Control Manual

SE5000 Smart 2

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Control Manual

Tachographs by Stoneridge - www.stoneridge-tachographs.comAll data subject to change without notice.

IATF 16949 ISO 14001 ISO 80079-34

Important

The Stoneridge tachograph SE5000 Smart 2 has full type approval for use in the European union according with Commission Regulation (EU) 2016/799 of 18 March 2016 amended by Commission implementing regulation (EU) 2021/1228 of 16 July 2021 – M3 and other related legislatives.

The Approval Certificate number will be indicated on all Stoneridge tachograph.

The tachograph fulfils the requirements of UNECE regulation number 10, revision 05, in respect of electromagnetic compatibility.

Tachograph Version

Smart Tachograph SE5000 Smart 2.

Type approval number: e5 0002.

Internet Information

Further information about Stoneridge SE5000 Smart 2 and about Stoneridge can be found at:

www.stoneridge-tachographs.com

Copyright

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Changes

Stoneridge Electronics reserves the right to introduce changes in design, equipment, and technical features at any time. You cannot, therefore, base any claims on the data, illustrations or descriptions in this Manual.

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Introduction

This manual concerns the control mode of operation. However, knowledge of the operational mode of the unit is also required in case of driving a tachograph fitted vehicle.

A Stoneridge tachograph can be operated in one of four modes of operation:

- Operational (driver card or no card inserted)
- Control (control card inserted)
- Calibration (workshop card inserted)
- Company (company card inserted)

Company Lock-in/Lock-out details can be used to identify the true owners of blocks of stored tachograph data. Enforcement officers should encourage companies to Lock-in tachograph data as it not only identifies their company as the owner of the data, but also prevents third party company card owners from viewing or downloading their data.

Also, when transferring ownership of a tachograph to another company, the current tachograph owner must Lock-out the data before transfer of the tachograph. Thus any future data stored after the Lock-out would be clearly identified as not applying to them.

Due to data protection laws, care must be taken to ensure that the tachograph data is not downloaded and passed on to third parties without the permission of the tachograph owner.

The control card can be inserted in either of the trays. If control cards are inserted in both trays the card in tray 1 will be used for the control operation and the card in tray 2 will be ignored.

The Control Card

- Must be obtained via an application to the relevant authorities.
- Is valid for 2 years only.
- Will only be issued to enforcement officers or enforcement authorities.
- Is personal to the authority and is not transferable.
- Allows read-only access to data stored in the driver card or in the tachographs internal memory respectively.
- Can store a minimum of 230 records of displaying and/or printing and/or VU downloading and/or card downloading. The maximum number of records is dependent on the card type. When the upper limit is reached the oldest data will be overwritten.

Note!

Extra care must be taken to ensure that only the authorised owner of a control card has access to it at all times.

Don't open the Case

The tachograph has been installed by authorised personnel.

A tachograph case must never be opened. No tampering with or modifications to the tachograph are permitted. A tamper label is placed inside the printer housing. The tamper label must not be torn apart.

Here you can see where the tampering label is placed and how it looks when it is untouched.

- On the left-hand side of the label there will be a security ink section
- On the right-hand side Stoneridge Electronics AB and a data matrix code (contains the serial number of the Tachograph) is printed



A tampered label might look like this, and a few examples to check for.

- Void appears as text on the label
- Not correctly attached on the tachograph
- The red label is damaged
- The security ink on the left is broken



Note!

Unauthorized persons that modify this equipment are committing a punishable offence, depending on the legislation in the country concerned.

Overview

The Tachograph installation.



- 1. Encrypted motion sensor
- 2. Smart tachograph, with integrated display and printer
- 3. Display in vehicle's instrument cluster
- 4. Card
- 5. DSRC (Dedicated short-range communications)

Motion Sensor (1)

Used to provide the tachograph with speed signal pulses from the vehicle gearbox. To ensure the integrity of the speed sensor signal, the speed signal is transferred between the sensor and the tachograph in an encrypted form. Encrypting the speed signal ensures that any tampering with the signal will be detected and recorded.

Smart Tachograph (2)

The tachograph records and stores various data:

- Workshop or driver card data.
- Warnings and malfunctions relating to
- tachograph, driver, company and workshop.Vehicle information, odometer data and
- detailed speed. • Tampering the tachograph
- Tampering the tachograph.

For more information on the tachograph, see the Driver & Company Manual.

Display in Instrument Cluster (3)

The display in the instrument cluster can be used to display information passed from the tachograph, such as speed (speedometer) and distance travelled (trip and odometer) and rest/drive counters.

Control and Driver Card (4)

The following cards dedicated for specific usage can be used in the tachograph:

- Driver card records the drivers activities.
- Control card authority control and inspection.
- Workshop card calibration mode.
- Company card hauliers and vehicle owners, downloading of data.

DSRC (5)

The DSRC, is a unit that is separate from the vehicle unit, and it is used to perform targeted roadside checks via a wireless communication link.

User Interface

The tachograph detailed within this manual comprises two card tray mechanisms, a printer, an LCD display, a calibration/download interface (6-pin connector located behind paper cassette) and user controls, located in an ISO standard radio enclosure. This type of enclosure enables mounting in a variety of locations, ensuring that insertion and removal of the driver cards and operation of the controls can be easily achieved by an operator.

The tachograph complies with EU Regulations and displays and records speed and distance in metric units (kilometres per hour and kilometres respectively).

The tachograph also incorporates an internal clock, which is used to indicate the current time on the tachograph display. The tachograph is available for use in both 12 and 24 V vehicle systems.



- 1. Co-driver button
- 2. Printer, 6-pin calibration/download connector, behind the paper cassette
- 3. Back button
- 4. Driver card tray
- 5. Up button
- 6. Display
- 7. Down button
- 8. Co-driver card tray
- 9. OK button
- 10. Driver button

Downloading Data

General

An enforcement officer can download data from a smart tachograph system. Downloading means the copying, together with a security digital signature, of a partial or a complete set of data that is stored in the memory of a tachograph or on a driver card.

The download must be done to aid investigations into "Drivers Hours" legislation checks and to aid determination of the validity of the smart tachograph systems. When carrying out "Drivers Hours" investigations, care must be taken to identify the true owners of blocks of stored tachograph data.

Dedicated download equipment or a valid control card is essential for the downloading of the data stored in the tachograph or on the driver card.

Download Equipment

Behind the paper cassette is a 6-pin connector located. This is where the required downloading equipment is connected.



Control Card

A valid control card is required to download or to view driving data stored on either an inserted driver card or in the tachographs data memory. The control card provides read-access to the entire tachograph data memory contents whether or not the data has been company locked using a valid company card.

Inserting a Control Card

Insert the control card in either of the trays (No. 1 in our example).

- 1. Press and hold button **1** on the tachograph until the tray is opened.
- 2. Insert the card with the chip facing forward and upwards.
- 3. Close the tray by pushing it carefully forward.



The control card must be inserted to identify the controller/user.

4. The tachograph now processes the control card data.

If the control card authentication fails, see **Display Messages** on page **22**.

The card tray is locked when the vehicle is in motion, while the tachograph is busy processing the control card and if the power supply to the tachograph is interrupted.

Eject a Control Card

- 1. Press button **1** or **2** on the tachograph and hold it until the tray opens.
- 2. Press the card up slightly from underneath through the opening on the tray, or push the edge of the tray down until the card pops out.

3. Close the tray by pushing it carefully forward. **Note!**

Withdrawal of the Control Card is not possible in all menus.

