
Derailmentinvestigations

Informationssystem für Schienenfahrzeuge auf Bus- bzw. Telematikbasis (Phase 1)



Inhalt:

1. Introduction
2. Testtrack
3. Vehicle
4. Measurement Arrangement
5. Test Execution
6. Evaluation



The *Risc*, which exists through a derailment of a freighttrain, can be reduced by the use of *Telematics*.

The standard deviation of acceleration is a suitable parameter for the derailment detection.

Question formulation:

- Which positions are suitable to apply an accelerationsensor for derailment detection ?



Risc

Risc (**R**) = Probability of the accident (**E**) X Extent of loss (**S**)

E - active safety

- Detction of wheel flats and ovalizations
- Detection of hot-boxes

S - passive safety

- Detection of derailment

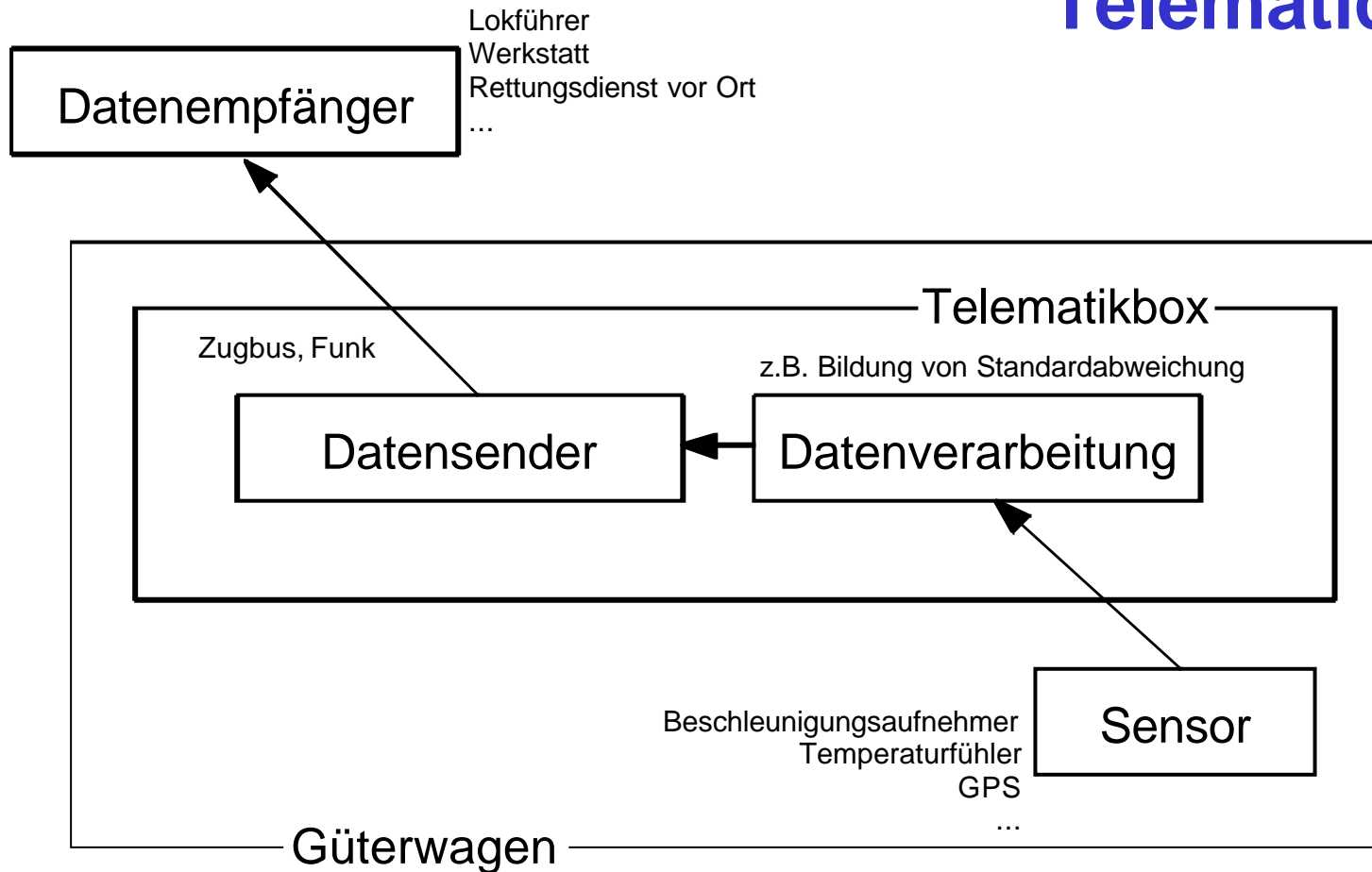


Possible extent of loss

- **Damages of track and vehicles**
- **Collisions** with
 - ... oncoming traffic
 - ... platforms
 - ... bridge piers
 - ... tunnel entrances
- **Fall** from
 - ... bridges
 - ... railroad embankments
- **Hazadation of humans and nature**

