Data Summary: AEI

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Synopsis

Purpose
The Automatic Equipment Identification (AEI) data summary helps identify bad tags at the equipment level and AEI reader errors using performance-based data from AEI systems.

Background
Automatic Equipment Identification detectors use readers equipped with RF (Radio Frequency) technology to wirelessly identify tags on railroad equipment while en route. The Inspection Quality system uses AEI data from the detectors to identify various issues with the tag and creates the AEI data summary. Identifying tag issues aids in improving AEI accuracy and wayside detector component identification.

Data Summary Elements

Element Name	Element Text	Element Description	Format	Aggregation Method	Action
Type	Type		TEXT		
Format Version	Format Version	Version of the format used to create the Data Summary	NUMBER [1.0-999.99]		
CreationTMST	Date opened	GMT timestamp for when the data summary was created, and the time zone offset of the originating data location.	TIMESTAMP	Earliest	Update when data summary created
RR_DB_Key	Key from originating railroad	Database key from the originating railroad (or detector owner)	NUMBER [0 - 999999999]		
LastUpdateTMST	Date of last update	GMT timestamp for when the data summary was last updated (any change other than closing) and the time zone offset of the originating data location.	TIMESTAMP	Last	Update every time data summary is updated, including when it is opened.
DSType	Type of Data Summary	Data summary type	TEXT		
DS_Owner/Reporting_System	Who created the Data Summary	Company ID (from Railinc) of the owner/creator of data summary	TEXT		
EquipmentMark	Equipment Mark	Current equipment initial	TEXT		
EquipmentNumber	Equipment Number	Current equipment number	NUMBER [0 - 9999999999]		
Location	Location	Location of the component			
ComponentType	Component type	BASE	TEXT		
ComponentName	Part of the component location	BASE	TEXT		
ComponentValue	Value for the component location		TEXT		
State	Data Summary state	Current status of Open, Closed, Perpetual or Nullified	TEXT		Update when data summary state changes
Passing_tmst_1	Last Passing Timestamp	Timestamp of the last passing by an AEI detector	TIMESTAMP	Descending	Update for each passing and move other passing timestamps down 1 position
Mismatched_Initial_1	Last Mismatched Initial	Equipment initial of last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_1; move other mismatched initials down 1 position.

Element Name	Element Text	Element Description	Format	Aggregation Method	Action
Mismatched_Number _1	Last Mismatched Number	Equipment number of last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_1; move other mismatched numbers down 1 position.
Pre_Initial_1	Last Pre Initial	Equipment initial of equipment in consist previous to this equipment from last reading	TEXT	Correlated	Correlated to Passing_tmst_1; move other pre- initials down 1 position.
Pre_Number_1	Last Pre Number	Equipment number of equipment in consist previous to this equipment from last reading	TEXT	Correlated	Correlated to Passing_tmst_1; move other pre- numbers down 1 position.
Post_Initial_1	Last Post Initial	Equipment initial of equipment in consist after to this equipment from last reading	TEXT	Correlated	Correlated to Passing_tmst_1; move other post- initials down 1 position.
Post_Number_1	Last Post Number	Equipment number of equipment in consist after to this equipment from last reading	TEXT	Correlated	Correlated to Passing_tmst_1; move other post- numbers down 1 position.
Tag_Status_1	Last Tag Status	Indicator of the success of reading one or both AEI tags from last reading (G,L,R,M,N.?)	TEXT	Correlated	Correlated to Passing_tmst_1; move other tag statuses down 1 position.
Orientation_1	Last Orientation	Equipment orientation from last reading (A,B,U)	TEXT	Correlated	Correlated to Passing_tmst_1; move other orientations down 1 position.
Umler_Status_1	Equipment status in Umler	Indicator of Active, Inactive, Preregistered, Deleted, or NotInUmler	TEXT	Correlated	Correlated to Passing_tmst_1; move other Umler status flags down 1 position.
Axle_Conversion_Cod e_1	Last Axle Conversion Code	Axle conversion code from last reading (G,B,S)	TEXT	Correlated	Correlated to Passing_tmst_1; move other axle conversion codes down 1 position.
Axle_Cnt_Wrong_1	Last Axle Count Wrong	Flag indicating the axle count from the last reading did not match Umler (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_1; move other axle count wrong flags down 1 position.
Equip_Grp_Code_Erro r_1	Last Equipment Group Code Error	Flag indicating the equipment group code from the last reading did not match Umler (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_1; move other equipment group flags down 1 position.
Orientation_Error_1	Last Orientation Error	Flag indicating the likelihood of orientation error from the last reading (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_1; move other orientation error flags down 1 position.
Extra_Tag_1	Last Extra Tag	Flag indication an extra tag was read during the last reading	TEXT	Correlated	Correlated to Passing_tmst_1; move other extra tag flags down 1 position.

