

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2627

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS
RAILWAY COMPANY

REPORT IN RE ACCIDENT

AT ASHMORE, ILL., ON

SEPTEMBER 16, 1942

SUMMARY

Railroad: Cleveland, Cincinnati, Chicago
& St. Louis

Date: September 16, 1942

Location: Ashmore, Ill.

Kind of accident: Head-end collision

Trains involved: Freight : Passenger

Train numbers: Third 80 : 11

Engine numbers: 2142 : 5384

Consist: 49 cars, cabooses : 13 cars

Speed: Standing : 55 m. p. h.

Operation: Interlocking

Track: Single; tangent; 0.065 percent
descending grade westward

Weather: Clear

Time: 3:15 p. m.

Casualties: 3 killed; 20 injured

Cause: Accident caused by a remotely-
controlled switch being opened
while tests were being made and
after approaching train had
passed signal indicating proceed

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2627

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS
RAILWAY COMPANY

December 7, 1942.

Accident at Ashmore, Ill., on September 16, 1942, caused by
a remotely-controlled switch being opened while tests
were being made and after approaching train had passed
signal indicating proceed.

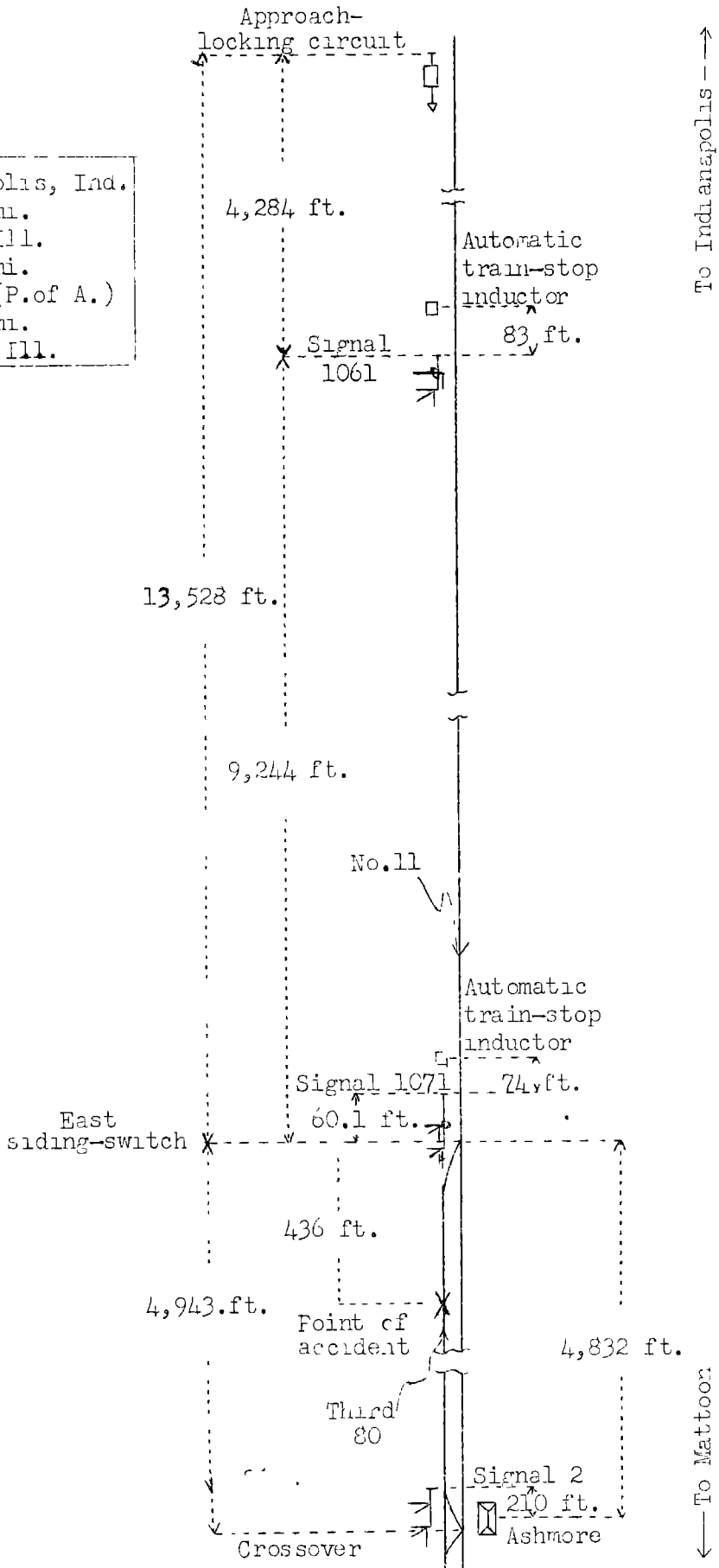
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On September 16, 1942, there was a head-end collision
between a freight train and a passenger train on the Cleve-
land, Cincinnati, Chicago & St. Louis Railway at Ashmore,
Ill., which resulted in the death of 1 express messenger and
2 train-service employees, and the injury of 14 passengers,
2 railway-mail clerks and 4 dining-car employees. This acci-
dent was investigated in conjunction with a representative
of the Illinois Commerce Commission.