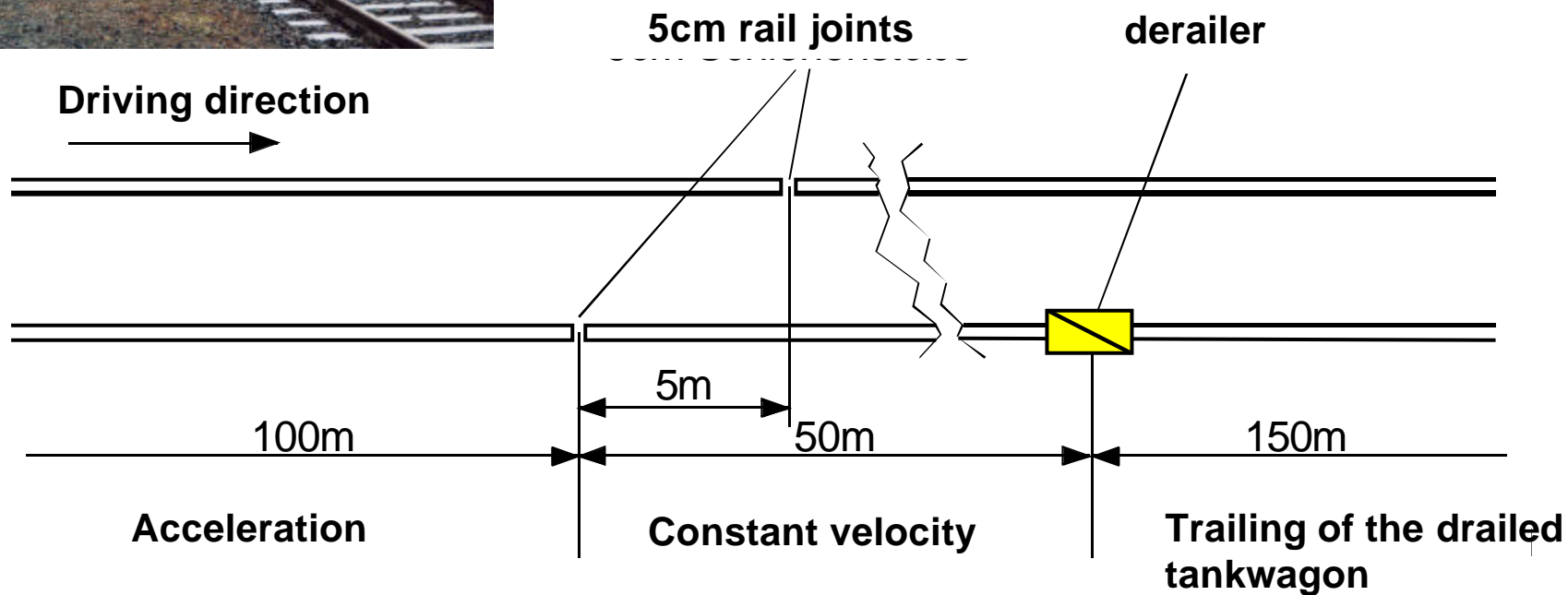


Telematics





Testtrack





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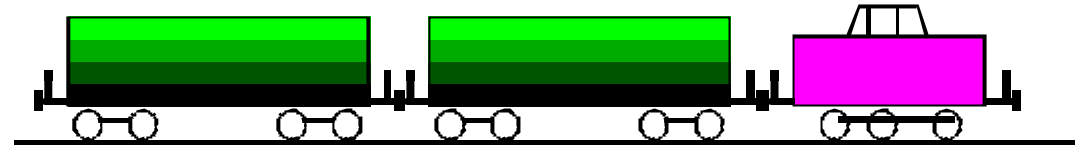
2. Testtrack



5cm rail joint



Derailer and guard rail



 **Derailment**



The Turn- and Triggermechanism



Derailmentinvestigations IfSBT (Phase 1)