Storing Data

When a control card is inserted into a tachograph in order to perform a control activity, a record of the control activity is stored on the control card and in the tachograph as described below. The type of controls that can be performed are displaying, downloading or printing data from the tachograph and/or the card.

Storing Data on the Control Card

On the control card a single record will be stored. This record contains the following:

- The card number.
- The issuing Member state, issuing authority name and the issue date.
- The beginning of card validity date, and card expiration date.
- The control body name and address.
- The surname and forename of the card holder.
- The preferred language.

Each time a control card is used to carry out a control activity the following data is stored on the control card:

- The date and time of the control activity.
- The type of control activity performed.
- The period downloaded, if applicable.
- The VRN (Vehicle Registration Number) and Member State registering authority of the controlled vehicle.
- The card number and card issuing Member State, of the controlled driver card.

Storing Control Activities in the Tachograph

Each time a control card is used to carry out a control activity a record of the activity is stored in the tachograph. The data in each record is:

- Date and time of the control.
- The control card number and card issuing Member State, and card generation.
- The type of control.

Note!

In case of downloading, the date of the oldest and most recent days downloaded must also be recorded.

Downloading Data

To download data do the following:

- 1. Remove the paper cassette.

- 2. Attach the download equipment to the tachograph through the 6-way front download connector.
- 3. Start downloading data according to the instruction on the download equipment.

When the download is completed, the following message will be displayed.

Download complete

If the download process has failed and is incomplete the following message will be displayed:

Download failed

If the download fails:

- 4. Remove the control card.
- 5. Check the connections.
- 6. Check the download equipment.
- 7. Re-insert the control card and redo the process until downloading is completed.

If the data download cannot be completed and the following message is displayed:

Download fault

If the tachograph is found to be the cause or if it is unsure whether the card or the tachograph is faulty, the vehicle must be taken to a Tachograph Workshop for investigation.



System Inspection

General

The control function involves a number of different functions associated with the smart tachograph system. A tachograph inspection is done to ensure that it still meets the EU legislation requirements.

For example, downloading and checking the data stored on either the driver card or in the tachograph internal memory, and an inspection of the tachograph system.

Note!

If any unit fails the inspection the vehicle must be taken to a Workshop for further investigation.

Visual Check

- 1. Verify that the entire exterior casing, including underneath the rubber acorn, is undamaged and free of drill holes, as this could indicate tampering.
- 2. Inspect all seals and labels for signs of tampering.
- 3. Ensure that no additional seals or labels are applied to the tachograph. Extra labels may be used to cover drill holes.
- 4. Verify that the predetermined breakpoints (see image below) are unbroken. These breakpoints support the opening of failing card trays.



A. Predetermined breakpoint

- 5. Ensure that all tachograph system seals are intact.
- 6. Confirm the presence of the installation plaque.
- 7. Verify that the tamper label is intact and meets the following criteria:
 - The left side of the label features a security ink section.
 - The right side of the label displays **Stoneridge Electronics AB** and a data matrix code, which contains the VU's serial number.





Stoneridge default print



MAN customer print

Check for the following signs that may indicate tampering:



- 1. "VOID" text is visible under the label
- 2. Label color has turned from red to yellow
- 3. Label color is not red-brown and has turned to tomato-red
- 4. Label has some cut ins or pieces missing.

- 5. Stoneridge print is missing, or placement is wrong.
- 6. Security ink is missing.
- Color shift will not appear on security ink or sparkling effect missing, see following chapter.
- 8. Surrounding material has visible traces of cuts, deformations or color variations.

Inspection Procedure

To confirm correct functioning of the recording equipment, follow these steps:

Note!

Certain steps may require the unit to be removed from its fixture.

- 1. Verify that the recording equipment functions correctly, including data storage on the cards.
- 2. Ensure the tachograph operates within the specified tolerances for both speed and distance measurements.
- 3. Confirm that the actual tyre circumference and size match the information specified on the installation plaque.
- 4. Compare the calibration factors stored internally with those on the installation plaque, using a technical printout for verification.
- 5. Verify the internally stored vehicle parameters, including VIN (Vehicle Identification Number) and VRN (Vehicle Registration Number), against the actual vehicle data using a technical printout.
- 6. Confirm that the UTC time is correctly set.
- 7. Confirm that the serial number is the same on the seal label, technical printout and on the laser mark on the casing. To see the laser mark, the unit needs to be removed from its fixture.

Methods to see Color Shift

Tamper labels have two types of security ink with different color shifts depending on the viewing angle:



- 1. Upper ink: Blue/violet.
- 2. Lower ink: Green/blue.

Color shift is best visible when viewed from the bottom left corner. Use a flash light with direct beam.

1. Point light perpendicular to the label.



Upper ink: Blue Lower ink: Green

2. Point light from the right side at 45°-50°.



Upper ink: Violet Lower ink: Blue

Installation Plaque

The final part of the smart tachograph system installation procedure is the completion and fitment of an installation plaque.

The installation plaque must be clearly visible and easily accessible. The installation plaque is normally placed on the recording equipment, the vehicle's "B" pillar or the doorframe on the driver's side of the vehicle.

The installation plaque state the following:

- Name, address, or trade name of the approved fitter or workshop.
- Constant of the tachograph, K factor (imp/km).
- Characteristic coefficient of the vehicle, W factor (imp/km).
- Effective circumference of the wheel tyres, L factor (mm).
- Tyre size.
- Vehicle Identification Number (VIN).
- Date of calibration.
- Information that the GNSS facility is internal.
- Serial number of the DSRC unit.
- Load type of the vehicle (Goods or Passenger)
- Serial numbers of the seals in place (up to 5).

• If motion sensor is not connected to the gearbox the other location needs to be specified

Additional data shall be included if a M1N1-adaptor is used.



HOLO GUARD LABEL

Pictograms

Symbols

This is a list of the most frequently shown symbols on the display and on the printouts.

Symbol	Description		
Θ	Function not available		
1	Driver or slot #1		
2	Co-driver or slot #2		
	Card		
	Eject		
*	Work		
0	Driving / driver (Operational mode)		
Ь	Rest / break		
Ø	Available		
۵	Ferry / train crossing		
OUT	Out of scope, -i.e. no activities time durations are calculated		
•	Local time / location		
	Start of daily work period		
FI	End of daily work period		
	Break		
+	From or to		
	Printer, printout		
e	Paper		
	Display		
Σ	Processing, please wait		
G	Time, clock		
UTC	UTC time		
24h	Daily		
	Weekly		
	Two weeks		
Σ	Total / summary		
>	Speed		
>>	Over speeding		
×	Faults		
ļ	Events		
?	Pre-warning/question/unknown activity / undefined load type		
T	Workshop / calibration mode		
Ó	Company / company mode		
۵	Controller / control mode		
В	Manufacturer / not activated		
8	Security / authenticated positions / seals		
Ŧ	External storage / download		
£	Buttons		
1	Finished		
А	Tachograph (VU), vehicle		
•	Tyre size		
Л	Sensor		

Symbol	Description
÷	Power supply
'B'	Print
·=·	Print, submenu
8	Company lock
0_F ⁰	Places
0+0	Places, sub menu
c	Settings
H	GNSS positioning facility
3	ITS interface
Ť	Remote communication facility (DSRC)
7	Load operation
۷	Unload operation
2	Simultaneous load / unload operation
۴,	Load type: Passengers
H	Load type: Goods
P	Digital map / border crossing
M	Manual entry of driving activities
8	RHMI

Symbol Combinations

The following combination of symbols are the most common.

