the 'tone' control of the bridge is set as the instructions included with the bridge direct. The 'tone' control is left on its zero setting to maintain a sharp null point.

A wood enclosure for the microammeter fits into part of the space allocated for storage of the headphone in the moisture bridge case (Figure 2). The cost of the components of the visual readout and for fabrication of their wood case was less than $25.00.

Adoption of the visual readout has eliminated errors in resistance measurements from loss of aural acuity through long exposure to the signal from the headphones. In addition, use of the microammeter greatly reduces the time spent in 'tuning' for null points to balance the bridge.

USE OF A TUBE SAVER WITH THE LINE-OPERATED BECKMAN DU SPECTROPHOTOMETER

Alfred Haunold, R. M. Hill, and P. J. Matters

THE convenience of using the Beckman DU Spectrophotometer was greatly increased when the line-operated power supply was introduced. Whenever the instrument is not to be used for a period of eight hours or more, it is recommended that the power supply be turned off. Research workers using the DU regularly may have noticed that frequently some of the silicon rectifier diodes in the power supply become defective, after a relatively short lifetime, resulting in blown fuses, burned-out tubes, and operating instability.

The trouble in this laboratory seemed to develop at more or less regular intervals, especially on week-ends when the consumption of electric power was at a minimum and probably the line voltage was excessive. When the instrument was turned on in the morning one or more fuses would

Figure 1. Tube saver (left), adapter, and 3-prong plug of power supply used for protection of the line-operated Beckman DU spectrophotometer.

blow. Two or four of the rectifiers would be found defective and often tubes would be shorted. Time consuming testing was required to locate the defective parts, replacements for which were not always readily available.

A simple and inexpensive tube saver of the type recommended for television sets (Figure 1) has eliminated the above troubles. The tube saver (Model TG1, Workman Elec. Prod., Inc.) is available at most radio or television supply stores. It can be attached to the wall outlet and the DU power supply cord connected directly to it. If the cord is equipped with a three-prong grounding plug, the adapter supplied with the instrument must be used.

The tube saver reduces the initial line voltage and prevents a surge of high voltage from damaging the cold tubes. After a short warm-up period the full line voltage is restored. Since the tube saver was installed about a year ago, no further trouble has been experienced. Installation of a tube saver in conjunction with the line-operated Beckman DU Spectrophotometer power supply is highly recommended, particularly in view of the cost of some of the tubes used in the power supply. Tube savers designed for the higher power requirements of color television sets would be the most desirable ones for use with the spectrophotometer.

In case a variable transformer is available, it may be used in place of a tube saver to reduce the initial line voltage as suggested by Ramirez-Munoz et al. It is, however, considerably more expensive than the tube saver.

INCREASED NATURAL ACTIVITY OF PLANT MATERIAL IN RADIOACTIVE TRACER EXPERIMENTS


FOR the past three years the radioactive isotope P, incorporated as a tracer in superphosphate fertilizer obtained through the cooperation of the Fertilizer Laboratory, U. S. Department of Agriculture, has been used in field experiments measuring available phosphate in Quebec soils. The test crop was oats. The ripe, aboveground portion of the plant was dried, ground, and compressed into a cylinder to fit around a thin-walled Geiger counting tube.

The radioactive count for samples from plots not receiving tracer fertilizer (inert plant material) was much higher

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