

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

October 2, 2017

Locomotive Event Recorder

Specialist's Factual Report
By Bill Tuccio, Ph.D.

1. EVENT SUMMARY

Location: Biloxi, Mississippi
Date: March 7, 2017
Company: CSX Transportation (CSX)
Locomotive: CSX230 (Lead Locomotive)
NTSB Number: HWY17MH010

For a description of this event, see the public docket for this investigation.

2. LOCOMOTIVE EVENT RECORDER GROUP

A locomotive event recorder group was not convened.

3. DETAILS OF RECORDER INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received an event recorder file from the following locomotive:¹

Locomotive ID: **CSX230 (Lead Locomotive)**

3.1. Locomotive Event Recorder Recording Description

Using the wheel size of 41 7/16 inches for CSX230 as provided by investigators, the locomotive event recorder data were extracted using the Wabtec Railway Electronics Event Recorder Data Analysis Software. This software outputted the locomotive event recorder parameters including distance and speed. The exported data have a sampling rate of one second; therefore, the data have an accuracy of +/- 1 second. Only the data relevant to this event are provided in this report.

3.2. Parameters

Table A-1 lists the parameters verified and provided in this report. Additionally, table A-2 contains the unit and discrete state abbreviations for the parameters.

¹ The NTSB also received the physical recorder from CSX230, a Pulse model, serial number 0147868 from which the recorder file was downloaded; however, the physical recorder was not re-downloaded by the NTSB.

3.2.1. Distance Traveled

The default output for the distance traveled is the distance decreasing in time. Therefore, the distance traveled began with a very large value and continually decreased to 0 feet.

3.3. Time Correlation

The recorded time from CSX230's locomotive event recorder and onboard forward-facing video recorder² are independently time stamped and, consequently, the times may not be synchronized. Four events recorded by the video recorder's parametric channels were compared to the event recorder: horn activations at 14:04:49, 14:08:08, and 14:08:17 central standard time (CST); and Pneumatic Control Switch (PCS) activation at 14:11:29 CST. These events correlated to event recorder times of 15:04:52, 15:08:11, 15:08:20, and 15:11:32, respectively. All these times had a consistent offset of 3,603 seconds. Thus, 3,603 seconds was subtracted from CSX230's event recorder data to convert to CST.

3.4. Plots and Corresponding Tabular Data

Figures 1 through 5 contain locomotive event recorder data from CSX230 recorded during the event on March 7, 2017. All the parameters listed in table A-1 were plotted. All figures were created using additional information from the NTSB's Onboard Image Recorder Factual Report, including the collision time of 14:11:43 CST. The geographic overlay in figure 5 was created using Google Earth. Weather and lighting conditions in figure 5 may not be representative of weather and lighting conditions at the time of the accident.

Collectively, figures 2 through 4, show:

- From 14:05:45 CST until 14:11:28 CST, CSX230 was operating between 27 and 29 mph.
- At 14:11:29 CST, PCS was activated as electronic air brake pressure brake pressure (EAB BP) began to decrease.
- By 14:11:31 CST, speed began to decrease.
- At the time of collision, 14:11:43 CST, CSX230 was slowing through 19 mph.
- At 14:12:00 CST, CSX230 came to a full stop.

The collision occurred 14 seconds after PCS activation, during which time CSX230 travelled 502 feet. Additionally, CSX230 came to a full stop 17 seconds after collision, during which time CSX230 travelled 259 feet. These distances and times are shown schematically in figure 1.

² Refer to the NTSB's Onboard Image Recorder Factual Report.

Figure 1. Event recorder time/distances (scale is based on distance).

