Workshop Manual

SE5000 Digital Tachograph

STONERIDGE - EVERY ANGLE COVERED

Stoneridge

www.stoneridge-electronics.com
www.SE5000Exakt.com

Important

The Stoneridge tachograph SE5000 Rev 7.6 has full type approval for use in the European union according with Commission Regulation (EC) No. 1360/2002 of 13 June 2002 and other related legislatives.

The Approval Certificate number is e5-0002. This number will be indicated on all Stoneridge tachograph.

The tachograph fulfils the requirements of UNECE regulation number 10, revision 03, approval No 03126, in respect of electromagnetic compatibility.

Workshop Card

If a workshop card is lost, stolen or faulty, contact the responsible authority.

Note!
The workshop card is not allowed to be used by any unauthorised personnel.

Never store the workshop card together with the associated PIN code.

Contact Stoneridge

You are welcome to forward any queries or suggestions you may have about the Tachograph and the operating instructions to any of our sales offices, as listed below.

United Kingdom

Stoneridge Electronics Ltd
Charles Bowman Avenue
Claverhouse Industrial Park
Dundee DD4 9UB, Scotland
UK

Phone: +44 (0)1382 866 400
Fax: +44 (0)1382 866 401
E-mail: amsales@stoneridge.com

France

Stoneridge Electronics France
Z.I St. Etienne
F-64100 Bayonne
France

Phone: +33 (0)5 59 50 80 40
Fax: +33 (0)5 59 50 80 41
E-mail: france.amsales@stoneridge.com

Germany

Stoneridge Aftermarket GmbH
Talweg 8
D-75417 Mühlacker-Lomersheim
Germany

Phone: +49 7041 9695-10
Fax: +49 (0)7041 9695-55
E-mail: infode@stoneridge.com

Italy

Stoneridge Electronics s.r.l.
Viale Caduti nella Guerra di Liberazione, 568
00128 Rome
Italy

Phone: +39 06 50 78 07 87
Fax: +39 06 50 89 001
E-mail: italy.amsales@stoneridge.com

Netherlands

C.A.S.U. - Utrecht b.v.
Ravenswade 118
NL-3439 LD Nieuwegein
Netherlands

Phone: +31 (0)30 288 44 70
Fax: +31 (0)30 289 87 92
E-mail: info@casuutrecht.nl

Spain

Stoneridge Electronics España
Avda. Severo Ochoa 38
Pol. Ind. Casa Blanca
28108 Alcobendas
Madrid
Spain

Phone: +34 91 662 32 22
Fax: +34 91 662 32 26
E-mail: spain.amsales@stoneridge.com

Sweden

Stoneridge Nordic AB
Gårdsfogdevägen 18 A
SE-168 66 Stockholm
Sweden

Phone: +46 (0)8 154400
Fax: +46 (0)8 154403
E-mail: info@stoneridgenordic.se

Tachograph Version

Digital Tachograph SE5000 Rev 7.6.

Internet Information

Further information about Stoneridge Digital Tachograph SE5000 and about Stoneridge Electronics Ltd can be found at:

www.stoneridgeelectronics.com

Copyright

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 is directed to workshop personnel performing installation, maintenance, periodic inspection and repair of the SE5000. It is mainly concerning the calibration mode of operation. However, knowledge of the operational mode of the unit is also required in case of driving a tachograph fitted vehicle for calibration or testing purposes.

For driver related information, please see the latest version of the Driver & Company Manual.

Repairs and Modifications

Note!
A tachograph case must never be opened. No tampering with or modifications to the tachograph system are permitted.

Unauthorized personnel that modify this equipment may be committing a punishable offence, depending on the legislation in the country

In case of any exterior damage, the workshop must carry out an inspection on the unit to determine whether the tachograph still conforms to security requirements or not. If a tachograph does not pass an evaluation or is faulty, it must be returned to Stoneridge Electronics, unless another arrangement with Stoneridge is made.

Operation Safety

Risk of Damage!
High-level transient voltage can cause permanent damage to tachograph electronic circuits. Similarly, failure of other electrical components on the vehicle, for example the alternator regulator, may result in damage to the tachograph , which is permanently connected to the battery. Any damage done to the tachograph in this way will result in the tachograph warranty being invalidated.

Disconnect the electrical supply to the tachograph if:

- Electrical welding is carried out on the vehicle.
- Prolonged boost starting is anticipated.

Workshop Functions and Equipment Requirements

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)

A tachograph workshop will be involved in a number of different functions associated with digital tachograph systems. For example installation, activation, calibration and inspection.

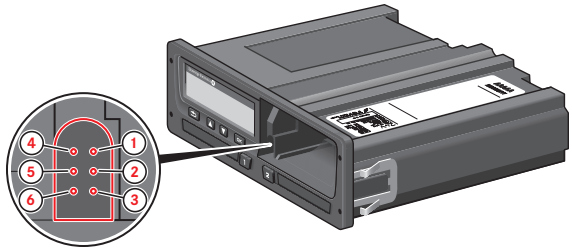
A variety of equipment will be required to carry out the above-mentioned workshop functions. Essential to most of the workshop functions carried out is the workshop card. Due to the security implications of digital tachograph systems, all workshop cards use a PIN code for authentication.

With a validated workshop card it is possible to enter the tachograph calibration mode. Also, unrestricted data downloading of the entire tachograph data memory contents is possible with an authenticated workshop card inserted. Cards are obtained by a workshop via application to the relevant authorities.

Other equipment required will include an approved method and equipment to read and set calibration data and other parameters. A tachograph programmer will be necessary for programming a tachograph with calibration data and tachograph specific parameters. Download equipment will be required for downloading tachograph data.

The SE5000 can program certain parameters without the need of calibration equipment.