¹Under authority of section 17 (2) of the Interstate Com-
merce Act the above-entitled proceeding was referred by the
Commission to Commissioner Patterson for consideration and
disposition.

- Indianapolis, Ind. 104.4 mi.
- Kansas, Ill. 4.4 mi.
- ✕ Ashmore (P. of A.) 19.4 mi.
- Mattoon, Ill.



Inv. No. 2627
 Cleveland, Cincinnati, Chicago & St. Louis Railway
 Ashmore, Ill.
 September 16, 1942

Location of Accident and Method of Operation

This accident occurred on that part of the Illinois Division extending between Indianapolis, Ind., and Mattoon, Ill., a distance of 128.2 miles. In the immediate vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders, an automatic block-signal system and an automatic train-stop system. At Ashmore the eastward siding parallels the main track on the north. The east switch is located 4,832 feet east of the station and is equipped with dual-control mechanism. When it is operated by power it is under the control of the operator at Ashmore. The accident occurred on the eastward siding, within interlocking limits, at a point 436 feet west of the east switch. Approaching from the east there is a tangent a distance of 2 miles to the east siding-switch. On the siding there is a No. 10 turnout 192 feet in length having maximum curvature of 7 degrees 25 minutes, which is followed by a tangent 244 feet to the point of accident. The grade for west-bound trains varies between 0.033 and 0.497 percent descending throughout a distance of 2 miles immediately east of Ashmore and is 0.065 percent descending at the point of accident.

The automatic-block system is arranged on the absolute-permissive-block principle. Approach signal 1061 and home signal 1071 governing west-bound movements are located, respectively, 9,244 and 60 feet east of the east siding-switch. Signal 1061 is of the automatic, two-unit, four-indication, color-light type, and is approach lighted. The aspects and corresponding indications of this signal are as follows:

<u>Aspect</u>	<u>Indication</u>
Green-over-red, staggered	Proceed
Yellow-over-green	Proceed approaching next signal at medium speed
Yellow-over-red, staggered	Proceed preparing to stop at next signal. Train exceeding medium speed must at once reduce to that speed. * * *
Red-over-red, staggered	Stop, then proceed at restricted speed

Home signal 1071 is of the two-unit, semi-automatic, five-indication, color-light type, and is approach lighted. The aspects and corresponding indications of this signal are as follows:

<u>Aspect</u>	<u>Indication</u>
Green-over-red	Proceed
Yellow-over-green	Proceed approaching next signal at medium speed
Yellow-over-red	Proceed preparing to stop at next signal. Train exceeding medium speed must at once reduce to that speed. * * *
Red-over-yellow	Proceed at restricted speed
Red-over-red	Stop

Approach locking and electric switch locking are provided, and the signal control circuits are so arranged that when the east siding-switch is lined for a train to enter the siding signal 1061 will display approach and signal 1071 will display red-over-yellow.

The control machine, which is located in the station at Ashmore, consists of 10 working levers in a 15-lever frame. Of these levers, 3 operate 6 signals, and 4 operate 6 switches. Lever 1, which controls the east siding-switch and signal 1071, is mounted upright on the interlocking machine and has five positions, from left to right as follows: Normal, normal-indicating, center, reverse-indicating, and reverse. The arc through which lever 1 travels from normal-indicating to reverse-indicating position is 15 degrees. Lever 1 is equipped with two latch-type centering devices. In order to move the lever in either direction the latch in the direction of movement may be released by manual depression. When lever 1 is in normal position the east siding-switch is lined for the main track and signal 1071 operates as an automatic signal. When this lever is in center position, signal 1061 displays approach and signal 1071 displays stop. An approach-indication lamp lights when the track between Kansas and Ashmore, a distance of 4.4 miles, is occupied. The approach-locking circuit extends 13,468 feet east of home signal 1071 and an annunciator bell sounds when a train enters this circuit. No time release is provided and there is no mechanical locking on lever 1. The control machine is provided with a track diagram and approach and OS lamps.

