

# New "Look" in Hotbox Detectors

• A new entry into the hotbox detection field involves different principles from those previously employed. First, instead of "looking" at the journal box proper, the new device views the hub of the wheel. Second, instead of the sensing element being heated by the radiation, the new device is directly sensitive to the particles of energy hitting it.

The General Railway Signal Co. has introduced its new Wheel Thermo-Scanner Unit to detect heat resulting from improperly performing journals or from dragging brakes. The radiometer, which includes the optical system and the heat sensing element, was developed by Eastman Kodak Co.

The radiometer views a 1-in. by 3-in. area of the hub of the wheel at a point common to both plain and roller bearing cars. GRS research indicated that the hub provided a natural collector for bearing heat. Viewing at this location puts all bearings in the same proportionate temperature range and makes the heat-sink effects of the side frame unimportant. Thus a graph results which clearly indicates which bearings are heated above normal. Misinterpretation, resulting from confusing overheated journals with the normally hotter roller bearings should be reduced.

The infrared radiation from the hub enters the radiometer through a filter which passes only the desired wavelength range. A concave mirror focuses the radiation on the sensing element. There are no lens transmission losses.

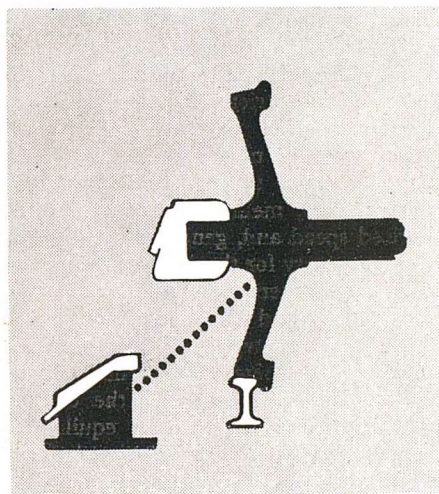
## Sensor Responds to Photons

The heat sensor is a tiny, sealed, photon responsive element. The photon is a particle of energy, in this case infrared-light or heat energy. The previously used thermistor bolometer changes its resistance when it is heated by the radiant energy. The photon detector is directly sensitive to the particles of energy hitting it. Since it requires no heating it can react in only 15 microseconds (0.000015 second).

The trackside radiometers are housed in cast iron cases. A shutter, to seal out light, closes automatically after the train has passed. No active electronic components, other than the sealed detector cells, are housed at the

trackside. As the device views the hub at right angles to the rails, only one set is required for bi-directional train operation.

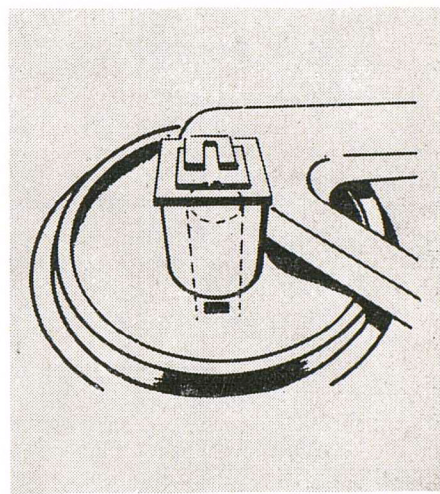
All electronic components—dual channel amplifier, gating unit, power supply and relays—are located away from the track. All interconnecting cables are plug coupled. The amplifier is transistor operated. Power requirements are 100 watts operating, 15 watts standby, at 105-130 volts, 60 cycles ac.



New "look" of GRS radiometer is at the hub of the wheel.

A single wheel detector to trigger each wheel scanning sequence is required at each installation. The wheel detector is encapsulated in epoxy resin for moisture protection and clamps to the rail, requiring no drilling.

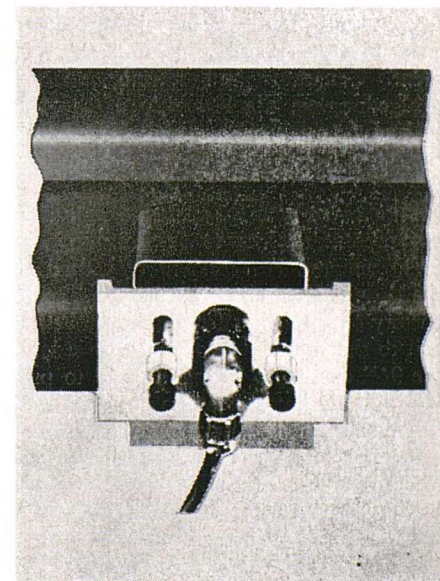
The system provides an output suitable for any standard pen recorder. This recorder may be at the site or remotely located. For distances in excess of two miles. Data-Tran, the GRS telemetering system, is recommended by the manufacturer.



Fast radiometer action measures heat in 1 x 3 in. area of hub.



A cast iron case houses the radiometer head at trackside.



The single clamp-on wheel detector triggers the scanning sequence.