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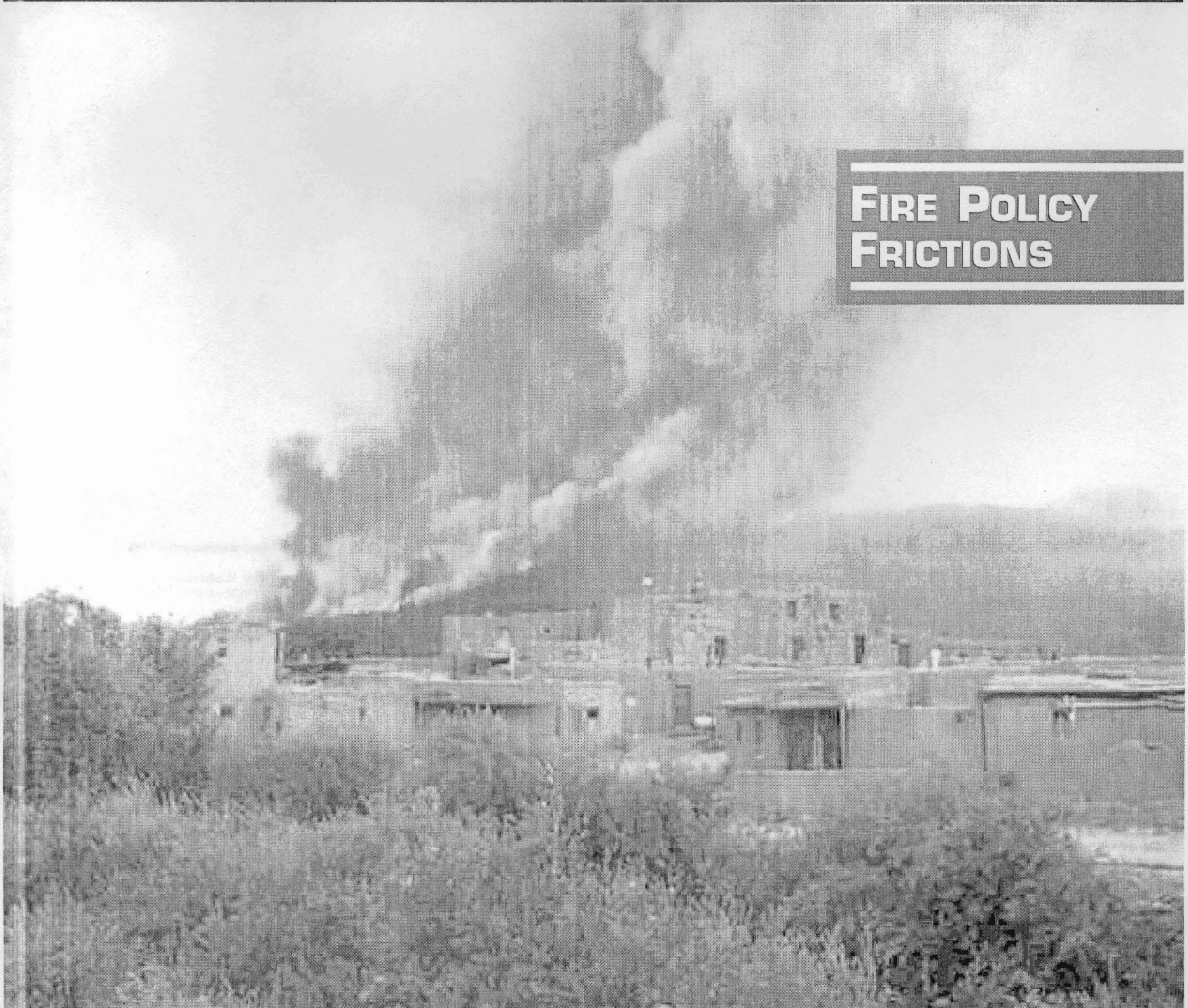

Fire Policy Frictions

United States Department of Agriculture
Forest Service

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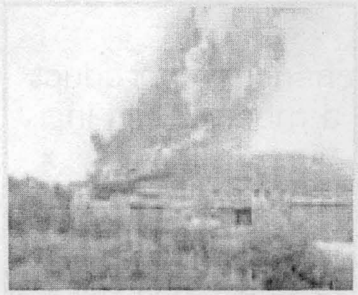

The 2003 Encebado Fire approaches Taos Pueblo in northern New Mexico. In fire-adapted ecosystems, simply throwing more resources at fires might not be enough to protect the wildland/urban interface. Such fires suggest the need for a full understanding and respect for the ecological dynamics that shape the land we live in. See the articles by Jerry Williams and Jon Keeley beginning on page 4. Photo: Ignacio Peralta, Carson National Forest, Taos, NM, 2003.

