MINISTRY OF
CONSTRUCTION AND TRANSPORT

TRANSPORTATION SAFETY BUREAU

FINAL REPORT (EXTRACTION)

2021-1166-5
(HU-10151)

Railway accident / Level crossing accident
Pápa - Mezőlak (AS 460), 6th November 2021

Translation

This document is the translation of Points 1, 5 and 6 of Hungarian version of the Final Report. Although efforts have been made to translate the mentioned parts of the Final Report as accurately as possible, discrepancies may occur. In this case, the Hungarian Final Report is the authentic, official version.

Basic principles of the safety investigation

The purpose of the safety investigation fulfilled by Transportation Safety Bureau (TSB) as National Investigation Body of Hungary is to reveal the causes and circumstances of serious railway accidents, railway accidents and railway incidents and propose recommendations in order to prevent similar incidents. The safety investigation is not intended to examine and determine fault, blame or liability in any form.

The findings of the safety investigation are based on an assessment of the evidence available and obtained by TSB in the course of the investigation, taking into account the principles of a fair and impartial procedure. In the Final Report, the persons involved in the occurrence shall be referred to by the positions and duties they had at the time of the occurrence.

The Final Report shall not have binding force and no appeal proceedings may be initiated against it.

This safety investigation has been carried out by TSB pursuant to relevant provisions of

- Act CLXXXIV of 2005 on the safety investigation of aviation, railway and marine accidents and incidents;
- Commission Implementing Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed for railway accident and incident investigation reports;
- in the absence of other related regulation of the Act CLXXXIV of 2005, the TSB conducts the investigation in accordance with Act CL of 2016 on General Public Administration Procedures.

Act CLXXXIV of 2005 is to serve compliance with Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety.

The competence of the TSB is based on Government Regulation № 230/2016. (VII.29.) on the assignment of a transportation safety body and on the dissolution of Transportation Safety Bureau with legal succession.

The safety investigation is independent of other investigations, administrative infringement or criminal proceedings, as well as proceedings initiated by employers in connection with the accident or incident.

Copyright Notice

1. SUMMARY

On 6 November 2021, at 8 am, the passenger train № 9600-1 with the motor train set of the series 1426 travelling from Balatonszentgyörgy to Győr collided with a car in the level crossing protected with warning lights (№ AS460) showing flashing white light towards the road. There were no personal injuries in the accident.

During the investigation, the IC found that at the time of the accident, the warning lights were flashing a white signal towards the road because the wheels of the railway vehicle had picked up electrically insulating dirt on the track section before the accident, so the warning lights' train detection elements (13 kHz track circuits) were not working. The design of the vehicle contributed to this: the track flange lubricating device helps the dirt stick, while the disc brakes prevent the wheel surface from being cleaned as it would be in the case of shoe brake.

The fault was not an isolated incident: it had been a regular occurrence on this line in the days before the accident (although it had caused no accident). The railway company had recognised years earlier that modern rolling stock and track circuits could not work together reliably, but the development and implementation of solutions was slow or had not taken place.

Similar accidents can also be avoided if drivers receive feedback on the operation of the level crossing via main signals, but such a system is more common only on branch lines and main lines equipped for speeds above 120 km/h. Under the rules in force, it is still permitted to install warning light lights at level crossings without this equipment.

Already during the investigation, the IC issued a safety recommendation to the Railway Authorities Department of ITM to investigate the interaction between 13 kHz track circuits and disc brakes. The Authority requested the relevant infrastructure managers to prepare risk assessments, which have been sent to the Authority. The common conclusion is that the risk of cooperation (shunt resistance) between self-operated shunting devices using the 13 kHz track circuit train detection mode and railway vehicles using disc brakes during their service braking is well understood and that the development of the relevant safety devices is a priority, subject to the availability of resources.

5. CONCLUSIONS

5.1 Summary

5.1.1 Direct causes

Acts, mistakes, events or conditions or a combination thereof the elimination or avoiding of which could probably have prevented the accident or incident:

a) the train detection track circuit of the warning lights did not detect the motor train because
   - the vehicle's wheels were contaminated,
   - the operating principle of the track circuit implies good electrical conduction between the wheel and the track;
b) the technical system of the warnings lights is such that the train detection fault was hidden from the driver, so in the event of a fault he could not know that he should approach the crossing with caution;
c) the driver of the road vehicle did not make sure that passage was not dangerous.

5.1.2 Indirect causes

Acts, mistakes, events or conditions which influenced the occurrence by increasing its probability, accelerating the effects or the severity of the consequences, but the elimination of which would not have prevented the occurrence:

a) falling autumn leaves could stick to the wheels of railway vehicles;
b) the vehicle involved in this case is fitted with a wheel flange lubricating device, which makes the tread wet with oil and more likely to catch dirt, and has disc brakes, so the braking did not have a wheel-cleaning effect;
c) short, light-weight trains increase the probability of train detection errors.

