



AUSTRALIAN RAIL TRACK CORPORATION LTD

Discipline
Engineering Standard

Category
Rolling Stock

Automatic Equipment Identification (AEI)

WOS 01.H

Applicability

ARTC Network wide	
New South Wales	✓
Western Jurisdiction	
Victoria	

Primary Source
(RIC Standard RSU Appendix H Version 2.0)

Document Status Record

Status	Date	Prepared	Reviewed	Endorsed	Approved
Issue 1 Revision 0	Dec 05	Standards & Systems (refer to Primary Source)	Standards & Technical Services Engineer	GM Infrastructure Strategy & Performance M Owens	Safety Committee 12/08/2004

List of Amendments

Issue	Date	Clause	Description
1.0	07/12/2005	All	Reformatting to ARTC Standard

Disclaimer

This document is for internal use by the Australian Rail Track Corporation Ltd ("ARTC") only and may **not** be relied on by any other party. ARTC:
1. does not accept any liability or responsibility whatsoever for this Document in respect of any use or reliance upon it by any other party; and
2. does not provide any warranty as to the accuracy or reliability of this Document.

Contents

This appendix is set out as follows:

WOS 01.H – Automatic Equipment Identification	3
H[1] Introduction	3
H[2] Purpose.....	3
H[3] General principles	3
H[4] AEI system requirements	3
H[5] Location of transponder tags – rolling stock.....	4
H[6] Location of transponder tags – containers.....	5
H[7] Passive alarm tags	5

WOS 01.H – Automatic Equipment Identification

H[1]

Introduction

The Australian Rail Track Corporation have installed electronic equipment to monitor vehicle condition, such as, train loads, hot boxes and dragging equipment. These monitoring stations have facilities to automatically read data off the AEI tags to identify the vehicle and vehicle information.

This section describes the recommended system of electronic automatic equipment identification (AEI) for all rail vehicles operating on the Australian Rail Track Corporation network.

The prescribed requirements are applicable to freight vehicles, locomotives, passenger vehicles, on-track maintenance vehicles, rail compatible freight trailers, end of train units and, where applicable, other road vehicles and containers regularly transported on rail.

This Appendix also includes for the location, fitting and data fields for AEI tags.

These requirements are identical to those specified in the Draft National Code of Practice for Railway Rolling Stock except for the addition of data fields for passenger vehicles and on-track maintenance vehicles.

H[2]

Purpose

The Australian Rail Track Corporation have installed electronic equipment to monitor vehicle condition, such as, train loads, hot boxes and dragging equipment. These monitoring stations have facilities to automatically read data off the AEI tags to identify the vehicle and vehicle information.

H[3]

General principles

An interrogation unit (or reader) operating in UHF radio waves shall decode the modulated radio waves reflected by the tag. The tag itself shall not be a transmitter, but shall act as a field disturbance device, modifying and reflecting the signal transmitted by the reader system.

H[4]

AEI system requirements

H4.1 The design, construction, operation, performance and coding principles for the AEI system shall comply with the requirements of Association of American Railroads (AAR) Standard S-91 in Section L of the AAR Manual of Standards and Recommended Practices

H4.2 Certain administration provisions of AAR Standard S-918 are not applicable. Clauses 9.1.1 and 9.8 relating to the approval of changes in tag position are examples.

- H4.3 Tag coding for freight vehicles, locomotives and other types of equipment are prescribed in AAR Standard S-918, Appendices A to J. Coding details for freight vehicles are summarized in Table 1 below, for locomotives in Table 2 and for containers in Table 3.
- H4.4 Rail compatible Trailers with separable rail bogies, such as Road/Railer units, shall be tagged as road trailers or chassis in accordance with AAR Standard S-918 paragraphs 9.2, 9.5, and 9.6. Coding details are given in Appendices C and D of S-918.
- H4.5 Bogies for Rail Compatible Trailers shall be tagged as freight vehicles, with the coding details given in AAR Standard S-918, Appendix A and summarized in Table H1 below.
- H4.6 In addition to the application of standard ID tags, some vehicles and equipment may also be fitted with passive alarm tags.
- H4.7 Freight vehicles and locomotives shall be fitted with a standard beam powered tag as described in Section 6 of AAR Standard S-918. The tags fitted to all other vehicles and equipment shall have a performance equivalent to that of a battery powered tag.
- H4.8 For Australian applications, the allocation of data values for platform identification in Clause 1.9 of Appendix A of AAR Standard S-918 are not appropriate, and shall be amended as follows.
- (a) for conventional two-bogied or single platform vehicles, the ID code shall be "0".
 - (b) For articulated or multi-unit vehicles (permanently coupled sets), platforms are numbered consecutively from one end to the extreme opposite end i.e. 1, 2, 3, 4, 5, etc. Accordingly, the ID code (data value) for each platform shall be its platform number, regardless of the handbrake position.