The FIRE 21 symbol (shown below and on the cover) stands for the safe and effective use of wildland fire, now and throughout the 21st century. Its shape represents the fire triangle (oxygen, heat, and fuel). The three outer red triangles represent the basic functions of wildland fire organizations (planning, operations, and aviation management), and the three critical aspects of wildland fire management (prevention, suppression, and prescription). The black interior represents land affected by fire; the emerging green points symbolize the growth, restoration, and sustainability associated with fire-adapted ecosystems. The flame represents fire itself as an ever-present force in nature. For more information on FIRE 21 and the science, research, and innovative thinking behind it, contact Mike Apicello, National Interagency Fire Center, 208-387-5460.

FIRE 21

Firefighter and public safety is our first priority.

An Updated Rate-of-Spread Clock

Jeremy Kolaks, Keith Grabner, George Hartman, Bruce E. Cutter, and Edward F. Loewenstein

Several years ago, Blank and Simard (1983) described an electronic timer, frequently referred to as a rate-of-spread (ROS) clock—a relatively simple instrument used in measuring fire spread. Although other techniques for measuring rate of spread are available (such as data loggers), the basic ROS clock remains a valuable and relatively inexpensive tool. However, several items described in the original article have changed. Therefore, we are describing an updated version of the ROS clock.

Project Need

In 2003, we needed several hundred ROS clocks to complete a fuel loading project funded by the Joint Fire Science Project. Although the original ROS clock would have worked, several technological advances and changes in product availability have occurred that allowed or required a modification in design (Grabner 1996). We changed the electronic circuitry and used plastic piping for the enclosure.

Jeremy Kolaks is a former graduate research assistant in the School of Natural Resources, University of Missouri–Columbia, Columbia, MO; Keith Grabner is an ecologist for the U.S. Department of the Interior, U.S. Geological Survey, Columbia Environmental Research Center, Columbia, MO; George Hartman is a fire ecologist for the Missouri Department of Conservation, Columbia, MO; Bruce E. Cutter is a professor of forestry in the School of Natural Resources, University of Missouri–Columbia; and Edward F. Loewenstein is an assistant professor of silviculture in the School of Forestry and Wildlife Sciences, Auburn University, Auburn, AL.

> Technological advances and changes in product availability allow or require a modification in design.

Grabner (1996) used one removable 3-volt battery instead of two 1.4-volt hearing-aid batteries, as shown in the original schematic. The removable battery also eliminated the need for a switch and allowed very easy replacement when the batteries got low. Grabner did have trouble with clock failure due to low battery voltage. However, we have found that the addition of a 470,000-ohm resistor between the transistor and the clock provided a more stable, longer lasting voltage supply (fig. 1).

New Clock Design

The original ROS clock was contained in thin-walled copper tubing three-quarters of an inch (1.9 cm) thick, with a cap soldered to one end. The original also used thermocouple wire for the exposed leads. We substituted schedule 40 PVC plumbing pipe and fittings for the copper tubing and caps. One end cap was glued in place using the appropriate solvent adhesive and the other end was fitted with a threaded end cap (fig. 2). We used

