

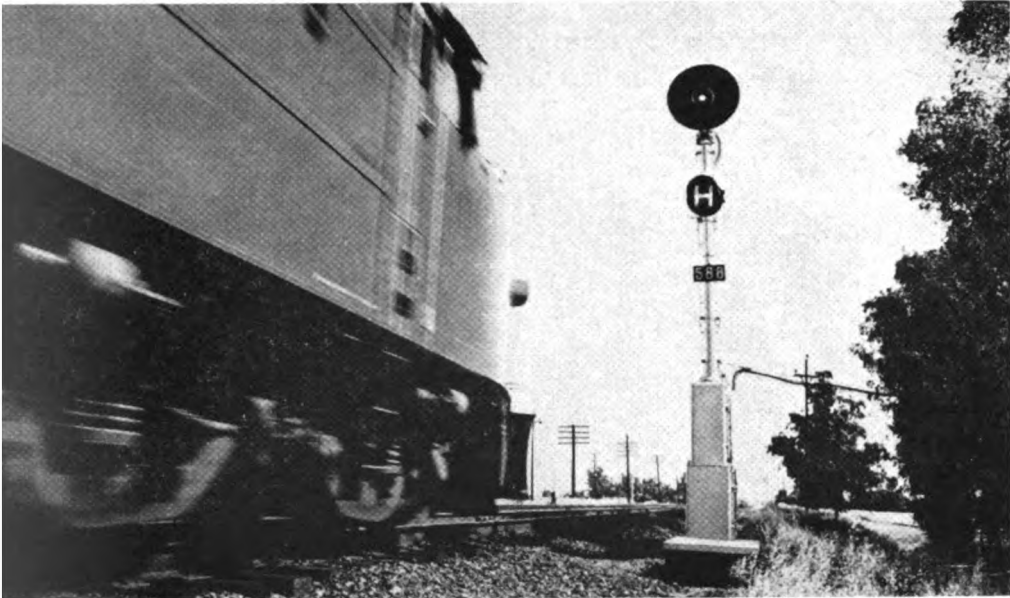
Yellow over "H" is the signal for engineer to stop train at Hotbox Locator. Red over "W" keeps second train from upsetting wheel count.

# Trainmen Read Hotbox Locator

One railroad has four hotbox detectors in service, all completely automatic. Actuation of the detector lights an indicator signal, the engineer stops the train, and a trainman reads the hotbox locator panel at the backside. The journal heat pengraph recorder is located at the scanner site, and serves only as a record and maintenance tool.

The general arrangement of the equipment is as follows: the scanners are located at a signal in three of the four locations. The recorders are always at the same place as the scanners. At a distance of at least maximum train length plus 2,000 ft past the scanner, a "hotbox indicator" is attached to an existing signal. The indicator consists of a glass with engraved

letter "H" in an HC-33 light unit, complete with Phankil device and a 40-watt, 10-volt lamp. When a hotbox actuates the detector, the "H" unit is lighted, and the signal displays an "approach" indication. Any intermediate signal between the scanners and the "H" indicator will also display "approach." No "stop" indication is used here or at the car identification panel.



When engineman sees yellow over "H" he has 2 miles to bring train to stop at Locator.

The car identification panel is located from 6,000 to 26,000 ft past the "H" indicator, at or near a siding at a location specified by general order or timetable.

In approach to the scanners, a signal is used to keep a second train from passing the scanners before the first train has passed the car identification panel. This is done to avoid having the first train cancel a hotbox indication that came from the second train, and to keep a hotbox on the second train from confusing the axle count for the first train. At two of these locations, in CTC territory, the station leaving signals are simply prevented from clearing. At the two other locations, one an automatic signal in CTC territory, the other a signal in automatic block signal territory, the signal is prevented from clearing, and a "wait" indicator is lighted. The wait indicator is the letter "W" in a unit identical to the "H" indicator. These holdout signals are located from 3,400 to 7,200 ft in approach to the scanners, a sufficient distance to enable the train that has stopped at the holdout signal to accelerate to a reasonable speed before reaching the scanners. The "W" and "H" indicators are approach lighted by the track circuit immediately approaching the signal (since this indication has a short range aspect).

Operation proceeds thusly: A train with a hot journal passes the holdout signal, which will go to "stop" as usual. Shortly afterward, it will pass the scanners. When the scanners perceive the hotbox, the hotbox indication and axle count are transmitted to the car

identification panel, the "H" indicator is lighted and an "approach" aspect is caused to be displayed at a signal in advance of the train. Simultaneously, the holdout signal in the rear of the train is now prevented from clearing. If there had been no hotbox in the train, the holdout signal would have cleared as soon as track and signal circuits would allow.

