RAILWAY SIGNALING AND COMMUNICATIONS
APRIL 1960

Long Distance Hot Box Detection

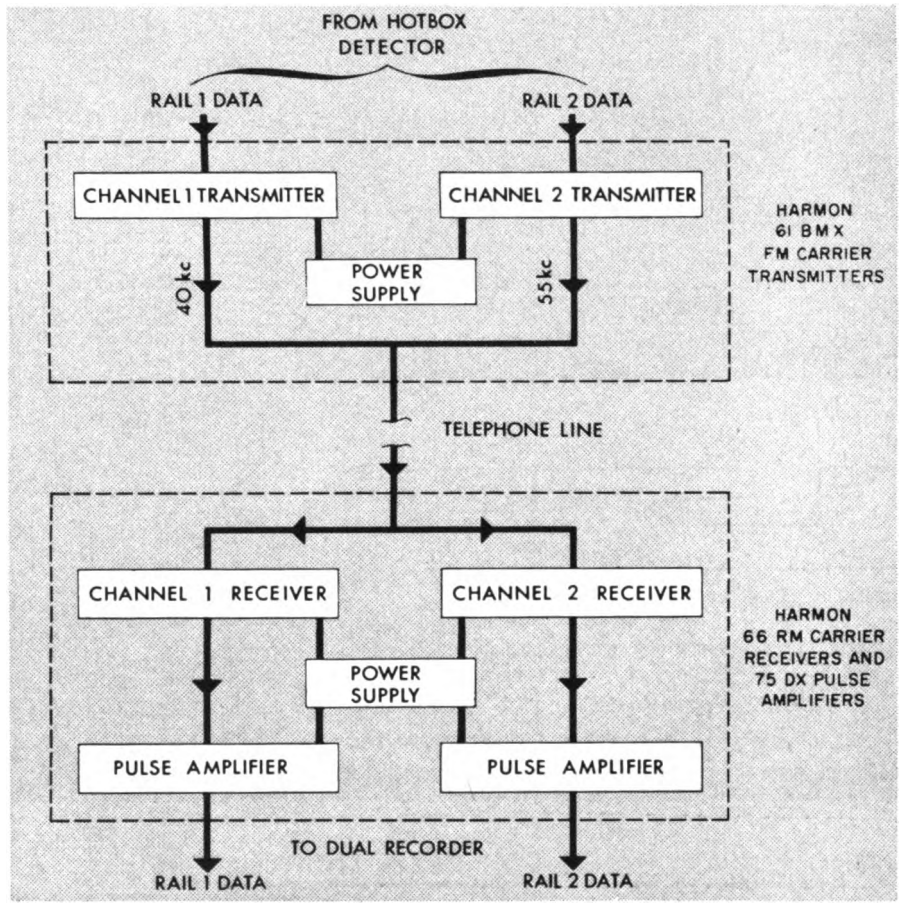
) The Clinchfield Railroad has in-alled a Servo hotbox detector near ort Blackmore, Va., a location that ad had a high incidence of over-eated journals. The detectors inspect ıe heavy southward coal trains pass-ıg here, and have cut the number of :touts due to hotboxes in half. The etectors are about 64 miles south of ıe railroad's northern terminus at ilkhorn City, about halfway to the ivision point at Erwin.

Choosing the exact location for the etectors posed a problem: Servo Corp. engineers recommend that the etectors be placed on tangent track t least 2,600 ft from a curve. Finding . piece of tangent that long in the de-ired area on this curving mountain ailroad was not easy. The tangent ection was located, however, although he inspected trains go around a curve oon after passing the detector.

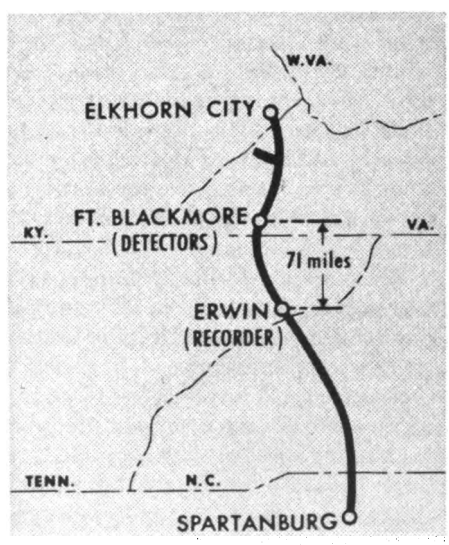
As the entire 277-mile railroad has CTC signaling, it was desirable to ıave the hotbox recorder at the dis-ıatcher's office at Erwin, Tenn., the ocation of the CTC control machine. Erwin, however, is 71 miles from the letector site. It was decided, there-ore, to transmit the heat signals from he detector to recorder by carrier.