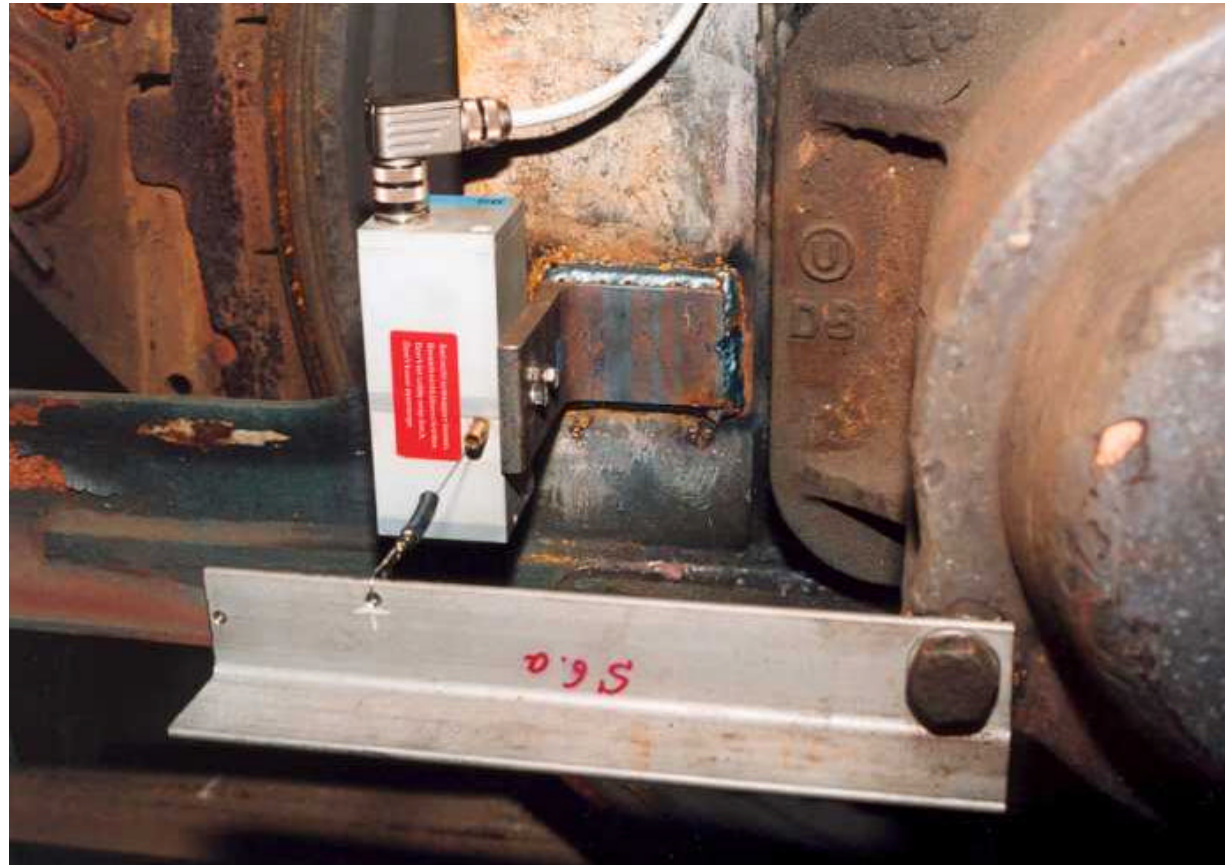
3. Testvehicle



Testtrain



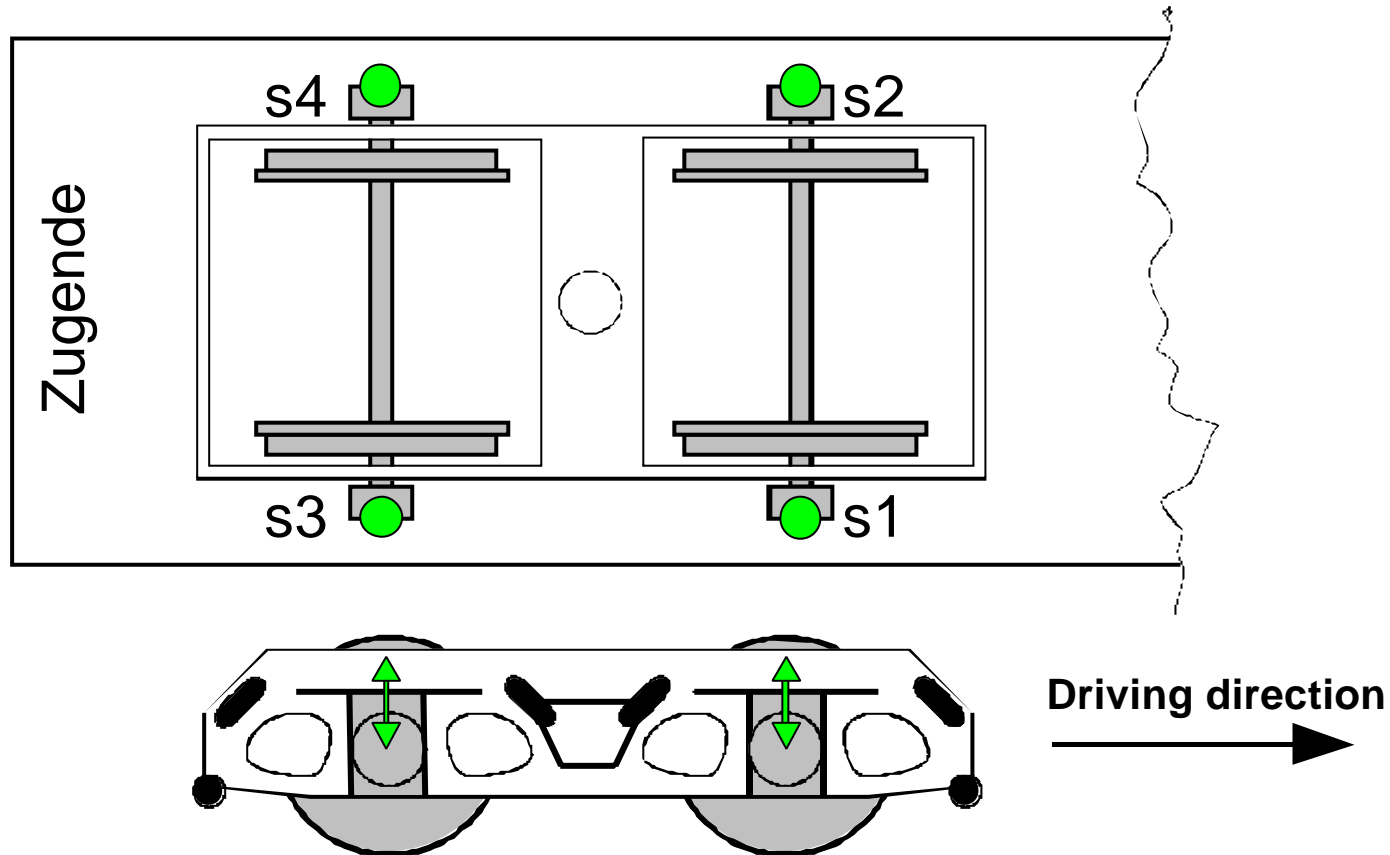
Testbogie BA 661.1



Distancesensor

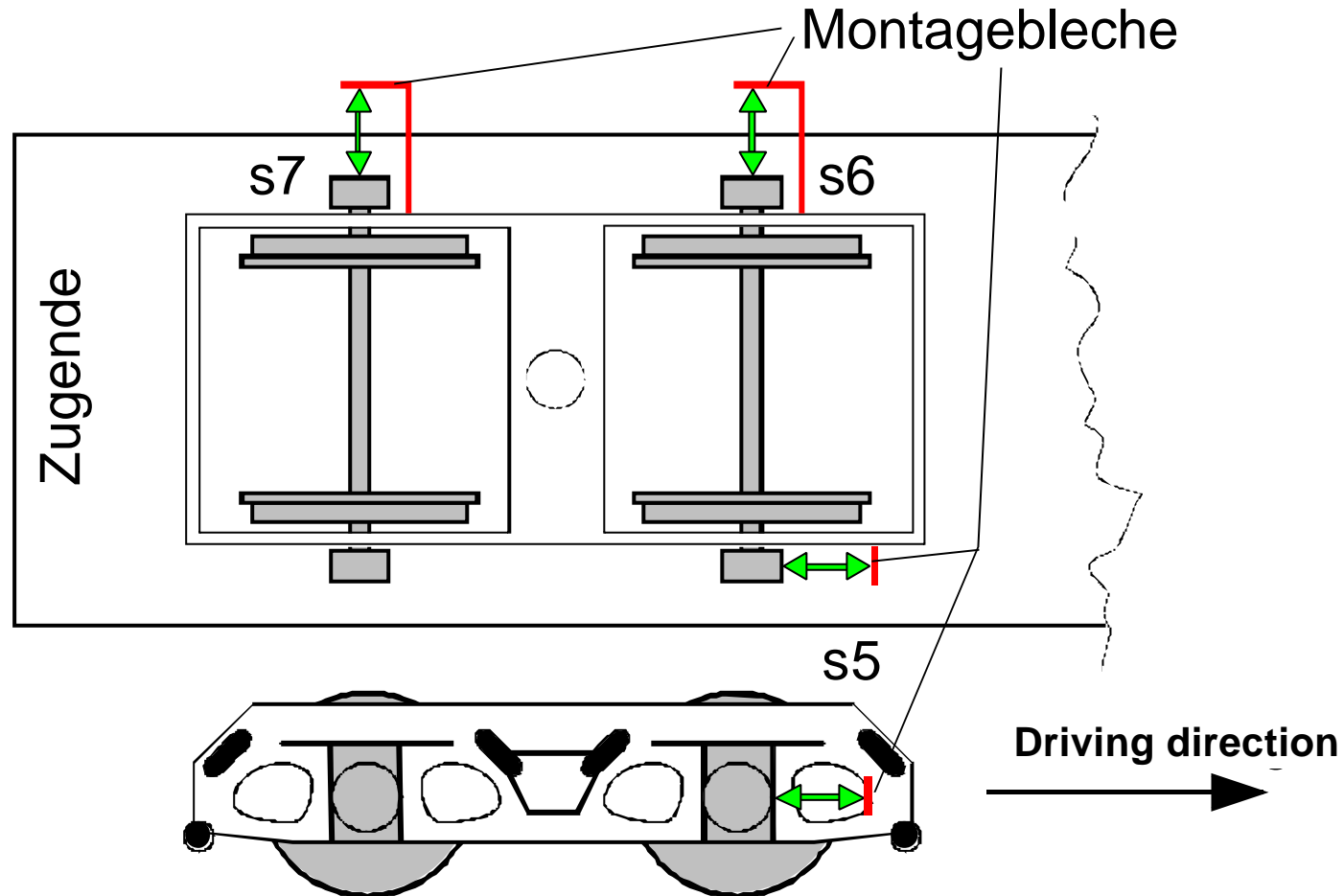