When the engineman sees the "approach" aspect and "H" indicator lighted, he will brake his train to a stop with the engine near the car identification panel. One of the head-end trainmen will check the panel to find the location of the faulty journal and will then check the car to see what action need be taken. If the car is near the rear of the train, he will radio to the rearend trainmen the location of the hotbox, and they will check it.

When the location of the hotbox or hotboxes has been noted from the car identification panel, a "cancel" button is pushed which resets the counters to zero. In the event the trainman should fail to cancel the reading, a track circuit will automatically cancel the reading when the train proceeds past the car identification panel. In CTC territory, the control machine operator can also cancel the reading.

The pengraph recorders, carrier, power supply, and associated equipment are housed in a precast concrete house. About once a week the maintainer removes the tape from the recorder and checks it for proper operation of the detector. The tape is then sent to the supervisor. A slow tape speed of 2.5 mm per second is used,

giving each roll of tape a life of from one to two weeks. A 9-mm difference in deflection (differential) between the ends of the same axle is used to trip the automatic alarm system, lighting the indicator to stop the train. The equipment is adjusted to produce a 2 to 3-mm normal deflection on a 1-mm pedestal.

At the one detector installation in ABS territory, a time recorder has been installed at the signal which includes the "H" indicator. This time recorder produces a tape which indicates the day and time, to the second, of the lighting and extinguishing of the "H" indicator light. This provides a record of each actuation and canceling of the hotbox indication, and is sent to the supervisor each week, along with the pengraph recorder tape. A time recorder is unnecessary in CTC territory, since the indication is brought into the control machine by an indication code. The time recorder was located at the "H" indicator, rather than at the hotbox recorder or car identification site, since it was desired to check that the "H" indicator was actually lighted, thus checking carrier and lamp circuits (by means of a series relay in the lamp circuit).

Normal train speed in all the detector areas is 60 mph for freight trains and 79 mph for passenger trains. The detector equipment currently includes engine eliminating equipment (determined by wheelbase), which also eliminates most passenger trains. The railroad is considering removing the engine elimination equipment, allowing passenger trains to be checked also. Examination has shown that wheel count and detection apparatus work satisfactorily at maximum passenger train speed. Although engine journals, like other roller bearings, normally operate at higher temperatures than friction bearings, they will not trip the alarm system unless there is a differential exceeding 9 mm deflection.

A standard 3-ft 3-in relay case was used to house the car identification panel and associated equipment. It is mounted with the back door of the relay case toward the track. An opening was cut into the back and a pane of glass installed, mounted in rubber, through which the panel can be seen. A steel door was fabricated and covers the glass area and cancel pushbutton when closed. It is locked with a switch lock. Opening the door completes a circuit to a fluorescent light which illuminates the panel.

Transmission of information is accomplished by unit carriers riding on a pair of wires reserved for the hotbox

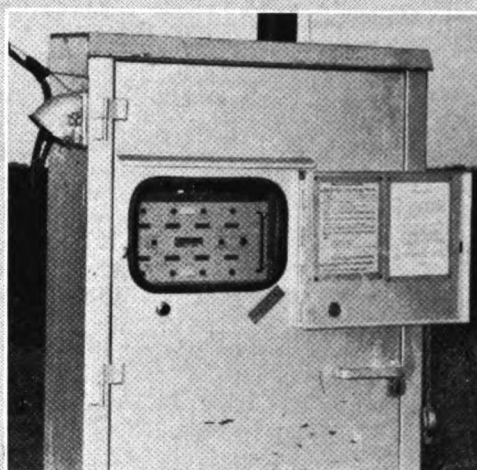
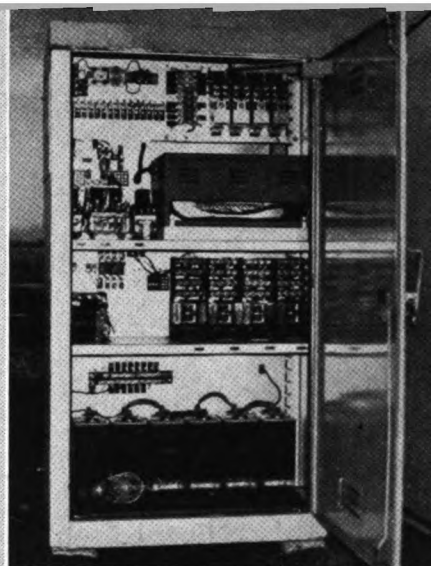
detector system. Three transmitters at the scanner site transmit only overheated journal information to the car identification panel. The heat signal itself is not transmitted, since the recorder is at the scanner location. Only the fact that an overheated (9-mm differential) journal has been detected on the Rail 1 or Rail 2 side, and the wheel count, are transmitted by off-on carrier signals as follows: Rail 1 hot journal, 9 kc; Rail 2 hot journal, 11 kc; wheel count, 15 kc.

