ATOC Guidance Note
ATOC/GN001
Issue 2
Date: May 2004

ATOC

Association of Train Operating Companies

ATOC Guidance Note
Use of Data Recorders

Synopsis

This Guidance Note provides information on the use of Data Recorders

Submitted by

Signatures removed from electronic version

Steve Bence
Director, Production Support, ATOC

Authorised by

David Franks
Chairman, ATOC Operations Council

Contents

Part A

Issue Record

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

Amended or additional parts of revised pages will be marked by a vertical black line in the adjacent margin.

Issue	Date	Comments
One	January 2001	Original Document
Two	May 2004	

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.

Copies of this Guidance Note have been provided to HM Railway Inspectorate and to RSSB.

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

Controlled and uncontrolled 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

Train Operators must comply with Railway Group Standard GO/RT3272 with regard to the fitment and functions of Data Recorders.

4.2 Purpose and Ensuring Effectiveness

Data Recorders provide factual data about the performance of trains and traincrew. This enables operating incidents and accidents to be more effectively investigated and train and traincrew performance to be more effectively monitored. To ensure effective use of Data Recorders, it is important that

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

4.3 Briefing of Traincrew

Although traincrew are generally aware that Data Recorders are installed on certain fleets, they are sometimes unaware of what data is recorded and what it can be used for. It is recommended that traincrew are given suitable briefing on both what data is recorded and what it can be used for.

5. Procedures and Documentation

Train Operators should have documented procedures covering:

- criteria for data extraction
- traincrew performance monitoring
- training and competence assessment
- operating instructions
- data extraction
- data analysis
- data validation
- records and data storage
- audit

6. Criteria for Data Extraction

Data extraction should normally be carried out for the following events and incidents for the purpose of analysing and controlling risk:

Operating incidents	Collisions, Derailments, Cat. C and D SPADs, Divided Trains, Door Irregularities, Suicides etc.
Cat A SPAD	After a reported Cat. A SPAD – evidence of use of DRA (if appropriate) also to be examined.
Station overrun / Failure to stop	After receiving a report of a train overrunning or failing to stop at a booked station.
Reported speeding	After receiving a report that a train may have infringed the line permissible speed or maximum train speed.

Radar speed check	To check the recorded speed after an infringement and to review driver performance over the whole journey.
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	As a part of the competence assessment procedure or where additional post incident assessments have been implemented by the incident or SMD Procedure.
Training	Trainee and New Drivers during and in the period following initial training.
Post Training Assessments	Post qualification assessment requirements.
Traincrew Monitoring	For the unannounced monitoring of the performance of traincrew.
Train speed checking	For routine monitoring of speed against permitted line and train speeds.
Low adhesion	Following a low adhesion related incident.
Reported Wrong Side Door Opening	Following staff or passengers alleging wrong side opening of passenger doors

7. Traincrew Performance Monitoring

7.1 Use in Respect of Monitoring Traincrew

Data Recorders provide factual records of events and therefore can be used to monitor the actions of traincrew. As the factual record of events is obtained continuously and without the presence of a supervisor, the actions of the traincrew are likely to be typical of their day to day performance. Furthermore, if the traincrew are aware that their actions *may* be monitored, it is likely that they will comply with rules and procedures more assiduously than would otherwise be the case.

7.2 Use in Respect of Monitoring Other Members of Traincrew

Although performance monitoring in this way is mostly relevant to assessing the Driver, operations such as door release and closure under control of the Guard can be similarly assessed.

7.3 Recommended Frequency

Train Operators should set criteria for the frequency at which monitoring using recorded data is undertaken taking into account the percentage of their fleet which is fitted. Where this approaches 100% it is recommended that this should be at least once in a two-year period for each Driver.

7.4 Optimum Driving Profile

It is recommended that data should be obtained and retained of the 'optimum driving profile' for principal routes. This may be obtained by special test run or on an observed normal service run. Once obtained, this data can be used as reference data which, once output as hard copy, can be suitably marked with route data to aid later use. Different hard copy outputs may be referenced for different actions such as braking technique, speed regulation, energy conservation (traction power control and speed), door control etc.

7.5 Analysis and Feedback

Monitoring, using recorded data, should be carried out at a minimum frequency which is in accordance with the company policy on performance monitoring. Any deficiencies with driving techniques or operation of train systems should be assessed and mapped across to the competency record file of the person and any shortfalls discussed and appropriate corrective action plans implemented.

7.6 Retention of Hard Copy

A hard copy of the data extracted for the purpose should be retained on the member of traincrew's personal record to assist in identifying trends.

8. Training and Competence Assessment

8.1 Extraction, Analysis and Validation of Data

Data from Data Recorders will often be used to determine the basic causes of incidents and accidents. 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, for example at least once per month. It is recommended that such persons undertake refresher training after any extended period of non-use, for example after a period of 6 months 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 maximum frequency of every two years.

9. Operating Instructions

Operating instructions should detail:

- fault reporting
- the continued use of vehicles with defective Data Recorders (refer to Rule Book)
- post incident and accident testing of vehicles

10. Data Extraction

10.1 Avoidance of Data Corruption

To avoid the possibility of data corruption or interference with data, Train Operators should have systems to control data extraction.

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.

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 incidents and accidents detailed in this document. This should define the required extraction regime for each incident/accident 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

Train Operators 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 and storing data and training/competence of staff undertaking data analysis.

11.3 Register of Persons Authorised to Undertake Data Extraction

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, Train Operators should set the requirements for the analysis and satisfy themselves that the contractor is competent to meet these.

11.5 Software Licence Requirements

Train Operators 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

Train Operators 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 incident or accident.

13. Records and Data Storage

13.1 Retention of Master Copies

Train Operators should ensure master copies of extracted data are retained for use at a later date. This is particularly important in regard to extracted data to be used in accident inquiries. Working copies should be made from master copies as necessary.

13.2 Preserving Data Integrity

Train Operators should ensure that extracted data is retained in a manner that will preserve its integrity.

14. Audit

Train Operators should undertake regular audits of compliance with the documented procedures.