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

December 14, 2015

Locomotive Event Recorder

Addendum 1

Group Chairman's Factual Report
By Cassandra Johnson

1. EVENT SUMMARY

Location:	Philadelphia, Pennsylvania
Date:	May 12, 2015
Company:	Amtrak
Train ID and Locomotive ID:	Train 188 and Locomotive 601 (lead)[1]
Train ID and Locomotive ID:	Train 90 and Locomotive 635 (lead) [2]
NTSB Number:	DCA15MR010

For a summary of the accident, refer to the Accident Summary report, within this docket.

2. ADDENDUM

In support of the investigation, locomotive event recorder data from the engineer's May 10, 2015 northbound trip from the Philadelphia, PA Amtrak train station (Amtrak 635) were overlaid with the locomotive event recorder data from the accident trip (Amtrak 601).

3. DETAILS OF RECORDER INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received a locomotive event recorder file from Amtrak 635.

3.1. Locomotive Event Recorder Recording Description

Using the wheel size of 44 inches as provided by Amtrak, Amtrak 635's 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 sample per second; therefore, the data have an accuracy of +/- 1 second. Only the data relevant to this event are provided in this report.

[1] For the rest of this report, Amtrak locomotive number 601 will be referred to as Amtrak 601.
[2] For the rest of this report, Amtrak locomotive number 635 will be referred to as Amtrak 635.

3.2. Parameters

Table A-1 lists the parameters verified and provided in this report for Amtrak 601 and Amtrak 635. Additionally, table A-2 contains the unit and discrete state abbreviations for the parameters.

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 in value.

3.3. Locomotive Event Recorder Timing and Data Correlation

The recorded time from Amtrak 635's locomotive event recorder data file is independently time stamped. As a consequence of the independent time stamping, recorded times do not reflect the actual time of the day. In order to overlay Amtrak 635's locomotive event recorder data with Amtrak 601's locomotive event recorder data, Amtrak 635's data was first compared to the actual time Amtrak 635 left the Philadelphia, PA Amtrak station. Next, the distance traveled from both sets of data were compared so that both trains at 21:19:12 eastern daylight time (EDT) had traveled approximately the same distance from the Philadelphia, PA Amtrak station.

Amtrak provided Amtrak 635's departure and arrival times on May 10, 2015. This schedule indicated on May 10, 2015 Amtrak 635 left the Philadelphia, PA Amtrak station at approximately 21:09:00. Therefore, 3,910 seconds was subtracted from the data to align Amtrak 635's locomotive event recorder data to depart the Philadelphia, PA Amtrak station at 21:09:00. Then using Amtrak 601's locomotive event recorder data as the time baseline, at 21:19:12 EDT Amtrak 601 had traveled approximately 5.8 miles from the Philadelphia, PA Amtrak station. Therefore, so that Amtrak 635 also traveled approximately 5.8 miles from the Philadelphia, PA Amtrak station at 21:19:12 EDT, 40 seconds was added to Amtrak 635's data. The final time adjustment for Amtrak 635's data was subtracting 3,870 seconds. Therefore, for the rest of this report, all times are referenced as EDT

3.4. Plots and Corresponding Tabular Data

Figures 1 and 2 contain the locomotive event recorder data from the accident trip (Amtrak 601) and Amtrak 635's locomotive event recorder data from May 10, 2015. All the parameters listed in table A-1 were plotted. Parameters labeled with _Train90Eng635Data are from Amtrak 635 and the other parameters are from Amtrak 601.

Figure 1 covers the time both trains left the Philadelphia, PA Amtrak station up to Amtrak 635 arriving at the Trenton, NJ Amtrak station (21:10:00 to EDT to 21:39:00 EDT). Figure 2 has an expanded scale from 21:10:00 EDT to 21:21:00 EDT and covers both trains leaving the Philadelphia, PA Amtrak station; and ends when Amtrak 601's data ends.

In brief, locomotive event recorder data from Amtrak 601 and Amtrak 635 were plotted together such that at 21:19:12 EDT both trains had traveled approximately 5.8 miles from the Philadelphia, PA Amtrak train station.

All of the corresponding tabular data used to create figures 1 and 2 are provided in electronic comma separated value (.csv) format as attachment 1 to this factual report addendum 1.

Figure 1. Amtrak 601 and Amtrak 635 Locomotive Event Recorder Data from Philadelphia, PA Station to Trenton, NJ Station.

