

Accident Involving Rule 93

ON MARCH 14, 1938, there was a head-end collision between two freight trains on the Illinois Central at North yard, Carbondale, Ill., which resulted in the death of two employees. An investigation of this accident was made by the Bureau of Safety, Interstate Commerce Commission, in conjunction with the Illinois Commerce Commission. A digest of the report on this accident is as follows:

Location and Method of Operation

This accident occurred on that part of the St. Louis division which extends between Centralia, Ill., and Ballard, Ky., a distance of 113 miles. In the vicinity of the point of accident this is a double-track line over which trains are operated by time table, train orders and an automatic block signal system. The accident occurred within yard limits on a crossover connecting the northward and southward main tracks, located near the north end of the yard. The crossover is 213 ft. in length and the turnouts are facing-point switches for trains moving with the current of traffic. Southbound trains enroute from the Centralia district to the Johnson City district move through the crossover involved to the northward main track, continue on this track for a distance of 80 ft. and then proceed through another switch leading to the tracks of a classification yard.

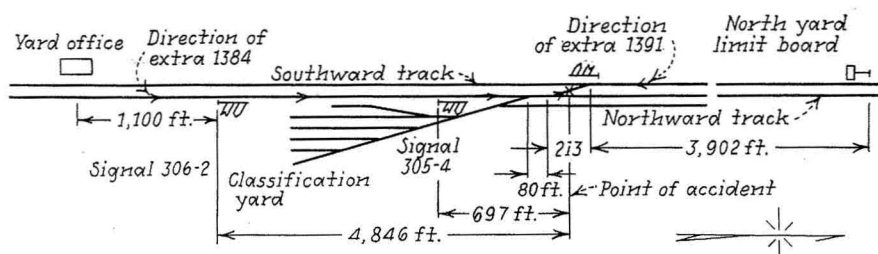
The automatic block signals involved are signals 306-2 and 305-4, governing northward movements, and are located 4,846 ft. and 697 ft., respectively, south of the point of accident. These signals are of the 2-arm, 2-position, lower-quadrant, semaphore type; night indications are green over green for proceed, green over yellow for proceed at medium speed prepared to stop at the next signal, and red over yellow for stop; then proceed. The track circuits are so arranged that when either crossover switch is open an approach indication is displayed by signal 306-2 and a stop-and-proceed indication by signal 305-4.

Rule 93 of the Transportation Rules provides as follows:

"Within yard limits the main track may be used, clearing the time of first-class trains. Second- and third-class and extra trains must move within yard limits prepared to stop unless the main track is seen or known to be clear. In case of accident, the responsibility rests with the approaching train.

"Trains and yard engines occupying the main track within yard limits must be protected by flagman during fogs, storms or other unfavorable conditions; also, where the view of an approaching train is obstructed by curvature or other conditions. Trainmen and yardmen will be held responsible for any failure to exercise reasonable precaution in protecting their trains under such condition."

The weather was slightly foggy but visibility was good at the time of the accident, which occurred at 4:55 a.m. Extra 1391, a southbound freight train, departed from Duquoin, Ill., 18.3 miles from North yard, at 4:22



a.m., and stopped at the crossover switch at the North yard at 4:52 a.m., according to the statements of the engine crew. After the route was lined, the train started through the crossover, but before reaching the northward track, the northbound train was seen approaching and Extra 1391 had just started to back up when it was struck by Extra 1384.

Extra 1384, a northbound freight train, departed from Cairo Junction, 54.73 miles from North yard, at 3:05 a.m., passed Carbondale, 1.29 miles from North yard, at 4:51 a.m., passed the yard office at North yard at 4:54 a.m., passed signal 306-2, the indication of which is in question, passed signal 305-4 displaying a stop-and-proceed indication, entered the open crossover switch and struck Extra 1391 while traveling at a speed estimated to have been between 25 and 30 m.p.h.

Summary of Evidence

The engineman of Extra 1391 stated that the air brakes functioned properly enroute, but when he stopped his train to enter the crossover at the North yard at Carbondale he misjudged his speed and ran by the switch a few feet and had to back up; as he backed up the head brakeman unlocked the switch. He stopped at the switch at 4:52; at that time it was

slightly foggy but he saw a headlight in the vicinity of the coal chute or yard office, more than 1 mile distant. The head brakeman lined the crossover switches as well as the switch leading to the yard track, and when the fireman informed him that the route was lined, the engineman started the train and had just entered the crossover when the fireman warned him of the approaching train. He immediately stopped, and had just started to back up when the collision occurred; it was then 4:55 a.m.

The head brakeman of Extra 1391 stated that as he threw the first crossover switch he saw a headlight in the vicinity of the yard office, and after lining the yard-track switch he saw the train was approaching and was about 35 car lengths from him or

about 30 car lengths south of signal 305-4. It was working steam and he gave stop signals with his white lantern, but as his signals were not answered and the engine of the approaching train continued to work steam he ran back and closed the yard entrance switch and then continued toward the crossover switch. He had run a total distance of about 250 ft. and had just reached the crossover switch when the train passed him at a speed of about 30 m.p.h., still working steam, and with no indication that the air brakes had been applied. He stated that after opening the crossover switches he observed the arms of signal 305-4 in stop position, and while he could not see signal 306-2, it was his opinion that the northbound train was south of that signal when he threw the first switch. He further stated that he hurried in lining the route for his train and there was no delay in unlocking or operating the switches.