The east siding-switch is so arranged that it can be operated either by remote-control or by hand. The switch mechanism is equipped with a selector lever which permits the switch to be operated manually. When the switch mechanism is in position for manual operation the approach-locking is released. A control-relay booth and a telephone booth are located near the east siding-switch.

The automatic train-stop system is of the intermittent-inductive type and engines are equipped with forestalling

devices. Wayside inductors are located 83 and 74 feet, respectively, east of signals 1061 and 1071. If a restrictive indication of these signals is not acknowledged by forestalling, a full-service automatic-brake application will occur. When an automatic brake application is forestalled the train may proceed in accordance with operating rules. Engine 5384 is equipped with a speed recorder provided with three pencils, one of which marks the tape when an automatic brake application has been forestalled.

Operating rules read in part as follows:

SIGNAL DEFINITIONS

MEDIUM SPEED.--A speed not exceeding thirty miles per hour.

RESTRICTED SPEED.--A speed not exceeding that which will enable a train to stop short of train ahead, obstruction, or switch not properly lined, * * *.

Rules for the government of the signal department read in part as follows:

MAINTENANCE

3065. When any part of an interlocking is to be repaired a thorough understanding must first be had with the signalman, in order to secure the safe movement of trains and engines during repairs. * * *

3070. Circuits must not be opened or closed or apparatus worked on, which may change a signal indication that has been displayed for a train or engine movement or which may permit or cause improper operation of a switch, * * * in the route, until train movement has been completed. * * *.

In this vicinity the maximum authorized speed for the passenger train involved is 80 miles per hour.

Description of Accident

Train 80, an east-bound second-class freight train, consisted of engine 2142, 49 loaded cars and a caboose. This train entered the eastward siding at Asnmore at 2:29 p. m., and stopped with the front end of the engine 436 feet west of the east siding-switch. About 45 minutes later the engine was struck by No. 11.

No. 11, a west-bound first-class passenger train, consisted of engine 5384, 1 mail car, 1 express car, 1 passenger-baggage car, 3 coaches, 6 Pullman sleeping cars and 1 dining car, in the order named. The second car was of steel-underframe

construction and the remainder were of all-steel construction. At Indianapolis, 108.8 miles east of Ashmore, a terminal air-brake test was made and this train departed at 1:10 p. m., according to the dispatcher's record of movement of trains, 1 hour 8 minutes late, passed Kansas, 4.4 miles east of Ashmore and the last open office, at 3:10 p. m., 1 hour 19 minutes late, passed signal 1061 at a speed of 59 miles per hour and signal 1071 at a speed of 60 miles per hour, as indicated by the tape of the speed-recorder with which engine 5384 was equipped, and while moving at a speed of 55 miles per hour it entered the east siding-switch and collided with Third 80. The brakes of No. 11 had functioned properly at all points where used en route.

Engine 2142, of Third 80, was driven backward by the impact about 100 feet. The engine and tender were overturned on their left sides, north of the siding and parallel to it. The front end of the engine was crushed inward about 5 feet and the cab was demolished. The cistern was torn from the tender frame. The first three cars were derailed, the oil with which they were loaded became ignited and they were destroyed. Engine 5384, of No. 11, and its tender were derailed and stopped on their right sides, north of the siding and parallel to it. The cab was demolished. The first car was derailed and considerably damaged, and stopped on its right side at the rear of the tender and parallel to the siding. The second car was demolished. The third to seventh cars, inclusive, were derailed and considerably damaged. The eighth car was slightly damaged.

It was clear at the time of the accident, which occurred at 3:15 p. m.

The train-service employees killed were the engineer and the fireman of No. 11.

Data

During the 30-day period preceding the day of the accident, the average daily movement in the vicinity of the point of accident was 45.76 trains.