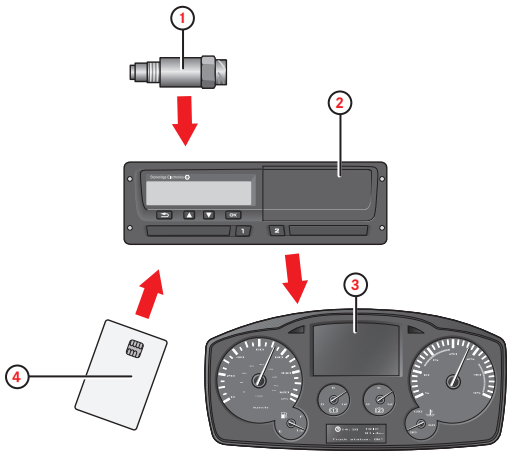
There is a 6-pin calibration/download connector located behind the paper cassette. Approved calibration/download equipment should be connected there when required.



It is also possible to program parameters via the CAN bus interface at the rear of the tachograph.

Overview

The Tachograph installation.



1. Encrypted motion sensor
2. Digital tachograph, with integrated display and printer
3. Display in vehicle's instrument cluster
4. Card

Encrypted 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.

Digital 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. 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).

Workshop or Driver Card (4)

A driver card is used to store driving data relating to the owner of the card.

Due to the security implications of digital tachograph systems, all workshop cards use a PIN code for authentication. A workshop card can also store driving data and be used to enter the tachograph calibration mode of operation.

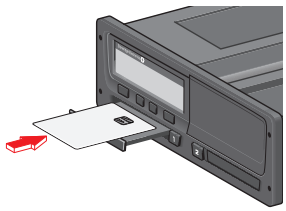
When in calibration mode, a workshop card is additionally used to store tachograph calibration information. The workshop card can hold data for minimum 88 and maximum 255 calibrations and when the card is full the oldest data will be replaced with the newest. Remember to download data regularly. This will ensure that no calibration data stored on the card are lost.

Note!
The workshop card is personal and may not be used by anyone else but the rightful card holder.

Insert a Workshop Card

Insert the workshop card in either of the left or right card tray. The workshop card must be inserted in the tachograph in order to identify the workshop.

1. Press and hold the **1** button to open the driver card tray or the **2** button to open the co-driver card tray.
2. Insert the card with the chip facing upwards.



3. Close the tray by pushing it in carefully. The tachograph now processes the workshop card data.

Initial Procedure

When a valid workshop card has been inserted correctly, the name of the card holder will appear shortly afterwards (we use Mr. Smith in our card examples).

```
1 Welcome
Smith
```

Enter the PIN code associated with the card. The PIN can be entered by using the buttons on the tachograph or a Stoneridge MKII Tachograph Programmer.

The following explains how to enter the PIN code using the buttons.

4. Use the arrow button to select the correct digit. Confirm with OK. Repeat selecting and confirming as needed.

The PIN code can contain from 4 to 8 characters. Use the **Back** button to go back and change a digit. The card will be ejected if no PIN code is entered within 2 minutes.

5. Select the enter ↵ symbol to identify the end of the entered PIN code and then confirm the code by long-pressing the **OK** button.

Note!
If the wrong PIN is entered, a message will be displayed to indicate how many attempts there are left. Withdrawal of card after entering a wrong PIN code will not reset the PIN code counter.

When the correct PIN code has been entered and confirmed the last withdraw of the card and local time will be shown:

```
                  Last withdraw
15:23 . 15:03 2011
```

After a few seconds the first line of the display will change and show the local time difference from UTC (+ 1 hour in this case).

```
                        UTC+01h00
15:23 . 15:03 2011
```

Then the display will ask.

```
Rest until
now?
```

6. Select and confirm **No**.

Then the display will ask.

```
Add manual
entries?
```

7. Select and confirm **No**.
8. Select and confirm your present country location.

And the question:

```
Entries
printouts?
```

And the question:

```
Confirm
entries?
```

9. Select and confirm **Yes**.

The following display will now be shown and after that the Driver Standard Display.

```
Ready to
drive
```

Withdraw a Workshop Card

1. Press and hold the **1** button to open the driver card tray or the **2** button to open the co-driver card tray.
2. Select and confirm your present country location.
3. Remove the workshop card.
4. Close the tray by pushing it in carefully.

The card tray is locked when:

- The vehicle is in motion.
- While the tachograph is busy processing the company card.
- If the power supply to the tachograph is interrupted.

Note!
If the workshop card authentication failes, see heading on page **42** and look for:

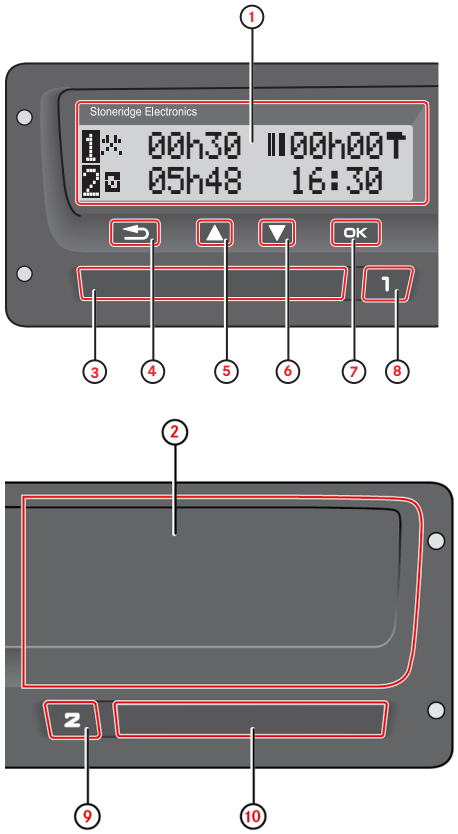
```
Card 1auth.
failure
```

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

Settings

You can change and use the following settings:

- Tachograph language
- Local time
- UTC time
- Invert display
- Built-in test (Self test)
- Parameters
- Vehicle Registration Number (VRN)
- DDS Settings
- WTD Setting

Languages

The workshop card language is by default used in the tachograph and on the printouts. The language can be changed to any of the available languages in the tachograph.