Symbols	Description			
• I •	Location start of daily work period			
> •	Location end of daily work period			
9 →	From time (UTC)			
→ ©	To time (UTC)			
• 0	Local time			
$\odot \odot$	Crew driving			
0	Driving time for one week			
⊙	Driving time for two weeks			
OUT ➔	Out of scope - begin			
→ OUT	Out of scope - end			
♦٠	Ferry/train mode - begin			
÷₽	Ferry/train mode - end			
⊙ I▶	Cumulative driving time of current day			
ΥO	Printer low temperature			
ΥO	Printer high temperature			
	No card			
⊙ ∎	Driver card			
T 🖬	Workshop card			
	Company card			
	Control card			
□ ●	Control place			
₽ →	From vehicle			
GH	Position after 3 hours accumulated driving time			
FH	Position where the vehicle has crossed the border between two countries			
2H	Position where a load operation has occurred			

Symbols	Description		
٧X	Position where an unload operation has occurred		
۶X	Position where a simultaneous load/unload operations has occurred		
24h 8 T	Daily (24h) activities from card		
24ha v	Daily (24h) activities from tachograph		
!×87	Events and Faults from card		
!×A¥	Events and Fault from tachograph		
Tet	Technical data		
>> v	Over speeding		
8207	Historic of inserted cards		
! 🛙	Insertion of a non-valid card		
! 88	Card conflict		
<u>i ee</u>	Time overlap		
! 0 E	Driving without an appropriate card		
! B o	Card insertion while driving		
! 88	Last card session not correctly closed		
>>	Over speeding		
!+	Power supply interruption		
! N	Motion data error		
! A.I.	Vehicle motion conflict		
!8	Security breach		
i e	Time conflict / time adjustment		
>0	Over speeding control		
! X	Absence of GNSS position		
! Y	Communication error with DSRC unit		
! #?	GNSS Anomaly		
×91	Card fault (driver slot)		
×∎2	Card fault (co-driver slot)		
×O	Display fault		
×ŧ	Downloading fault		
×Ŧ	Printer fault		
Х×	Sensor fault		
ХД	VU internal fault		
×H	GNSS fault		
×۲	DSRC fault		

Printouts

You can view the information stored in the tachograph and on the driver cards by printing it on paper or by showing it on the display. There are a number of different presentations available, which you can read more about in **Printout Examples below**

Printout Data

- Press **OK** to show the menu and select: PRINT
- 2. Press **OK** and select the type of printout to make. Then press **OK**.

Some types of printouts require specification of the driver card and a date. If so the following is displayed:

Select card 1 or 2

3. Select **1** to make a printout for the current driver's card or **2** to make a printout for a co-driver's card.

Some printouts require selection of the file system generation (generation 2 cards has two file systems, gen 1 and gen 2). If so the following is displayed:

Card gen 1 or 2

- 4. If applicable, select card file system generation 1 or 2
- 5. Select the desired date by using the arrow buttons and press **OK**.
- 6. Now you select whether to view the data on the display only or to make a printout on paper.
 - To view the data on the display only, select:

display

- Press **OK** and scroll through the data using the arrow buttons and then press **OK** to return.
- To make a printout on paper, select

printer

• Press **OK**. The display will show:

Printer busy

• If you would like to cancel the process, press and hold the **Back** button. Wait until the message is cleared and then pull the printout upwards to tear it off.

Note!

To avoid paper jam make sure the slot on the paper cassette is not blocked.



Printout Examples

On the following pages there are a number of printout examples that can be selected from the **PRINT**menu:

- Daily printout (card) **24h** c.ard (including local time).
- Daily printout (VU) **24h** vehicle (including local time).
- Event and faults (card) event card.
- Event and faults (VU) event vu.
- Technical data technical data.
- Overspeeding overspeeding.
- Historic cards historic cards.

Generation 1

User selected to print Gen1 data from the card

VVV GEN1 VVV

▼ 22/10/2022 08:04 (UTC)

Generation 2

User selected to print Gen2 data from the card

VVV GEN2 VVV

▼ 22/10/2022 08:04 (UTC)

• If card is Gen2 v1, it does not include any Gen2 v2 data.

• If card is Gen2 v2, it includes Gen1 and Gen2 v2 data.

Daily Printout (card) (1/2)

This printout lists all activities stored on the driver card (or codriver card) for the selected date (legal requirement). UTC time is used.

The display shows the following (on the second line):

24h card



To make it easier to check the activities on the printout you can select local time instead of UTC. The printout contains in all other respect the same information.

Note!

The text OUT OF REGULATION indicates that this printout doesn't comply with any regulation.

	***	GEN2	***	
v 22	2/10/	2022 (09:04	(
** (OUT O	F REGL	JLATI	DN **
		GEN2	v2	
24h	V		UTC	+01h00
		0		
⊙ Sr Bo	nith ob			
o∎S	/10	007001	L1305	90 0 0
0:	/08/	2023 -	GEN	2 v2
A YI	1448	843M10	1234	56
	100	D221		



/CAR321

/CAR321

44-

(45)

(46) (47) (48)

17/09/2022 13:5

18/09/2022 08:0: 00h10 /CAR321 @Π(02) 17/09/2022 13:55

(1) 00h0 /10007001130590 0

- Type of data printed, GEN1 or GEN2
- 2 Printout date and time
- 3. Printout from a GEN2 v2 VU
- 4. Type of printout (24h, card)
- 5. Card holder's surname
- 6. Card holder's first name 7.
- Type of card, Issuing country, and Card number 8.
- Card expiry date, Generation and version 9.
- Vehicle identification number (VIN) 10. Country of registration, and Vehicle registration number
- (VRN)
- Tachograph manufacturer 11.
- 12 Tachograph part number 13.
- Tachograph generation 14.
- Workshop responsible for last calibration Workshop card, Issuing country, Card number 15.
- 16. Date of last calibration
- Control card, Issuing country, Card number, Last 17. inspection the driver experienced, type of VU action by enforcer
- 18. Date printed and Card daily presence counter
- 19. Printed if Out of Scope was active at insertion of card
- 20.Load type of vehicle if card was as left inserted over night
- 21. Manually entered activities (Unknown, and Rest)
- 22 Slot in which card was inserted
- 23. Country of registration and VRN
- 24. Vehicle odometer at card insertion
- Load type of the vehicle (Goods or Passenger) 25.
- 26. Activity type, Start time, and duration of the activity
- Out of Scope Started, Out of Scope Ended 27
- 28. Ferry/Train Started, Ferry/Train Ended
- Vehicle odometer at withdrawal and distance travelled 29. since last insertion
- Summary block indicator 30
- 31. Time and Country (and region if applicable) at start of daily working period
- 32. Latitude at start of daily working period, Authentication status
- 33. Longitude at start of daily working period, Authentication status
- 34. Date and time of latest position, Authentication status
- 35. Odometer at start of daily working period
- End of daily working period record 36.
- 37. 3 hours of accumulated driving record
- 38. Border crossing record with Country left, Country entered
- 39. Load operation record (Load, Unload, Simultaneous
- Load/Unload
- 40 Total driving duration and distance
- 41. Total duration of the activities, Work, and Available
- Total duration of the activities, Rest, and Unknown 42.
- 43. Total duration of crew activities
- 44. Events and faults from the card
- 45 Events and faults from the VU
- Control place 46.
- Controllers signature 47.
- 48. Driver's signature

Daily Printout (VU) (1/3)

This printout lists all activities stored in the tachograph (VU) for the selected date (legal requirement). UTC time is used.

The printout is dependent of the following:

- If no card is inserted, select either the current day or any of the eight previous calendar days.
- When a card is inserted, select any day stored in the tachograph, out of a maximum of typically the most recent 28 days. If no data is available for the selected date, the printout will not be initiated.

