



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

<b>GROUP</b>	<b>E</b>
<b>EXHIBIT</b>	
16	

Agency / Organization

**Norfolk Southern**

Title

**Exhibit 16- Railbam Data  
Summary\_ Acoustic Bearing**

# 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.

**Prefixes:** Noisy, FBS (Flanging,Braking,Slamming), Shrkr (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.

**Types:** 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.

**Suffixes:** \_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.

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)	Shrkr(RS1_e)	Clpd(RS1_e)
RS1_m	RS2_r	RS3_r	LF2	WHLFLT2	NOISY(RS1_r)	FBS(RS1_m)	Shrkr(RS1_m)	Clpd(RS1_m)
RS1_r	RS2_n	RS3_n	LF3		NOISY(RS1_n)	FBS(RS1_r)	Shrkr(RS1_r)	Clpd(RS1_r)
RS1_n	RS2_p	RS3_p			NOISY(RS1_p)	FBS(RS1_n)	Shrkr(RS1_n)	Clpd(RS1_n)
RS1_p	RS2	RS3			NOISY(RS1)	FBS(RS1_p)	Shrkr(RS1_p)	Clpd(RS1_p)
RS1					NOISY(RS2_m)	FBS(RS1)	Shrkr(RS1)	Clpd(RS1)
					NOISY(RS2_r)	FBS(RS2_m)	Shrkr(RS2_m)	Clpd(RS2_m)
					NOISY(RS2_n)	FBS(RS2_r)	Shrkr(RS2_r)	Clpd(RS2_r)