The carrier signals are superim-osed on the message circuit. Two eparate Harmon FM carrier channels vere provided, one for the heat signal rom each side of the train. The fre-quencies chosen were 40 kc and 55 kc. The presence or absence of carrier ontrols the recorder on and off by neans of contacts on the carrier quelch relay.

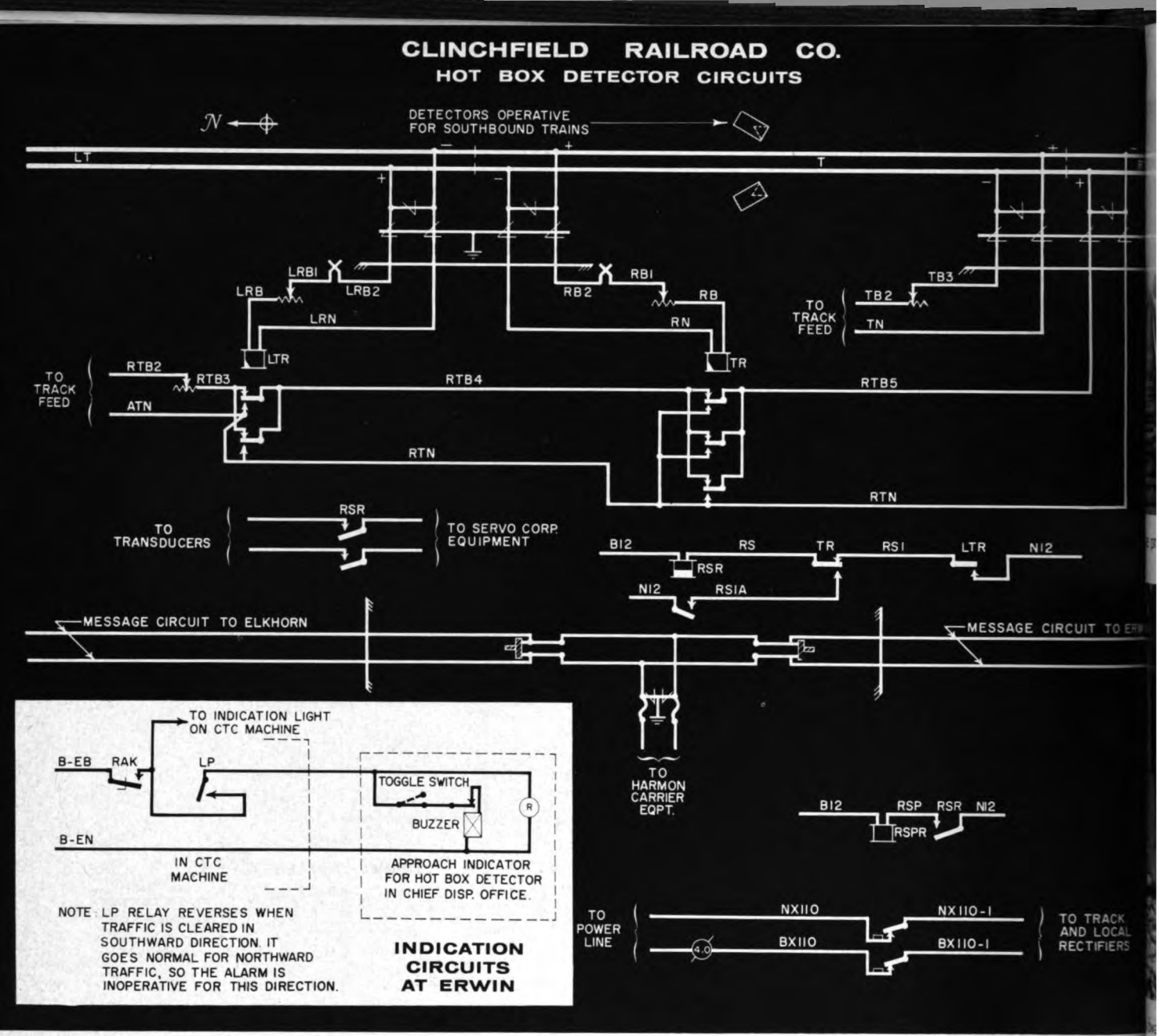
At Erwin, the recorder is located in the chief dispatcher's office. To alert the chief dispatcher of the approach of a train to the detector, a buzzer is sounded and a red indication lamp is lighted approximately eight minutes prior to the train's arrival at the de-tector location. Connections to the CTC indication circuits are utilized to



Above: The carrier system (block diagram) transmits the heat detector signals 71 miles from the field location to the office at Erwin, Tenn.