Value	Platform
0	Single vehicle
1	Platform 1
2	Platform 2
3	Platform 3
4	Platform 4
5	Platform 5

H[5] Location of transponder tags – rolling stock

- H5.1 Transponder tags shall be located and fastened to freight vehicles and locomotives in accordance with the criteria specified below and AAR Standard S-917.
- H5.2 Detailed requirements for the location and mounting of tags on various types of vehicles and equipment are prescribed in Clauses 9.1 to 9.7 of AAR Standard S-918.

H5.3 For tank vehicles, tags and their mounting plates **shall not** be attached to the tank shell. Tags shall be attached only to the tank vehicle underframe or boundary members.

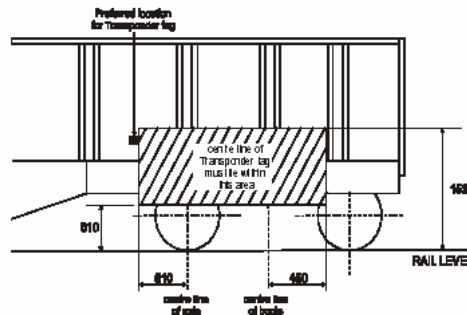


Diagram H2 - Location of transponders – vehicles.

H[6] Location of transponder tags – containers

H6.1 In general, the location and fitting of transponder tags to containers shall conform to the requirements of AAR Standards S-918 and S-917. Only one (1) standard ID tag is to be fitted to containers. The right hand end referred to below is the end without doors (the “blind” end). In the case of containers without end doors or without solid sides and/or fixed ends, the right hand side is determined when facing either side of the container.

H6.2 When applied to containers with a length of 12.2 metres (40 feet) or less, the tag shall be positioned on the side wall of the container, with the centre of the tag located 300 mm inboard from the right hand end post and 300 mm below the top of the roof line of the container.

H6.3 On containers which are more than 12.2 metres (40 feet) long, the tag shall be positioned on the side wall of the container, with the tag located immediately inboard of the right hand end post and 300 mm below the top of the roof line of the container.

H6.4 For containers without solid side walls, such as curtain-siders, tank containers, platforms and other open configurations, the tags may be located on or immediately adjacent to the right hand side corner post, facing toward the outside of the container.

H6.5 Tags on containers shall be mounted so that they will respond to an interrogating signal which is vertically polarized.

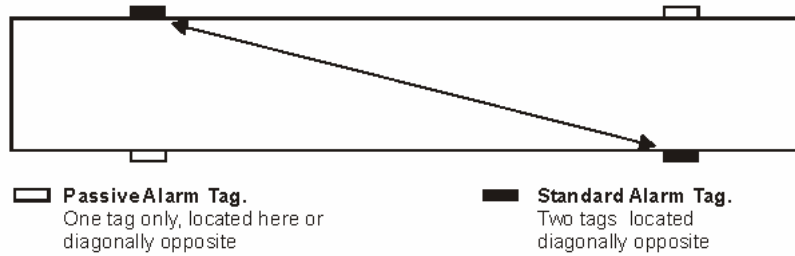
H[7] Passive alarm tags

H7.1 Passive alarm tags are used to provide an interface between the trackside reader and onboard equipment, and are either activated (able to read) if there is an alarm condition or disabled (unable to read) if there is no alarm condition.

H7.2 Tag data shall be as prescribed in Appendix J of AAR Specification S-918. Polarization of the alarm tag shall be the same as prescribed for the standard ID tag, i.e. horizontal for freight cars and road trailers and vertical for containers.

H7.3 When fitted to freight vehicles, the passive alarm tag shall be located directly opposite one of the standard ID tags, as shown below.

Diagram H2 - Location of passive alarm tags – vehicles.



H7.4 When fitted to containers, the passive alarm tag shall be located directly opposite the standard ID tag, i.e. at the same end but on the opposite side.

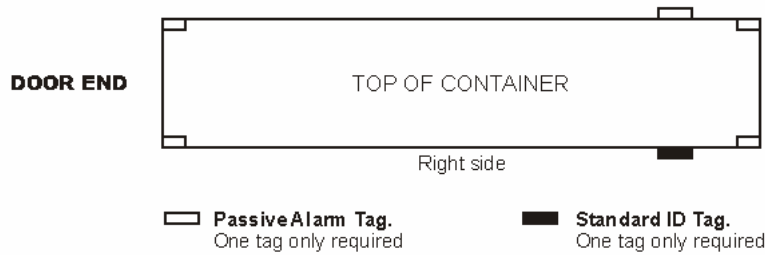


Diagram H3 - Location of passive alarm tags – containers.

