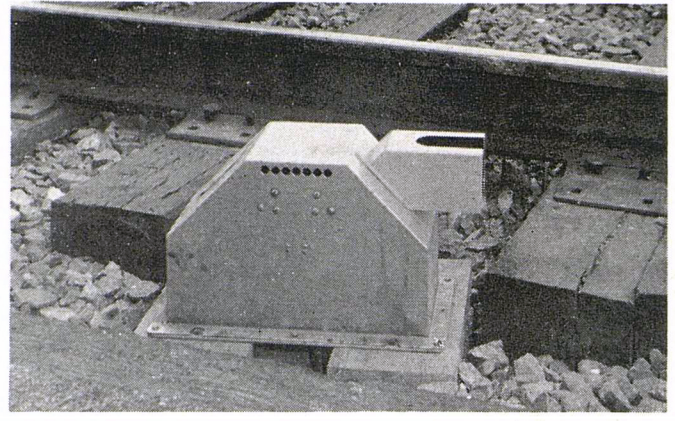


To avoid high readings for normal temperature roller bearings detector is set 10 deg. toward rail



Special hoods were applied to detectors to exclude sunshine when flat cars are in trains

Story Behind the News

The C&O Hot Box Detector

In the April issue of this magazine, you read about a hot box detector which had been installed recently on the Reading. That story caused an end to silence concerning nearly four years of early thinking, planning and development of this type of detector on the Chesapeake & Ohio. Now read the C & O story including an explanation of how the C & O management, placed an order for equipment at the proper time to insure further development, and to indicate to the manufacturer a willingness to share in the expense of this development

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 over heating. T. L. Carlson, 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, Calif., to explore the possibility of using these electronic devices, mounted along the track, to check for overheated bearings. In 1955, the Servo Corporation of America was contacted, and on November 14, 1956, using Servo equipment, the C&O made its first test installation of an automatic hot box detector at Norge, Va.

The first objective was to develop proper location of the detector heads along the track and the method of mounting to withstand

extreme vibration due to passing trains, as well as prove operation under outdoor weather conditions. These objectives were attained and proven at Norge, using the same type of Servo equipment which had undergone short tests on the Norfolk & Western and the Pennsylvania.