Distance in vertical direction between wheelset and bogieframe



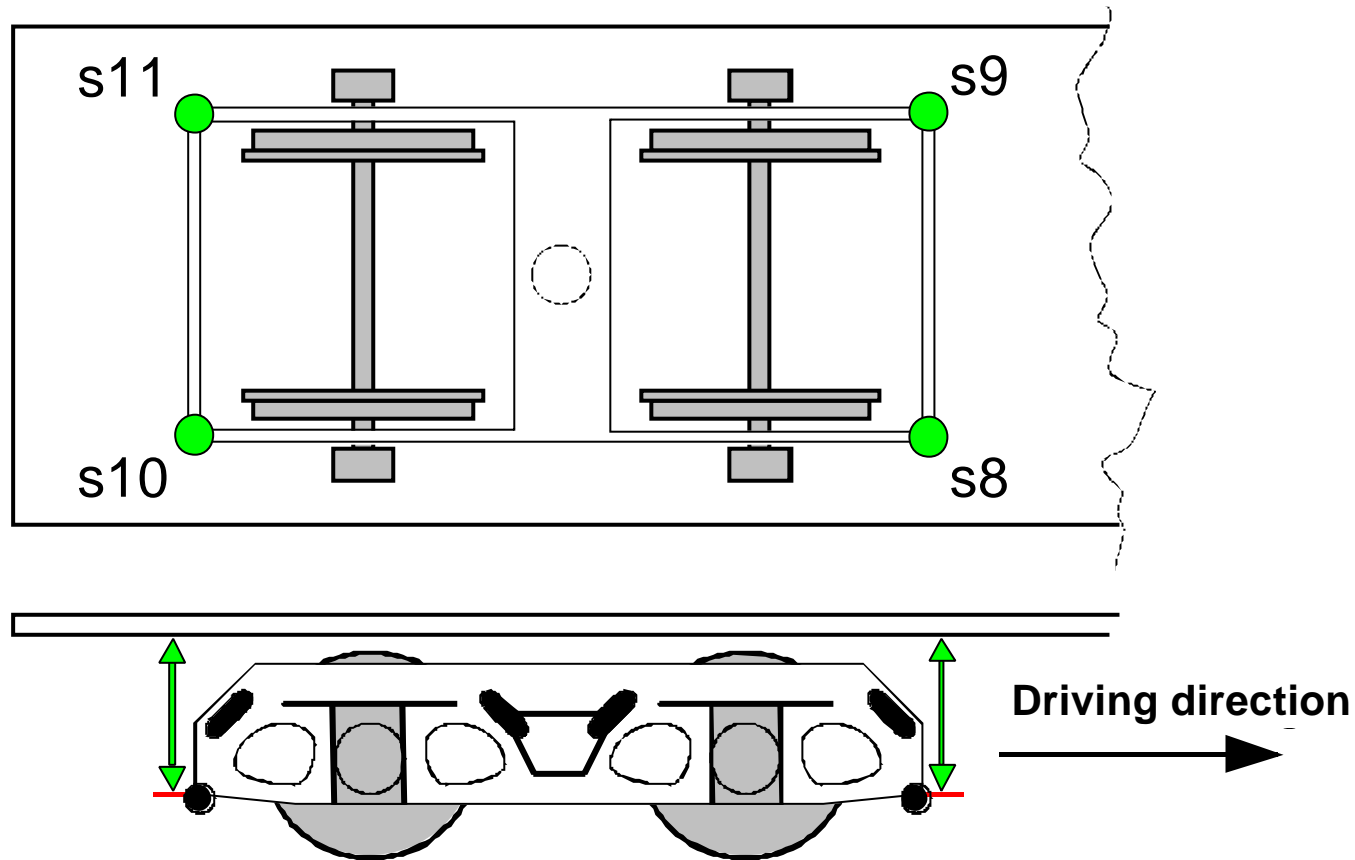


Distance in lateral and longitudinal direction between wheelset and bogieframe



