

RDG Guidance Note: Use of Data Recorders

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About this document

Explanatory Note

The Rail Delivery Group is not a regulatory body and compliance with Guidance Notes or Approved Codes of Practice is not mandatory; they reflect good practice and are advisory only. Users are recommended to evaluate the guidance against their own arrangements in a structured and systematic way, noting that 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 adopt) elements of the guidance should be documented. Compliance with any or all of the contents herein, is entirely at an organisation's own discretion.

Other Guidance Notes or Approved Codes of Practice are available on the [Rail Delivery Group \(RDG\) website](#).

Executive Summary:

This Guidance Note provides information on the use of Data Recorders

Issue Record

Issues 1 to 4 of this document were published as: GN001.

Issue	Date	Comments
1	January 2001	Original Document
2	May 2004	Periodic update
3	July 2007	Periodic update
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5	September 2020	Reissue incorporating new RIS-2472-RST and General Data Protection Regulations (GDPR)

This document is reviewed on a regular 3-year cycle.

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Contents

About this document	2
Explanatory Note	2
Executive Summary:	2
Issue Record	2
Contents	3
1 Introduction	4
1.1 What are Data Recorders?	4
1.2 Purpose of Data Recorders	4
2 Procedures and Documentation	4
2.1 Procedural Considerations	4
2.2 Briefing of Traincrew	4
2.3 Defining Competent Persons	5
2.4 Retaining and Assessing Competent Persons	5
2.5 Register of Authorised Competent Persons	5
3 Operating Instructions and Data Extraction	5
3.1 Considerations for Operating Instructions	5
3.2 Avoidance of Data Corruption	5
3.2 Responsibilities for Data Extraction	5
3.3 Providing Data Extraction Criteria	5
4 Traincrew Performance	6
4.1 Use in Respect of Traincrew Performance Monitoring	6
4.2 Recommended Frequency	6
4.3 Feedback	6
5 Accident, Incident and Near Miss Investigation	7
5.1 Resourcing	7
5.2 Retention of data	7
6 Data Analysis	7
6.1 Responsibilities for Data Analysis	7
6.2 Data Limitations	7
Appendix A – Suggested Criteria for Data Extraction	9

1 Introduction

1.1 What are Data Recorders?

For the purpose of this document, Data Recorders are defined as equipment provided on a train to record data about the operation of its controls, performance in response to those controls and other train control systems. A Data Recorder can also be referred to as a: Data Logger, Event Recorder, On-Train Monitoring and Recording (OTMR), On-train Data Recorder (OTDR) or Judicial Recording Unit (JRU).

The requirement to have a Data Recorder on the train is set out in the Locomotive and Passenger Rolling Stock Technical Specification for Interoperability (LOC & PAS TSI). Supplementary Great Britain specific requirements, including the minimum information to be recorded, is contained in RIS-2472-RST (previously Railway Group Standard GM/RT2472). Additional information can also be found in Euronorm BS EN 62625-1:2013 (*Electronic railway equipment - On board driving data recording system - Part 1: System specification*).

1.2 Purpose of Data Recorders

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, as noted in RIS-3119-TOM (*Accident and Incident Investigation*). A list of suggested criteria for data extraction is shown in [Appendix A](#).

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

2 Procedures and Documentation

2.1 Procedural Considerations

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

- a. criteria for when data should be extracted (Appendix A provides a list of circumstances where use of information captured on data recorders may be helpful).
- b. operating instructions
- c. data extraction
- d. traincrew performance monitoring/ competence assessment and training
- e. accident, incident and near miss investigations
- f. data analysis
- g. data validation
- h. records and data storage
- i. audit

For each of the points above, Railway Undertakings can undertake regular audits of compliance with the documented procedures (this forms part of "i" in the list).

2.2 Briefing of Traincrew

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

2.3 Defining Competent Persons

In this document, a Competent Person is defined as an individual 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.

