



Association of Train Operating Companies

ATOC/GN001
Issue Four
Date: August 2012

Submitted by

.....
Gary Cooper
Head of Operations, ATOC

Authorised by

.....
Ian Smith
Chair, ATOC Operations Standards
Forum

ATOC Guidance Note Use of Data Recorders

Synopsis

This Guidance note provides information on the use of Data Recorders

Contents

Section	Description	Page
<hr/> Part A		
	Issue Record	3
	Responsibilities	3
	Explanatory Note	3
	Guidance Note Status	3
	Supply	3
<hr/> Part B		
1	Purpose	4
2	Scope	4
3	Definitions	4
4	General	4
5	Procedures and Documentation	5
6	Train crew Performance Monitoring and Competence Assessment	6
7	Accident, Incident and Near Miss Investigation	7
8	Training and Competence of Those Responsible for Data Extraction and Analysis	7
9	Operating Instructions	8
10	Data Extraction	8
11	Data Analysis	9
12	Maintenance of Data Recorders	11
13	Records and Data Retention and Storage	11
14	Audit	11
<hr/> Appendices		
A	Suggested Criteria for Data Extraction	12

Part A

Issue Record

This Guidance Note will be updated when necessary by distribution of a complete replacement.

Issue	Date	Comments
One	January 2001	Original Document
Two	May 2004	
Three	July 2007	
Four	August 2012	

Responsibilities

Copies of this Guidance Note should be distributed by ATOC members to persons responsible for ensuring compliance with the appropriate Railway Group Standards.

Explanatory Note

ATOC produces ATOC Guidance Notes for the information of its members. ATOC is not a regulatory body and compliance with ATOC Guidance Notes is not mandatory.

ATOC Guidance Notes are intended to reflect good practice. ATOC members are recommended to evaluate the guidance against their own arrangements in a structured and systematic way. Some parts of the guidance may not be appropriate to their operations. It is recommended that this process of evaluation and any subsequent decision to adopt (or not to adopt) elements of the guidance should be documented.

Guidance Note Status

This document is not intended to create legally binding obligations between train operating companies and should be binding in honour only

Supply

Electronic and printed copies of this Guidance Note may be obtained from the Director, Production Support ATOC.

Part B

1 Purpose

This document provides guidance on the use of Data Recorders.

2. Scope

This Guidance Note applies to all ATOC Members.

3. Definitions

Data Recorder

For the purpose of this document, equipment provided on a train to record data about the operation of its controls and performance in response to those controls and other train control systems.

A Data Recorder is also referred to elsewhere as a Data Logger, Event Recorder and On-Train Monitoring and Recording (OTMR) equipment.

Competent Person

A person with the necessary skills and experience to undertake the extraction of and/or the analysis and validation of the recorded data from a Data Recorder.

4. General

4.1 Compliance with Appropriate Railway Group Standard

Railway Undertakings must comply with Railway Group Standard GM/RT2472 with regard to the design requirements for Data Recorders. This mandates the fitment of Data Recorders to trains, along with the minimum information to be recorded.

4.2 Purpose and Ensuring Effectiveness

Onboard data recorders provide valuable information relating to train performance and the interactions between the train and the persons responsible for the operation of the train.

Analysis of such information is an effective way to monitor individual performance as part of an organisation's competence management arrangements. In addition, the availability of such data allows accidents, incidents and near misses to be more effectively investigated.

The effectiveness of Data Recorders is reliant upon

- the equipment recording the most appropriate data, taking account of the equipment's technical capabilities and the risks associated with the various recordable events
- the equipment being reliable
- the integrity of the data being beyond question

4.3 Briefing of Traincrew

Traincrew are generally aware that Data Recorders have been installed on the vast majority of trains. However, they may not be aware of what data is recorded and how and why it is analysed. It is recommended therefore that traincrew are given suitable briefing on these aspects.

5. Procedures and Documentation

Railway Undertakings should consider the following when developing procedures relating to data recorders:

- a) Criteria for when data should be extracted
 - i) for the purpose of traincrew performance monitoring/competence assessment and training
 - ii) following accidents, incidents and near misses. Appendix A provides a list of circumstances where use of information captured on data recorders may be helpful.
- b) operating instructions
 - i) data extraction
 - ii) data analysis
 - iii) data validation
- c) records and data storage
- d) audit

6. Traincrew Performance

Monitoring and Competence

Assessment

6.1 Use in Respect of Traincrew Performance Monitoring

Railway Undertakings should consider making provisions within their competency management arrangements for the use of data recorders to monitor the performance of members of traincrew.