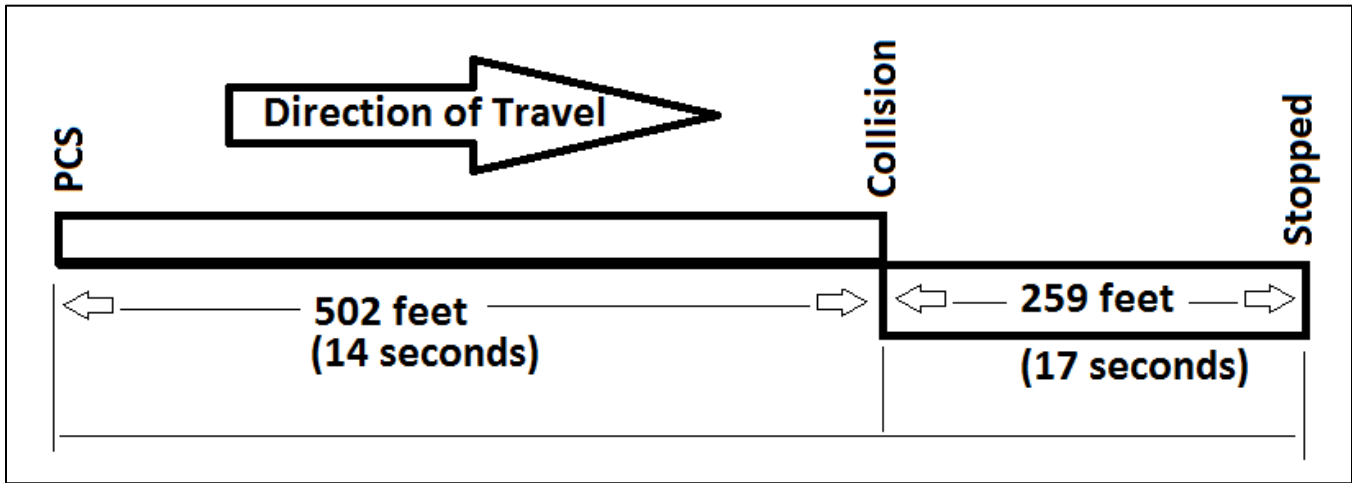


Figure 5 shows the horn was activated nearly continuously from 14:09:26 CST (when CSX230 crossed Gill Avenue) until after the collision at Main Street.

All the corresponding tabular data used to create figures 1 through 5 (with the exception of Onboard Image Recorder Factual information, such as street locations and time of collision) are provided in electronic separated value (.csv) format as attachment 1 to this factual report.

Figure 2: CSX230's locomotive event recorder parameters (2.5 hours).