Left: The detectors are located about 64 miles south of the northern terminus at Elkhorn City. Future installations are planned 50 miles south of Erwin and 30 miles north of Spartanburg for southward and northward trains respectively.



LONG DISTANCE HOT BOX DETECTION continued

provide this warning. The buzzer may be silenced by operating a toggle switch, but the red lamp remains on until the train clears the approach circuit in which the detector is located.

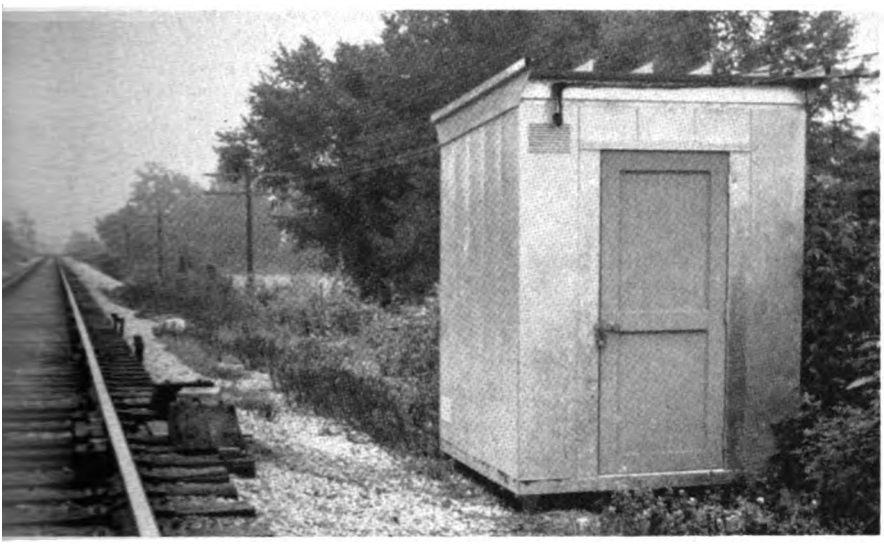
The chief dispatcher scans the graph of the journal temperature deflections and advises the dispatcher to stop the train if an abnormal deflection is noted. The train dispatcher places a controlled signal (no special aspect) about five miles past the detector to stop, and turns on the maintainer call light. Operating rules on the Clinchfield require any person seeing a mainliner call light on to contact the train dispatcher. When a member of the crew calls in, he is told of the location of the hot journal.

"The train crew at present decides if the car can be moved or must be set out," says Engineer of Signals and Communications, W. E. Prince, Jr. "We have not set a fixed deflection point beyond which cars will always be set out, but every deflection of more than 10 to 12 mm above the normal is reason to stop the train for inspection."

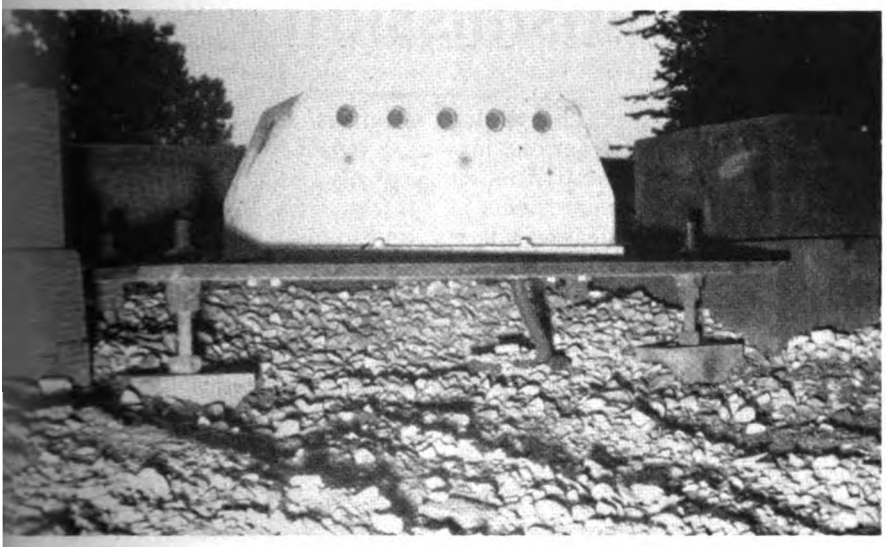
Southbound traffic through here amounts to an average of 450 cars per day hauled in five trains. The hotbox setouts for the months of September, October, and November for 1958 and 1959 (before and after the detector installation) reveal that about half as many cars were set out after passing the detector, than were before the detector was installed, whereas about the same number of cars were set out north of the detector before and after the detector installation. In essence, stopping the train and cooling and lubricating hot journals before serious damage was done, allowed 10 more cars to get to their consignees without undue delay.