Data recorders can provide a useful form of evidence in relation to an individual's performance as they record the interaction between a person and specific onboard systems. It is also possible, through careful analysis of the data, to gain an understanding of the effect those interactions have on the train concerned.

Once the data has been extracted, it can be analysed and used to provide evidence that demonstrates an individual's compliance with a set of predefined performance criteria, thus providing an accurate record of a their competence at a specific point in time over a given line of route.

Records of this nature can be extremely useful as they are factual and based upon data that has been collected unobtrusively and which is therefore representative of a person's day-to-day performance.

Although performance monitoring in this way is of greatest relevance to train driving, it is also possible to monitor other roles involved in the operation a train, for example, the guard when involved in door operation.

6.2 Recommended Frequency

Railway Undertakings should set criteria for the frequency at which monitoring using recorded data is undertaken. The frequency of downloads during the assessment cycle should be risk based however as a minimum there should be one per assessment cycle.

6.3 Feedback

Following each download, feedback should be provided to the driver on driving performance and techniques and operation of train systems. Any deficiencies should be assessed and mapped across to

the competency record file of the person, any shortfalls discussed and appropriate corrective action plans implemented.

7. Accident, Incident and Near Miss Investigation

7.1 Resourcing

Sufficient resources should be provided to ensure the availability of persons competent to download data as soon as is reasonably practicable following accidents, incidents and near misses. Railway undertakings should consider the possibility of accessing and downloading data remotely.

7.2 Retention of data

The legal position in respect of retention periods for data used in the investigation of accidents and incidents is complex, with civil, criminal and employment law each having different requirements. Given this, it is recommended that such data be retained indefinitely or at least until such time as there is legal advice to the effect that it may safely be discarded.

8. Training and Competence of Those Responsible for Data Extraction and Analysis

8.1 Extraction, Analysis and Validation of Data

Data from Data Recorders will be used to support formal performance monitoring and competence assessment of traincrew and may also be used to assist in determining the basic causes of accidents, incidents and near misses. Therefore, it is vital that staff engaged in the extraction and/or analysis and validation of data are trained and assessed as competent for each type of Data Recorder that they are required to use. By ensuring that staff are competent and adhere to procedures, disputes over the validity of data and errors in analysis and validation will be minimised.

8.2 Retention of Competence

To ensure competence is retained, it is recommended that persons authorised to extract and/or analyse and validate data should do so on a regular basis and that such persons undertake refresher training after any extended period of non-use.

8.3 Assessment of Competence

It is recommended that persons undertaking data extraction and/or analysis and validation are reassessed as competent to do so at a minimum frequency of every two years.

9. Operating Instructions

Operating instructions for data recorders should detail:

- fault reporting (whether of the data recorder, downloading equipment or analysis software, etc.)
- the continued use of vehicles with defective Data Recorders (refer to Rule Book/company DOTE)
- post accident and incident testing of vehicles

10. Data Extraction

10.1 Avoidance of Data Corruption

Railway Undertakings should have systems to control data extraction. Extracted data should be held in secure conditions to prevent unauthorised access, interference or risk of damage or corruption from fire, electro-magnetic currents (EMC) or other sources.

10.2 Responsibilities for Data Extraction

Responsibilities for data extraction together with the requirements for labelling, disseminating, removal and validation of Data Recorders should be defined in company procedures.

10.3 Register of Persons Authorised to Undertake Data Extraction

It is recommended that a register of authorised, Competent Persons who may undertake data extraction should be maintained, including those from third party companies likely to undertake extraction on a contractual basis. This should be available to persons with responsibility for determining the need to undertake data extraction.

10.4 Guidance on Data Extraction

It is recommended that guidance be provided for persons with responsibility for determining the need for data extraction for all types of accidents, incidents and near misses detailed in this document. This should define the required extraction regime for each accident/incident/near miss type, such as removal of Data

Recorders, extraction of data from all Data Recorders, extraction of data from other trains, protection of data extraction evidence, etc.

10.5 Data Extraction Considerations

When deciding that data extraction is required, consideration should be given to the need to extract data from:

- **other Train Data Recorders on the same train.** This additional data permits comparison of vital recordings, such as speed, time and distance, together with an understanding of the status and reaction of the train as a whole, for example was wheel slide present throughout all of the train, were brakes applied at the rear etc.
- **other trains that have recently traversed the same route prior to the incident.** This may be necessary for incidents where there are location specific causes, for example, contaminated rails.
- **other trains that have traversed the route under 'normal' conditions.** This may be of value in determining the 'normal' driving technique over the particular route in order to compare the details of an incident against, for example, normal braking points so that speeds at the braking point can be determined. Where an 'optimal driving profile' exists for the route in question, this may be used.

