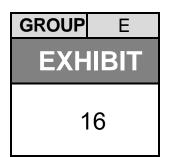


NATIONAL TRANSPORTATION SAFETY BOARD Investigative Hearing

Norfolk Southern Railway general merchandise freight train 32N derailment with subsequent hazardous material release and fires, in East Palestine, Ohio, on February 3, 2023



Agency / Organization

Norfolk Southern

Title

Exhibit 16- Railbam Data Summary_ Acoustic Bearing

Docket ID: DCA23HR001

Appendix B - Acoustic Bearing Detectors

RailBAM

The RailBAM acoustic detection device records audio from a train passing and produces train and axle based files with four main descriptors: Prefixes, Types, Levels, and Suffixes. This data summary uses those descriptors as the vehicle for data exchange with the industry.

Goals of the data summary include:

- 1) Data summaries are only opened with a high confidence in a rolling surface fault.
- 2) Data summaries are to contain information suitable for prioritizing bearing removals.
- 3) Data summaries are to contain information suitable for indicating: remediation of a problem (support for autoclose) or a data integrity error that led to a false opening.
- 4) A good pass is considered a read without a problem (prefix) and has a severity level of 4.

<u>Prefixes</u>: Noisy, FBS (Flanging, Braking, Slamming), Shrk (Shriek), Clpd (Clipped) Prefixes are indicative of non-bearing faults, errors, or other external inputs that may diminish the reliability of the information produced. If there is a prefix, there is a likely error with the reading.

<u>Types</u>: RS (Running Surface), LF (Loose/Fretting), WHLFLT (Wheel Flat) Fault types are indicative of a match using a particular algorithm to pinpoint a particular defect.

Levels: 1,2,3,4

Levels are indicative of the level of noise decibels associated with a type of defect. Level 1 is the most severe with the highest decibels while level 4 is considered not to be a problem and counts towards autoclosing the data summary. A level with a null value indicates no reading could be made. All null level readings will be ignored.

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<u>Suffixes</u>: _e (extended), _m (multiple), _r (roller), _n (cone), _p (cup)
Suffixes are indicative of a particular aspect associated with a type of defect. Suffixes are based on the speed of the wheel and are a quality indicator.
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Locomotives are not analyzed and no values are sent for them. A locomotive is determined by the leading and trailing indicators (locomotives use F and R while cars use A and B indicators).

Important! A clear fault is indicated by a full descriptor that has no prefix but does have a suffix. For example, RS1_p is a clear cup fault.

All possible problem full descriptors for RailBAM

 $(PREFIX)(TYPE)(LEVEL)(SUFFIX) - in the format: Prefix(TypeLevel_Suffix)$

```
RS1 e RS2 m RS3 m LF1 WHLFLT1 NOISY(RS1 m) FBS(RS1 e) Shrk(RS1 e) Clpd(RS1 e)
RS1 m RS2 r RS3 r LF2 WHLFLT2 NOISY(RS1 r) FBS(RS1 m) Shrk(RS1 m) Clpd(RS1 m)
RS1 r
       RS2 n RS3 n LF3
                                  NOISY(RS1 n) FBS(RS1 r)
                                                           Shrk(RS1 r)
                                                                       Clpd(RS1 r)
RS1 n
      RS2 p RS3 p
                                  NOISY(RS1 p) FBS(RS1 n)
                                                           Shrk(RS1 n)
                                                                       Clpd(RS1 n)
RS1_p
      RS2
              RS3
                                  NOISY(RS1)
                                                FBS(RS1_p)
                                                           Shrk(RS1_p)
                                                                       Clpd(RS1_p)
                                  NOISY(RS2 m) FBS(RS1)
                                                           Shrk(RS1)
                                                                       Clpd(RS1)
RS1
                                  NOISY(RS2 r) FBS(RS2 m) Shrk(RS2 m) Clpd(RS2 m)
                                  NOISY(RS2_n) FBS(RS2_r)
                                                           Shrk(RS2 r)
                                                                       Clpd(RS2_r)
```