



Instrument case at signal near Tower 80

automatic block signal protection throughout the two-mile gap.

Special Communication and Whistle Signals

The Missouri Pacific automatic block signal rules make it necessary to provide a telephone at each absolute signal for the use of trainmen. The telephones located at the home signals in the Houston area, as discussed in this article, are all connected to a line which extends to loud speakers in Towers 26 and 80. At Tower 80 switches are provided to connect the entire telephone system to the dispatcher's line or to the city telephone system.

It is often necessary for the engineer of an approaching train to give locomotive whistle signals to let a towerman know which train is approaching in order that the proper route may be lined up. Furthermore, switching trains may want to call for a route different from the one set up. Therefore, on account of the extended area controlled, it was desirable to have the whistle signals at the various crossings and junctions repeated in the two towers. After experimenting with microphones, it was found that the desired result could be accomplished simply by energizing the transmitter of the regular telephone in the booth at a signal, this being controlled through a back contact of a track relay. No special ap-

paratus or special location of the telephone was required. When a train passes one of these telephone stations, the transmitter is cut in and the noise of the passing train and the whistle signals are brought into the towers over the loud speakers.

Power Lines and Water Pumps

The a-c. floating system of power supply is used, the energy being supplied by a 4,400-volt distribution line. A set of 4 cells of 60-a.h. storage battery is used at each signal location to supply the line circuits and as a stand-by for signal lamps in case of a power outage. One 60-a.h. storage cell is used for each track circuit. These cells are of the lead type, manufactured by the Exide Company.

The 4,400-volt energy is supplied at Tower 80 and is distributed to Spring and to Kenefick. This power is used for illumination of the building at Tower 80, and for illumination of station facilities at Spring and at Huffman. Spring is 20 miles north of Tower 80 and Huffman is 20 miles east, and at both of the towns named, connections from the 4,400-volt line extend to electric motors for operating pumps for pumping locomotive water. Rotary-type pumps of comparatively low capacity are used, but by means of an automatic float-switch control the required amount of water is pumped, because the tanks are practically on "floating charge" the same as the storage batteries on the signal system.

On the interlocking consolidations and automatic signaling carried out on the Missouri Pacific Lines as explained in this article, the color-light signals, relays, cases, switch machines, desk levers, etc., were furnished by the General Railway Signal Company. The two longer stretches of automatic block signals were installed under contract by the General Railway Signal Company, but the interlocking consolidations and rearrangements were made by the signal forces of the railroad.

Call-on Signal Involved In Accident

On January 29, 1935, there was a rear-end collision between a multiple-unit electric passenger-equipment extra and a multiple-unit electric passenger train on the Delaware, Lackawanna & Western at Harrison, N.J., which resulted in the injury of 79 passengers and 14 employees. Following is an abstract of the report of an investigation made by the Bureau of Safety of the I.C.C.

In the immediate vicinity of the point of the accident this line consists of three electrified tracks over which the trains are operated by time-table and an automatic block signal system.

Opposite the Harrison station is a crossover between the center and westward tracks, the switch points being facing for west-bound trains. This crossover and the signals in the immediate vicinity are controlled from an electro-pneumatic interlocking machine approximately 3,000 ft. distant. The Harrison station is situated about 1,725 ft. east of a drawbridge over the Passaic river. The signals involved are of the four-indication color-light type displaying red for "stop," yellow for "approach," yellow over green for "approach-restricting," and green for "proceed." In addition, pushbutton control is provided whereby the leverman may change the red indication to red-over-yellow as a calling-on signal to advance a train into an occupied block; one of these signals, R-14, is situated 121 ft. in the approach to the place of accident.

Three trains had been advanced into the block governed by signal R-14 by the call-on aspect, while waiting for the drawbridge to be lowered. These trains were closely spaced, the rear of the third train having cleared signal R-14 by only 121 ft.

A fourth westbound multiple-unit passenger train, consisting of four cars, left Hoboken, 7.13 miles east of Harrison, at 8:16 a.m., according to the train sheet, one minute late, passed signal R-6, which was displaying an approach-restricting indication; passed signal R-12 displaying an approach indication; passed the flagman of Extra 2235 at a point approximately 316 ft. behind his train; passed signal R-14 displaying a slow-speed or calling-on indication, and collided with the rear of Extra 2235 while traveling at a speed estimated to have been between 15 and 30 m.p.h.

Had the engineer properly obeyed the approach indication of signal R-12, he would have approached signal R-14 prepared to stop and would then have been in a position to accept the slow-speed or calling-on indication displayed by that signal and close up behind Extra 2235. The evidence indicates that the flagman of Extra 2235 had done all that he could to protect his train within the limited time at his disposal.

According to the report, this accident was caused by the failure of the engineer of the passenger train to obey signal indications.