

Panel Discussion Theme 2:

The necessity of installing audio and device recording devices in train driver cabs and challenges in promoting their implementation

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A train derailed on the JR West Fukuchiyama Line between Tsukaguchi Station and Amagasaki Station after entering a curve at a speed exceeding the speed limit. This resulted in a major train derailment accident, causing 106 passenger fatalities and 562 injuries.

Railway operator : West Japan Railway Company

Accident type : Train derailment

Date and Time : About 9:18, April 25, 2005

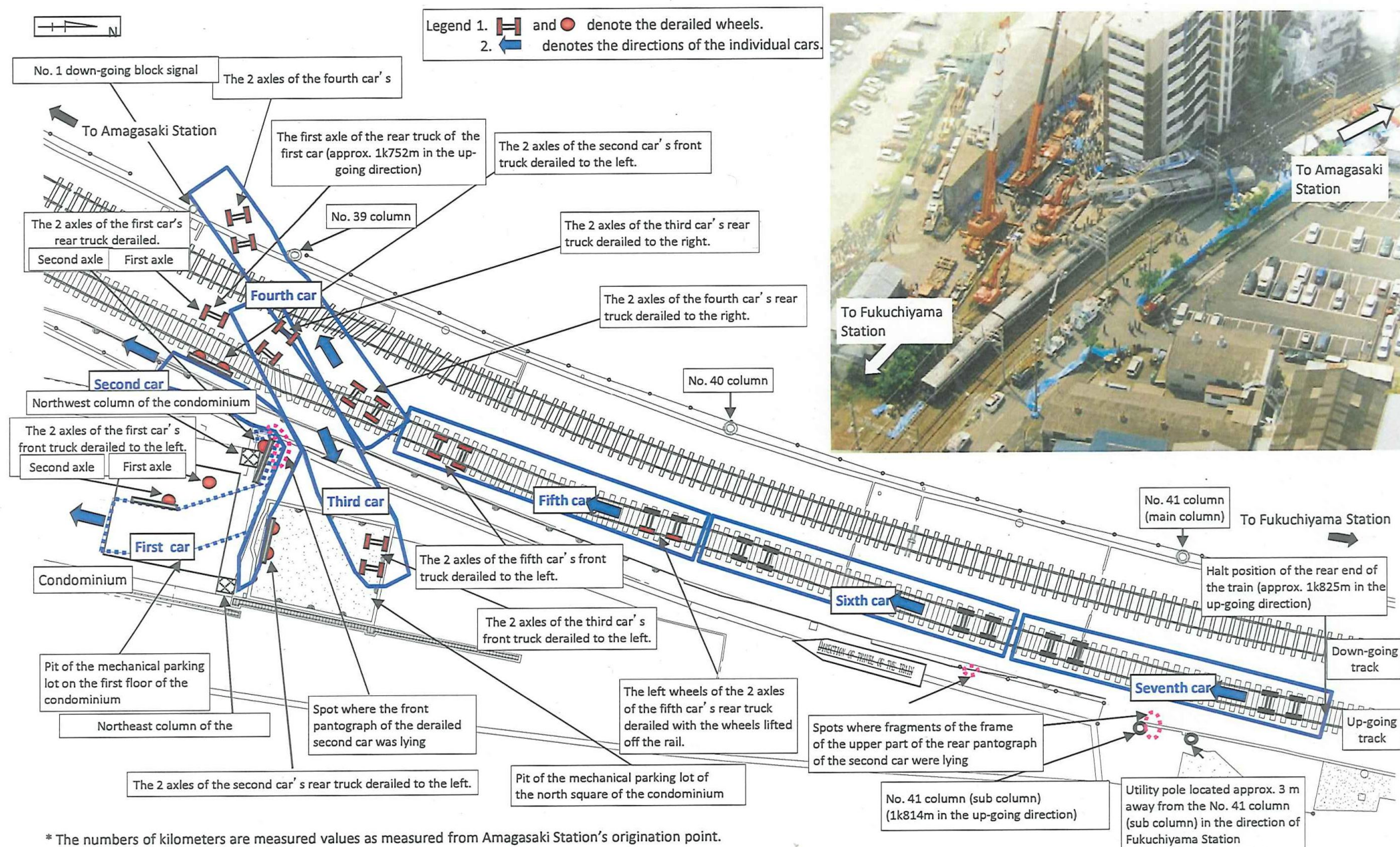
Weather : Sunny

Location : Between Tsukaguchi and Amagasaki Stations of the Fukuchiyama Line

Casualties : The number of people killed in the accident was (106 passengers and the driver), and the number of people injured was 562

Summary : The train was derailed due to exceeded speed limit in a curve section

Background for introduction of on-board Driving Information System



* The numbers of kilometers are measured values as measured from Amagasaki Station's origination point.

Background for introduction of on-board Driving Information System

This derailment prompted the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) to establish the “Technical Standards Review Committee” to examine the appropriate safety standards required under railway technical standards. An interim report was compiled on November 29 of the same year.

The report identified the need for recording devices to capture operational conditions (such as speed and braking status) during accidents. Consequently, the Ministry established the “Study Group on Driving Condition Recording Devices” in November of that year to examine specifications. Based on these findings, the Ministry amended the Technical Standards Ordinance in July 2006, mandating the installation of driving condition recording devices.

This amendment newly mandated the installation of automatic train stop (ATS) systems with speed restriction functions for curves, train stop systems for driver emergencies, and driving condition recording devices.

