Inventory Control

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An Inexpensive Alternative to Commercial Variable Transformers

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Avoidance of the flame in the organic chemistry laboratory is an important consideration in devising experiments for the teaching of the laboratory part of the course. Heating mantles controlled by variable transformers are therefore generally used. The cost of these can be prohibitive. We found these devices to be more expensive than the heating mantle. A cheap suitable alternative to the commercial product is a common light dimmer switch[1], which is pictured below as a part of the assembly.

The controller was assembled from a rotary light dimmer switch rated at 600 W,[2] a metal receptacle box and plate, an 8-ft, three-prong, power-tool extension cord, four wire-nut caps, and two clamp-type connectors for connecting the cord to the box. The assembly and testing required less than 30 min each. The cost of the device was less than $9.[3] The assembly was accomplished as follows:

(1) The extension cord was cut in the middle, into two pieces of the desired length, and $\frac{3}{4}$ in. of wire was stripped from each end.
(2) The cord was strung into the box and fastened to the box with the connectors.
(3) The stripped wires were attached to the dimmer, according to the instructions on the unit, with the wire-nut caps. The ground wires were grounded to the metal box.
(4) The controller was mounted in the box, and the metal wall plate was then attached.
(5) The assembled controllers were conveniently checked for correct wiring with a circuit tester.[4]

The controllers have been used on Thermowell heating mantles (100- to 1000-mL size, 140–500 W), heating tape, an oil bath,[5] and an overhead stirring motor with success.

[1] The dimmer switch is not a variable transformer but rather a stepless electronic controller. (See Zubrick, J. W. *The Organic Chem Lab Survival Manual;* Wiley: New York, 1988; pp 137–141).

[2] A rotary-on dimmer switch is preferable to the push-on type dimmer switch because it is easier to determine whether the controller is on. A neon on/off light can be installed in the box at a nominal extra expense.

[3] All parts were purchased from True Value Hardware. The cost of the parts for 35 controllers was $307.

[4] A Sears circuit tester was simply plugged into the controlled outlet.

[5] The oil bath was a nichrome wire coil immersed in polyethylene glycol contained in a Pyrex 190 × 100 crystallizing dish.