The display shows the following (on the second line):

24h vehicle

Daily Printout (VU) (2/3)

To make it easier to check the activities on the printout you can select local time instead of UTC. The printout contains in all other respect the same information.

Note!

The text OUT OF REGULATION indicates that this printout doesn't comply with any regulation.





lat + 57º22.2' lon +018º01.0'

lat + 60°13.5' lon +019°32.2'

lat + 57°22.2' lon +018°01.0'

14/09/2022 15:43

14/09/2022 11:30

101 820 km

102 210 km

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km

⊠ 00h00

(45)

(46)

(47

(50)

49

- 1. Printout date and time
- 2. Printout from a GEN2 v2 VU
- 3. Type of printout (24h, VU)
- 4. Card holder's surname
- 5. Card holder's first name
- 6. Type of card, Issuing country, and Card number
- 7. Card expiry date, Generation and version
- 8. Vehicle identification number (VIN)
- 9. Country of registration, and Vehicle registration number (VRN)
- 10. Load type of the vehicle (Goods or Passenger)
- 11. Tachograph manufacturer
- 12. Tachograph part number
- 13. Tachograph generation
- 14. Workshop responsible for last calibration
- 15. Workshop card, Issuing country, Card number
- 16. Date of last calibration
- Control card, Issuing country, Card number, Last inspection the vehicle experienced, type of VU action by enforcer
- 18. Date printed
- 19. Vehicle odometer at 00:00, and at 24:00
- 20. Slot relevant for below activities
- 21. Printed if Out of Scope was active at beginning of day
- 22. Indicator that below information is when there was no card present
- 23. Odometer at the beginning of the following activities
- 24. Driver's surname and first name
- 25. Type of card, Issuing country, Card number, Card expiry date, Generation and version
- Country of registration, and Vehicle registration number of the vehicle where the card was last inserted
- 27. Date and time of card withdrawal from previous vehicle
- 28. Vehicle odometer at card insertion, and indicator (M) if driver performed manual entries
- 29. Activity type, Start time, and duration of the activity
- 30. Out of Scope Started, Out of Scope Ended
- 31. Ferry/Train Started, Ferry/Train Ended
- 32. Vehicle odometer at withdrawal and distance travelled since last insertion
- 33. Slot relevant for below activities
- 34. Indicator that below information is when there was no card present
- 35. Odometer at the beginning of the following activities
- 36. Activity type, Start time, and duration of the activity
- Vehicle odometer at withdrawal and distance travelled during the no card period
 Summary block indicator
- Summary block indicator
 Time and Country (and region if applicable) at start of daily working period
- 40. Latitude at start of daily working period, Authentication status
- 41. Longitude at start of daily working period, Authentication status
- 42. Date and time of latest position, Authentication status
- 43. Odometer at start of daily working period
- 44. End of daily working period record
- 45. 3 hours of accumulated driving record
- 46. Border crossing record with Country left, Country entered
- 47. Load operation record (Load, Unload, Simultaneous Load/Unload)
- 48. Total driving duration and distance travelled
- 49. Total duration of the activities, Work, and Available
- 50. Total duration of the activity, Rest

Daily Printout (VU) (3/3)



- 51. Driver's surname and first name
- 52. Type of card, Issuing country, Card number
- 53. Start of daily working period record
- 54. End of daily working period record
- 55. 3 hours of accumulated driving record
- 56. Border crossing record with Country left, Country entered
- 57. Load operation record (Load, Unload, Simultaneous Load/Unload)
- 58. Total driving duration and distance
- 59. Total duration of the activities, Work, and Available
- 60. Total duration of the activities, Rest
- 61. Total duration of crew activities
- 62. Last five events and/or faults from the VU
- 63. Remote HMI session block
- 64. Indicator for which slot the session was active
- 65. Start time of the Remote HMI session
- 66. End time of the Remote HMI session, omitted if still ongoing
 - 67. Control place
- 68. Controllers signature
- 69. From time
- 70. To time

1.

71. Driver's signature

Events and Faults (card)

This printout lists all warnings and faults stored on the card (legal requirement). UTC time is used.

The display shows the following (on the second line):

event card



- Type of data printed, GEN1 or GEN2
- 2. Printout date and time
- 3. Printout from a GEN2 v2 VU
- 4. Type of printout (Events and Faults, card)
- 5. Card file system (generation 1 or 2)
- 6. Card holder's surname, and first name
- 7. Type of card, Issuing country, and Card number
- 8. Card expiry date, Generation and version
- 9. Vehicle identification number (VIN)
- 10. Country of registration, and Vehicle registration number (VRN)
- 11. List of all events stored on the card
- 12. List of all faults stored on the card
- 13. Control place
- 14. Controllers signature
- 15. Driver's signature

Events and Faults (VU)

This printout lists all warnings and faults stored in the tachograph or vehicle unit (legal requirement). UTC time is used.

The display shows the following (on the second line):

event vehicle



- 1. Printout date and time
- 2. Printout from a GEN2 v2 VU
- 3. Type of printout (Events and Faults, VU)
- 4. Card holder's surname, and first name
- 5. Type of card, Issuing country, and Card number
- 6. Card expiry date, Generation and version
- 7. Vehicle identification number (VIN)
- 8. Country of registration, and Vehicle registration number (VRN)
- 9. List of all events stored in the VU
- 10. List of all faults stored in the VU
- 11. Control place
- 12. Controllers signature
- 13. Driver's signature

Details of Events and Faults (VU)



- 1. Type of event or fault.
- 2. Event or fault code.
- 3. Event or fault record purpose (All purposes are not saved for each event): 00 one of the 10 most recent (or last) events or faults.
 - 01 the longest event for one of the last 10 days of occurrence.
 - 02 one of the 5 longest events over the last 365 days.
 - 03 the last event for one of the last 10 days of occurrence.
 - 04 the most serious event for one of the last 10 days of occurrence.
 - 05 one of the 5 most serious events over the last 365 days.
 - 06 the first event or fault having occurred after the last calibration.
 - 07 an active/on-going event or fault.
- Date of event or fault.
- Start time of event or fault.
- 6. Number of events of the same type during the day.
- 7. Duration of event or fault.
- 8. Card inserted in slot 1 at the beginning of event or fault (Driver card).
- 9. Card issue country.
- ¹10. Card number (shown with every second number replaced with a space if not in calibration or company mode or if no card is inserted

Technical Data (1/2)

This printout list data as speed settings, tyre size, calibration data and time of adjustments.

The display shows the following (on the second line):

technical data



- Printout date and time 1
- Printout from a GEN2 v2 VU 2
- 3. Type of printout (Technical data)
- Card holder's surname, and first name
- Type of card, Issuing country, and Card number
- Card expiry date, Generation and version Vehicle identification number (VIN)
- Country of registration, and Vehicle registration number (VRN)
- VU manufacturer
- Address of VU manufacturer
- VU part and variant number
- VU type approval number
- VU extended serial number
- Year of manufacturing
- VU generation and version, and ADR marking for ADR units
- VU software version and initial production installation date
- Digital map version, and Stoneridge map version
- Sensor extended serial number
- Sensor type approval number
- Sensor pairing date and time
- Information that the GNSS receiver is internal in the VU
- DSRC extended serial number
- Name and address of the workshop that performed the calibration of the VU
- Type of card, Issuing country, and Card number
- Card expiry date, Generation and version

Date and time of calibration, and calibration 26. purpose. Calibration purposes:

- Activation (parameters when VU was activated)
- First calibration of the VU after activation 2
- 3. First calibration in a new vehicle
- 4. Periodic inspection
- Entry of vehicle registration number by 5. company
- Time adjustment without calibration
 - Vehicle identification number
- Country of registration, and Vehicle registration 28number (VRN)
- W-factor, the characteristic coefficient of the 29 vehicle
- 30. K-factor, the constant of the VU
- 31. L-factor, the effective circumference of the tyres
- 32 Vehicle tyre size

27.