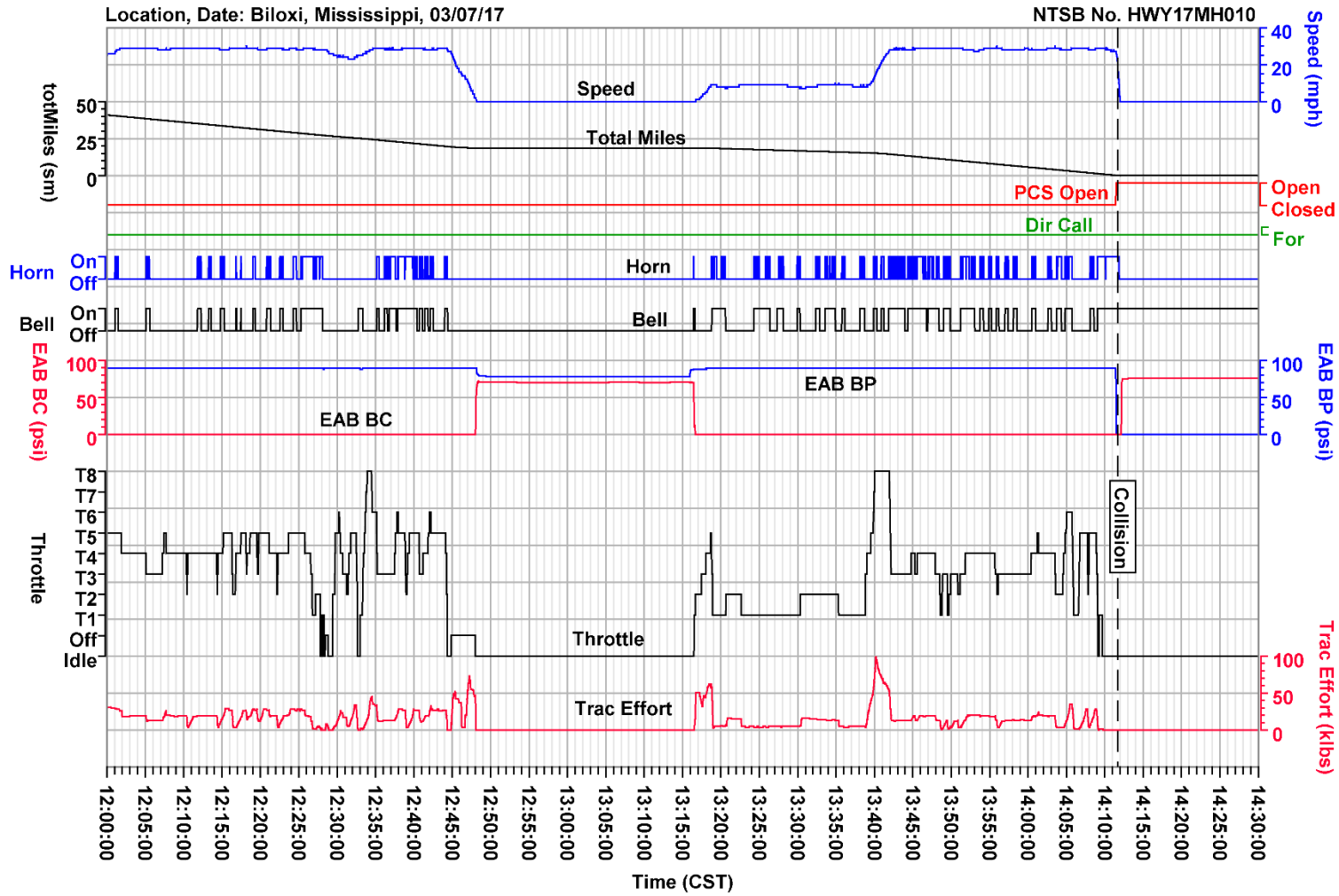


Figure 3: CSX230's locomotive event recorder parameters (7 minutes).

