



Report #	Date	Reporting Carrier	Block System	Interlocking	Auto. Systems	Loco or Train No.	Device that Failed	Location	Collision or Derailment?
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**Cause**

**Narrative**

454	2/12/1995	NICD	APB			2009	Track Circuit	Porter, IN	N
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**Foreign Current Induced in Track Circuit from Adjacent Power Lines**

At 1:46 P.M., Sunday, February 12, 1995 a false proceed indication was displayed at eastbound home signal number 481, a head block signal at the east end of the Wilson passing track, milepost 47.46.

An APB system with continuously-lighted, three-aspect wayside colorlight signals is in place in the area in question. Trains operate by timetable and train order authority. The maximum authorized passenger train speed for this area is 79 mph. The maximum authorized freight train speed is 35 mph. A local speed restriction of 40 mph applies to the diverging route.

Extra train #2009 East, an eastbound freight train with two engines and 21 empty gondolas was in the clear awaiting a meet at the east end of the Wilson passing track per train order #21, dated 2/12/95. Scheduled passenger train #508, a two-car consist, was proceeding westward toward the meet location per train order #22, dated 2/12/95. See figure 1.

Train 2009 East observed absolute signal #481 display a STOP indication at the time it was expected that train 508 passed the opposing head block signal. Signal 481 continued to display a STOP indication as train 508 proceeded westward. As train 508 came into the view of train 2009 East, the indication of signal 481 changed from STOP to PROCEED and remained thus until train 508 proceeded through the turnout when signal 481 again displayed a STOP indication. Signal 481 then recleared as train 508 left the fouling circuit. The crew of train 508 did not report any unusual signal aspects. Train 2009 East, however, reported the false proceed aspect to the dispatcher.

The signal supervisor and a signal maintainer were immediately notified of the false proceed report. Upon inspection of the track circuit in the area in question, the north rail of the main track was found broken at approximately the same location where train 508 was observed when signal 481 was reported to have falsely cleared. When the track circuit was tested, it was discovered that the track relay would release when a 0.06-ohm test shunt was applied to the east of the rail break but that the track relay was unaffected by a test shunt applied west of the rail break. Track crews repaired the broken rail while signal department personnel continued to inspect the track circuit.

Because NITCD passenger trains are electrically propelled via a 1,500 VDC catenary system, AC vane relays and track transformers are employed as track devices for train detection. Since the track relay is located at the east end of the track circuit, it was determined that a foreign source of alternating current must have been energizing the track relay when shunts were placed west of the rail break. Initially, all adjacent track circuits were deenergized to determine if the problem was a result of insulated joint failure. Subsequently, the phase angle (instantaneous polarity) of all adjacent track circuits was tested to assure that adjacent circuits were 180 degrees out of phase and therefore could not falsely energize 472TR, the relay in question.

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To determine if the foreign source of AC energy was from another NICTD AC supply, all NICTD controlled AC circuits were deenergized simultaneously from milepost 44.0 to milepost 52.8 by deenergizing the local 2,300 VAC primary system. Track relay 472, however, remained energized under these conditions. It was discovered, however, that the track relay would release when the impedance bond neutral tap was removed at the west end of track circuit 472.

The area surrounding track circuit 472 is primarily used by heavy industry with many sources of alternating current present. It is quite possible that the foreign source of alternating current is the result of differences in ground potential over several thousand feet. This can result in foreign current being developed on NITCD's running rails and can potentially develop voltage between the neutral tap and one rail connection of an impedance bond. This has the net effect of developing an AC voltage parallel to the track relay. See figure 2.

As NITCD cannot possibly locate sources of AC grounds other than those on its own supply, it was found necessary to develop a means whereby the effects of foreign AC sources would be negated. To this end, a cut section was installed to shorten track circuit 472. This arrangement presents a higher impedance to a foreign source of energy than does a single, longer track circuit. Furthermore, an adjustment procedure was developed to raise the release value of track relay 472 and cut section track relay A472 to a value more than twice that of the foreign voltage.

Shunt tests and applicable block signal tests were performed upon completion of the modifications to track circuit 472.



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666	6/4/2001	NICD	APB			2006	Line Circuit	Michigan City, IN	N
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**Cause**  
**Vandalism - Signal Damaged, Caused Unintended Signal Aspect**

**Narrative**  
Foreign signal governing entrance to NICTD main line was vandalized causing false feed of line circuit controlling NICTD dwarf signal 317. False feed was removed and signal tested okay. Foreign line is now locked out of service. NICTD is developing plans for new NICTD-maintained dwarf signal governing entrance to mainline from foreign railroad.

No. of Reports Shown in this Listing: 3