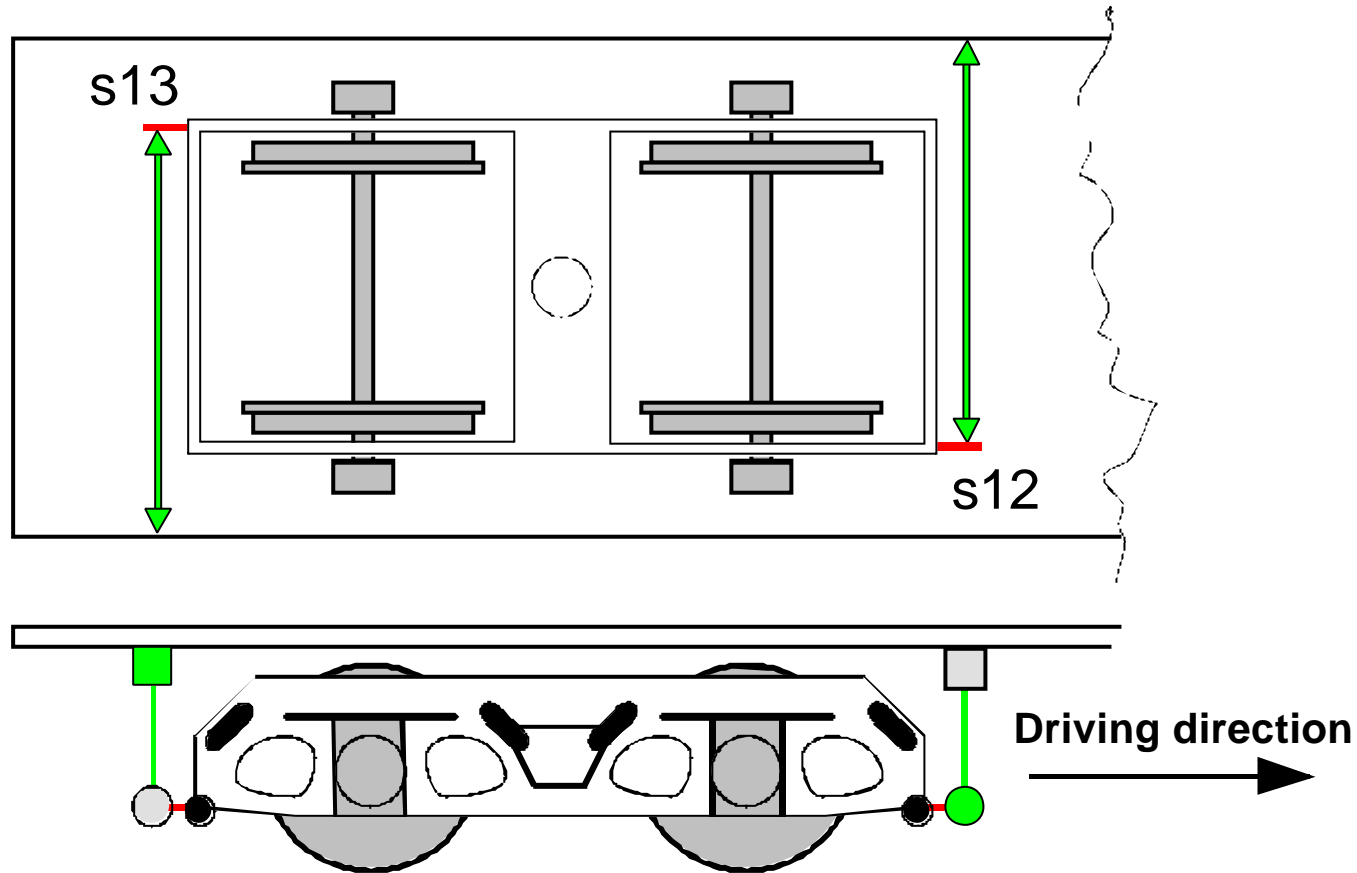


Distance in vertical direction between bogieframe and carbody frame



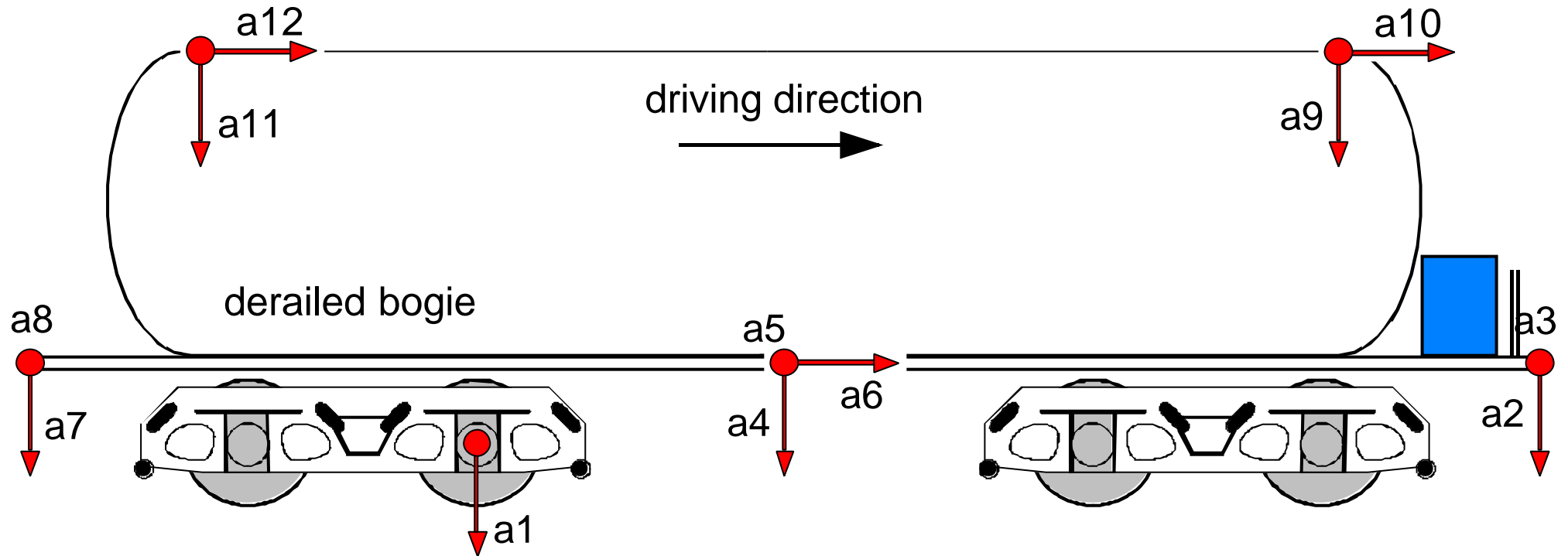


Distance in lateral direction between bogieframe and carbodyframe