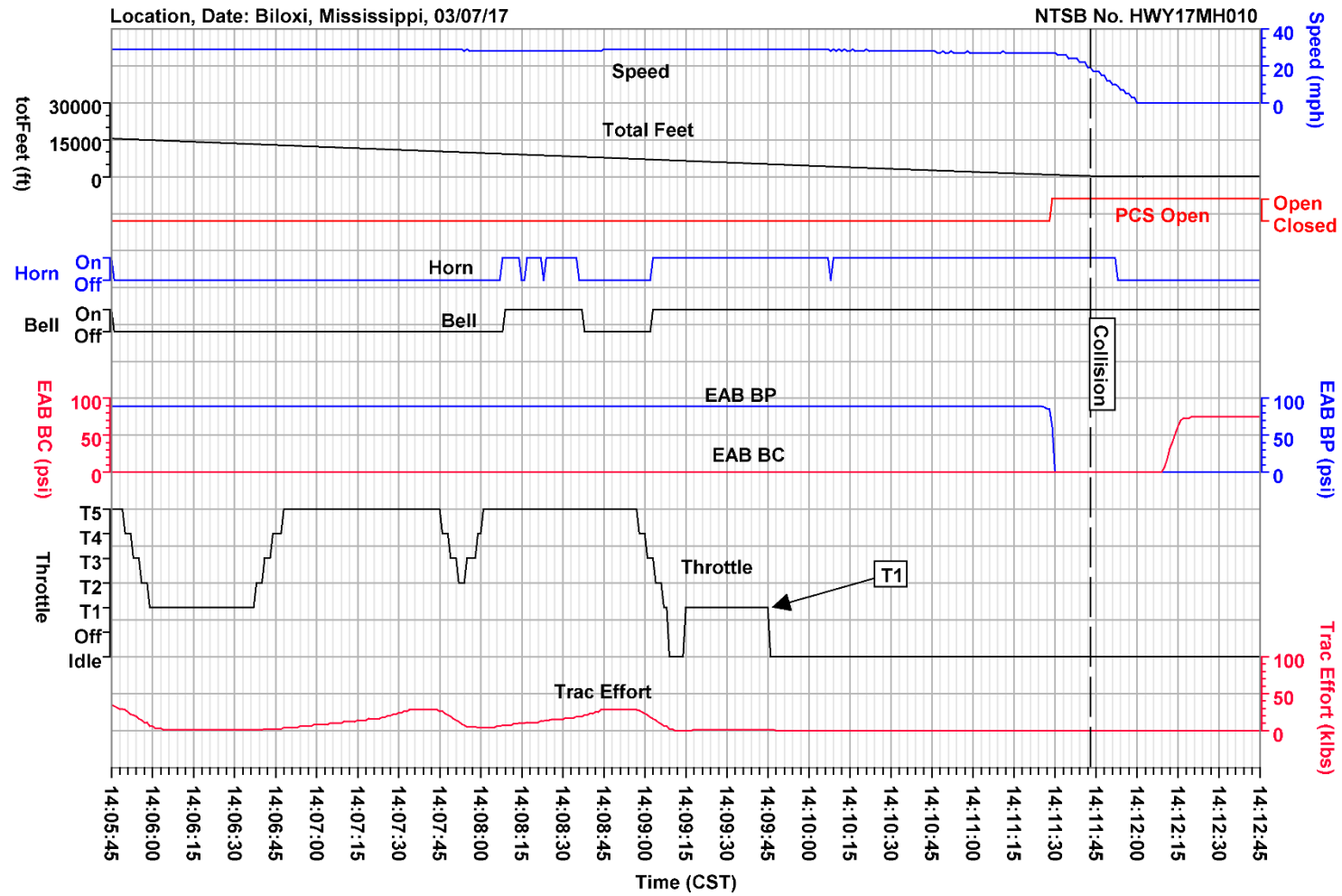


Figure 4: CSX230's locomotive event recorder parameters (time period considered by Onboard Video Factual Report).