Element Name	Element Text	Element Description	Format	Aggregation Method	Action
Passing_tmst_2	Second to Last Passing Timestamp	Timestamp of the second to last passing by an AEI detector	TIMESTAMP	Descending	Update for each passing and move other passing timestamps down 1 position
Mismatched_Initial_2	Second to last Mismatched Initial	Equipment initial of second to last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_2; move other mismatched initials down 1 position.
Mismatched_Number_2	Second to Last Mismatched Number	Equipment number of second to last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_2; move other mismatched numbers down 1 position.
Pre_Initial_2	Second to Last Pre Initial	Equipment initial of equipment in consist previous to this equipment from second to last reading	TEXT	Correlated	Correlated to Passing_tmst_2; move other pre- initials down 1 position.
Pre_Number_2	Second to Last Pre Number	Equipment number of equipment in consist previous to this equipment from second to last reading	TEXT	Correlated	Correlated to Passing_tmst_2; move other pre- numbers down 1 position.
Post_Initial_2	Second to Last Post Initial	Equipment initial of equipment in consist after to this equipment from second to last reading	TEXT	Correlated	Correlated to Passing_tmst_2; move other post- initials down 1 position.
Post_Number_2	Second to Last Post Number	Equipment number of equipment in consist after to this equipment from second to last reading	TEXT	Correlated	Correlated to Passing_tmst_2; move other post- numbers down 1 position.
Tag_Status_2	Second to Last Tag Status	Indicator of the success of reading one or both AEI tags from second to last reading (G,L,R,M,N.?)	TEXT	Correlated	Correlated to Passing_tmst_2; move other tag statuses down 1 position.
Orientation_2	Second to Last Orientation	Equipment orientation from second to last reading (A,B,U)	TEXT	Correlated	Correlated to Passing_tmst_2; move other orientations down 1 position.
Umler_Status_2	Equipment status in Umler	Indicator of Active, Inactive, Preregistered, Deleted, or NotInUmler	TEXT	Correlated	Correlated to Passing_tmst_2; move other Umler status flags down 1 position.
Axle_Conversion_Code_2	Second to Last Axle Conversion Code	Axle conversion code from second to last reading (G,B,S)	TEXT	Correlated	Correlated to Passing_tmst_2; move other axle conversion codes down 1 position.
Axle_Cnt_Wrong_2	Second to Last Axle Count Wrong	Flag indicating the axle count from the second to last reading did not match Umler (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_2; move other axle count wrong flags down 1 position.

Element Name	Element Text	Element Description	Format	Aggregation Method	Action
Equip_Grp_Code_Error_2	Second to Last Equipment Group Code Error	Flag indicating the equipment group code from the second to last reading did not match Umler (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_2; move other equipment group flags down 1 position.
Orientation_Error_2	Second to Last Orientation Error	Flag indicating the likelihood of orientation error from the second to last reading (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_2; move other orientation error flags down 1 position.
Extra_Tag_2	Second to Last Extra Tag	Flag indication an extra tag was read during the second to last reading	TEXT	Correlated	Correlated to Passing_tmst_2; move other extra tag flags down 1 position.
Passing_tmst_3	Third to Last Passing Timestamp	Timestamp of the third to last passing by an AEI detector	TIMESTAMP	Descending	Update for each passing; previous value drops from data summary
Mismatched_Initial_3	Third to last Mismatched Initial	Equipment initial of third to last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Mismatched_Number_3	Third to Last Mismatched Number	Equipment number of third to last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Pre_Initial_3	Third to Last Pre Initial	Equipment initial of equipment in consist previous to this equipment from third to last reading	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Pre_Number_3	Third to Last Pre Number	Equipment number of equipment in consist previous to this equipment from third to last reading	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Post_Initial_3	Third to Last Post Initial	Equipment initial of equipment in consist after to this equipment from sec third ond to last reading	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Post_Number_3	Third to Last Post Number	Equipment number of equipment in consist after to this equipment from third to last reading	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Tag_Status_3	Third to Last Tag Status	Indicator of the success of reading one or both AEI tags from third to last reading (G,L,R,M,N.?)	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Orientation_3	Third to Last Orientation	Equipment orientation from third to last reading (A,B,U)	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary

Element Name	Element Text	Element Description	Format	Aggregation Method	Action
Umler_Status_3	Equipment status in Umler	Indicator of Active, Inactive, Preregistered, Deleted, or NotInUmler	TEXT	Correlated	Correlated to Passing_tmst_3; move other Umler status flags down 1 position.
Axle_Conversion_Code_3	Third to Last Axle Conversion Code	Axle conversion code from third to last reading (G,B,S)	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Axle_Cnt_Wrong_3	Third to Last Axle Count Wrong	Flag indicating the axle count from the third to last reading did not match Umler (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Equip_Grp_Code_Error_3	Third to Last Equipment Group Code Error	Flag indicating the equipment group code from the third to last reading did not match Umler (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Orientation_Error_3	Third to Last Orientation Error	Flag indicating the likelihood of orientation error from the third to last reading (Yes,No)	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Extra_Tag_3	Third to Last Extra Tag	Flag indication an extra tag was read during the third to last reading	TEXT	Correlated	Correlated to Passing_tmst_3; previous value drops from data summary
Passing_tmst_4	Fourth-to-Last Passing Timestamp	Timestamp of the fourth-to-last passing by an AEI detector	TIMESTAMP	Descending	Update for each passing; previous value drops from data summary
Mismatched_Initial_4	Fourth-to-Last Mismatched Initial	Equipment initial of fourth-to-last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Mismatched_Number_4	Fourth-to-Last Mismatched Number	Equipment number of fourth-to-last mismatched equipment	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Pre_Initial_4	Fourth-to-Last Pre Initial	Equipment initial of equipment in consist previous to this equipment from fourth-to-last reading	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Pre_Number_4	Fourth-to-Last Pre Number	Equipment number of equipment in consist previous to this equipment from fourth-to-last reading	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary

Element Name	Element Text	Element Description	Format	Aggregation Method	Action
Post_Initial_4	Fourth-to-Last Post Initial	Equipment initial of equipment in consist after this equipment from fourth-to-last reading	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Post_Number_4	Fourth-to-Last Post Number	Equipment number of equipment in consist after this equipment from fourth-to-last reading	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Tag_Status_4	Fourth-to-Last Tag Status	Indicator of the success of reading one or both AEI tags from fourth-to-last reading (G,L,R,M,N.?)	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Orientation_4	Fourth-to-Last Orientation	Equipment orientation from fourth-to-last reading (A,B,U)	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Umler_Status_4	Equipment Status in Umler	Indicator of Active, Inactive, Preregistered, Deleted, or Not in Umler	TEXT	Correlated	Correlated to Passing_tmst_4; move other Umler status flags down one position
Axle_Conversion_Code_4	Fourth-to-Last Axle Conversion Code	Axle conversion code from fourth-to-last reading (G,B,S)	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Axle_Cnt_Wrong_4	Fourth-to-Last Axle Count Wrong	Flag indicating the axle count from the fourth-to-last reading did not match Umler (Yes, No)	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Equip_Grp_Code_Error_4	Fourth-to-Last Equipment Group Code Error	Flag indicating the equipment group code from the fourth-to-last reading did not match Umler (Yes, No)	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Orientation_Error_4	Fourth-to-Last Orientation Error	Flag indicating the likelihood of orientation error from the fourth-to-last reading (Yes, No)	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary
Extra_Tag_4	Fourth-to-Last Extra Tag	Flag indication an extra tag was read during the fourth-to-last reading	TEXT	Correlated	Correlated to Passing_tmst_4; previous value drops from data summary

