



ITSRR GUIDANCE FOR TRAIN DATA LOGGERS

Purpose of Guidance

The aim of this Guidance is to ensure that:

1. Rolling Stock owned or operated by rail operators operating on the NSW Rail Network are fitted with functioning, reliable and accurate Data Loggers;
2. in the event of an accident or incident the Data Logger will be capable of providing the accident investigators with a prescribed minimum amount of accurate information;
3. the equipment can be used effectively as a proactive safety tool to gather data, to analyse trends, and to monitor train and safety performance; and
4. the requirements of recommendation numbers 36 & 37 of the Waterfall Special Commission of Inquiry are satisfied.

Application of Guidance

Definitions:

“Data Logger” means either an electronic or tape recording data or event recording device fitted within Rolling Stock that is capable of recording certain information relating to the operation and movement of the Rolling Stock on the railway track that complies with the requirements of this Guidance.

“NSW Rail Network” means all railway tracks (including private sidings) that are used for the through movement of trains.

“Rolling Stock” means a vehicle that operates on or uses a railway track, including all driving motor cars and locomotives. For the avoidance of doubt, “Rolling Stock” does not include wagons, trailers, infrastructure maintenance vehicles¹, non-driving motor cars and rolling stock that are not capable of operating at speeds in excess of 25km per hour.

“Unauthorised Access” means:

- (a) access by any person for reasons other than that specified in section 3.1;
- or
- (b) access by persons not authorised by the rolling stock operator’s procedures or carrying out the functions of a rail safety officer under the Rail Safety Act 2007 or an investigator under the Transport Safety Investigation Act 2003.

¹ Such as track maintenance vehicles.



1. General requirement for Rolling Stock

- 1.1 Rolling Stock should not operate on the NSW Rail Network unless it is equipped with a Data Logger that is operating and recording data continuously from commencement of operation of the Rolling Stock until the operation ceases.
- 1.2 On all new Rolling Stock and all Rolling Stock built after 4 June 2007 the Data Logger should record the information electronically.

2. General requirement for rolling stock operators

- 2.1 All rolling stock operators should ensure that all Rolling Stock operating on the NSW Rail Network comply with the requirements of this Guidance.

3. Use of recorded data

- 3.1. Rolling stock operators should have documented procedures for the collection, extraction and use of data for the following purposes:
 - 3.1.1. for accident / incident investigation purposes; and
 - 3.1.2. for monitoring train and safety performance.

4. Matters to be recorded by Data Loggers

- 4.1. Electronic Data Loggers should, as a minimum, record the following information²:
 - 4.1.1.1. Train speed;
 - 4.1.1.2. Distance;
 - 4.1.1.3. Time;
 - 4.1.1.4. Braking, brake pipe or brake cylinder pressure;
 - 4.1.1.5. Throttle/Master Controller setting;
 - 4.1.1.6. Safety devices acknowledgement, e.g. acknowledgment of deadman device, vigilance device, trip gear;
 - 4.1.1.7. Headlight switch operation; and
 - 4.1.1.8. Horn operation (on leading unit in case of multiple units).

² For train or safety monitoring purposes the operator may wish to measure a far greater number of parameters, however, that is at the discretion of the operator and would be outside the scope of this Guidance.



4.1.2. Electronic Data Loggers fitted to all new or retrofitted Rolling Stock should make provision for identifying the driver operating the controls of the train.³

4.1.3. Electronic Data Loggers fitted to all new or retrofitted Rolling Stock should, as a minimum, record the following information:

- 4.1.3.1. Train speed;
- 4.1.3.2. Distance;
- 4.1.3.3. Time;
- 4.1.3.4. Throttle/Master Controller setting;
- 4.1.3.5. Application of train automatic brake;
- 4.1.3.6. Operation of train automatic brake;
- 4.1.3.7. Application of the independent brake, if equipped;
- 4.1.3.8. Operation of the independent brake, if equipped;
- 4.1.3.9. Application of the dynamic brake, if equipped;
- 4.1.3.10. Operation of the dynamic brake, if equipped;
- 4.1.3.11. Operation of safety devices, e.g. acknowledgment of deadman device, vigilance device, trip gear;
- 4.1.3.12. Driver response to safety devices, e.g. acknowledgment of deadman device, vigilance device, trip gear;
- 4.1.3.13. Headlight switch operation;
- 4.1.3.14. Horn operation (on leading unit in case of multiple units);
- 4.1.3.15. Wheel slip/slide application.