- 33. Authorized speed of the vehicle
- Old odometer value new odometer value 34.
- 35. Load type of the vehicle (Goods or Passenger) 36.
- Country where the calibration has been performed, time and date for the GNSS position data
- 37. Seal data (up to five seals) - Equipment sealed, manufacturer code, serial number
- Old date and time (before time adjustment) 38
- 39. New date and time (after time adjustment)
- 40. Workshop that updated the UTC
- 41. Type of card, Issuing country, Card number and Card expiry date
- 42 Most recent event date and time
- Most recent fault date and time 43. 44.
- End of legally required printout data Company lock (Company name and card data) 45.
- 46. Next calibration date of the VU

Technical Data (2/2)

Overspeeding

This printout lists overspeeding events together with duration and the name of the driver.

The display shows the following (on the second line):

overspeeding



- 1. Printout date and time
- 2. Printout from a GEN2 v2 VU
- 3. Type of printout (Over speeding), and authorized speed
- 4. Card holder's surname, and first name
- 5. Type of card, Issuing country, and Card number
- 6. Card expiry date, Generation and version
- . Vehicle identification number (VIN)
- 8. Country of registration, and Vehicle registration number (VRN)
- 9. Date and time of last over speeding control
- 10. First over speeding and number of over speeding events since
- 11. First over speeding after last calibration
- 12. Date, time and duration
- 13. Max and average speed, and number of similar events this day
- 14. Driver's surname, and first name
- 15. Type of card, Issuing country, and Card number
- If no over speeding events exists this line would be printed
- 17. The 5 most serious over speeding events in the last 365 days
- The most serious for each of the last 10 days of occurrence
- 19. Control place
- 20. Controllers signature
- 21. Driver's signature

Historic Cards

This printout lists the history of cards used in the Tachograph. Only available with inserted Workshop card or Control card.

The display shows the following (on the second line):

historic cards



- 1. Printout date and time
- 2. Printout from a GEN2 v2 VU
- 3. Type of printout (Historic card)
- 4. Card holder's surname, and first name
- 5. Type of card, Issuing country, and Card number
- 6. Card expiry date, Generation and version
- 7. Control card information
- 8. Type of card, Issuing country, and Card number
- Pype of early, issuing country, and early number
 Card expiry date, Generation and version
- Card expiry date, Generation and Version
 Type of card, generation, version, manufacturer code
- 11. Card information
- 12. Card serial number
- 13. Date of last card insertion
- 14. Data for most another of the most recent card inserted
- 15. End of legally required printout data

Display Messages

There are four type of messages that can be seen on the display.

- **Messages** contains information on processes or reminders to the driver. Messages are not stored and can not be printed. Press the **Back** button to clear the message.
- **Pre-warnings** appear as early reminders to the warnings. Pre-warnings, except DDS and WTD related, are stored and can be printed. Press the **OK** button twice to clear the Pre-warning.
- **Warnings** appear in the event of e.g. overspeeding or violations of the law or tachograph recording issues. Warnings are stored and can be printed. Press the **OK** button twice to clear the Warning.
- Faults are more critical than warnings and are displayed if there is a fault detected in the tachograph, in the sensor or driver card. In addition faults are presented if tampering with the equipment is detected. Faults are stored and can be printed. Press the **OK** button to acknowledge the Fault.

Display	Description	Action
Θ	Message Entry not possible while driving. Related to the operator.	 Remove the B-plug to make sure there is no motion sensor pulses received at standstill. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. If message still present, replace the unit and issue a certificate of non downloadability.
X∺ Absence of GNSS pos info	The VU is unable to detect any valid GNSS satellite signal for a long time	 Verify current GNSS Signal integrity. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Move away antenna, coaxial cables, or 3rd party ECUs in the vicinity of the tachograph. Move the tachograph to the bottom right hand side of the upper shelf, or to any position where you can secure a reliable GNSS fix.
!■ Already in control mode	Message Two control cards inserted. The second card will be ejected without being processed (authenticated). Related to the operator.	1. Insert only one control card.
! 0∎⊡ Card auth.failure	Fault The tachograph security check for the card in slot 1 failed. Similar message for slot 2. Related to the tachograph.	 Check that the inserted card is valid and correctly inserted. Check that the card works in another tachograph. Verify tachograph operation with another card.
×∎⊡ Card fault	Fault The card in slot 1 is defective. Similar message for slot 2. Related to the card.	 Check that the inserted card is valid and correctly inserted. Clean card chip. Check that the card works in another tachograph. Insert another card.

Display	Description	Action
!∎∎ Card conflict	Warning An invalid card combination has been detected. Related to the card.	1. Withdraw one of the two cards.
! ∏→×⊠ Card eject without saving	Message Data could not be stored on the card withdrawn from slot 2 due to an error. Similar message for slot 1. Related to the card.	 Clean the card and the card slot with a soft damp cloth and try again. In case of a faulty card, contact the responsible authority in the country in which you are located.
CEN Card expired	Message The card in slot 1 has expired. Similar message for slot 2. Related to the operator.	 Remove the card and replaced it with a valid one.
0!08 Card expiry	Message The card in slot 1 will expire (Day/Month) . Similar message for slot 2. Related to the operator.	1. Contact the responsible authority to get a new card.
!∎⊙ Card ins. while driving	Warning A tachograph card is inserted in any slot while driving. Related to the operator.	1. Insert card only when vehicle is standing still.
! @←■② Card integrity error	Fault Corrupt data detected when reading data from the card in slot 2 to the tachograph. Similar message for slot 1. Related to the card.	1. In case of a faulty card, contact the responsible authority in the country in which you are located.
!0A/A Data integrity error	Fault A checksum in the file downloaded does not match the Mass memory checksum. Related to the tachograph.	 Check for tachograph integrity. Download the memory from the VU for the past 56 days, without detailed speed. Check file for digital signature errors, for example using OPTIMO. If the file has got no signature error, or signature errors for less than 3 days, keep the unit on the truck.
∎!∎Į d/m download card	Message Indicates the time to next download of the card (Day/Month) in slot 1. Similar message for slot 2	1. Prepare for download.
! A↓ d/m download vehicle	Message Indicates the time to next download from the tachograph (Day/Month).	1. Prepare for download.
↓✓↓ Download complete	Message The tachograph download process has been completed successfully.	
↓×↓ Download failed	Warning The tachograph download process has failed and is incomplete. [Workshop card]	 Retry the download. Check the connections and the download equipment. Re-insert the card and retry the download. Replace or repair the download equipment if required. Remove power from the tachograph for 30 seconds and try with another tool/download-
		5. Decommission and replace the tachograph.