Data Summary Roll Up Example

Element Name	Aggregation	RR1	RR2
Type	AEI_TAG	AEI_TAG	AEI_TAG
Open Date	09-07-2015 12:00	09-07-2015 12:00	09-15-2015 12:00
Last Event Date	10-01-2015 12:00	09-29-2015 12:00	10-01-2015 12:00
Count of DS Creators	2	n/a	n/a
EquipmentMark	CSXT	CSXT	CSXT
EquipmentNumber	610555	610555	610555
Location			
ComponentType	BASE	BASE	BASE
ComponentName	BASE	BASE	BASE
ComponentValue	BASE	BASE	BASE
State	O	O	O
Passing_tmst_1	10-01-2015 12:00	09-29-2015 12:00	10-01-2015 12:00
Mismatched_Initial_1	RAIL	RAIL	RAIL
Mismatched_Number_1	0000332261	0000332261	0000332261
Pre_Initial_1	CSXT	UP	CSXT
Pre_Number_1	0000561833	0000341292	0000561833
Post_Initial_1	BNSF	UP	BNSF
Post_Number_1	0000104423	0000941212	0000104423
Tag_Status_1	L	L	L
Orientation_1	A	B	A
Umler_Status_1	A	P	A
Axle_Conversion_Code_1	G	B	G
Axle_Cnt_Wrong_1	Yes	Yes	Yes
Equip_Grp_Code_Error_1	Yes	Yes	Yes
Orientation_Error_1	No	No	No
Extra_Tag_1	No	No	No
Passing_tmst_2	09-29-2015 12:00	09-03-2015 12:00	09-01-2015 12:00
Mismatched_Initial_2	RAIL	RAIL	RAIL
Mismatched_Number_2	0000332261	0000332261	0000332261
Pre_Initial_2	UP	NS	NS
Pre_Number_2	0000341292	0000673991	0000673991
Post_Initial_2	UP	DTTX	DTTX

Element Name	Aggregation	RR1	RR2
Post_Number_2	0000941212	0000749013	0000749013
Tag_Status_2	L	G	G
Orientation_2	B	A	A
Umler_Status_2	P	P	P
Axle_Conversion_Code_2	B	B	B
Axle_Cnt_Wrong_2	Yes	Yes	Yes
Equip_Grp_Code_Error_2	Yes	Yes	Yes
Orientation_Error_2	No	Yes	Yes
Extra_Tag_2	No	No	No
Passing_tmst_3	09-03-2015 12:00	No	
Mismatched_Initial_3	RAIL		
Mismatched_Number_3	0000332261		
Pre_Initial_3	NS		
Pre_Number_3	0000673991		
Post_Initial_3	DTTX		
Post_Number_3	0000749013		
Tag_Status_3	G		
Orientation_3	A		
Umler_Status_3	P		
Axle_Conversion_Code_3	B		
Axle_Cnt_Wrong_3	Yes		
Equip_Grp_Code_Error_3	Yes		
Orientation_Error_3	Yes		
Extra_Tag_3	No		
Passing_tmst_4	09-01-2015 12:00		
Mismatched_Initial_4	RAIL		
Mismatched_Number_4	0000332261		
Pre_Initial_4	NS		
Pre_Number_4	0000673991		
Post_Initial_4	DTTX		
Post_Number_4	0000749013		
Tag_Status_4	G		
Orientation_4	A		
Umler_Status_4	P		

Element Name	Aggregation	RR1	RR2
Axle_Conversion_Code_4	B		
Axle_Cnt_Wrong_4	Yes		
Equip_Grp_Code_Error_4	Yes		
Orientation_Error_4	Yes		
Extra_Tag_4	No		

Opening Criteria

A new AEI data summary will be created for the equipment if there is no existing data summary for the asset and one of the below conditions are met:

Tag status is L (Left tag missing), R (Right tag missing), M (mismatch)

Data discrepancies like - Equipment does not exist in Umler, Equipment type does not match with Umler, Axle counts do not match with Umler etc.,

Update Criteria

An AEI data summary will be updated on each pass by an AEI detector if a data summary already exists.

Closing / Reset Criteria

Autoclose logic: Three sequential reads without a problem. A problem is defined as any defect such as Tag status is L (Left tag missing), R (Right tag missing), M (mismatch), Data discrepancies like - Equipment does not exist in Umler, Equipment type does not match with Umler, Axle counts do not match with Umler, etc..

If there are 3 consecutive timestamps after the last timestamp with the problem, a close message is generated and the data summary for that equipment is closed.

Appendix A – EHMS Display Information

Opening Criteria Display Text
AEI tag is not identified accurately

Autoclose Display Text
Three consecutive reads with no problem.

Appendix B – AEI Data Summary Rules and Definitions

The AEI data summary uses the following definitions:

AEI Read: A reading reported by an AEI detector.

Good Read: An AEI read without any tag problems.

Bad Read: An AEI read that reports a problem.

Left tag missing: An AEI read with tag status 'L'.

Right tag missing: An AEI read with tag status 'R'.

Mismatch tag: An AEI read with tag status 'M'.