4.1.4. In addition to items listed in section 4.1.3, operators may consider the following data being recorded by new installations:

- 4.1.4.1. Acceleration / deceleration rates;
- 4.1.4.2. Door operation;
- 4.1.4.3. Audio signals from alerting or warning devices for fire or passenger emergency alarms;
- 4.1.4.4. Voice communications transmitted from or received to the driver's radio and intercom;
- 4.1.4.5. Voice communications in the driver's cab;
- 4.1.4.6. Status and operation of cab radio system;
- 4.1.4.7. Train control data both received or transmitted;
- 4.1.4.8. Time, speed and position of the train as determined by the satellite navigation system (GPS) that is operating on that Rolling Stock;
- 4.1.4.9. Locomotive forward-looking video recording.

³ Only applicable to locomotives operated by two drivers.



- 4.2. Data Loggers that record on tape should, as a minimum, record the following information:
 - 4.2.1.1. Train speed;
 - 4.2.1.2. Distance;
 - 4.2.1.3. Time; and
 - 4.2.1.4. Brake Status.

5. Design Requirements

- 5.1. All Data Loggers should meet the following requirements:
 - 5.1.1. There should be a visible indication when the data logger is operational and not operational.
 - 5.1.2. All Data Loggers should be capable of retaining stored data once removed from the train or in the event of power loss.

6. Storage (memory) and accessibility of the data

- 6.1. Rolling stock operators should develop procedures covering the download, extraction and storage of the data, including procedures to ensure only competent persons perform this task.
- 6.2. The Data Logger should be capable of recording and storing data for, as a minimum, the last three (3) days of the train's operation.
- 6.3. The oldest information captured by an electronic Data Logger should be overwritten first.
- 6.4. The rolling stock operator should have documentation that specifies the source of all the recorded parameter and any signal conversion performed prior to recording the parameter.

7. Use of recorded data

- 7.1. Rolling stock operators should have documented procedures for the collection, extraction and use of data for the purposes specified in section 3.1 of this Guidance that are consistent with the requirements of the Rail Safety Act 2007 and all other laws.



8. Accuracy / Validation

- 8.1. To ensure accuracy of Data Loggers, the Data Loggers should be validated on a regular basis. This should occur not less than once per year.
 - 8.1.1. At a minimum, the Data Logger validation test shall include cycling all recorded parameters and determining the full range of each parameter by reading out the recorded data. A copy of the data validation results shall be maintained with the maintenance records until the next validation test.
- 8.2. To avoid inaccurate reading, the Data Logger should be able to accept information to compensate for wheel-wear.
 - 8.2.1. The wheel-wear compensation should be either recorded on the maintenance record or within the electronic data on the Data Logger.
- 8.3. The sampling rate of electronic Data Loggers should, as a minimum, occur once every second or when the status changes.

9. Crashworthiness

- 9.1. The Data Logger should, as far as practical, be designed and installed so as to withstand the impact of crash or crush forces, heat, fire, vibration, moisture, smoke damage and fluid immersion;
- 9.2. The Data Logger memory module should be installed within the train in a secure position such that the structure of the train will, as far as possible, provide the device protection; and
- 9.3. The Data Logger memory module should be contained so it is protected from any fluid ingress (this would include spilt liquids) and from dust.

10. Maintenance, testing and repair

- 10.1. The Data Loggers should, as a minimum, be maintained in accordance with the manufacturer's recommendations.
- 10.2. Rolling stock operators should have documented systems in place for the maintenance, testing and repair/replacement of Data Loggers.



- 10.3. Rolling stock operators should have documented procedures in place regarding the action to be taken by the train crew in the event that the Data Logger has stopped working or is malfunctioning.
- 10.4. Rolling stock operators with Data Loggers that record information on tape should have a programme in place to ensure the devices are maintained, including a requirement to ensure new tapes are installed when necessary.
- 10.5. Rolling stock operators should have a process in place to ensure clocks used to record time are correctly set⁴.

11. Requirement for procedures for downloading data

- 11.1. All data obtained / downloaded from the Data Logger should be “read only” so as to prevent alteration or deletion of data.
- 11.2. Rolling stock operators should have in place documented procedures and systems (and implement such procedures and systems) to:
 - 11.2.1. Ensure, as far as possible, the data obtained from the Data Logger is protected against Unauthorised Access, fire, electronic or magnetic interference or other sources of damage;
 - 11.2.2. Ensure, as far as possible, access to the data is only able to be obtained by those persons and positions authorised and qualified to receive, download and analyse data from the Data Logger;
 - 11.2.3. Ensure, as far as possible, all relevant employees or contractors of the rolling stock operator (including train crew) are trained and consulted in relation to the use of Data Loggers and the purpose for which data collected from such Data Loggers will be used by the rolling stock operator, and other organisations, including training in relation to all the requirements of this Guidance where that employee or contractor is involved in the maintenance and or repair of the Data Logger.
- 11.3. Nothing in this clause (Section 11) limits the powers of ITSRR to lawfully obtain such information under the Rail Safety Act 2007.

⁴ This would include having a means of identifying time differences due to travel across time zones or changes to daylight saving.