The head brakeman of Extra 1384 stated that he was on the brakeman's seat on the fireman's side when they passed signal 307-2, located 2,351 ft. south of signal 306-2. It displayed a proceed indication and at the same time he observed that signal 306-2 was also displaying a proceed indication. He called the indication of signal 307-2 and soon after passing that

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nals governing train movements over a switch, depending on the selection set up by the position of the switch. In other words, this plant represented practically the ultimate development in the ingenious use of mechanical devices in the interlocking field prior to the introduction of electric circuits and apparatus.

Contrast Between Old and New

In decided contrast, this old all-mechanical interlocking was recently replaced by a modern all-relay interlocking using a machine with miniature levers, the locking being effected electrically by interconnection of circuits rather than by mechanical locking between levers, and selections effected by circuits rather than with mechanical selectors. Switches are operated by electric machines rather than by pipe lines actuated by manually-operated levers; electric locking controlled by track circuits replaces detector bars; and searchlight type signals displaying three aspects in one unit, all operated electrically, replace the old semaphore signals which were operated by wire line connections.

In certain respects, this replacement is typical of many that should be made at numerous locations as a means of improving safety, expediting train movements and reducing operating expenses. Especially is this true where two or more interlockings can be consolidated into one control arrangement.

The Relation of Signaling to Train Operation

WITHIN recent years, signaling apparatus has been applied in several new ways which have brought about changes in the methods of directing train movements. As a result, those who plan signaling installations, as well as those who construct and maintain these systems, should be informed of terms used in train operation as applied to signaling, so that a clear understanding may be had of the exact meaning of manual block, permissive manual block, time-interval block, operation by time table and train orders with or without automatic signals, remote control, and centralized traffic control in which train movements are directed by signal indication without train orders or rights of trains by time table direction or class.

An Analysis of Problems

With the thought that many of the readers of *Railway Signaling* would be interested in an extended study of the background through which signaling and train operation have been built up, a series of questions and answers has been prepared and is to be published in installments monthly in the What's the Answer department. This series has been prepared to present both the background of signaling and an analysis of signaling systems. Special attention has been given to the orderly arrangement of the material. The general field of railway signaling will be described, an attempt being made to clarify its interconnection with railroad operation. As the subject matter is developed, the various sub-divisions of signaling

will be discussed and analyzed in detail. It is to be understood that all answers are to be considered as "general" in nature, since practices vary on railroads.

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signal the engineman called the indication of signal 306-2. It was still displaying a proceed indication when the head brakeman last observed it, at which time his engine was a short distance beyond the yard office or about 10 or 12 car lengths from the signal. He estimated the speed of his train to have been about 20 m.p.h. at that time and it was then increased to about 25 m.p.h. He saw the southbound train which appeared to be clear on the southward track and he called attention to this train, referring to it by number. He did not see either signal 305-4 or the switch lights, nor did he see anyone giving stop signals, and he did not realize that a collision was imminent until his engine entered the crossover, at which time he thought he heard an application of the air brakes. The signal lights in that vicinity are bright and can be seen for a considerable distance. The engine cab is equipped with storm windows and there is nothing in the cab to interfere with the view through these windows. No one in the cab called the indication of signal 305-4, and he was unable to explain his failure to see that signal.

Using as a basis for calculation the time consumed in opening the crossover switches during a test conducted after the accident, it appears that signal 305-2 would have displayed an approach indication and signal 305-4 a stop-and-proceed indication approximately $2\frac{1}{2}$ min. before the accident occurred. A train traveling at a speed of 25 m.p.h. would consume 2 min. 10 sec. traversing the distance between signal 306-2 and the point of accident, and this would indicate that the signal displayed an approach indication before engine 1384 passed it. Twenty-five m.p.h. was the lowest estimate of the speed of Extra 1384 in the vicinity of signal 306-2.

There is conclusive evidence that signal 305-4 displayed a stop-and-proceed indication and that the crossover switch displayed a red indication; in addition, the brakeman of Extra 1391 gave a stop signal when the train was approximately 30 car lengths south of the block signal. Apparently none of these warning signals were seen by any of the employees on engine 1384. The engineman and fireman of Extra 1391 were killed in the accident.

Tests conducted after the accident showed that the signals functioned as intended, and that switch indications adverse to the movement of Extra 1384 were displayed in time for that train to have been brought to a stop before passing the clearance point of the switches. Regardless of block-signal indications, weather conditions, or the effect of the headlight of the southbound engine upon visibility, this accident would have been averted had Extra 1384 been operated within the yard limits in compliance with the requirements of rule 93.

This accident was caused by the failure of the crew of Extra 1384 properly to observe and obey signal indications and to comply with the requirements of rule 93.