This information is received at the car identification panel by corresponding receivers and displayed by lights and counters (see RS&C, Sept. 1959, page 25). When the first hot journal indication comes in, a 19-kc carrier transmitter is turned on. A 19-kc receiver at the "H" indicator signal causes the indicator to become illuminated and the signal to display an "approach" aspect. A second 19-kc receiver at the "W" indicator signal (where used) is also caused to be illuminated and that signal held at the "stop and proceed" indication. Where the "W" indicator is not used, the relay controlled by the 19-kc receiver prevents the station leaving signals from being cleared.

Also at the installation in ABS territory, a "cancel" pushbutton is provided at the scanner site for use by the maintainer. When in the course of testing the apparatus, he causes a hotbox indication to occur, he can cancel the indication from the scanner site. This is done by applying 10-volt DC to the line wires otherwise used only for the detector carrier circuits. This picks up a non-vital relay at the hotbox locator which cancels the hotbox indication. This maintainer's cancel button is not required in CTC territory, for the control machine operator can cancel the indication. Also as an aid to testing, a knife switch is provided in the controlling relay case so that the "H" and "W" indicators may be illuminated, without an actuation of the detector, provided the approach lighting circuit is completed also. The switch controlling the "H" indicator may also be closed by a supervisor desiring to check whether trainmen are complying with the indication.

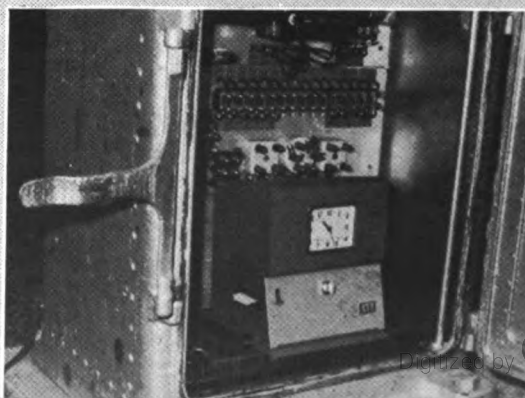
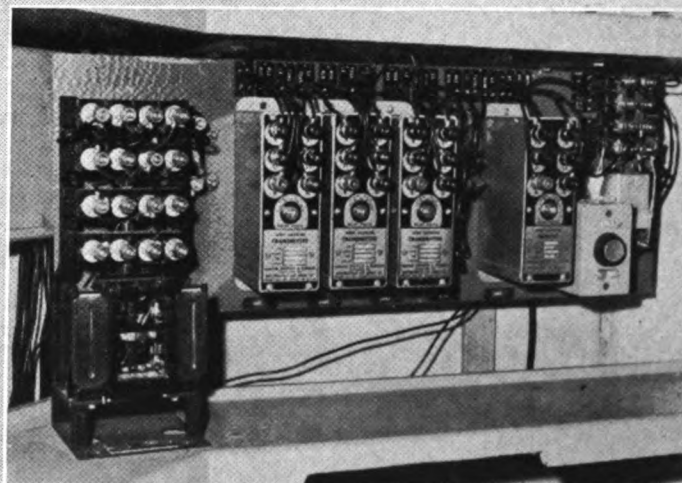
The hotbox detector equipment was supplied by Servo Corp. of America. The unit carrier was supplied by Union Switch & Signal. All four detectors have been in service for over a year, and have performed well. Since the train crews have become aware of the accuracy of the equipment, the hotbox detector operation has been satisfactory. ●

Backside of Hotbox Locator shows carrier at top right, Servo axle counter just below, and type KP relays. Six cells of Exide provide the local battery. This is what normally would be considered the front of the case. Axle counter is on wood block to raise it above upturned lip at back of shelf.



Trackside of Hotbox Locator, with door open, exposes view of counters. Button at lower left resets counters to zero. Metal projection on door strikes button at lower right to turn off fluorescent light inside of case. Telephone is close by so dispatcher can be informed of any delay.

At site of detector scanners, relay case contains three transmitters and one receiver, all US&S Unit Carrier. Receiver operates KP relay which causes "W" (wait) signal to be displayed. Pushbutton at right allows maintainer to cancel the indication after making a test.



Time recorder at "H" signal in APB territory prints date and time "H" signal goes on and off. DS records time indication appears in CTC territory.