11. Data Analysis

11.1 Audit

Railway Undertakings should ensure that they have systems in place to control data analysis.

11.2 Responsibilities for Data Analysis

To maintain data integrity and validity of analysis, responsibilities for analysis should be defined together with the requirements for validating data and training/competence of staff undertaking data analysis.

11.3 Register of Persons Authorised to Undertake Data Analysis

It is recommended that a register of authorised, Competent Persons who may undertake data analysis should be maintained, including those from third parties likely to undertake analysis on a contractual basis. This should be available to persons with responsibility for investigating incidents.

11.4 Use of Third Party Contractors

Where a third party contractor is used to analyse data, Railway Undertakings should set the requirements for the analysis and satisfy themselves that the contractor is competent to meet these.

11.5 Software Licence Requirements

Railway Undertakings should ensure that they, and any third parties likely to undertake analysis on a contractual basis, have a valid licence to use the analysis software.

11.6 Data Limitations

When reading the recorded data, it is important to understand any limitations on the data and how it is sourced. Common sources of error when analysing data include:

- inaccurate time when compared with 'real time', other Data Recorders on the same train or on other trains involved, or other recording systems such as signalling systems.
- inaccurate speed readings due to maladjusted wheel-wear compensators.
- inaccurate speed and distance readings due to wheel spin or wheel slide (for axle-derived speed/distance input). This is particularly problematical where extremely low levels of adhesion cause a high level of WSP activity and the axles are subject to locking or controlled slip by the WSP.
- difficulties in pinpointing exact location due to limited interface to track side location markers.
- data not being sourced directly from the actions taken by the traincrew, for example data sourced from train lines rather than directly from the pushbutton which is the start of the sequence leading to the train line being energised/de-energised.
- digital signals being 'inverted', that is showing ON when they should show OFF and vice versa.
- incorrect or misleading data textual descriptions.
- no compensation allowed in the analysis for the effects of gradients on braking performance (see below).
- failure to take into account the effects of gradients.

12. Maintenance of Data Recorders

Railway Undertakings should ensure that checks to confirm the correct functioning of data recorders are carried out as part of routine vehicle maintenance. It is recommended that such checks be repeated in the event of a serious accident, incident or near miss.

13. Records and Data Retention and Storage

13.1 Retention of Data

Retention periods for competence assessments will be specified within the company driver competence management systems. Retention periods for data used in connection with traincrew performance monitoring and/or competence assessment should be aligned with these. Hard copies of data extracted from each download should be retained on individual staff member personal files to assist both in accident/incident inquiries and in identifying trends

13.2 Retention of Master Copies

Railway Undertakings should ensure master copies of extracted data are retained for use at a later date. Working copies should be made from master copies as necessary.

13.3 Preserving Data Integrity

Railway Undertakings should ensure that extracted data is retained in a manner that will preserve its integrity.

14. Audit

Railway Undertakings should undertake regular audits of compliance with the documented procedures.

APPENDIX A

SUGGESTED CRITERIA FOR DATA EXTRACTION

Consideration should be given to extracting and analysing the data from a data recorder following:

Cat A SPAD	After a reported Cat. A SPAD.
Operating incidents	Collisions, Derailments, Cat. B, C and D SPADs, Divided Trains, Door Irregularities, Fatalities, etc, whether actual or alleged.
Station overrun / Failure to call	After receiving a report of a train overrunning or failing to call at a booked station stop.
Reported speeding	After receiving a report that a train may have infringed the permissible line speed or maximum train speed.
Speed Checking of trains	Duty holders to consider using Data Extraction to monitor the speed of trains
TPWS, ATP, Speed and Tilt Control System Interventions, Mechanical Trainstop Systems	Intervention by these systems on the approach to and over speed restrictions and tilt prohibited sections, and at a signal displaying a danger signal.
Isolation of Train safety systems	When these have been isolated in the wrong circumstances.
Customer complaints	Insufficient station dwell time applied, speeding, etc.
Competence assessment	Unannounced monitoring as a part of the competence assessment procedure or where additional post incident assessments have been implemented by the incident or SMD Procedure.
Training/Post Training Assessments	Trainee and New Drivers during and in the period following initial training/qualification.
Low adhesion	Following a low adhesion related incident.