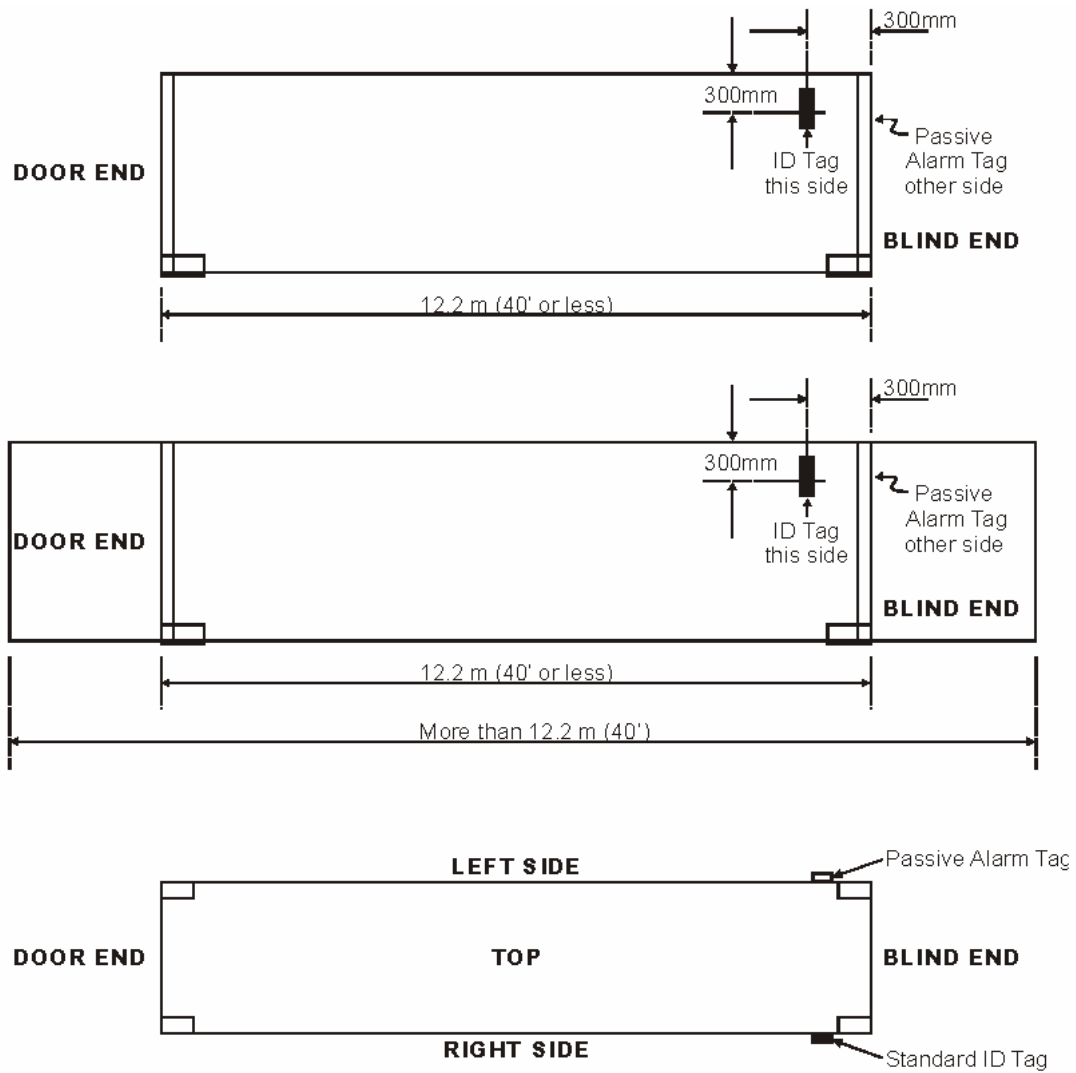


Diagram H4 - Location of transponders – typical freight containers.

Table H1 – Data fields for freight vehicles

Entry	Bits Required	Tag data Sequence	Minimum Value	Maximum Value	Units
Equipment group Code – Note 1	5	0-4	0	31	Type Code
Tag Type	2	5-6	1	4	Type Code
Vehicle Class (Code)	19	7-25	A_	ZZZZ	Alpha
Vehicle Number	20	4-45	0	999999	Numeric
Side Indicator Code – Note 2	1	46	0	1	Side Code
Length – See Note 3	12	94-96 47-55	0 [0	4095 1343	Decimetres Feet]
Number of Axles	5	56-59, 64	1	32	Axles
First Check Sum	2	60-61			
Reserved frame Marker	2	62-63			
Bearing Type Code	3	65-67	0	7	Type Code
Platform Identifier Code	4	68-71	0	15	Platform Code
Owners Identification	5	72-76			Alpha
Spare #2	10	77-86			Owners Use
Spare #3	7	87-93			Owners Use
Reserved	9	97-105			
Security	12	106-117			Security or Owners Use
Data Format Code	6	118-123			
Second Check Sum	2	124-125			
Frame Marker	2	14-27			

Note 1: Data values for the equipment group shall be 19 for revenue freight vehicles and 14 for non-revenue (service) vehicles.