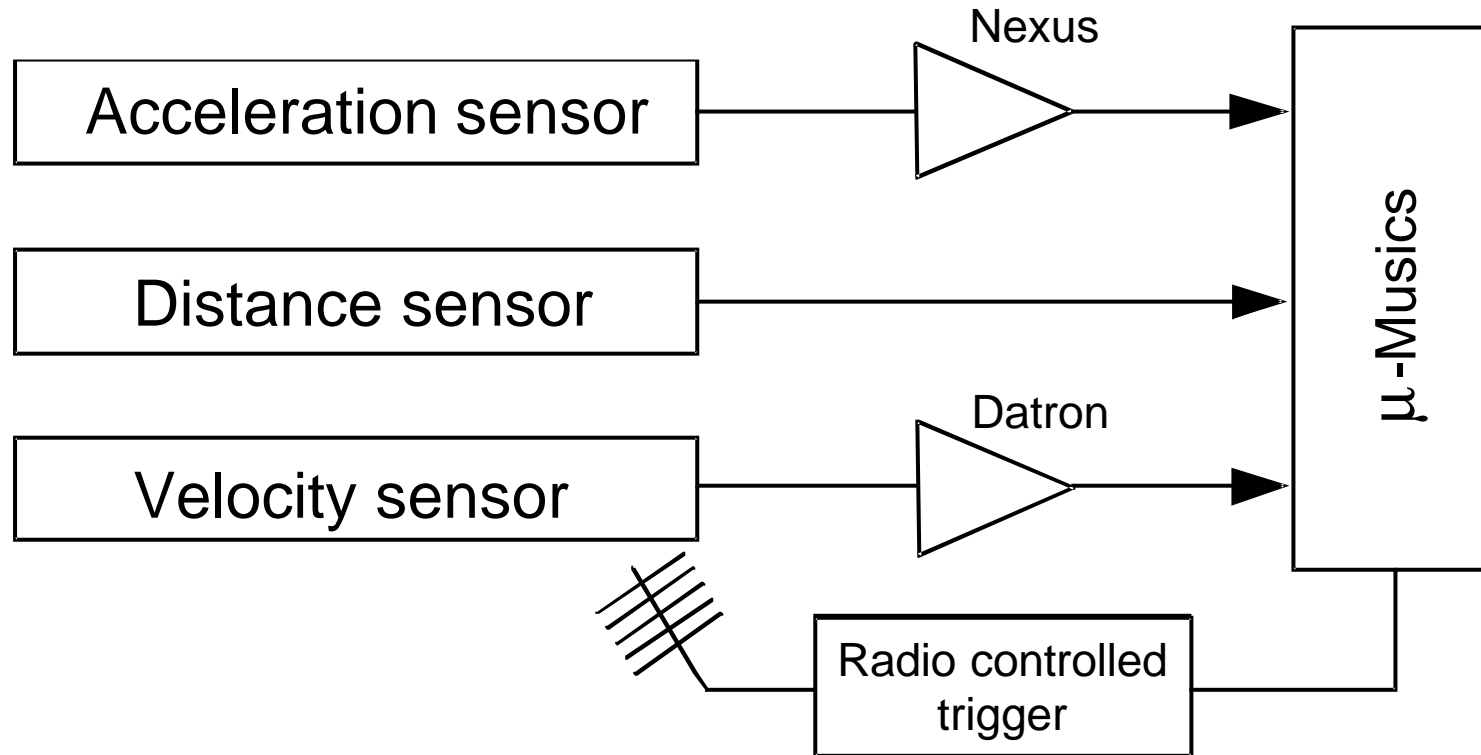
Acceleration sensor

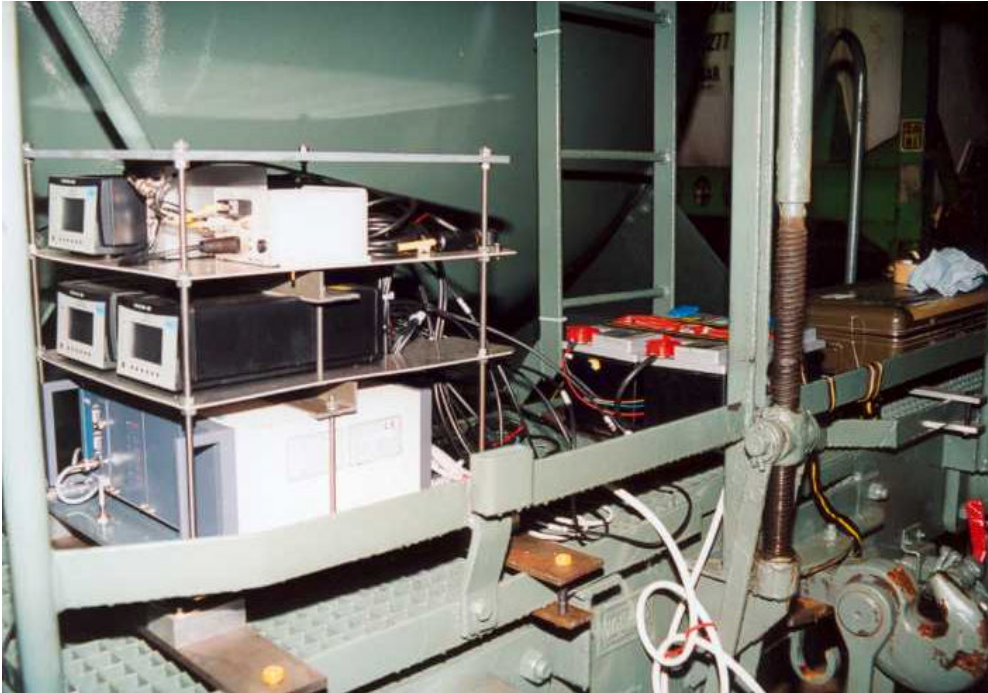


Implementation of the acceleration sensors spread over the tankwagon

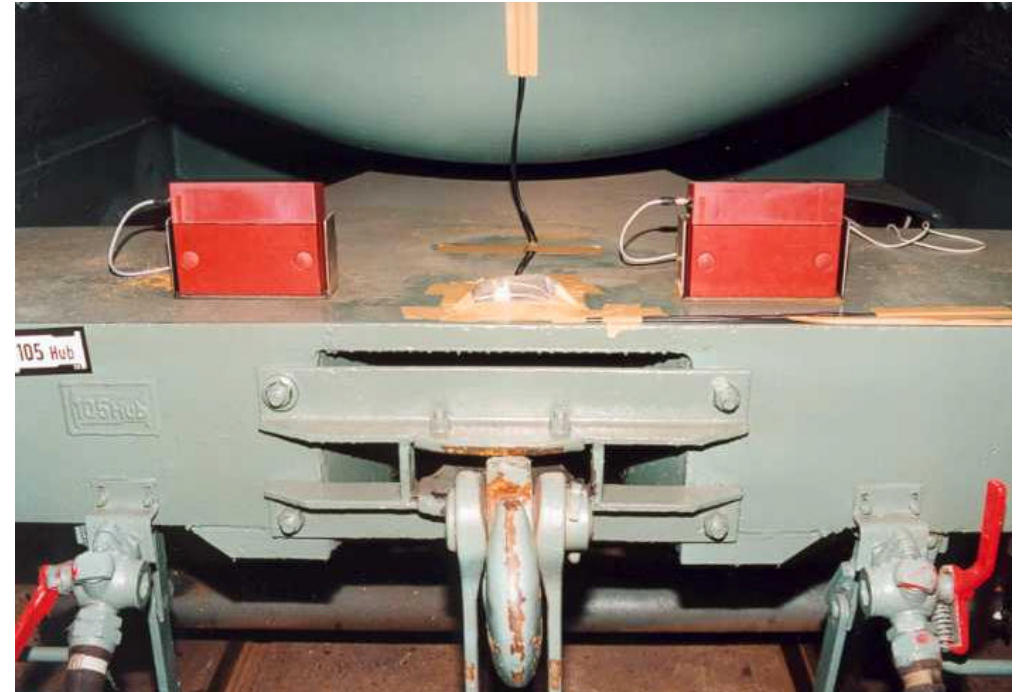


Signal flow diagram





Opened device box



ATIS-Boxes



Velocities at derailment		
	No.	V_{Derail.} [km/h]
empty vehicle	1	13
	2	26
	3	38
	4	43
loaded vehicle	5	16
	6	25
	7	37