Available Languages

When you insert your driver card the Tachograph automatically changes to the language on the card. But you can select any of the following languages.

Language	Language in English
Български	Bulgarian
Čeština	Czech
dansk	Danish
Deutsch	German
eesti	Estonian
Ελληνικά	Greek
English	English
español	Spanish
français	French
islenska	Icelandic
italiano	Italian
latviesu	Latvian
lietuviu	Lithuanian
magyar	Hungarian
Nederlands	Dutch
norsk	Norwegian
polski	Polish
português	Portuguese
română	Romanian
русский	Russian
slovencina	Slovakian
slovenscina	Slovenian
suomi	Finnish
svenska	Swedish
shqip	Albanian
bosanski	Bosnian
hrvatski	Croatian
Македонски јаз	Macedonian
srpski	Serbian
Türçke	Turkish
Україна	Ukraine

Change Parameters

The parameters menu is accessible in calibration, company, and non-activated mode.

Warning!
Changes in the parameter settings affect the tachograph and the vehicle system.

Make sure you know the configuration of the vehicle before any changes are made. To change a parameter:

Press the **OK** button and select:

```
SETTINGS
```

Press the OK and select:

```
Parameters
```

Scroll through the parameters and use the arrow button to change the parameter settings.

Confirm the change with **OK**. The display will show:

```
Changes
saved
```

Press the **Back** button twice to return to the standard display.

The following parameters can be changed in calibration and non-activated mode.

Parameter	Selections	Effect on tachograph
Light source	Select between CAN, (Controller Area Network), A2 step or A2.	Input source for the display illumination.
CAN termination A4 and A8	Select "ON" or "OFF".	Controls termination resistor of TCO CAN.
Additional data recording	Select whether the additional data recording for vehicle speed, engine speed and D1/D2 status should be available "ON" or not "OFF".	ON = Enables the tachograph to record additional data. OFF = It is not possible to record additional data.
Output format D6	Set the hardware to ISO or to OC, (Open Collector).	D6 is used by the tachograph to drive an external speedometer.
K-line rear contact D7 master/slave	Select master or slave mode for K-line D7.	Selects if the tachograph is acting as master or slave.
Download CAN selection	Select the output channel for remote download, A-CAN or C-CAN.	Selects which channel the remote download function shall use.
Show download progress	Select whether or not to show a progress display when the tachograph is busy downloading.	If activated the download progress is shown in the display.
D8 data format	Select the serial output format to SRE standard or 2400 extended.	D8 is the serial data output. SRE standard = an extended serial data format. 2400 extended = the analogue tachograph original serial data format.
Default activity key **ON**	Select what activity to enter when the ignition is switched ON, Rest, work, available or no change.	Customer opportunity to make the driver duty automatically changed when the ignition is switched ON.
Default activity key **OFF**	Select what activity to enter when the ignition is switched OFF. Rest, work, available or no change.	Customer opportunity to make the driver duty automatically changed when the ignition is switched OFF.
Manual entries timeout	Select the timeout for manual entries to the tachograph - 1 or 20 minutes..	The manual entries will be closed when no interaction has been made for 1 or 20 minutes, depending on the settings. As default the timeout is 1 minute.

All parameters are also possible to configure through A-CAN, C-CAN or front side K-line.

Symbols

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

Symbol	Description
⊖	Function not available
1	Driver or slot
2	Co-driver or slot
	Card
⏏	Eject
⚒	Work
	Driving/driver (mode of Operation)
	Rest/break
	Available
	Ferry / train crossing
OUT	Out of scope, -i.e. no recording is required
●	Local time/location
	Start of daily work period
	End of daily work period
	Break
	From or to
	Printer, printout
	Paper
	Display
	Processing, please wait
	Time, clock
UTC	UTC time
24h	Daily
❙	Weekly
❙❙	Two weeks
Σ	Total/summary
›	Speed
»	Over speeding
×	Faults
!	Events
?	Pre-warning/question/unknown activity
	Workshop
	Company
	Controller
	Manufacturer
	Security
	External storage/download
	Buttons
✓	Finished
	Tachograph (VU), vehicle
	Tyre size
	Sensor
	Power supply
	Print
	Print, submenu
	Company lock
	Places
	Places, sub menu
	Settings

Symbol Combinations

The following combination of symbols are the most common.

Symbols	Description
●	Location start of daily work period
●	Location end of daily work period
	From time (UTC)
	To time (UTC)
●	Local time
	Crew driving
❙❙	Driving time for two weeks
OUT	Out of scope - begin
OUT	Out of scope - end
	Cumulative driving time of current day
	Printer low temperature
	Printer high temperature
– –	No card
	Driver card
	Workshop card
	Company card
	Control card
●	Control place
	From vehicle

Printouts

The information stored on the tachograph and on the driver cards can be printed. There are a number of different printouts available, see below.

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

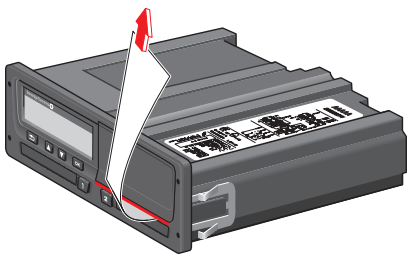
Some types of printouts require specification of the driver card and a date. If so the following is displayed:

`Select card 1 or 2`

2. Select **1** to make a printout for the current driver's card or **2** to make a printout for a co-driver's card. The following is displayed:
   `Select date`
3. Select the desired date by using the arrow buttons and press **OK**.
4. 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:

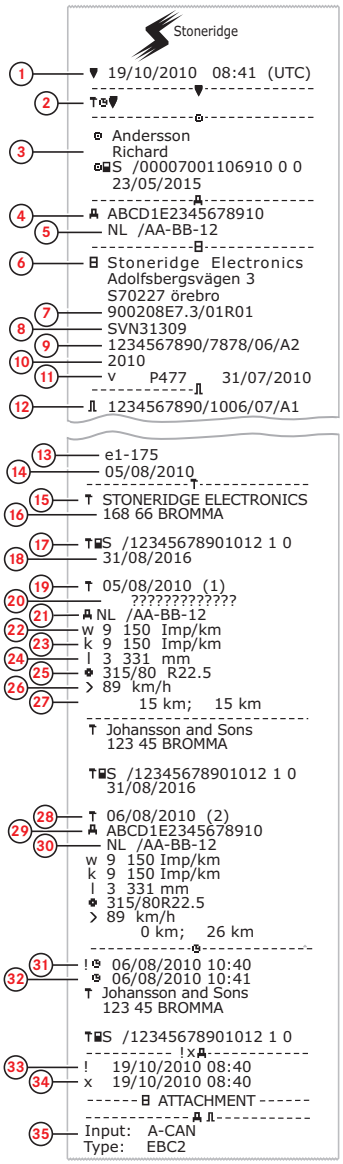
- Daily printout (card) `24h card` (including local time).
- Event and faults (card) `event card`.
- Event and faults (VU) `event vu`.
- Drive Time Info `drive time info`
- Technical data `technical data`.
- Overspeeding `overspeeding`.
- Vehicle speed `vehicle speed`.
- Engine speed (rpm) `engine speed`.
- Status D1/D2 `status D1/D2`.
- Manual Entry Sheet `man entry sheet`.

Technical Data

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
```



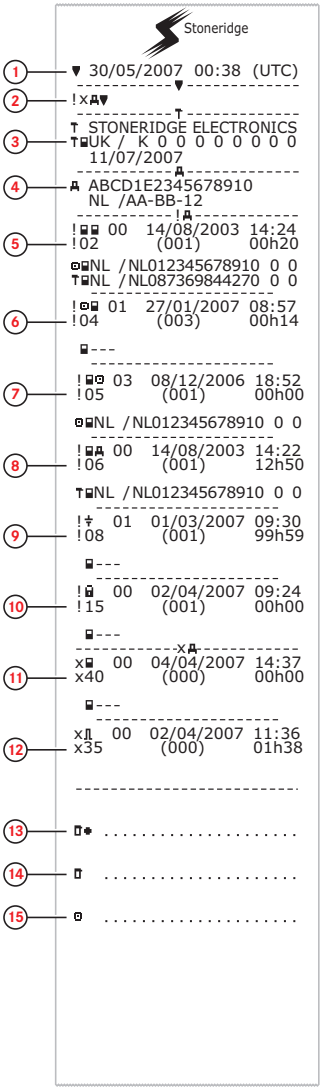
1. Date and time.
2. Type of printout (technical data).
3. Cardholder ID.
4. Vehicle Identification Number (VIN).
5. Vehicle Registration Number (VRN) and country of registration.
6. Tachograph manufacturer.
7. Tachograph part number.
8. Tachograph approval number.
9. Tachograph serial number, date of manufacture, type of equipment and code of manufacturer.
10. Year of manufacture.
11. Software version and installation date.
12. Motion sensor serial number.
13. Motion sensor approval number.
14. Date of first installation of motion sensor.
15. Workshop having performed the calibration.
16. Workshop address.
17. Workshop card identification.
18. Workshop card expiry date.
19. Calibration date and purpose.
20. VIN
21. VRN and country of registration.
22. Characteristic coefficient of vehicle.
23. Constant of the recording equipment.
24. Effective circumference of wheel tyres.
25. Vehicle tyre size.
26. Authorized speed setting.
27. Old and new odometer values.
28. Calibration date and purpose.
29. VIN.
30. VRN and country of registration.
31. Old date and time (Before time adjustment).
32. New date and time (After time). adjustment
33. Most recent event time.
34. Most recent fault date time.
35. Second source configuration. If not shown second source is disabled.

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):

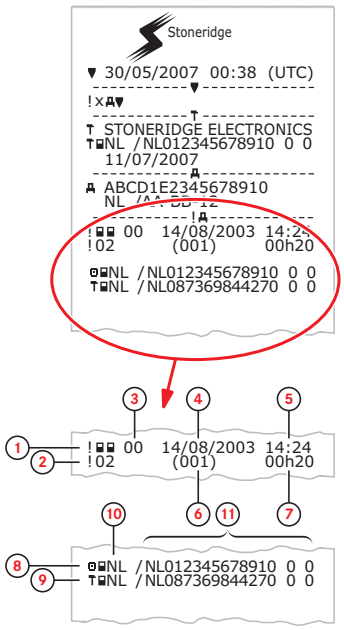
```
event vehicle
```



1. Date and time of the printout.
2. Type of printout (events and faults, VU).
3. Workshop card identification.
4. Vehicle Identification Number (VIN) Vehicle Registration Number (VRN) and country of registration.
5. Card conflict (event).
6. Driving without valid card (event).
7. Card inserted while driving (event).
8. Last card session not correctly closed (event).
9. Power supply interruption (event).
10. Data integrity error (event).
11. Card fault (fault).
12. Sensor fault (fault).
13. Control place.
14. Controller signature.
15. Driver signature.

For a detailed list of all events and faults, see heading on page **49**.

Details of Events and Faults (VU)



1. Type of event or fault (card conflict).
2. Event or fault code (card conflict).
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.
4. Date of event or fault.
5. 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 inserted in slot 2 at the end of the event or fault (Workshop card).
10. Card issue country.
11. Card number (shown with every second number replaced with a space if not in calibration or company mode or if no card is inserted

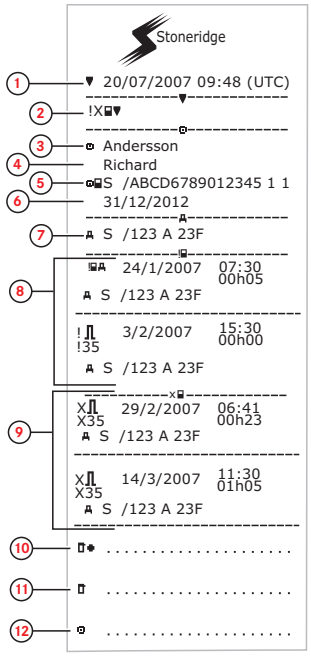
For a detailed list of all events and faults, see heading **Event, Fault and Diagnostic Trouble Codes** on page **49**.

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
```