Display	Description	Action	
⊙ 0/8× Driving can't open slot	Message An attempt was made to open the slot while the vehicle was in motion. Related to the operator.	1. Stop the vehicle. The card tray can be opened only when the vehicle is stationary.	
!⊡∎ Driving w⁄o valid card	Warning Driving without an appropriate card, or with an inappropriate card combination. Related to the operator.	 Stop and insert a valid driver or workshop card in the slot 1. Remove inappropriate company or control card. 	
fn× Function not possible	Message The desired function cannot be carried out. Related to the tachograph.		
! 0A Hardware sabotage	Fault Authenticated card has been removed by force. Related to the operator.	 Check integrity of card reader slots 1 & 2. Check the tachograph integrity. Decommission and replace the tachograph. 	
!@∎Л Inconsistency	Inconsistency between Motion Sensor pulses and Activity registered in the tachograph.	 Follow SIL23_012. Perform a SW update. Check for tampering devices. 	
!■ Insertion of a non valid card	Warning A non-valid card has been inserted to a slot. Related to the operator.	1. Check that the card has not been inserted upside down or is expired.	
!∎AO Last sess. not closed ok	Warning The driver card in tray 1 was ejected incorrectly during the last session. The previous card withdrawal in tray 1 was not completed correctly by the tachograph. Similar message for slot 2. Related to the card.	 Eject the card and check it visually. Clean the card with a soft damp cloth and try again. In case of faulty card, contact relevant authority to get it replaced. 	
M! Memory full!	Message Manual entries memory full. Related to the operator.	1. Modify the manual entries so that the total number of entries is less.	
New time?	Message	Answer YES to start or end daylight saving time.	
••• •3:01	Daylight saving time changes.	Answer NO or press the Back button to cancel.	
! ATd/m next calibration	Warning Next mandatory calibration has to be carried out (d/m = Day /Month)	1. Plan for the calibration.	
! ⊡/T≣ No driver/ workshop card	Message A function has been selected that requires an inserted driver or workshop card. Related to the operator.	1. Insert a driver or workshop card.	
! @∏ ? _{No} further details	Fault An unknown type of sensor error occurred. Related to the motion sensor.	 Control the operations of the motion sensor. Control the B-plug wiring. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components. 	

Display	Description	Ac	tion
!† Power supply interruption	Warning The power supply to the tachograph has been interrupted for more than 200 milliseconds. Cranking voltage should not cause this event. The event is not generated in calibration mode. Related to the vehicle.	 1. 2. 3. 	This code generally indicates a genuine power interruption, battery disconnected or removed A-plug. Check the vehicle power supply levels during all operation modes, including engine start, KL30 & KL15. Check the vehicle battery and replace if percessary
		4.	Check the tachograph.
		5.	Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
♥个○ Printer high temperature	Message The printing could not start, or the ongoing printing has been interrupted, because the temperature of the printer is too high. Related to the printer.	1.	Wait until the printer temperature is in allowable range and try to print again.
▼↓† Printer low power	Message The ongoing printing has been interrupted because the tachograph input voltage is too low. Related to the vehicle.	1. 2.	Check that the ignition is on. Check the vehicle battery voltage, connections, etc.
♥↓① Printer low temperature	Message The printing could not start because the temperature of the printer is too low. Related to the printer.	1.	Wait until the printer temperature is in allowable range and try to print again.
♥Ĉ× Printer out of paper	Message The ongoing printing has been interrupted because the printer is out of paper.	1. 2. 3.	Insert a new type approved paper roll. Verify paper roll is inserted correctly. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
Cancelling printing	Message The ongoing printing is being cancelled.		
×Υ _{Remote} Detection fault	Fault Cannot communicate with the Remote Detection facility (DSRC)	1.	CAN Bus error from DSRC module to tachograph. Refer to event code !0C in the Motion sensor related events section of Event, Fault and Diagnostic Trouble Codes on page 29 .
!∰AX Security violation	Tampering with hardware has been detected	1.	Visit a smart tachograph workshop to have the equipment checked.
!∎¶ Sensor auth. failure	Fault The tachograph does not detect the sensor. Related to the motion sensor.		

Display	Description	Action
!⊡¶A Sensor auth. failure	Fault An unsuccessful authentication attempt of the motion sensor has been detected. Related to the motion sensor.	 Check motion sensor operation and B-plug wiring, using alternate cable if necessary. Check for evidence of tampering. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components.
! ∏=0 Sensor cable fault	Warning No pulses received from motion sensor, but encrypted data is received.Related to the motion sensor.	 Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
! ∏>0 Sensor cable fault	Warning Pulses received from motion sensor, but encrypted data missing or mismatch. Related to the motion sensor.	 Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
×ⅡA Sensor comms error	Fault Motion sensor communication error. Related to the motion sensor.	 Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
!∏ Sensor data error	Warning Signal failure between motion sensor and tachograph. Related to the motion sensor.	 Check the motion sensor operation and wiring. Replace the motion sensor if necessary. Check for evidence of tampering. Replace any defective components.
!₪∏∕∏ Sensor data integrity error	Fault Internal motion sensor error, stored data integrity failure. Related to the motion sensor	 Control operations of the motion sensor. Control B-plug wiring. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components.
×ⅡA Sensor no acknowledge	Fault Motion sensor communication error. Related to the motion sensor.	 Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
×A←l Sensor no answer	Fault Motion sensor communication error. Related to the motion sensor.	 Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
! l ‡ Sensor no power signal	Fault Motion sensor has no power. Related to the motion sensor.	 Check the vehicle battery voltage, wiring, cable between tachograph and sensor, etc. Replace the motion sensor if necessary.
×Α∏÷↑ Sensor power high	Fault Motion sensor power too high. Related to the motion sensor.	 Check the vehicle battery voltage, wiring, cable between tachograph and sensor, etc. Replace the motion sensor if necessary.
×ΑΛ≑↓ Sensor power low	Fault Motion sensor power too low. Related to the motion sensor.	 Check the vehicle battery voltage, wiring, cable between tachograph and sensor, etc. Replace the motion sensor if necessary.

Display	Description	Action
A→T? Service pre-warning	Message Next calibration, pre-warning.	1. Perform a calibration.
! © Time conflict GNSS versus VU	Message The internal clock and the GNSS clock differs more than 1 minute	 Check UTC time. Check GNSS time. Reset the tachograph UTC time after verifying the workshop tool is set to UTC by the second. If time is adjusted of more than 5 minutes, perform a new calibration of the tachograph system.
! ∄→T Time for service	Message The tachograph is out of calibration.	1. Perform a calibration.
∎→⊡ Timeout no key pressed	Message The tachograph is waiting for input. Timeout 1 min or 20 min.	1. Press the appropriate buttons and complete the process. Timeout can be changed in Settings menu.
X 0/0∠X Unable to open slot	Message The card tray concerned cannot be opened. Related to the tachograph.	 Check that the ignition is on. Power cycle the unit and check that the card is successfully ejected. Clean the card and the card slot with a soft damp cloth and try again.
!⊞ЛЛ Unauth. change of sensor	Fault The sensor has been changed since last pairing. Related to the motion sensor.	 Check the motion sensor operation and the B- plug wiring. Check for evidence of tampering, control technical data printout for MS serial number versus actual MS serial. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components.
! Α Λ Vehicle Motion Conflict	Message GNSS motion sensor and primary motions sensor data contradicts. Related to the motion sensor.	 Follow the instructions on the motion sensor related events table. Check the GNSS equipment, and if anything is interfering with the GNSS signal. Check for evidence of tampering. Use reference cables.
!8 _{12/10} VU expiry	Warning The tachograph (VU) will expire as per legal at the displayed date.	
×A VU internal fault	Fault The tachograph has detected an internal fault. Related to the tachograph.	1. Visit a smart tachograph workshop to have the equipment checked.