In tests made after the accident, the signals functioned properly and no evidence of crossed or broken wires or of grounds was discovered; however, certain contacts on the interlocking machine were not adjusted in accordance with the circuit plans. When lever 1 was at a point between center position and normal-indicating position, the switch would be lined for the main track and signals 1061 and 1071 would display proceed, provided signal 2 was clear. Signal 2 is a westward home signal located 210 feet east of the station. Because of internal corrosion, a resistance unit in the switch-indicating circuit failed on the day of the accident. The automatic train-stop inductor at signal 1061 conformed to the requirements and no electrical or mechanical defect was found. The automatic train-stop apparatus and the air-brake equipment of engine 5384 functioned properly and conformed to the requirements.

The speed recorder was tested and found accurate at speeds between 50 and 80 miles per hour. The forestalling recorder pencil functioned properly. An analysis of the speed-recorder tape of engine 5384 disclosed that No. 11 was moving at a speed of 59 miles per hour at signal 1061 and the speed increased to 67 miles per hour at a point 1,057 feet east of signal 1071. It was 60 miles per hour at signal 1071 and 55 miles per hour at the point of collision. Speed was reduced from 67 miles per hour to 55 miles per hour within a distance of 1,553 feet.

Discussion

Under the rules for the government of the signal department, before any part of an interlocking is to be repaired a thorough understanding between the signal maintenance employees and the operator must be had. Circuits and apparatus must not be tested or repaired when there is possibility of changing a signal indication which has been displayed for the movement of a train, or causing a route to be lined improperly for such movement.

The investigation disclosed that about 1:35 p. m. it was found a failure had occurred in the indicating circuit of the east siding-switch at Ashmore, causing the indicating lamp to be lighted continuously. It was later found that the cause of this trouble was the failure of a resistance unit in the relay nouse at the east siding-switch. This condition prevented lever 1 from being moved to either normal or reverse position, and also resulted in some signal 1071 displaying red-over-red. The operator on duty informed the signal maintainer of this condition

About 2:29 p. m. Third 80 entered the west end of the eastward siding and stopped with the front end of the engine 436 feet west of the east siding-switch. About 45 minutes later No. 11 entered the east siding-switch and collided with Third 80.

No surviving member of the crew of No. 11 observed what indications were displayed for his train by signals 1061 and 1071. However, the investigation disclosed that this train received a proceed indication at signal 1061 by reason of the fact that the speed-recorder tape showed that no automatic brake application had been forestalled or had occurred in the vicinity of this signal. The tape indicated that a heavy application of the brakes became effective at a point about 1,057 feet east of signal 1071, and the speed was reduced from 67 to 55 miles per hour in a distance of 1,553 feet. It could not be determined whether this application of the brakes was made because of the indication displayed by signal 1071 or in compliance with hand signals being given in the vicinity of the east switch. The weather was clear and signal 1071 could have been seen from the engine of a west-bound train a considerable distance.

The interlocking is so arranged that when a train is on the approach circuit, which extends 13,463 feet east of signal

1071, the remote-control switch at the east end of the siding cannot be operated by power for entry to the siding unless the approach locking is released. No time release for this locking is provided. If the approach locking is released in some manner, lever 1 must also be moved to the reverse-indicating position before the remote-control switch will move to reverse position. The investigation disclosed that the approach locking can be released by reversing the selector lever on the switch mechanism, by shunting the detector track relay, by a defective track detector circuit, or by the crossing of circuits in the relay house. In the investigation no evidence of crossed wires or grounds was found. The circuits were so arranged that when the resistance unit in the indication circuit failed, lever 1 could not be moved to either normal or reverse position. Because of improper adjustment of contacts on lever 1, when the lever was moved from normal-indicating position to center position there was an intermediate point at which signals 1061 and 1071 would display green-over-red, provided signal 2 was clear and the remote-control switch in normal position. There was no notch for center position, but a stopping device was provided.

The signal maintainer was at the remote-control switch when the operator informed him of the trouble in the switch-indicating circuit, and he immediately started to look for the cause. After Second 80 departed from the east siding-switch at 2:37 p. m., the maintainer and his helper went to the depot at Asmore and were engaged in checking the circuits for about 10 minutes. During this time the maintainer observed that lever 1 could not be latched in either the normal or the reverse position and, because of this condition and the fact that the relays were de-energized, he felt certain that signal 1071 displayed red-over-red. Shortly after 3 p. m. the maintainer and his helper returned to the east siding-switch and conducted tests to ascertain the cause of the trouble. When the maintainer arrived at the switch involved he observed that the selector lever on the switch mechanism was in position for power operation. About 3:07 p. m. the maintainer instructed his helper to call the operator at Asmore by telephone and to tell him to move lever 1 to center position and then to move it to normal-indicating position. The front brakeman of Third 80, who was near the relay house, heard the maintainer tell his helper to instruct the operator to move lever 1 to center position; however, the helper, who had had but little experience and did not fully understand signal terminology, said he instructed the operator to place lever 1 in neutral position. The operator was not certain what was meant by neutral position, but after some delay he placed the lever in center position. A conductor who was in the station said he saw the operator move this lever about a minute and a half before the accident occurred. Shortly before No. 11 approached, the remote-control switch moved to position for entry to the siding. The front brakeman of Third 80, the maintainer's helper and the maintainer noted this operation, but none of them was able definitely to determine the location of No. 11 at that time. The maintainer thought that the switch was lined for the siding before No. 11 passed signal