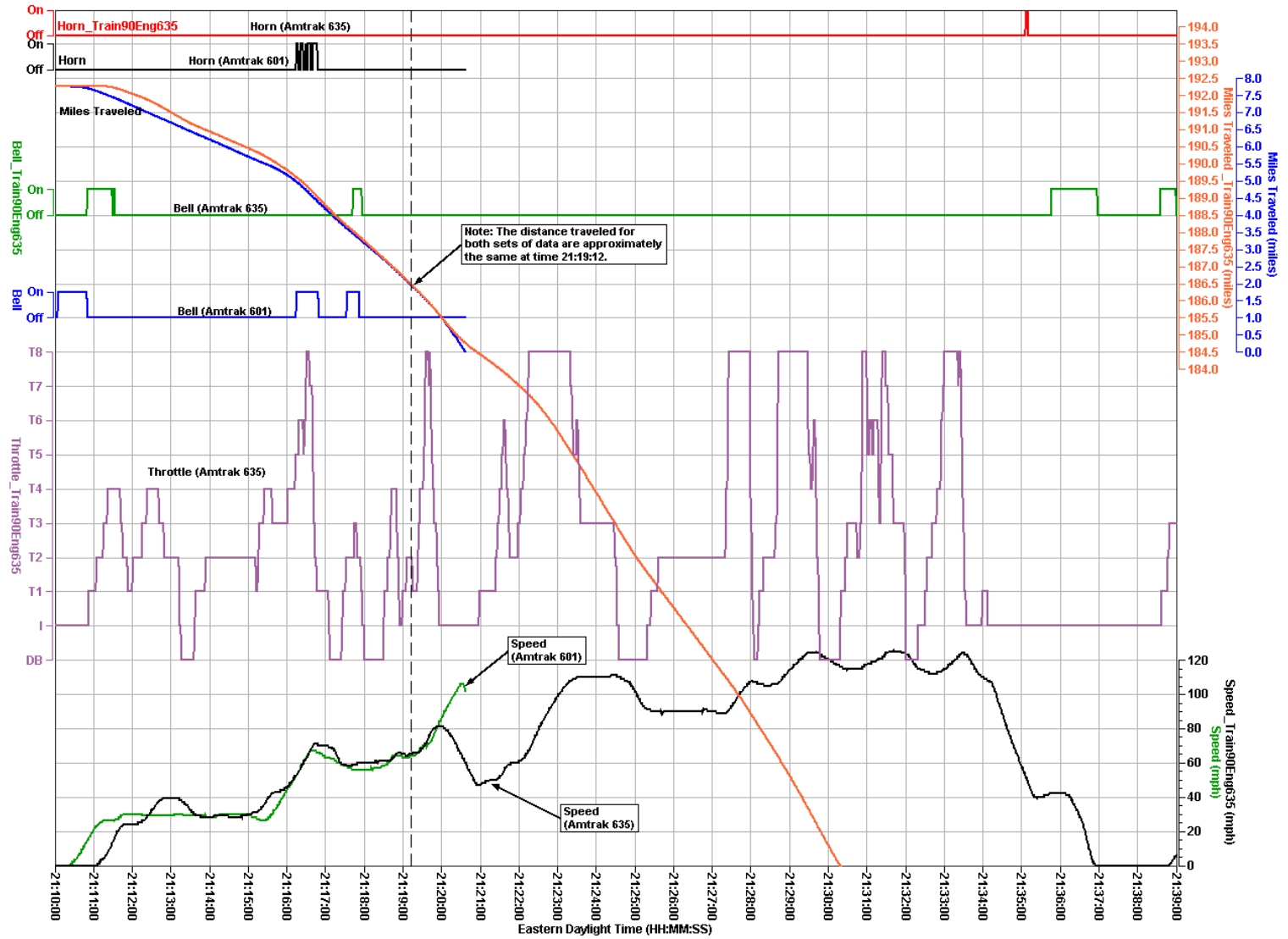

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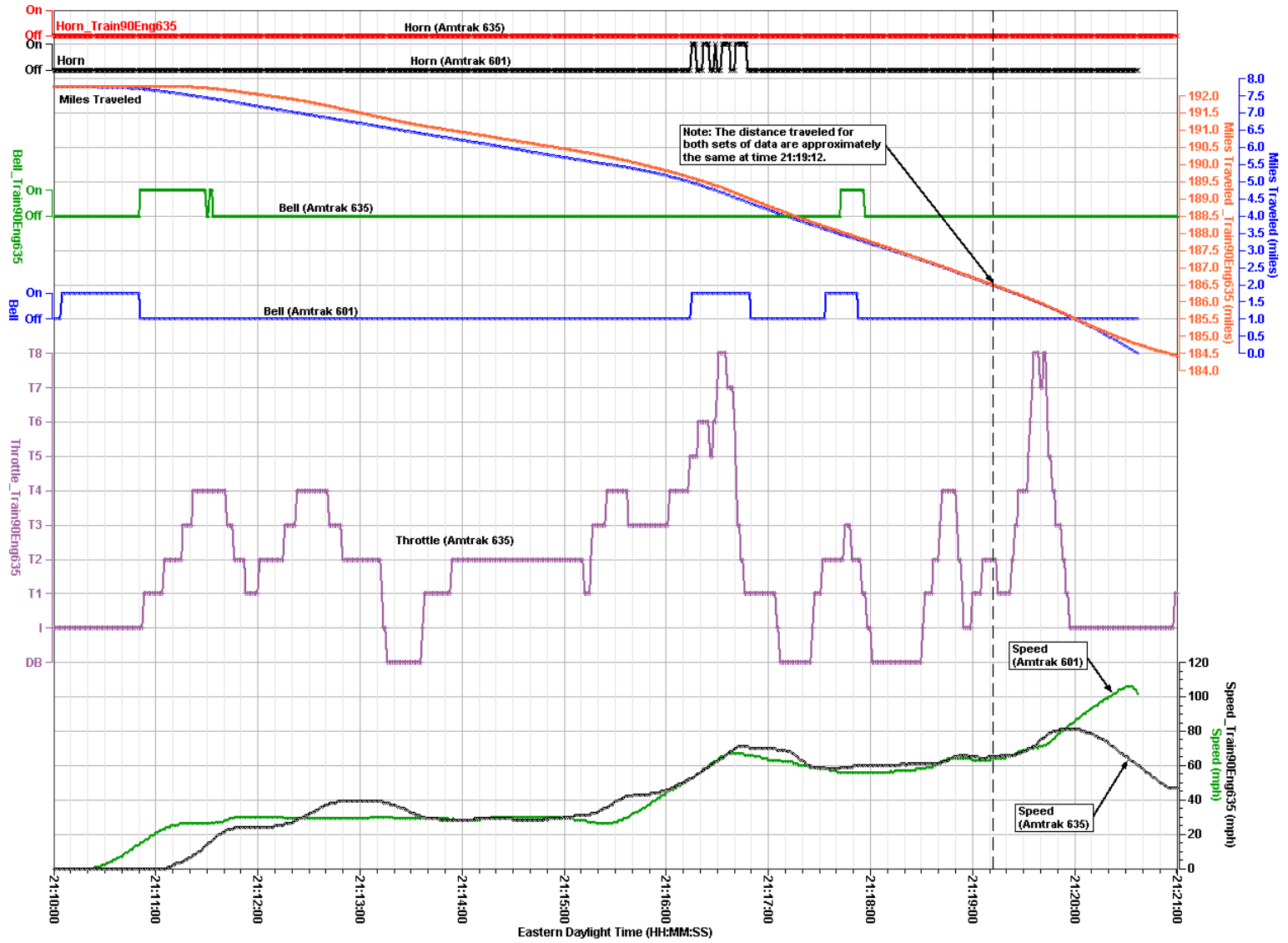
Figure 2. Amtrak 601 and Amtrak 635 Locomotive Event Recorder Data from Philadelphia, PA Station to end of Amtrak 601 data.



APPENDIX A

This appendix describes the locomotive event recorder parameters provided and verified in this report for Amtrak 601 and Amtrak 635. 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 for Amtrak 601 and Amtrak 635

Parameter Name	Parameter Description	Amtrak 601	Amtrak 635
1. Bell (discrete)	Bell	X	X
2. Horn (discrete)	Horn	X	X
3. Miles Traveled (miles)	Miles Traveled	X	X
4. Speed (mph)	Speed	X	X
5. Throttle Position (discrete)	Throttle Position		X

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.

Table A-2. Unit and discrete state abbreviations.

Units Abbreviation	Description
DB	Dynamic Brake
discrete	discrete
I	Idle
mph	miles per hour
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