As a result, for items with legally mandated installation deadlines, all installations were completed by the end of June 2016.

For the following cases, installation was mandated within 10 years:

- * Facilities on sections where passenger trains operate at a maximum frequency of 10 round trips per hour or more, or rolling stock running on such sections
- * Rolling stock operating at speeds exceeding 100 km/h, or facilities on sections where such rolling stock operates

For rolling stock operating at low speeds (below 100 km/h) on low-traffic lines (lines with a maximum hourly passenger train service of fewer than 10 round trips), installation was encouraged but no deadline was set.

Extraction of Items to be Recorded by the Driving Information Recording Device and the Rationale

- Recording not only accidents but also incidents enables accurate understanding and utilization of their circumstances, which is effective for accident prevention.

- Therefore, the study group examined the information necessary to obtain data on train behavior and operating conditions during accidents, incidents, etc., to determine the desirable specifications for recording devices to be installed on future railway vehicles.
- As a result, desirable specifications for the recording devices to be installed on vehicles manufactured going forward were formulated.

Recording Items (Vehicle Information)	Time, location, speed, status of service brake control devices, status of control device operating controls, operation of automatic train control systems, operation of emergency brakes, brake chamber pressure, equivalent brake force signal, main circuit current, door opening/closing information
Recording Device (Non-Vehicle Information)	Forward-facing video footage

Railway accidents to be investigated

Category

[Ordinance on Report on Railway Accident, etc.]

Item 1: Train collision

Item 2: Train derailment

Item 3: Train fire

Item 4: Level crossing accident

Item 5: Accident against road traffic

Item 6: Other accidents with casualties

Item 7: Heavy property loss without casualties

Tramway accident

Railway accidents to be investigated

[Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board, etc.]

All accidents

✕ Except for derailment accidents of working snowplows.

- Accidents involving the death of a passenger, crew member, etc.
- Accidents involving five or more casualties with at least one of the casualties dead
- Fatal accidents that occur at level crossings with no automatic barrier machines
- Accidents found to have likely been caused by a railway worker's error in procedure or due to the malfunction, damage, destruction, etc., of vehicles or railway facilities, which resulted in the death of a person

- Accidents that are particularly rare and exceptional

Accidents specified by the public notice stipulated in item 5, Article 1 and item 7, Article 2 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board

Serious incidents to be investigated

Category

[Ordinance on Report on Railway Accident, etc.]

Item 1: Incorrect management of safety block

Item 2: Incorrect indication of signal

Item 3: Violating red signal

Item 4: Main track overrun

Item 5: Violating closure section for construction

Item 6: Vehicle derailment

Item 7: Dangerous damage in facilities

Item 8: Dangerous trouble in vehicle

Item 9: Heavy leakage of dangerous object

Item 10: Others

Tramway incident

Serious incidents to be investigated

[Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board, etc.]

The situation wherein another train or vehicle had existed in the zone specified in said item

The situation wherein a train had entered into the route as specified in said item

The situation wherein another train or vehicle had entered into the protected area of the signal which protects the zone of the route as specified in said item

The situation which caused malfunction, damage, destruction, etc. bearing particularly serious risk of collision or derailment of or fire in a train;

The situation which is found to be particularly rare and exceptional

Incidents specified by the public notice stipulated in item 5, Article 1 and item 7, Article 2 of the Ordinance for Enforcement of the Act for Establishment of the Japan Transport Safety Board

Necessity of on-Board Driving Information System



For railway accidents investigated by JTSCB, particularly train collisions, road obstacle accidents, level crossing accidents (fatal accidents at Class 3 and Class 4 crossings), and railway pedestrian accidents, detailed circumstances at the time of the accident can only be ascertained through the driver's statement without video recording devices.

Similarly, for serious railway incidents investigated by the Transportation Safety Board, analyzing the events and determining the cause of the serious incident can be difficult without a driving information recording device.

(Examples)

- Clarifying the actions taken by the driver at the time of the accident can protect the driver from liability.
- Did the deceased notice the train?
- Where was the deceased standing before contact with the train?
- How did the driver perceive the obstacle or person?
- A driver's memory is not perfect and may contain assumptions or misperceptions.
- A driver may provide a statement that differs from the facts.

For railway accidents and serious incidents investigated by the JTSCB, it is by no means uncommon for railway vehicles not to be equipped with video recording devices.

Relying solely on the driver's account can make it difficult to analyze accident details, potentially preventing thorough investigation of causes and recommendation of recurrence prevention measures.

There are multiple cases where analyzing data from video recording devices installed on rolling stock enabled accurate grasping of factual information about railway accidents, leading to successful cause determination through analysis.

Challenges in Promoting installing audio and device recording devices implementation

It is desirable to install audio and device recording to improve safety.

However,

Challenge is that Installing and maintaining video recording devices in driver cabs is expensive.

Examples used video recording device data in investigation reports



Time 13:46:12

Train is running near the beginning of the level crossing



Time 13:46:14

Train vibrated slightly while passing through the crossing.

Time 13:46:16

While traveling near the end of the crossing, an abnormal noise was happened and the train was shaken.



Time 13:46:19
Train stopped

Train derailment (Ohmi railway)

Occurred on December 27, 2018

Dangerous trouble in vehicle (Kumamoto City Transportation Bureau)

Occurred on February 23, 2024



(a) Footage from the rear-view drive recorder
(When stopped)



(b) Footage from the rear-view drive recorder
(When stopped)

Thank you for your attention.