5.1.3 Systemic factors

Causal or contributing factors of organisational, management, social or regulatory nature which are likely to have an effect on similar or related occurrences, particularly including regulatory framework conditions, the design and use of the safety management systems, the skills of the personnel, the procedures and maintenance:

a) the company recognised the risk associated with the accident, but was slow to address it;
d) legislation allows the installation of level crossings where train detection faults are hidden from the driver.

5.2 Actions taken

Based on the findings of the on-site inspection, it was temporarily ordered that the crews of trains with motor train sets on line 10 be informed that the warning lights at the level crossings were unserviceable; and subsequently that the open line level crossings with warning lights on lines 10 and 26 should be closed manually during train movements (for more details see Chapter **Hiba! A hivatkozási forrás nem található.**).

On 7 November, the staff of the track maintenance and safety equipment service cleaned the points of contact of the level crossings on line 10 by grinding the upper surface of the rails.

On November 10, the accident investigators of MÁV Zrt. recommended to the employees of MÁV-START Zrt. that the flange lubricating equipment of the Series 426 (Desiro) motor coaches be taken out of service until further action. Feedback received on 19 November indicated that the above items would be removed during the next weekly inspections, but on 22 November the order was withdrawn, citing increased costs due to increased wheel wear.

In its comments to the draft final report, MÁV Zrt. informed that 8 of the existing level crossings of the 10 railway lines affected by the incident had been upgraded with the technical solution to reduce the shunt resistance by 10 November 2022, and another 3-4 level crossings are expected to be upgraded this year. The main materials required for a further 20 set of warning lights are already available, and bids for some of the materials are being evaluated. In the future, the upgrading programme will be continued at critical points on other railway lines, depending on procurement and funding opportunities.

5.3 Additional notes

The IC identified no risk-increasing factors that could not be linked to the occurrence of the accident.

5.4 Proven procedures, good practices

The IC identified no good practices or procedures that helped reduce the consequences of the incident and avoid more serious outcomes.

5.5 Lessons learnt

The nature of rail traffic has changed since the railway line was equipped with the current technical equipment. Safety features (in this case train detection) that worked reliably in the past can be risky in today's rolling stock and traffic conditions (disc brakes, wheel flange lubricating device, short and light-weighted trains, etc.).

If the nature of rail transport as one part of the system - in this case traffic and rolling stock - changes, then it is appropriate to review the other parts of the system to ensure that the elements can continue to work together as a system.

This was already done after the risks were published (**Hiba! A hivatkozási forrás nem található.**), but the review will only be effective if action is taken as soon as possible to address the problems identified,

1. even with traffic restrictions, as long as
2. timely implementation of the solutions identified as necessary (accompanied by the necessary resources) takes place.

6. SAFETY RECOMMENDATION

Safety recommendations, together with the findings and conclusions in the final investigation report, represent important information for the further improvement of railway safety. Accordingly,

- The authorities responsible for safety shall take action as necessary to ensure that safety recommendations are duly taken into consideration and applied where appropriate.
- The organisations responsible for introducing such safety recommendations shall start, with no delay, the risk assessment and risk management activities related to the contents of such safety recommendation within the procedural framework of their safety management system.

Within 90 days of the issue of the safety recommendation, they shall report back to the IC on the actions taken or planned or on their non-acceptance (with justification) of such safety recommendation.

6.1 BA2021-1166-5-01A

The TSB issued an interim safety recommendation during the investigation, given the severity of the risk identified:

Number: **BA2021-1166-5-01A**

Date of issue: **3 January 2022**

Addressee: **ITM Railway Authority Division**

Responsible for introduction: **MÁV Zrt., GYSEV Zrt.**

The TSB recommends ITM Railway Authority Division to consider obligating national infrastructure managers to perform a risk analysis to find out whether there is appropriate cooperation in all circumstances between

- **automatic warning light equipment designed with a train detection mode using 13 kHz track circuits, and**
- **railway vehicles using disc brakes during their service braking,**

and then, depending on the results of the analysis, take the necessary steps to prevent similar cases from recurring.

By acceptance and expected implementation of the safety recommendation, the risk of malfunctioning of similar types of automatic shunting equipment due to high shunt-resistance can be significantly reduced.

6.1.1 Action taken following the recommendation

The Railway Authority Division, as the addressee of the previous safety recommendation, ordered the relevant infrastructure managers to carry out risk assessments. The companies have sent the documents to the Authority. The common conclusion is that they are aware of the risk of cooperation (high shunt resistance) between automated shunting devices with train detection using 13 kHz track circuits and railway vehicles using disc brakes during their service braking

and that the development of the relevant safety devices is a priority, subject to the availability of resources.