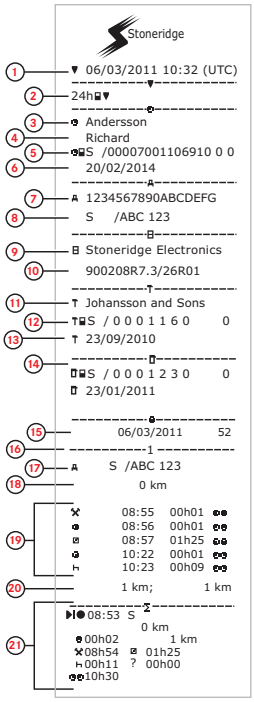
1. Date and time.
2. Type of printout. (event and faults, card).
3. Card holder's surname.
4. Card holder's first name.
5. Card and country identification number.
6. Expiry date of the card.
7. Vehicle registration number VRN.
8. List of all events stored on the card.
9. List of all faults stored on the card.
10. Control place.
11. Controller´s signature.
12. Driver´s signature.

Daily Printout (card)

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

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

```
24h card
```

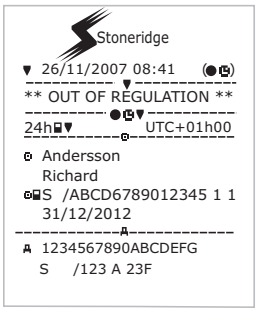


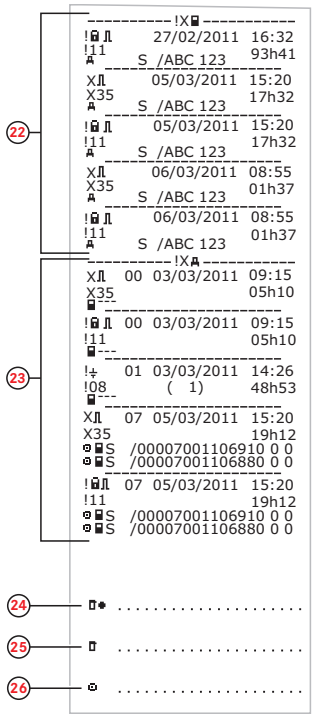
1. Printout date and time.
2. Type of printout (24h, card).
3. Card holder's surname.
4. Card holder's first name.
5. Card and country identification number.
6. Expiry date of the driver card.
7. Vehicle identification, VIN.
8. Registering member state and Vehicle Registration Number, VRN.
9. Tachograph manufacturer.
10. Tachograph part number.
11. Responsible workshop for last calibration.
12. Workshop card number.
13. Date of last calibration.
14. Last control the inspected driver has been subjected to.
15. Enquiry date and daily card presence counter.
16. Tray where card was inserted
17. VRN, Vehicle Registration Number, for the vehicle where the driver card was inserted.
18. Vehicle odometer at card insertion.
19. Activities with driver card inserted, start and duration time.
20. Card withdrawal: Vehicle odometer and distance travelled since last insertion for which odometer is known.
21. Daily summary of activities.

Daily Printout (card) continued

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.





22. Last five events and faults from the driver card.
23. Last five events and faults from the VU, vehicle unit.
24. Control place.
25. Controller´s signature.
26. Driver´s signature.

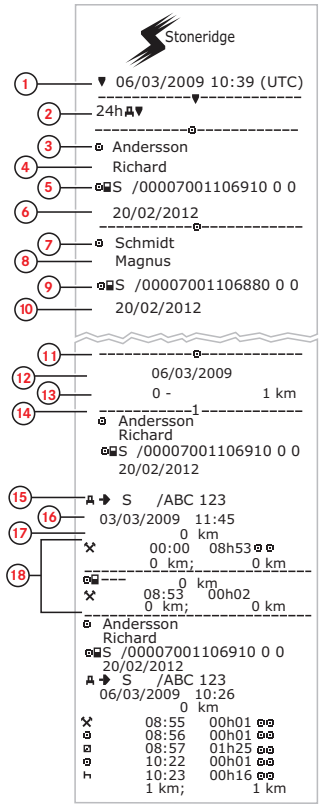
Daily Printout (VU)