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

2.4 Retaining and Assessing Competent Persons

It is recommended that persons authorised to extract and / or analyse and validate data:

- do so on a regular basis to maintain competence,
- are reassessed as competent at a minimum frequency of every two years,
- undertake refresher training after any extended period of non-use.

2.5 Register of Authorised Competent Persons

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

3 Operating Instructions and Data Extraction

3.1 Considerations for Operating Instructions

Operating instructions for Data Recorders should detail:

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

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

3.2 Avoidance of Data Corruption

It is recommended Railway Undertakings have systems to control data extraction. Extracted data may need to 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.

3.2 Responsibilities for Data Extraction

Responsibilities for data extraction, together with the requirements for labelling, disseminating, removal and validation of Data Recorders can be defined in company procedures. The General Data Protection Regulation (GDPR) also places a responsibility on organisations collecting and handling personal data, which may include some parts of data extracted from Data Recorders.

3.3 Providing Data Extraction Criteria

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.

When deciding that data extraction is required, other considerations may include whether 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 / typical' 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, establishing typical 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.

4 Traincrew Performance

4.1 Use in Respect of Traincrew Performance Monitoring

Railway Undertakings can make 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 their competence at a specific point in time over a given line of route. This may include, for example, and where applicable: appropriate use of the Automatic Warning System (AWS) or Driver Reminder Appliance (DRA), smooth acceleration / brake application, respecting permanent and temporary applicable speeds, undertaking a running brake test and no safety system interventions / activations.

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.

4.2 Recommended Frequency

It is recommended Railway Undertakings 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. A typical assessment cycle is 36 months.

4.3 Feedback

Following each download, feedback can be provided to the driver on driving performance and techniques and operation of train systems. Any areas for development should be assessed, discussed and mapped across to the competency record file of the person. This may necessitate the creation of a personal or professional development plan with specific, measurable and realistic objectives, and planned review points / time-bound goals.

5 Accident, Incident and Near Miss Investigation

5.1 Resourcing

It is recommended that sufficient resources are provided to ensure the availability of persons competent to download data as soon as is reasonably practicable following accidents, incidents and near misses. This includes accessing and downloading data remotely. This underpins the standards set out in RIS-3119-TOM (*Accident and Incident Investigation*).

5.2 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, data protection (GDPR) 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. Most data protection issues can be avoided by not including names of individuals, although further consideration may be given to recorded 'protected characteristics' or any identifiers that could help someone guess the identity of a person involved, such as work location, job title, staff number, gender.

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.

Master copies of extracted data can be retained for use at a later date, respecting all data protection laws where necessary. Working copies should be made from master copies as necessary, with extracted data retained in a manner that will preserve its integrity.

6 Data Analysis

6.1 Responsibilities for Data Analysis

It is recommended that Railway Undertakings have systems in place to control data analysis. To maintain data integrity and validity of analysis, responsibilities for analysis can be defined together with the requirements for validating data and training / competence of staff undertaking data analysis. Where a third-party contractor is used to analyse data, Railway Undertakings can set the requirements for the analysis and satisfy themselves that the contractor is competent to meet these.

It is recommended that Railway Undertakings make sure that they, and any third parties likely to undertake analysis on a contractual basis, have a valid licence to use the analysis software.

6.2 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 misadjusted 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 (1) when they should show OFF (0) 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.

Appendix A – Suggested Criteria for Data Extraction

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

Signal Passed at Danger / Exceeding End of Authority	After a reported Signal Passed at Danger (or Start against Red) or Exceeding End of Authority. .
Accidents / Incidents / Operating Irregularities	Collisions, Derailments, Divided Trains, Door Irregularities, Fatalities, etc, whether actual or alleged.
Station overrun / Failure to call / Stop Short	After receiving a report of a train overrunning, stopping short or failing to call at a booked station stop. This may include incidents where passenger doors have been opened whilst not alongside the operational platform.
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, European Train Control System	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.

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