Note 2: Data Values are 0 for the left side of the vehicle and 1 for the right side.

Note 3: This field records the vehicle length in both feet and decimetres. Bit order shall be 94, 95, 96, 48, 49, 50,55.

Table H2 – Data fields for locomotives

Entry	Bits Required	Tag data Sequence	Minimum Value	Maximum Value	Units
Equipment group Code – Note 1	5	0-4	0	31	Type Code
Tag Type	2	5-6	1	4	Type Code
Equipment Initial (Mark)	19	7-25	A_	ZZZZ	Alpha
Locomotive Number	20	4-45	0	999999	Numeric
Side Indicator Code	1	46	0	1	Side Code
Length	9	47-55	0	510	Decimetres
			0	167	Feet
Number of Axles	5	56-59, 64	1	32	Axles
First Check Sum	2	60-61			
Reserved frame Marker	2	62-63			
Bearing Type Code	3	65-67	0	7	Type Code
Owners Code (Initials)	5	68-72			Alpha
Spare	25	73-97			Owners Use
Reserved	8	98-105			Reserved for future use
Security	12	106-117			Reserved for Security
Data Format Code	6	118-123			
Second Check Sum		124-125			
Frame Marker		14-27			

Table H3 – Data fields for freight containers

Entry	Bits Required	Tag data Sequence	Minimum Value	Maximum Value	Units
Equipment group Code – Note 1	5	0-4	0	31	Type Code
Tag Type	2	5-6	1	4	Type Code
Owners Code (Initial)	19	7-25	A_	ZZZZ	Alpha
Identification Number	20	4-45	0	999999	Numeric
Check Digit	1	46-49	0	9	Numeric
Length	11	50-59, 64	0	2000	Centimetres
			0	805	Inches
First Check Sum	2	60-61			
Reserved frame Marker	2	62-63			
Height	9	65-73	0	500	Centimetres
			0	392	Half Inches
Width	7	74-80	200	300	Centimetres
			78	118	Inches
Container Type Code	7	81-87	1	128	Type Code
Maximum Gross Weight	9	88-96	45	455	Hundred kg
			99	1004	Hundred lbs
Tare Weight	7	97-103	0	91	Hundred kg
			0	200	Hundred lbs
Spare	2	104-105			Reserved
Security	12	106-117			Reserved for Security or limited owners use
Data Format Code	6	118-123			
Second Check Sum		124-125			
Frame Marker		14-27			

Table H4 – Data fields for passenger vehicles

Entry	Bits Required	Tag data Sequence	Minimum Value	Maximum Value	Units
Equipment group Code – Note 1	5	0-4	0	31	Type Code
Tag Type	2	5-6	1	4	Type Code
Vehicle Class (Code)	19	7-25	A_	ZZZZ	Alpha
Vehicle Number	20	4-45	0	999999	Numeric
Side Indicator Code	1	46	0	1	Side Code
Length	9	47-55	0	510	Decimetres
			0	167	Feet
Number of Axles	5	56-59, 64	1	32	Axles
First Check Sum	2	60-61			
Reserved frame Marker	2	62-63			
Bearing Type Code	3	65-67	0	7	Type Code
Owners Code (Initials)	5	68-72			Alpha
Spare	25	73-97			Owners Use
Reserved	8	98-105			Reserved for future use
Security	12	106-117			Reserved for Security
Data Format Code	6	118-123			
Second Check Sum		124-125			
Frame Marker		14-27			

Table H5 – Data fields for track maintenance vehicles

Entry	Bits Required	Tag data Sequence	Minimum Value	Maximum Value	Units
Equipment group Code – Note 1	5	0-4	0	31	Type Code
Tag Type	2	5-6	1	4	Type Code
Vehicle Class (Code)	19	7-25	A	ZZZZ	Alpha
Vehicle Number	20	4-45	0	999999	Numeric
Side Indicator Code	1	46	0	1	Side Code
Length	9	47-55	0	510	Decimetres
			0	167	Feet
Number of Axles	5	56-59, 64	1	32	Axles
First Check Sum	2	60-61			
Reserved frame Marker	2	62-63			
Bearing Type Code	3	65-67	0	7	Type Code
Owners Code (Initials)	5	68-72			Alpha
Spare	25	73-97			Owners Use
Reserved	8	98-105			Reserved for future use
Security	12	106-117			Reserved for Security
Data Format Code	6	118-123			
Second Check Sum		124-125			
Frame Marker		14-27			