Detector Operation

The transducers are normally not operative. A short track circuit, about five rail lengths long, was cut into the existing track circuit. This is used to provide a directional circuit which allows the transducers to become operative for southbound trains. In the circuit diagram, track relay LTR must pick up before TR in order to energize relay RSR. Contacts of relay RSR



ılse processing and carrier equipment is in steel house at the site.



wo dwarf signal foundations support each detector head.

ose the circuit to the transducers. A :peater of this relay, RSPR, opens ıe ac power to the rectifiers. This is one because of the extreme sensitivity f the preamplifiers on the detector eads to the ripple voltage present in ıe output of the rectifiers. During the ıort period that a southward train occupying track section T, the track ircuits and the local dc power supply re supplied entirely from battery.

Two dwarf signal foundations, one ınder each end, are used to support he steel plate on which the Servo Corp. detectors are mounted. These oundations are 28 in. high and are et on six inches of gravel with cement routing. An Armco Steelox building ıouses the carrier and the detector ıulse processing gear.

The circuits were designed and the installation was made under the jurisdiction of W. E. Prince, Jr., Engineer, Signals and Communications. Total cost of the system was $20,674, of which $717 represents the cost of the carrier system.

The Clinchfield is planning installation of detectors at two more points. The first will be approximately 50 miles south of Erwin to check southbound trains and the second about 30 miles north of Spartanburg, S. C., to check northbound trains from connections at the southern terminus. The first recorder will be in the Erwin Yard office and the second at Bostic Yard, N. C. The purchase of General Electric detectors and carrier is contemplated.

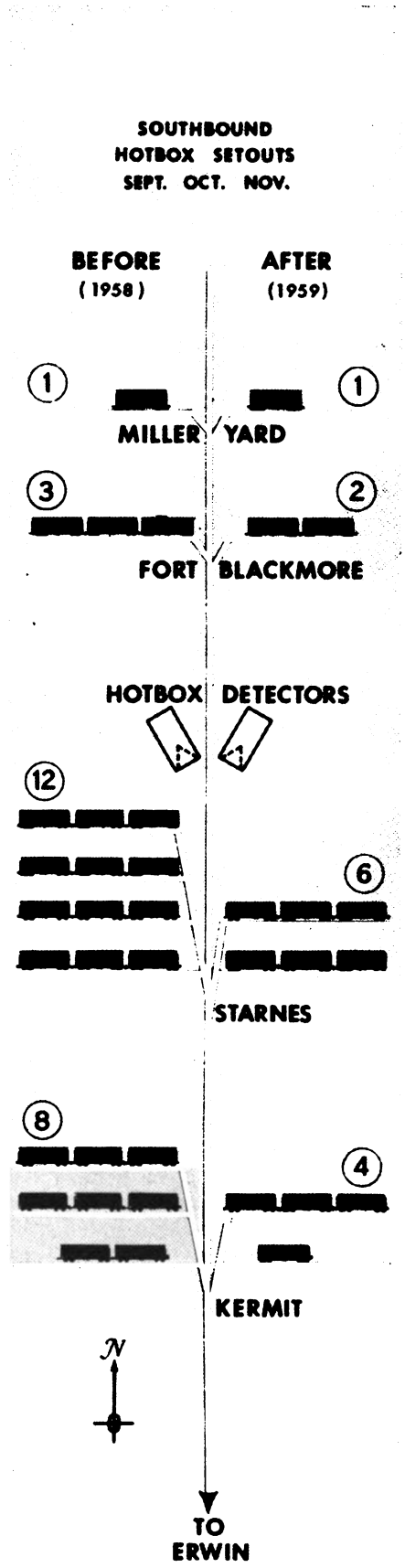


Diagram illustrates before (left) and after (right) effect of hotbox detector on car setouts.