Eventuell Videovorführung



After the derailment (43 km/h)

Empty vehicle (20t)



Derailed bogie (43 km/h)



Traces on the track

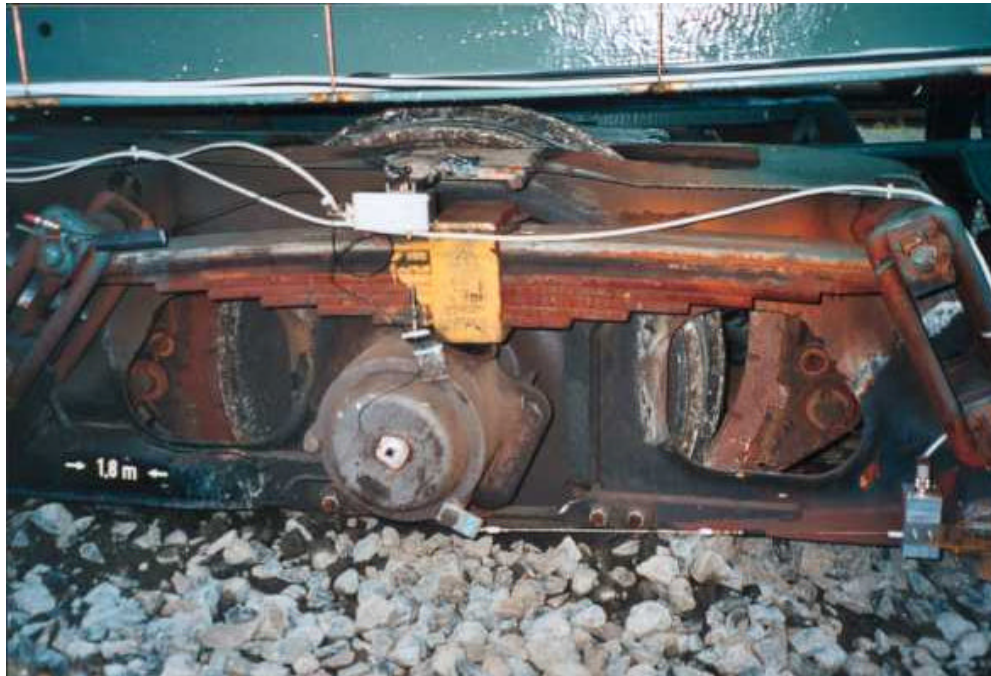


Demage of a sensor



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5. Test Execution



Bogie after derailment (35 km/h)

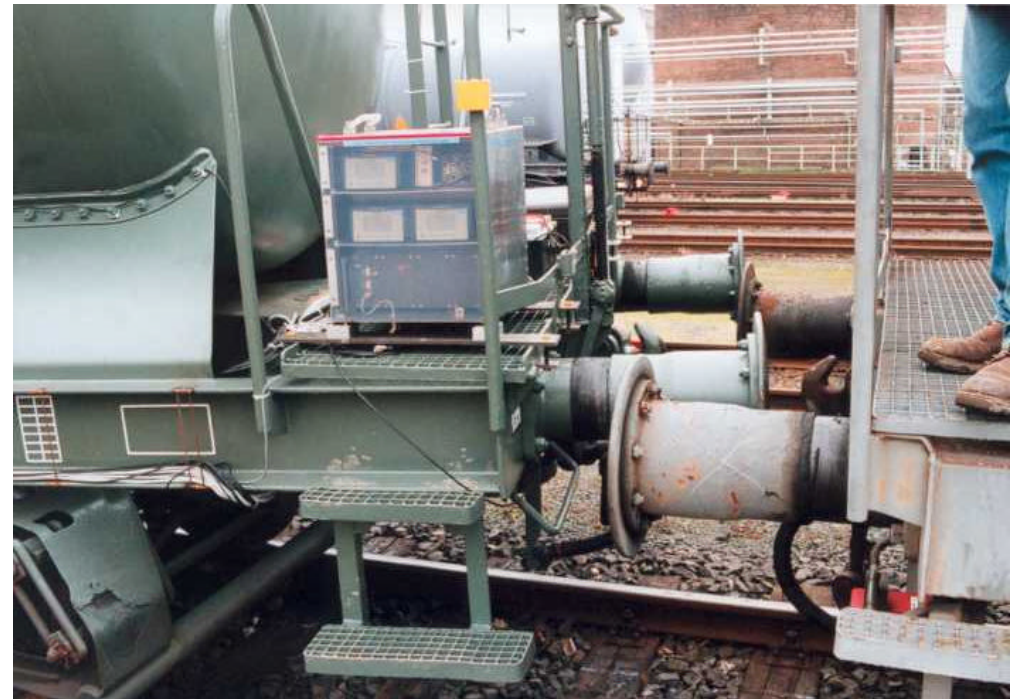
Loaded vehicle (80t)





Derailed vehicle

Loaded vehicle (80t)



Überpufferung



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5. Test Execution

After the test



Damaged track



Damaged sleepers



What we have measured?

	Nr.	V _{Derail.} [km/h]	Accelerations												Distances											
			a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	a11	a12	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11	s12
Empty vehicle (20t)	1	13																								
	2	26																								
	3	38																								
	4	43																								
Loaded vehicle (80t)	5	16																								
	6	25																								
	7	37																								
Empty vehicle (20t) (Wheel flat test)	8	13																								
	9	16																								
	10	21																								
	11	25																								
	12	37																								
	13	45																								

⇒ **338 records**