1061, and was not alarmed as he thought signal 1061 was displaying yellow and signal 1071 red-over-red continuously. When No. 11 was approaching the switch he was making a study of the circuit plans. The front brakeman of Third 80 reminded the maintainer that the switch was lined for the siding. The maintainer continued his work on the plans and relays for a time, and then instructed his helper to line the switch manually for main-track movement. The helper endeavored to throw the switch but could not move the selector lever. The maintainer went to his assistance, but neither the maintainer nor his helper was able to line the switch for the main track. The front brakeman of Third 80 and the maintainer then started eastward to flag No. 11; however, because of the speed of the approaching train the flag protection was not provided at a distance sufficient for No. 11 to stop short of the switch and thereby avert the accident. After the accident it was found that the selector lever could not be operated because the hand-throw lever and the switch points were not synchronized. During the time the maintainer was at the remote-control switch, a section force was engaged in track work about 250 feet west of the switch, but there was no evidence that the track circuit had been shunted or that an underground cable had been damaged, or that anything else had been done by them which would release the approach locking. The maintainer said that in his tests he had used a jumper to test relay contacts, but had made no contact that would move the switch.

According to the statement of the operator, when he went on duty at 3 p. m., lever 1 was in normal-indicating position. He did not understand that the maintainer would test the east siding-switch. About 3:07 p. m. the maintainer's helper instructed him by telephone to move lever 1 to neutral position and he placed this lever in its center position. He said that thereafter during his tour of duty he did not move lever 1 from center position. When he received information that No. 11 had departed from Kansas at 3:11 p. m. he placed lever 2 in normal position to clear home signal 2, which is a westward home signal located about 200 feet east of the station. Soon afterward the accident occurred. Lever 1 projects upward and lever 2 projects downward, and the operator was certain that during the last operation of levers he did not erroneously move lever 1 instead of lever 2.

Under the conditions as stated by the maintainer, namely, the signal-control relays being de-energized and lever 1 being in its center position, signal 1061 should have displayed approach, but it is evident that these conditions did not exist at the time No. 11 approached and passed signal 1061, as the investigation established the fact that a proceed indication was displayed by that signal at that time. This probably occurred during the movement of lever 1 from normal-indicating position to center position and resulted because of the adjustment of contacts which caused the signal to clear when lever 1 was in an intermediate position between normal-indicating and center.

In the tests after the accident it was found that when the approach-locking circuit was occupied and approach locking was in effect, it was not possible to change the position of the east siding-switch by any manipulation of lever 1 alone. However, before the accident occurred lever 1 was moved and in addition certain tests, including the use of a jumper, were also being made at the remote-control switch location, and it is apparent that some combination was created which caused the switch to be operated from main-track to siding-position as No. 11 was approaching. It was found that if lever 1 was moved past center position toward reverse-indicating position sufficiently to close the contacts of the switch-control-relay circuit and cause the relay contacts to be reversed, or if this condition was set up by tests at the relays, and if in addition a jumper was placed across certain other relay contacts the approach locking could be released and power applied to the switch motor so as to move the switch to siding-position.

Under the rules, no repair work to apparatus or testing of circuits should be conducted when there is possibility that a signal indication or a route may be changed for an approaching train. The employees involved understood these rules. In addition, signal maintainers are required to spike a remote-control switch in proper position for the movement intended.

Cause

It is found that this accident was caused by a remotely-controlled switch being opened while tests were being made and after approaching train had passed signal indicating proceed.

Dated at Washington, D. C., this seventh day of December, 1942.

By the Commission, Commissioner Patterson. --

(SEAL)

W. P. BARTEL,
Secretary.