Display	Description	Action
!X? GNSS Anomaly	Fault GNSS receiver has detected an attack, or failed in authenticating messages.	 This event is normal if triggered next to airports or other location with known GNSS interferences. If event duration is always less than 10 minutes, perform SW update. Check for evidence of tampering with the unit. Remove any device or shield in proximity of the tachograph able to stop or reduce the correct reception of the GNSS signal. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
! 0A X GNSS Tampering	Internal communication failure with GNSS module.	 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Perform a SW update.
!≩ Pairing Failed	Message The ITS pairing with a device has failed.	
!≩ Pairing Complete	Message The ITS pairing with a device has completed successfully.	
!3 RHMI Pairing Failed	Message The RHMI pairing with a device has failed.	
!3 RHMI Pairing Complete	Message The RHMI pairing with a device has completed successfully.	
RHMI TOKEN 12345678	Message The RHMI pairing requires confirmation from a device.	
RHMI Manual entries ongoing…	Message Manual entries via RHMI are currently taking place.	
RHMI Manual entries aborted!	Message Manual entries via RHMI have been aborted.	
8+8 VU Update available	Message The VU has detected that there is a software update available.	
8+8 Updating VU	Message The VU is currently being updated.	
8∕8 Update completed	Message The update of the VU was successfully completed.	
8×8 Update failed	Message The updated of the VU failed.	

Event, Fault and Diagnostic Trouble Codes

A list of all DTCs that are stored in the Stoneridge smart tachograph is presented below. A check should be made to determine whether the DTC is still active or not. The cause of the DTC should be determined and appropriate action taken as described in the table that follows. The Code will be seen on the Event & Fault printout as well as on the Daily printout. The DTC will be seen on a test instrument, such as Optimo².

General events

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!07		Overspeeding	The speed of the vehicle has exceeded the highest speed allowed for the vehicle. This has been active during at least 60 seconds.	1. Control the maximum speed allowed for the vehicle.
108	000004	Power supply interruption (VU)	The power supply to the tachograph has been interrupted for more than 200 milliseconds. The event is not generated in calibration mode.	 This code generally indicates a genuine power interruption, battery disconnected or A-plug removed. Check the vehicle power supply levels during all mode of operation including Engine start, KL30 & KL15. Check the vehicle's battery and replace if necessary. Check the tachograph. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it
!0F	002E80	GNSS Anomaly	The GNSS receiver has detected an attack, or failed in authenticating messages.	 This event is normal if triggered next to airports or other location with known GNSS interferences. If event duration is always less than 10 minutes, perform SW update. Check for evidence of tampering with the unit. Remove any device or shield in proximity of the tachograph able to stop or reduce the correct reception of the GNSS signal. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
!19		GNSS Tampering	Internal communication failure with GNSS module.	 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Check if a SW update is available.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!11	002452	Motion sensor authentication failure	An unsuccessful authentication attempt of the motion sensor has been detected.	 Check motion sensor operation and B- plug wiring, using alternate cable if necessary. Check for evidence of tampering. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components.
!13	002452	Unauthorised change of motion sensor	The sensor has been changed since last pairing.	 Check motion sensor operation and B- plug wiring. Check for evidence of tampering, control technical data printout for MS serial number versus actual MS serial. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components.
!15		Stored data integrity error	The stored data in the memory is erroneous or a checksum in the file downloaded does not match the mass memory checksum.	 Check for tachograph integrity. Download the memory from the VU for the past 56 days, without detailed speed. Check file for digital signature errors, for example using OPTIMO. If the file has got no signature error, or signature errors for less than 3 days, keep the unit on the truck.
!18		Security violation	Tampering with hardware has been detected.	 Check the tachograph integrity. Decommission and replace the tachograph.
		Hardware sabotage	Card has been removed by force.	 Check integrity of the card reader slots 1 & 2. Check the tachograph integrity. Decommission and replace the tachograph.
!1C	000140	Inconsistency between motion sensor pulses and activity registered in the tachograph	The validation of stored driver activity versus motion data has detected an inconsistency.	 Follow SIL23_012. Check for tampering devices.

VU Security breach attempts

Motion sensor related events

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	002004/ 002005	02004/ Power supply interruption (MS)	Power supply to motion sensor has been interrupted for more than 200 ms.	1. Check the vehicle power supply levels during all mode of operation including Engine start, both for KL30 & KL15.
				2. Check B1 and B2 power supply wiring from Tachograph to Motion Sensor.
				3. Check B4 communication line.
				4. Check the motion sensor.
				5. Check the tachograph.
!09	002180	Motion data error	Motion sensor data incorrect.	1. Check motion sensor operation
			B4 from motion sensor without receiving any pulses on B3.	2. Check all wiring and connections, in particular B3 wire
				 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				4. Replace any defective components if the error remains active.
	002280	Motion data error (CNTR)	Motion sensor data incorrect. Tachograph receives speed counter value from motion sensor on B3 that differs from value calculated from B4 by the tachograph.	1. Check motion sensor operation
				2. Check all wiring and connections
				3. If fault remains active, perform a PSI
				4. Replace any defective components.
	002452	Motion data error (Event)	Motion data incorrect. Tachograph signature mismatch.	1. Check motion sensor operation
				2. Check all wiring and connections, in particular B4 wire
				3. Pair the tachograph to the motion sensor again
				4. Replace any defective components.
	002480	180 Motion data error	Abnormal acceleration from 0 to 40 km/h may be an indication of tampering.	1. Check motion sensor operation
				2. Check all wiring and connections
				 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				4. Replace any defective components.
!0A	002780	Vehicle motion conflict (Trigger 1)	Speeds from motion sensor and GNSS contradict.	1. Legitimate fault if FERRY mode is not activated when on FERRY.
				2. Verify GNSS Signal integrity.
				3. Verify Motion Sensor signal and wiring.
				4. If fault remains active, perform a PSI.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!0A	002880	Vehicle motion conflict (Trigger 2)	GNSS distance versus travelled distance based on odometer valued has detected an inconsistency.	 Verify GNSS signal integrity. Verify motion sensor signal and wiring. Verify speed and odometer recording. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
!0A	002980	Vehicle motion conflict (Trigger 3)	The 3rd motion sensor has detected movement over a period of time while no speed has been recorded.	 Legitimate fault if FERRY mode is not activated when on FERRY. Verify motion sensor signal and wiring. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
!0B	002B80	Time conflict (GNSS versus VU internal clock)	VU internal clock and GNSS time are more than 10 seconds apart.	 Check UTC time. Check GNSS time. Reset Tachograph UTC time after verifying the workshop tool is set to UTC by the second If time is adjusted of more than 5 minutes, perform a new calibration of the tachograph system.
!0C	002D80	Remote communication module communication fault	CAN Bus error from DSRC module to tachograph.	 Adapt VU parameters to DSRC wiring. Update DSRC Module to Smart 2. Confirm DSRC is receiving permanent+ and ignition+. Verify CAN wiring from tachograph to DSRC and 60 Ohm resistance between CAN High and CAN Low. If the fault is triggered durning normal operation, check wiring and perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
IOD	002C80	Absence of position information from GNSS receiver	No valid GNSS signal received during three hours of accumulated driving.	 Verify current GNSS Signal integrity. If GNSS fix is not recovered, perform a PSI. Move away antenna, coaxial cables, or 3rd party ECUs in the vicinity of the tachograph. Move the Tachograph to the bottom right hand side of the upper shelf, or to any position where you can secure a reliable GNSS Fix.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!20	002508	No further details	Motion sensor internal error, but no further fault cause.	 Control operations of the motion sensor. Control the B-plug wiring. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components.
!21	002508	Authentication failure	Motion sensor internal error, authentication failure.	 Control operations of the motion sensor. Control B-plug wiring. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. If all faults are less than 2 minutes, perform a SW update. Replace any defective components.
!22	002508	Stored data integrity error	Motion sensor internal error, stored data integrity failure	 Control the operations of the motion sensor. Control the B-plug wiring. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair the tachograph to the motion sensor again. Replace any defective components if the error remains active.
	002580	Abnormal deceleration	B3 error, abnormal deceleration detected	 Check motion sensor operation. Check all wiring and connections. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Replace any defective components.
x25		Motion sensor fault	Motion sensor - Hardware sabotage	 Control the operations of the motion sensor. Control the B-plug wiring. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it. Pair again to the motion sensor.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
x31	000139 002007 000C31	VU internal fault	Internal fault in the tachograph	 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				2. If fault remains active after the PSI, decommission and replace the tachograph.
	002280	Sensor fault Error response or acknowledge	Motion sensor communication error. Content of acknowledge or response is	1. Check motion sensor operation and B- plug wiring, using alternate cable if necessary.
				2. Check for evidence of tampering.
				 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				4. Pair the tachograph to the motion sensor again.
				5. Replace any defective components if the error remains active.
	002003	Sensor fault (MS Power to Low)	Motion sensor power supply too low. DTC is activated 4 sec after low power is detected.	1. Check the vehicle power supply levels during all mode of operation including Engine start, both for KL30 & KL15.
				2. Check B1 and B2 power supply wiring from tachograph to motion sensor.
				3. Check the motion sensor.
				4. Check the tachograph.
x35	002380	Sensor fault (No acknowledge)	Motion sensor communication error. No acknowledge received when expected.	 Check the motion sensor operation and B-plug wiring, using alternate cable if necessary.
			2. Check for evidence of tampering.	
				3. If all faults are less than two minutes, perform a SW update.
				 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				5. Pair the tachograph to the motion sensor again.
				6. Replace any defective components.