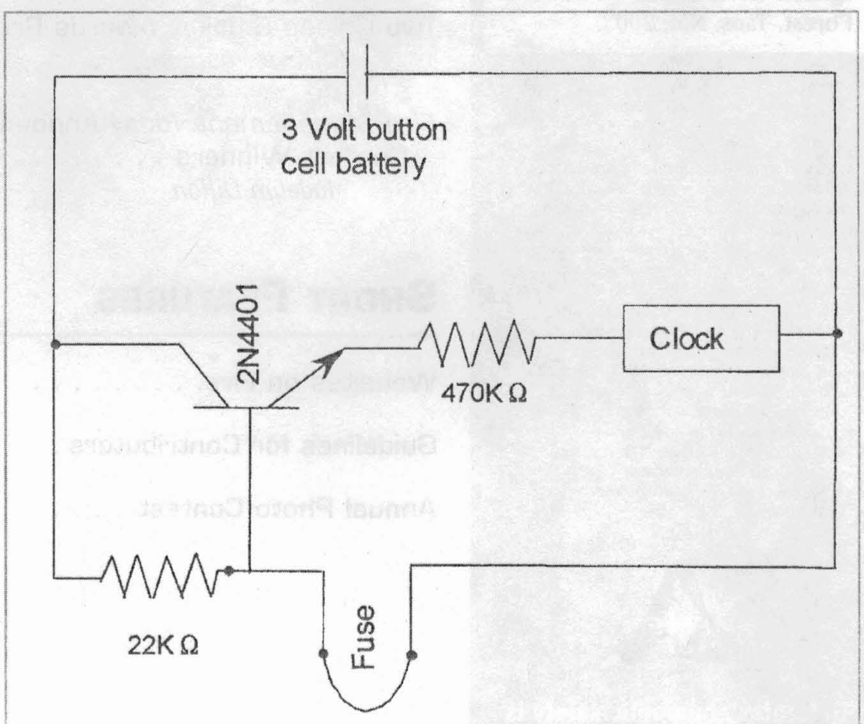

Figure 1—*Schematic diagram of the updated electronic timer.*

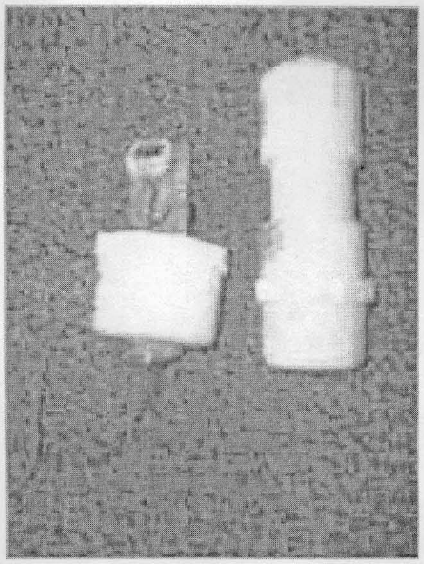

Figure 2—*The updated rate-of-spread clock is both useful and inexpensive, with parts that are easy to find. Photo: Keith Grabner, U.S. Geological Survey, Columbia, MO, 2004.*

Parts Needed*

- 22K Ω 1/4 w resistor (Radio Shack part no. 271-1339)
- 470K Ω 1/2 w resistor (Radio Shack part no. 271-1133)
- 2N4401 NPN silicon transistor (Radio Shack part no. 276-2058)
- 3.0 v lithium button cell battery (Radio Shack part no. 23-162)
- Button cell battery holder (Radio Shack part no. BH-32)
- Circuitboard
- Wire
- PVC schedule 40 1-inch (inside diameter) pipe, cut into 3-inch lengths
- PVC schedule 40 1-inch cap
- PVC schedule 40 1-1/4-inch x 1-inch adapter, male, reducing, MIPT x socket
- PVC schedule 40 1-1/4-inch screw-on cap
- Digital sports watch

* Catalog/part numbers for one vendor are shown for convenience. The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement of any product or service by the U.S. Department of Agriculture. Individual authors are responsible for the technical accuracy of the material presented in *Fire Management Today*.

silicone sealant to moisture-proof the fittings, although we highly recommend removing the clocks from the ground as soon as possible so that torrential rains do not cause malfunctions. We also found that regular electrical wire was adequate for the leads. The fusible link shown in figure 1 was simply a solder connection.

The electronic parts and wire were readily available at a local electronic parts store. The most difficult parts to obtain were enough digital sports watches. The watches we used ran most reliably at a level of 1.8 volts. The total cost of materials for the updated version was slightly more than $6 each in 2003.

Acknowledgments

The authors wish to thank John Roberts, a retired senior research analyst, and Milon George, an associate professor of forestry, University of Missouri–Columbia, for their assistance in redesigning the clock's circuitry.

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Grabner, K.W. 1996. Validation of BEHAVE fire behavior predictions in established oak savannas. Unpub. M.S. thesis. University of Missouri–Columbia. ■