



← **HOOD** eliminates "pips" caused by sunshine.

10° ANGLE ↑ toward rail minimizes effect of higher bearing temperatures.

New Angle on Hot Box Detector

Background: In the April 1 issue *Railway Age* reported on a hot box detector recently installed on the Reading. That story ended the silence about nearly four years of thinking, planning and development of this type of detector on the Chesapeake & Ohio. Now it can be told how the C&O management timed an order for equipment so as to insure its proper development, showing the manufacturer a willingness to share in its expense.

The Story

Back in 1953, the C&O signal department started investigating the use of infrared pyrometers to detect hot boxes on moving freight trains. Steel mills and other industries were already using these devices to continuously check stationary bearings to guard against overheating.

T. L. Carlson, C&O superintendent of signals, started correspondence with several manufacturers of electrical or electronic devices, such as General Electric Company, Schenectady, N. Y., and the Hycon Manufacturing Company, Pasadena, Cal., to explore the possibility of using these electronic devices, mounted along the track, to check passing trains for overheated bearings. In 1955, the Servo Corporation of America was contacted, and in 1956, using Servo equipment, the C&O made its first test installation of an automatic hot box detector.

PROBLEM NO. 1

First objectives were to:

... 1—develop proper location of the detector heads along the track.

... 2—Develop a method of mounting to withstand extreme vibration caused by passing trains.

... 3—Prove operation under outdoor weather conditions.

These objectives were attained at Norge, Va., using the same type of Servo equipment which had undergone short tests on the Norfolk & Western and the Pennsylvania.

As a result of a conference with the Servo engineers and officers, the C&O management was informed that the manufacturer had expended considerable money for research and development. Unless there was some definite recognition by railroads in the near future, the manufacturer would lose interest. So the C&O signal department was told to advise the Servo Company that an order for an installation would be placed immediately. This device was placed in service on the eastbound main track at Norge on November 14, 1956, and has been in continuous operation, checking every eastbound freight train on that track.

Why at Norge? Norge is 40 miles east of Richmond, Va., on the double-track main line to Newport News, 75 miles from Richmond. A mechanical

interlocking at Norge includes two crossovers between the main tracks and two single switches. This interlocking is seldom used except for through moves. Therefore, for many years a principal part of the operator's work has been to watch passing trains to check for hot boxes or dragging equipment. If he saw a hot box, he would close a lever to set up a flashing lunar-white indication on a normally dark unit about three miles east of Norge station. Thus Norge was a logical place for a test of a permanent installation of hot box detectors. These detectors were installed on the eastward track because this is the direction of movement of loaded coal cars.

How it works—Since the detectors were installed, the operator, besides watching the train as it passes, checks the graph sheet made by the recording instrument.

If he sees a "pip" that indicates a hot box, he sets up the flashing-lunar signal to stop the train. A member of the train crew uses a wayside telephone to call the operator who tells him, "You have a hot box on the 49th car from head end; leading journal; leading truck; northside."

Results—During the first five months this detector was in service, six hot boxes were detected, all of which were in such condition that the cars had to be set out before the train could proceed. None of these hot boxes had been observed by the train crew or the operator at Norge. On April 3, three hot boxes were detected. One car was set out. On one other car, the box was repacked and the third other car was left as it was to proceed to Newport News. Both of the cars which were allowed to proceed developed hot boxes and on inspection at Newport News were marked for shopping.

The basic hot box detectors, control devices, amplifiers and graphic recorder used by the C&O at Norge were made by the Servo Corporation of America.

They are practically the same as

those described in the Reading article in the April 1 Railway Age.

PROBLEM NO. 2

The boxes on freight cars equipped with roller bearings consistently run at higher temperatures than are normal for solid bearings, the differences being readily identified on the graph sheet. To eliminate recordings that may indicate hot boxes for what are actually normal roller bearings, the C&O is now making further experiments.

For example, the detector, instead of being parallel to the rail, is turned 10 degrees toward the rail so that the "scan" line from the lens of the detector is nearer to the end of the box as the bearing recedes. As a result, the detectors now give a better "pip" indication of the temperature of all

bearings. And indications by roller bearings are closer to the normal indications made by solid bearings.

PROBLEM NO. 3

Through Norge, the tracks run almost directly east and west. In the early forenoon on some sunny days, indication "pips" were made on the chart apparently by heat from the sun or sun reflections.

To eliminate this condition, small sheet metal hoods of a special design were applied to the detectors. They have eliminated this type of faulty operation.

The C&O intends eventually to replace the graphic recorder with an alarm-operating mechanism and journal counters made by Servo that will instantly report the location of a hot box in a train.