



TRAFIKKVERKET

**Preliminary report**

# Incident on the Bergslagen line

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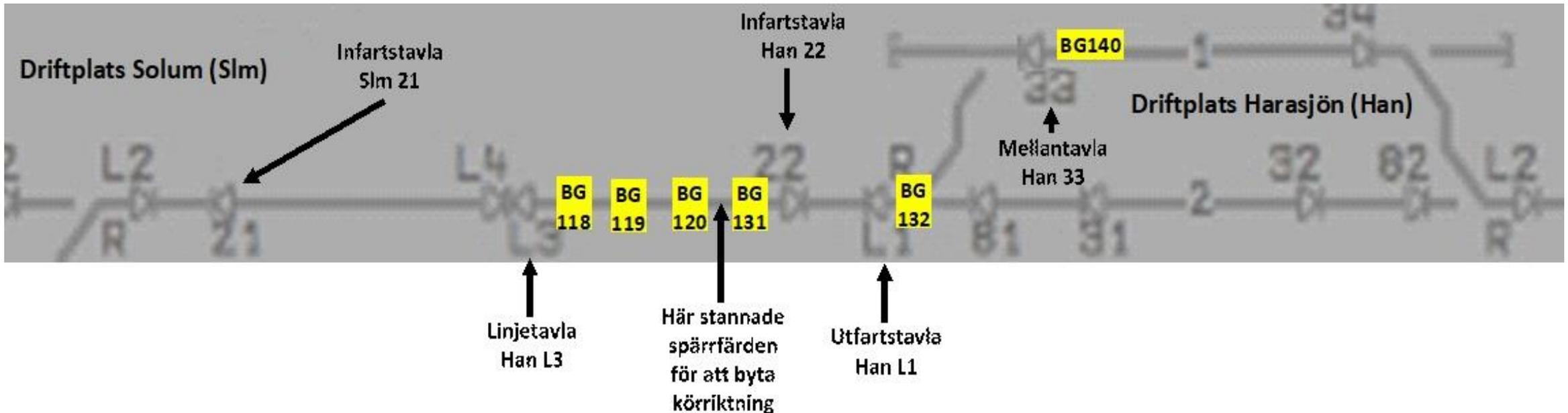
13 September 2019

# The line. The maintenance vehicle.



# What happened?

1. The maintenance vehicle started with a movement authority, operating mode "full supervision" (MA-FS) from Harasjön track 1 (intermediate board 33, balise group 140).
2. The vehicle stopped out on the line after having passed balise group 131, but before balise group 120.
3. The driver performed a "End of mission" and the MA was withdrawn.



# What happened?

4. The driver try twice to activate the B-cab of the maintenance vehicle. The request for a MA is made through the ETCS on board system. The attempt fails.
5. Then the B-cab is de-activated, and the A-cab re-activated again.
6. Now the driver makes a turn of the complete vehicle by using the in-built turning plate. However, the ETCS onboard system is not restarted when using the turning plate.
7. Following the request in the onboard system, the vehicle was given a new MA in operating mode “on sight” (MA-OS), which was acknowledged by the driver.
8. The vehicle starts to drive, now in the direction back to Harasjon. When the expected balise group 120 was not discovered, a text message “balise linking error” was sent to the ETCS on board and to the RBC.
9. The vehicle passes the balise group 131 in the opposite direction. [As the vehicle traveled in the opposite direction, the distance (in the onboard system) to the last position reference increased].

# What happened?

10. When the vehicle arrived at the position where the onboard system expected the second balise group (119), a more powerful reaction came from the ETCS system. The ETCS onboard system applied the operating brake to a full stop and shortened the MA to the front of the vehicle. A text message "balise linking error" was sent to the ETCS on board and to the RBC.
11. At a stand still, the onboard system automatically sent a request for a new MA to the RBC. The vehicle received a prolonged MA in the operating mode "On sight". The driver acknowledged operating mode "in the long run" one more time.
12. When the vehicle drove back to track 1 in Harasjon, the balise group 132 and also the balise group 140 were passed without any reaction from the ETCS system.
13. After the vehicle had stopped on track 1, it still had a MA, operating mode "On Sight".

# Contributing factors

- In connection with the installation of ETCS on board on the concerned maintenance vehicle, a risk was identified when using the turning plate and its connection with functionality in ETCS.
- In order to mitigate the identified risk, the RU wrote a SRAC in the driver's manual of the maintenance vehicle: *“Note that the ETCS system must be restarted after use of the turning plate in order to change the direction of travel. This is to ensure correct direction in the ETCS system”*.
- This SRAC was not known by the driver.
- The driver did not understand the “balise linking error” message.
- According to operational rules, the driver shall contact the dispatcher when receiving any “balise information error” message. In this case, the driver did not contact the dispatcher until the driver wanted to enter station Harasjon again.

# Why no technical solution?

- One of the technical barriers discussed during the implementation of ETCS onboard into the vehicle, was “making ETCS powerless” when using the turning plate.
- However, this option was not chosen because of the risk of locked brakes. (The braking system of the current vehicle type is so designed, that the brakes lock when rotating the vehicle).

# Analyses and conclusion

After the analyses of log files by the onboard manufacturer, the manufacture concluded that no technical errors were detected. The ETCS system worked as specified.

The manufacture and Trafikverket concluded, that the event could happen because of how the ETCS's onboard system was integrated in the particular vehicle type, in combination with the (in)correct use of the vehicle.

The RU concluded that the SRAC in the vehicle user manual was not known by the driver. Furthermore, it was unclear what is meant with "to restart the ETCS onboard system".

Swedish operational rules need to be clarified for "occupied movements with a MA" .

# Suggestion (harmonisation)

The ERA's manual for using ETCS on board equipment should be supplemented with a text directed to the driver about what the "linking error" message means and how the driver should act when it occurs.

Clarify which of the various ETCS forms the dispatcher shall use for different stop passage permit. Reduce the number of ETCS forms.

