

Track Circuit Developments In Europe

**Shunting improved by practice of using very little or no sand
Electronic track circuits being developed in France and Germany
Rail contactors and magnetic wheel counters used in check system**

THE ASSOCIATION OF AMERICAN RAILROADS, in its efforts to find solutions for signaling problems, has solicited the help of manufacturers of signal equipment. The Federal Telephone & Radio Company, manufacturer of signaling appliances, was so solicited, and agreed to have conducted an investigation of signaling practices in those countries of Europe where its associates of the International Telephone & Telegraph system were familiar. Arrangements were made for an investigation to be conducted by W. R. Triem, an operating officer of the Pennsylvania Railroad, retired, acting as consultant, and W. S. Storms, then signal engineer of the Erie Railroad. They visited six countries in Europe. A brief abstract of some of their findings and conclusions are as follows.

GREAT BRITAIN—Failures of equipment to shunt track circuits have been experienced not only with light-weight self-propelled cars but also with short wheel-base shunting engines and four-wheel (two-axle), small-capacity freight cars not equipped with air-brakes. After a short trial of disc (off-tread) brakes on light-weight self-propelled cars, they were replaced with clasp (on-tread) brakes, because of the difficulties experienced with the insulating film which formed on the wheel treads. Sand is used to prevent slippage on all types of motive power, but none is equipped with automatic sanders.

BELGIUM AND THE NETHERLANDS—In both countries difficulties with track circuit shuntings have been experienced because of formation of rust on the rails due to the climate. With several hundred highway crossings equipped with flashing-light protection, the problem is a serious one. Track circuits are being changed from d.c. to a.c., single-element vane relays are being changed to two-element relays, and voltages in some instances have been increased to as high as five volts, all for the purpose of increasing the shunting sensitivity of the track circuit. Track instruments are in general use to supplement the track circuits at

highway crossings and at interlockings on connecting yard and side tracks.

During the last war, a unique kind of check-out block system was developed and used extensively which provided for the automatic block signal to the rear of a train to be held in its most restrictive position until the train, upon passing the next signal in advance, had actuated that signal to display its most restrictive indication. If the last-named signal was not so actuated, the first signal would continue to display the restrictive indication. The scheme was discontinued after the war.

GERMANY—Two types of light-weight equipment are in use. One consists of a single-unit car with power units at each end, relatively heavy, on-tread brakes, manual sanding. Little trouble has been experienced with track circuit shunting. The other is a single unit of light weight with two axles and disc off-tread brakes. Failures to shunt track circuits when the surface of the wheels gets dirty are common. While there are only about 250 miles of track equipped with automatic block, track circuits supplemented by track instruments are common at interlockings and at signal boxes for manual block signaling. Great interest is being shown in automatic short-arm gates for railroad highway grade crossing protection which, it is planned, will use track instruments and short track circuits.

The track instruments are of many types; the magnetic type seems preferred. Although not susceptible to mechanical tampering, these instruments are not fool-proof because it is possible to actuate them by passing a ferrous metallic object through the gap through which the flange of the wheel is designed to pass. The Lorenz electronic track circuit is in service in automatic block signal territory in the Saar in track circuits of $1\frac{1}{4}$ miles, and can be worked up to two miles.

SWITZERLAND—The newest self-propelled light-weight passenger units are electrically operated, four

axles, clasp brakes, no automatic sanding, eight being in service. The Swiss Railways are all electrified, with practically no automatic block signaling because of the extensive use of steel ties. Through the Gothard Tunnel, trains are governed by an automatic block system which employs axle counters in place of track circuits.

In the light of these conditions, there appears to be no problem in the use of light-weight equipment on Swiss Railways and from the standpoint of signaling nothing could be learned bearing upon the subject under investigation. However, there is another field in which much work had been done that is of interest to railroads operating in light-weight equipment and to all railroads which have had trouble with sand preventing or interfering with the shunting of track circuits.

The mechanical department has conducted studies of use of sand on the Swiss Railways and found that by using an automatic device on electric locomotives to apply brakes to the driving wheels when they started slipping, the use of sand could be eliminated. It is claimed that in checking sealed sanding valves on numerous electric engines, very few were found to have had to use sand for any cause for long periods of time.

FRANCE—Disc type off-tread brakes are being used on some old equipment but are being replaced by on-tread brakes. All new equipment has on-tread brakes. Automatic sanding apparatus has been removed from all equipment. If the chief signal officer had his way, the use of sand would be completely eliminated. A great deal of work has been done on the French National Railways in developing a so-called electronic track circuit, six of which have been installed to date. At vital points on the railroad, where ordinary track circuits are used, track instruments are installed at fouling points and to check on the single-unit light-weight cars. About 50,000 such instruments are in service.