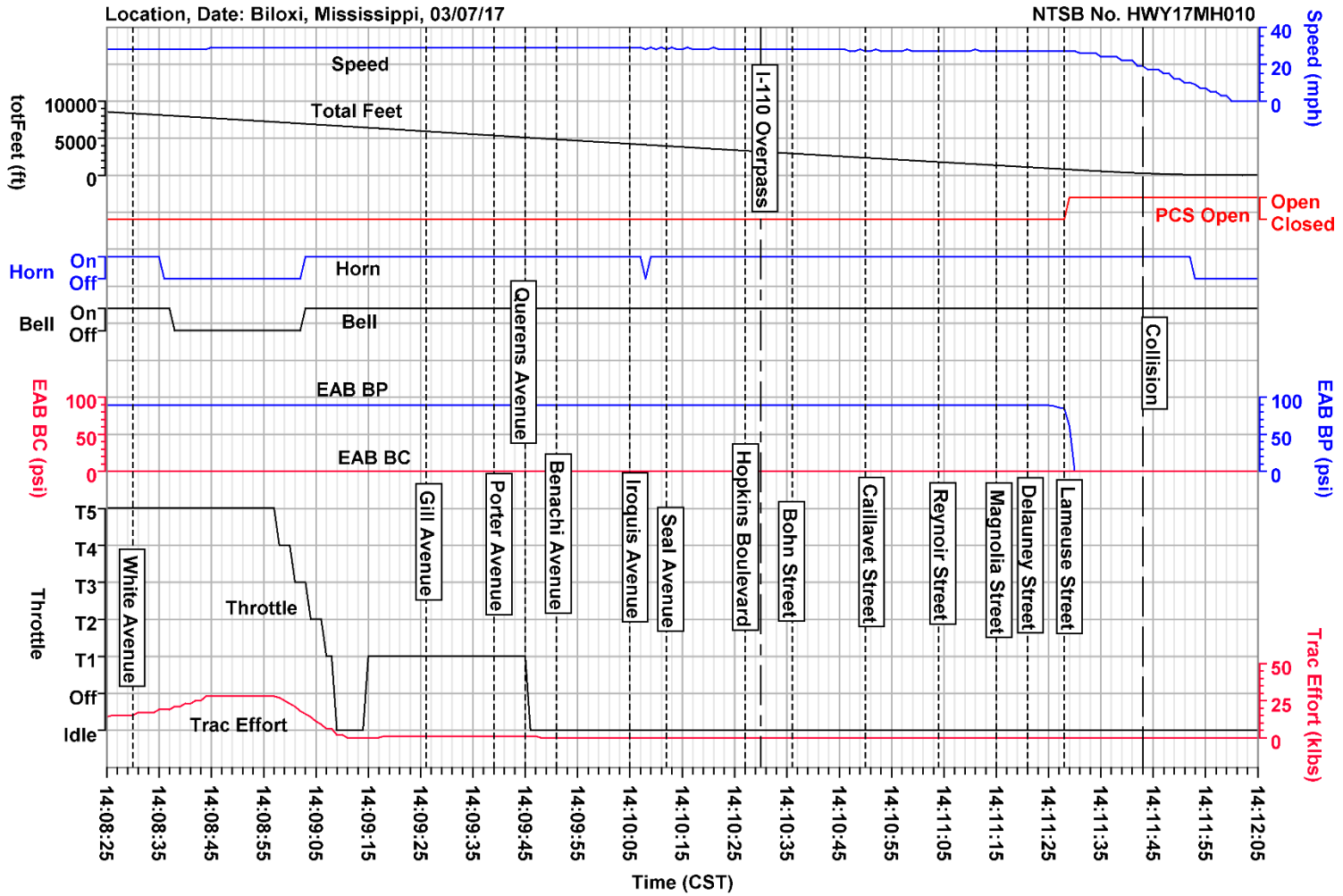


Figure 5: CSX230's horn activation from 14:09:26 CST until 14:11:52 CST.



APPENDIX A

This appendix describes the locomotive event recorder parameters provided and verified in this report for CSX230. Table A-1 lists the parameters and table A-2 contains the unit and discrete state abbreviations for the parameters.

Table A-1. Verified and provided locomotive event recorder parameters CSX230.

Parameter Name	Parameter Description
1. Bell (discrete)	Bell
2. Dir Call (discrete)	Direction of Travel
3. EAB BC (psi)	Electronic Air Brake – Brake Cylinder Pressure
4. EAB BP (psi)	Electronic Air Brake – Brake Pipe Pressure
5. Horn (discrete)	Horn
6. PCS (discrete)	Pneumatic Control Switch
7. Speed (mph)	Speed
8. Throttle (discrete)	Throttle Position
9. totFeet (ft)	Feet Traveled
10. totMiles (sm)	Miles Traveled
11. Trac Effort (klbs)	Traction Effort

Table A-2. Unit and discrete state abbreviations.

Units Abbreviation	Description
discrete	discrete
For	Forward
ft	feet
sm	statute miles
mph	miles per hour
psi	pounds per square inch
T1	Throttle Position 1
T2	Throttle Position 2
T3	Throttle Position 3
T4	Throttle Position 4
T5	Throttle Position 5
T6	Throttle Position 6
T7	Throttle Position 7
T8	Throttle Position 8

NOTE: For parameters with a unit description of discrete, a discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.