Recording equipment faults

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	002380	Sensor fault (No response)	Motion sensor communication error. No response received when expected.	 Check the motion sensor operation and the B-plug wiring, using alternate cable if necessary. Check for evidence of tampering. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				 Pail the tachograph to the motion sensor again. Replace any defective components
x36		Internal GNSS fault	Tachograph internal GNSS receiver has ceased to provide position data.	 Verify the GNSS can acquire a fix. Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
x39		ITS Interface fault	ITS Interface fault.	 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
хЗА		Internal sensor fault	Tachograph internal sensor (3rd source of motion) has ceased to provide data.	1. The fault should clear itself when the tachograph receives data again.
				2. Power cycle the tachograph, and take the vehicle for a test drive.

Card faults

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!01		Insertion of a non-	Card seen as invalid, usually right on	1. Clean the chip.
				2. Verify the card validity.
				3. Verify the UTC time & date in the tachograph.
				4. Clean the drawer with appropriate cleaning card.
				 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
!02		Card conflict	An invalid card combination has been detected. For example a company and a workshop card.	1. Withdraw the offending card.
!03		Time overlap	The last withdrawal time of the inserted driver card, as read from the inserted	1. Verify the UTC time & date in the tachograph.
			card, is later than the UTC time of the tachograph.	2. Wait for the overlap period to elapse.
				3. If UTC time differs more than 5 minutes, perform a calibration.
!04	001260	Driving without an appropriate card	Driving without a valid card or with an invalid card combination.	1. Stop and insert a valid driver or workshop card in the slot 1.
				2. Remove inappropriate company or control card.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
!05		Card inserted while driving	A tachograph card is inserted in any slot while driving.	1. No further action required.
!06		Last card session not correctly closed	The card (inserted in slot 1 or 2) has been withdrawn before all relevant data have been stored on the card. It is caused at withdrawal but detected at the next insertion.	1. Clean or replace card if recurrent with one specific card.
!12		Tachograph card 1 or card 2 authentication failure	An unsuccessful authentication attempt of the card has been detected.	 Check that the inserted card is valid and correctly inserted. Check that the card works in another tachograph. Verify the tachograph operation with another card.
!14		Card data input integrity	The cryptographic communication with the card inserted (in slot 1 or 2) is unsuccessful.	 Check that the inserted card is valid and correctly inserted. Check that the card works in another tachograph. Verify the tachograph operation with another card.
!18		Hardware sabotage	Card has been removed by force	 Check the integrity of card reader slots 1 & 2. Check the tachograph integrity. Decommission and replace the tachograph.
x40	000200	Card fault - Slot 1	Error detected on inserted card in slot 1.	 Check that the inserted card is valid and correctly inserted. Clean the card chip.
	000300	Card fault - Slot 2	Error detected on inserted card in slot 2.	 Check that the card works in another tachograph. Insert another card.

Manufacturer specific events and faults (pop-ups)

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	000660	Printing stopped, out of paper	Printer is out of paper.	1. Insert a new paper roll.
	0001C0	Overspeeding pre warning	The speed of the vehicle has exceeded the highest speed allowed for the vehicle. This has been active during less than 60 seconds and the overspeeding event is not yet activated.	 Set the correct configuration for the overspeeding warning and pre- warning.
	000D40	Calibration error	Calibration error, time for periodic inspection. Two years has passed since last calibration.	1. Perform a calibration.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
	000B78	CAN bus off, TCO CAN	Fault detected on A-CAN, also named TCO-CAN.	1. Test the tachograph on bench to check if the DTC can be cleared.
				2. Control if A-CAN settings are correct for the truck model.
				3. Control the wiring on A4 and A8 for continuity and grounding.
				4. Check for overall 60 Ohm impedance between A4 and A8 when installed in the truck.
				5. Remove any 3rd party unit installed on A-CAN if necessary.
	00FD0B	CAN bus off, FMS CAN	Fault detected on C-CAN.	1. Perform a PSI with the C-plug removed.
				2. Control if C-CAN settings are correct for the truck model.
				3. Control the wiring on C5, C7, C8 for continuity and grounding.
				4. Check for correct 60 Ohms impedance between C5 and C7.
				5. Remove any 3rd party unit installed on C-CAN if necessary.
	000007	VU power supply high	Tachograph power supply voltage is higher than maximum value.	 Check vehicle power supply levels, KL15 and KL30.
				2. Check the power supply input to the tachograph.
				3. Check all connections and tachograph operation.
				 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				5. Check that A5 & A6 are shunted together.
	000003	VU power supply low	The power supply to the tachograph has been lower than minimum value for more than 4 seconds. Cranking voltage should not cause this event.	 Check vehicle power supply levels, KL15 and KL30.
				2. Check the power supply input to the tachograph.
				3. Check all connections and tachograph operation.
				 Perform a Power Supply Interruption (PSI): disconnect the A-plug, wait for 10 seconds and reconnect it.
				5. Check that A5 & A6 are shunted together.
(8A)		Start of SW Update	Created after the deployment of a new SWID or map, at bottom of technical data printout, generally at the same time stamp as a block (8A).	1. No action required.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
(8B)		End of SW Update	Created after the Deployment of a new SWID or map, at bottom of technical data printout, generally at the same time stamp as a block (8B).	1. No action required.
	000900	No ignition but speed pulses present	Ignition off, but speed pulses are present.	 Investigate if the vehicle has been under environmental disturbances like vibrations etc. Check the motion sensor operation and all wiring – replace sensor if faulty, use a TEMSA variant if you suspect electromagnetic interference from PTO or other. Check that speed pulses are not being injected through front connector.
	003000	Output B7 fault	Diagnostic feedback from output B7 not equal to requested level.	 Remove the B-plug and perform Ignition OFF/ON. If fault clears, move B7 to B6. If fault remains, make sure A5 is shunt to A6 and replace tachograph if the DTC causes a T-light to remain ON on cluster, or if any system is using the B6/B7 or D6 output.

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