

lost out steadily to oil, especially for home heating. Obviously, a community heavily dependent on a dying industry faced enormous problems. Yet, Hazeltonians did not surrender; they responded imaginatively. Through creation of a self-help development organization, CAN DO (Community Area New Development Organization), town fathers attracted outside investors beginning in the mid-1950s. While the CAN DO group initially achieved mixed success, two decades later the local economy prospered. Boosters argued cogently that their region offered much — plentiful water, good transportation (particularly after completion of the interstate highway network), and an excellent labor force. The latter was conservative and willing to work hard.

By the 1970s, then, the Hazelton financial base depended largely on petroleum, and, of course, was vulnerable to the difficulties associated with this increasingly expensive fuel source. Rose, in fact, contends that the Hazelton transfer from one energy to another casts light on future conditions. As he suggests, "[The study's] relevance is that, with the decline of inexpensive petroleum, much of the world faces an ecological transition of unprecedented proportions. It may help us to anticipate and to make communities more adaptive."

The Hazelton, Pennsylvania, case study is provocative and generally well argued. Yet, the work is marred by excessive jargon, disjointed organization, uninspired prose, and some poor graphics. Actually, Rose's research might have been presented in better fashion as an article rather than a monograph. Also, the quality of bookmaking is substandard; the University of Pennsylvania Press needs to contact another printer.

*Department of History*  
*University of Akron*  
*Akron, Ohio*

H. ROGER GRANT

*The Search for Safety: A History of Railroad Signals and the People Who Made Them.* By MARY BRIGNANO and HAX McCULLOUGH. (Pittsburgh: Union Switch and Signal Division, American Standard, Inc., 1981. Pp. vii, 199. Dedication, preface, acknowledgments, bibliography. \$20.00.)

One of the great drawbacks to early railroad transportation was its considerable danger. Many people were appalled at the "unnatural" speeds at which the trains traveled. Their worst fears were fed by

reports of frequent, grisly wrecks, the result of inadequate signaling. Railroad owners wanted to pack as many trains as they could on the tracks they had invested heavily in, but they did not want costly wrecks either. Private and public interests coincided absolutely in a quest for adequate signaling and safety devices, and that made for a very noncontroversial story.

*The Search for Safety*, commissioned by the Union Switch and Signal Division of American Standard, Inc., traces this quest from earliest times into the 1960s, although the story gets progressively more sketchy as it reaches the present. The first signals used in the United States were huge balls suspended along the track, each within telescope range of a person at the next signal down the line. A ball raised high meant clear; down low it meant stop. Hence, the term "highball." On many of the semaphores that were adopted shortly after, the white side meant "go" and the red side meant stop; hence, there was trouble when the engineman "saw red."

Telegraphic communication was a major step forward and the beginning of a long-lasting alliance between the railroads and the telegraph companies — the telegraph using the railroads' rights-of-way in return for the free use of telegraph lines for dispatching of trains. The concept of the block — a section of track protected by signals and into which only one train at a time was allowed — was magnificently simple, so simple that every stubborn engineman could understand it, although it was not devised until the 1860s. That same decade also saw the development of interlocks, by which signals and switches, or series of switches and signals were operated simultaneously according to preset patterns.

In the 1870s, William Robinson perfected a system that worked by electric current in the rails themselves, the wheels of the train closing the circuit and thus indicating the train's whereabouts. Though not foolproof, it was successful, and he founded the Union Signal Company to manufacture it. George Westinghouse, fresh from his triumphant invention of the air brake, invented an electro-pneumatic pin valve to operate trackside semaphores which, when coupled with Robinson's closed circuits, constituted an automatic signal system. Westinghouse bought Robinson's company, along with others, to form the Union Switch and Signal Company, relocated its headquarters in Pittsburgh and built a factory at nearby Swissvale, Pennsylvania. The company went on to pioneer electric light signals, especially important for the new subway systems being built at the turn of the century, and in later years, centralized traffic control,

which enabled a single operator to operate switches and signals on up to several hundred miles of line from a master control panel.

Railroad signaling is a technical field with important economic and public-interest ramifications. It needs a thorough history that can be grasped by the nontechnician. Unfortunately, *The Search for Safety* falls short of this. For an audience that wants to know about signals, it goes too far in the direction of simplicity. The tone is junior-high-schoolish. Too much space is devoted to a general primer on railroad transportation. Such well-worn ground as Stephenson's "Rocket" and Zeus's thunderbolts does not need to be recounted here. Many of the illustrations were published by the Association of American Railroads in a teachers' packet in the 1950s and have been reprinted frequently elsewhere. The book devotes only a few pages to post-World War II developments, even though that was the era which saw the refinement of centralized traffic control in ways that had deep impact on railroads. There is very little in the book on the application of electronics, and virtually nothing on computers or silicon chips.

Some of the book's shortcomings can be blamed on its concentration on a single company, Union Switch and Signal, which, while its contributions were great, are only part of the story. In the narrative, Union's chief competitor, General Railway Signal of Rochester, is mentioned only briefly, and then at a time when they were having some difficulty with their all-electric systems (in contrast to Union's electro-pneumatic systems). But obviously, as a successful competitor, they had pioneering developments to their credit, too, which need to be included in a comprehensive history. Beyond that, nothing is mentioned of developments outside the United States (except for a few English antecedents) when in fact, some major breakthroughs have come from other parts of the world — Europe, Japan, even the Soviet Union — especially in the post-World War II period.

The book contains a good bibliography, although it, like the book itself, has a hard time differentiating between primers and primary sources.

*Department of History*  
*Clemson University*  
*Clemson, South Carolina*

RICHARD SAUNDERS