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 recent days.
- When a card is inserted, select any day stored in the tachograph, out of a maximum of typically the 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
```



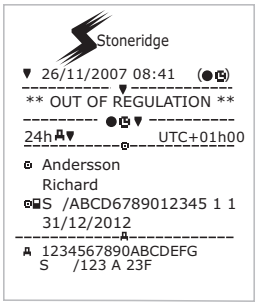
1. Printout date and time.
2. Type of printout (24h, VU).
3. Card holder's surname (driver).
4. Card holder's first name (driver).
5. Card and country identification number.
6. Expiry date of the driver card.
7. Card holder's surname (co-driver).
8. Card holder's first name (co-driver).
9. Card and country identification number.
10. Expiry date of the co-driver card.
11. Drivers activities stored in the VU per slot in chronological order.
12. Enquiry date.
13. Vehicle odometer at 00:00 and 24:00.
14. Driver
15. Registration member state and vehicle registration number of previous vehicle used.
16. Date and time of card withdrawal from previous vehicle.
17. Vehicle odometer at card insertion.
18. Activities with start and duration time

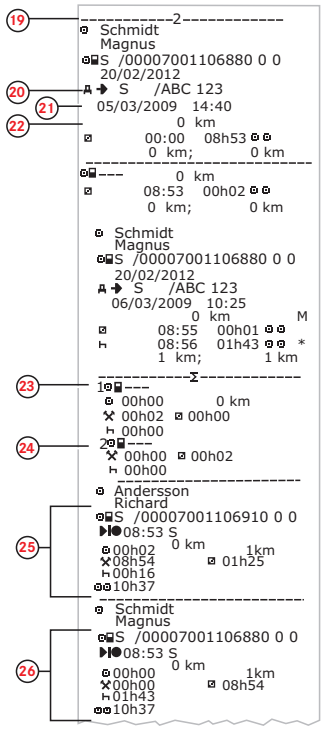
Daily Printout (VU) continued

M=Manual entries of driver activities.

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.





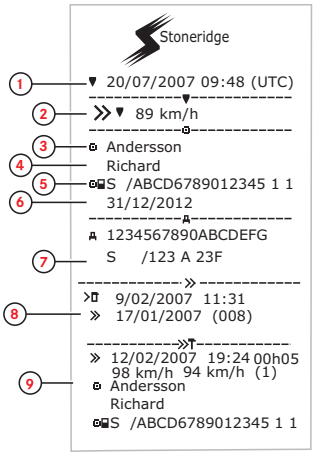
19. Co-driver.
20. Registration member state and vehicle registration number of previous vehicle used.
21. Date and time of card withdrawal from previous vehicle.
22. Vehicle odometer at card insertion.
    M = Manual entries of driver activities.
    * = Rest period of at least one hour.
23. Summary of periods without card in driver slot.
24. Summary of periods without card in co-driver slot.
25. Daily summary of activities (driver).
26. Daily summary of activities (co-driver.

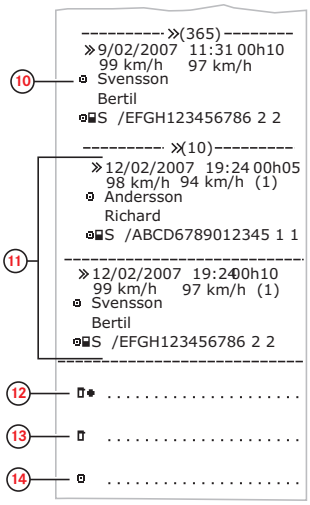
Overspeeding

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. Date and time.
2. Type of printout. (overspeeding). Speed limiting device setting.
3. Card holder's surname.
4. Card holder's first name.
5. Card and country identification number.
6. Expiry date of the driver card.
7. Vehicle identification. VIN, registering member state and VRN.
8. Date and time of the last overspeeding control.
9. Date and time of first overspeeding and number of overspeeding events.
   First overspeeding after the last calibration.
   Date time and duration. Max and average speed.
   Driver and drivers card identification.
10. Five most serious overspeeding over the last 365 days. Date time and duration. Max and average speed. Driver and drivers card identification.
11. Most serious overspeeding events over the last ten days. Date time and duration. Max and average speed. Driver and drivers card identification.
12. Control place.
13. Controller´s signature.
14. Driver´s signature.

Installation

A complete installation contains the following:

- Fitting the motion sensor and the sensor cable.
- Making mandatory electrical power and required signal connections.
- Mounting the tachograph.
- Activating pairing with motion sensor.
- Calibrating and programming the tachograph.
- Sealing the tachograph system.
- Completing and fitting an installation plaque.

Note!
Before the vehicle is allowed to be taken into operation on roads covered by EU legislation, the entire installation procedure must have been carried out. Although in case of installation of a replacement unit, only certain parts of the installation procedure might be required.

If vehicle registration number (VRN) is not entered during the first installation, it has to be entered by the vehicle owner before use. See the Driver & Company manual for further information.

Checking before Installation

Prior to the tachograph installation it must be verified that the tachograph about to be installed is a genuine Stoneridge Electronics tachograph. To do that ensure the following:

- The tachograph data label must show the correct Stoneridge tachograph type approval number-e5-0002.
- The tamper label must be intact and not interfered with. The tamper label which has 2 different appearances, see page heading **Inspecting Procedure** on page **36**.
- The Stoneridge hologram must be present and correct. The hologram is located on the tamper label behind the paper cassette, see page heading **Inspecting Procedure** on page **36**.
- It must be ensured that there is no damage i.e. drill-holes in the exterior casing of the tachograph.
- Any evidence of tampering with the tachograph seals and labels should be checked for.
- Any evidence of additional seals or labels should be checked for as they might cover drill-holes.
- Check that the heat seal is present. The heat seal is on the top of the tachograph.

Note!
The tachograph package must not have been tampered with before delivery and the content of the package should be confirmed with Stoneridge Electronics.

Fitting a Tachograph in a Vehicle

Power, motion sensor and associated signal connections must be prepared prior to installation.

Motion Sensor

The motion sensor must be a Stoneridge approved type of sensor and fitted directly to the vehicle gearbox.

Note!
See the manufacturer's installation instructions for more information about the motion sensor.

A Stoneridge tachograph only works with a Stoneridge approved motion sensor. Any existing motion sensor that was previously used with an analogue tachograph must be replaced before progressing.

Sensor Cable

If a motion sensor of the correct type is fitted the sensor cable can be connected.

Stoneridge sensor cables are available in various lengths to suit different types of vehicles. When fitting a sensor cable, the cable assembly must be laid into the vehicle in adequate length, bearing in mind the following criteria:

- Wherever possible, the cable must be routed alongside other cables to avoid the risk of damage.
- Avoid loose connections, which may catch or drag.
- Do not clip or tie the cable to any moving parts.
- Ensure the possibility of removing the tachograph from the panel with the sensor cable still plugged in.
- Do not pull the cable tight at either end.

- With tilt cabs, care must be taken that the cable cannot be nipped, cut or stretched when the cab is tilted.
- The cable must be routed well away from sources of intense heat such as an exhaust manifold or turbocharger.

If all conditions above have been satisfied, the cable assembly can be appropriately secured using cable ties.

The sensor is connected to socket B at the rear of the tachograph, see heading **Rear socket connections** on page **39**

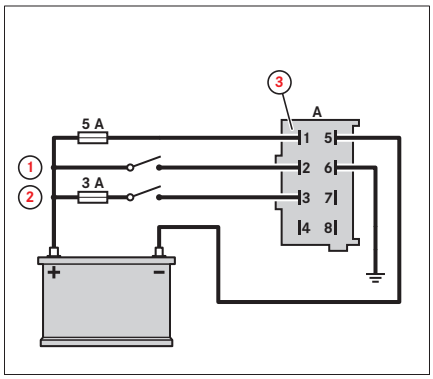
If any of the above conditions are not met, the tachograph must not be installed.

Power Connection

The power to the tachograph is supplied through rear socket A, see heading **Rear socket connections** on page **39**. Note that all fuses used to protect the non-ADR type tachograph must be of an anti-surge type and the fuses must be positioned in such way as to discourage illegal disconnection.

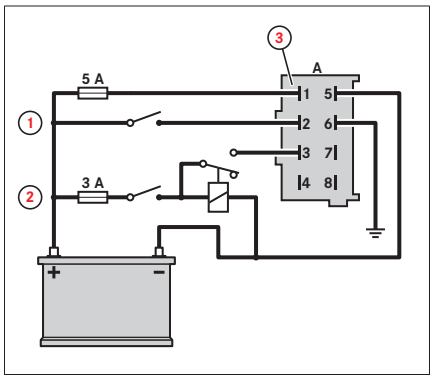
For details on how to make power connections and to protect the ADR version of the Stoneridge tachograph, see:heading **Fitting an ADR Tachograph** on page **41**.

A Stoneridge power cable must be used to make the circuit shown below.



1. Lights
2. Ignition
3. 2714-265 (housing natural) and 2714-270 (tabs)

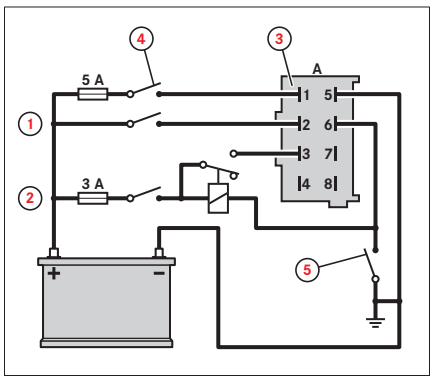
The tachograph can be affected by line borne interference and current surges. The effects of these occurrences can be reduced by connecting the power and ground feeds directly to the battery and using a relay on the ignition feed as shown below.



1. Lights
2. Ignition
3. 2714-265 (housing natural) and 2714-270 (tabs)

Note!
Line connections should be avoided, in particular the “scotch lock” type. A connector can be used for making in-line connections if necessary.

On vehicles where an isolator switch (battery master switch) is required, the switch can be connected to the positive line only (a), the negative line only (b) or with both switches (a and b) connected as shown in the figure below.



1. Lights
2. Ignition
3. 2714-265 (housing natural) and 2714-270 (tabs)
4. Isolator switch (a)
5. Isolator switch (b)

Tachograph Signal Connection

Various electrical signal connections to the tachograph rear sockets will be required, with the exact connections dependant on the vehicle type. For a description of all rear connections, see heading **Rear socket connections** on page **39**

Fitting the Tachograph

Since the Stoneridge tachograph conforms to the ISO 7736 standard for a radio enclosure, fitment of the tachograph is an easy procedure. The tachograph must be positioned in such way as to allow a driver to view the display and also to access the necessary functions safely from the seat.

A tachograph installation kit is available to aid fitting the tachograph into a vehicle. For more information, contact the Stoneridge local importer, see heading **Contact Stoneridge** on page **1**

1. Pull the wires through from the back of the cavity and insert the radio cage into the enclosure. It is very important that the wires are of suitable length to allow the unit to be moved in and out of the slot when connected. Equally important is to allow the wires enough space at the rear of the unit so that it can sit in place without damaging the wires.
2. Support the tachograph at the rear of the unit. This can be done either by:

   - placing a rubber acorn onto the peg at the rear of the unit or,
   - using a universal mounting strip and self-threading nut. Place one end of the mounting strip over the tachograph rear peg and then secure it with the self-threading nut screwed onto the peg. The other end of the strip can then be fixed to the vehicle to secure the rear of the tachograph.

Note!
Do not damage the exterior case during installation!

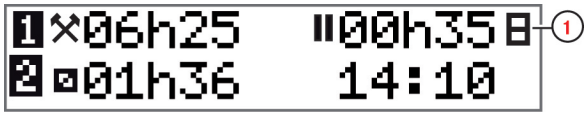
Activation and Motion Sensor Pairing

When a Stoneridge digital tachograph is manufactured, it leaves the factory in a non-activated mode of operation. In the non-activated mode the unit is not fully operational and no data records will be stored.

Note!
In non-activated mode, entry of calibration data is possible without a workshop card inserted. This allows pre-programming of tachographs without the need of a valid workshop card.

Changing a motion sensor can only be done in calibration mode. If the tachograph has not previously been activated then the activation process will occur before the pairing.

A non-activated tachograph can be identified when powered by the appearance of the activation symbol.



1. Activation symbol

When a motion sensor is connected to a powered tachograph it will automatically be paired with the tachograph . Pairing can only be done in the calibration mode of operation, i.e. with a valid workshop card inserted. Pairing can also be initiated with a programmer (e.g. a Stoneridge MKII) without removing the workshop card.

Activation and Pairing Processes

The activation and pairing processes are completed automatically unless the power to the unit is interrupted.

The tachograph must detect and automatically pair with a motion sensor in order for the activation process to be completed.

1. Insert a valid workshop card in the non-activated tachograph.
2. Enter the PIN security number.

The activation and paring processes will start automatically and the following is displayed.