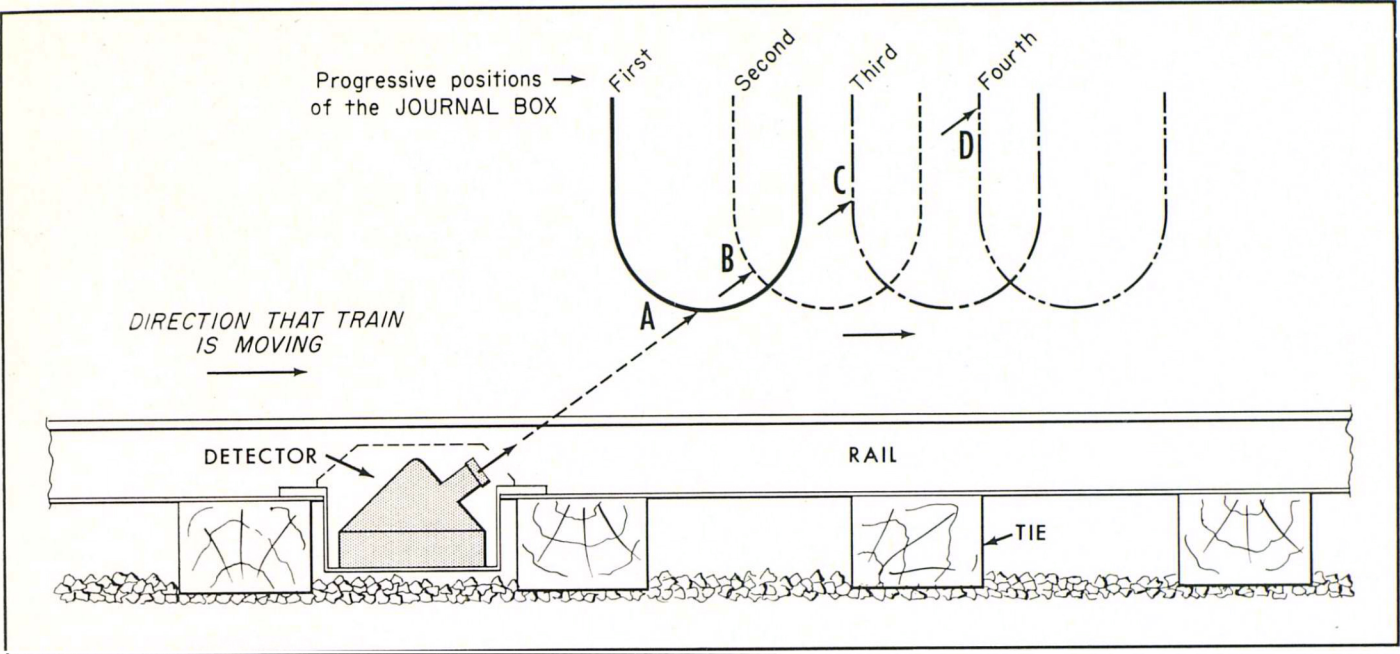
Money on the Line

As a result of a conference with the Servo engineers and officers, the C&O management was informed that the manufacturer had expanded considerable money for research and development, and unless definite recognition by railroads became evident in the near future, the manufacturer would lose interest. The signal department was instructed to inform the Servo Company that an order for an installation would be placed immediately. This project was placed in service on the eastbound main track at Norge, Va., on November 14, 1956 and has been in continuous opera-

tion, 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, each connecting from a main track to a siding, one eastward and one westward. This interlocking is seldom used except from 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 special lever and 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 to make a test or a permanent installation of hot box detectors. These detectors were installed on



As journal box moves from left to right, the "view line" of detector first encounters the bottom of the box at "A", then, as box moves on to the right the "view line" progresses up the side of the box, as at "B", "C" and "D".

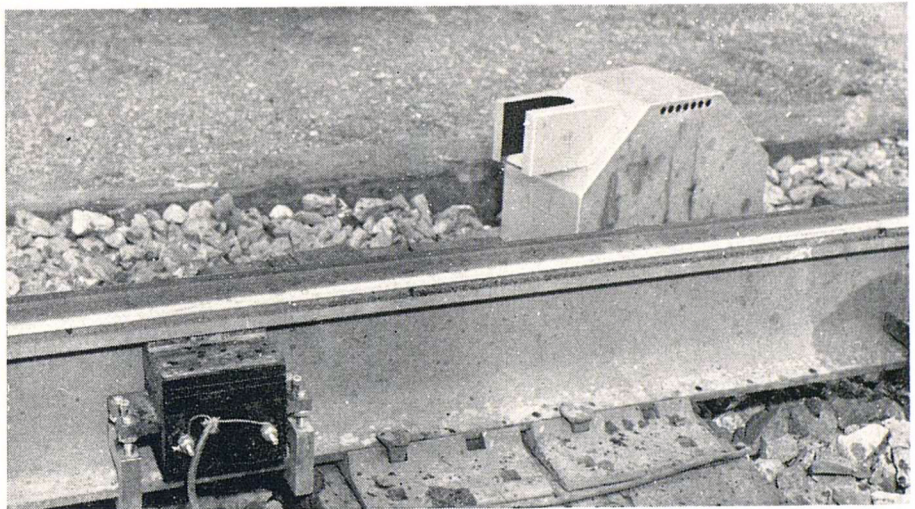
the eastward track because this is the direction of movement of loaded coal cars.

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."

Proof of the Pudding

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, and are practically the same as those explained in the Reading article in the April issue *Railway Signaling & Communica-*



Detector is controlled when wheel passes magnetic device on gauge side of rail

tions, therefore, this information will not be repeated here.

Further Developments

The boxes on freight cars equipped with roller bearings normally run at higher temperatures than are normal for solid bearings, the differences being readily identified on the graph sheet. However, in order to eliminate hot box recordings that may indicate hot boxes for 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 more nearly uniform with the normal indications by solid bearings. Thus, progress is being made with respect to hot box indications by roller bearings.

Through Norge, the tracks run almost straight east and west. In the early forenoon on some sunny days in March, indication "pips" were made on the chart that were probably caused by heat from the sun or sun reflections. In order to eliminate this condition, small sheet metal hoods of a special design were applied to the detectors. These hoods 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.