```
Sensor
pairing
```

If the **OK** button is pressed the following is displayed:

```
Activation
```

When the pairing process is complete the following is displayed:

```
Pairing
complete
```

3. Press **OK** to confirm.

When the activation process is complete the following is displayed:

```
Activation
complete
```

4. Press **OK** to confirm.

The activation process causes certain tachograph parameters to be initialised, see heading **Calibrating the Tachograph** on page **26**.

Note!
If no motion sensor is present in calibration mode the tachograph will continually attempt to pair with a motion sensor until the workshop card is removed. The two messages:

```
Pairing failed
Activation failed
```

will be displayed to indicate the pairing and activation failure.

Activation or Pairing failure

If the activation is not completed the following is displayed.

```
Activation
failed
```

If the pairing is not completed the following is displayed.

```
Pairing
failed
```

If activation or pairing fails:

1. Remove the workshop card.
2. Check the system connections.
3. Re-insert the workshop card and repeat the process until the activation/pairing is successful.

Programming Vehicle Related Parameters

Once the physical installation of the tachograph is complete, a number of vehicle related parameters are required to be programmed into the tachograph internal memory.

Connect a tachograph programmer (e.g. Stoneridge MKII version) to the front calibration/download connector to program the vehicle parameters.

For location of the front download connector, see heading **Calibration and Download Front Connector** on page **39**.

Calibrating the Tachograph

Calibration of a tachograph is a mandatory part of any inspection and should also take place after installation or after any repair that requires a tachograph system to be disconnected or the seal to be broken. In the non-activated mode, calibration parameter entry is possible to allow pre-programming of tachograph prior to fitment without the need for valid workshop card ownership.

There are a number of calibration parameters that are stored or updated in a tachograph by means of the calibration process as follows:

- The current UTC date and time.
- The odometer reading.
- The characteristic coefficient of the vehicle (W-factor) and the tachograph constant value (K-factor).
- The effective circumference of the vehicle drive wheels (L-factor) and the tyre size used on the drive wheels.
- The due date of the next calibration (2 years from current date).
- The speed limiting device setting.
- **The vehicle registering country, the vehicle registration number (VRN) and the vehicle identification number (VIN).**

Note!
If the time is updated less than 20 minutes and no other updates are performed, this does not constitute a calibration but a time adjustment.

The K and W-factors must both be explicitly written into the digital tachograph.

When a calibration is carried out a record of the calibration is generated and stored in the tachograph.

The contents of the record are as follows:

- The calibration purpose :
  - At activation.
  - The first calibration after activation.
  - The first calibration of the tachograph in the current vehicle.
  - Calibration as part of an inspection.
- The workshop name, address, card number and card expiry date.
- The VIN and VRN.
- The W, K and L-factors.
- The tyre size and speed limiting device setting.
- The odometer value.
- The UTC date and time.
- The date of next calibration (2 years from current date).

Similarly a calibration record is also generated and stored on the inserted valid workshop card. The contents of the workshop card stored calibration records are as follows:

- A count of the total number of calibrations performed with the card.
- The calibration purpose (as described above).
- The VIN and VRN.
- The W, K and L-factors.
- The tyre size and speed limiting device setting.
- The odometer value.
- The UTC date and time.
- The date of next due calibration.
- The tachograph part number and serial number.
- The motion sensor serial number.
- A count of the number of calibrations performed since the workshop card stored calibration records were last downloaded.

The vehicle calibration parameters should be determined using approved methods, for instance a rolling road. These along with all the other parameters listed above require to be programmed into the tachograph, heading **Programming Vehicle Related Parameters** on page **25**.

The tachograph programmer will give confirmation of the success or failure of programming the calibration parameters into a tachograph. If the programming procedure fails, the workshop card should be removed from the tachograph. The connections should be checked for faults before the workshop card is re-inserted and an attempt to re-program should be made. When in the calibration mode of operation it is possible to inject speed pulses into the tachograph via the calibration/download front connector pin 4 (the calibration I/O pin). This can be done to check the speed display by inputting speed pulses at a known rate. It should be noted however that whenever a vehicle begins to move, any speed pulses injected via the front connector will be ignored and any speed displayed or recorded will be derived from the true speed pulse signal coming from the motion sensor via the rear connector.

Checking Calibration Data

All tachograph calibration data must be checked for correctness following a tachograph data calibration mode session.

- Eject the workshop card.
- Take a technical data printout to confirm the correctness of the stored data.

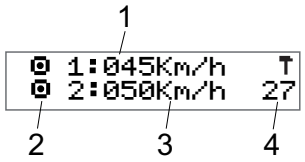
The workshop is responsible for the correct entry of the vehicle parameters.

Checking Second Source Motion Sensor

If the tachograph system is required to have a second motion sensor this section describes how this shall be checked. Checking can be carried out by viewing the Motion Sensor View.

If second source of motion function is disabled this view will not be shown.

With the workshop card inserted, press the arrow down button several times until you reach the last view, which is the Motion Sensor View. See position (3) below to check if a second source motion sensor is present.



1. Primary Motion Sensor speed.
2. Indicates motion. If this pictogram is shown (-), no motion is detected.
3. Second source of motion speed. The digits shows the speed indication of the second source.
   If these characters (- - -) are shown instead of the digits, the tachograph does not receive signals from a second source motion sensor.
4. Fault number.

Second source of motion configuration can also be checked in the technical printout, see heading **Technical Data** on page **14**.

Fault Number Motion Sensor

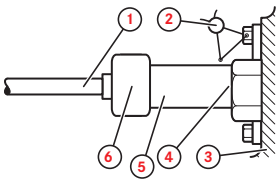
The Fault number in the view has a corresponding DTC Code, heading **Event, Fault and Diagnostic Trouble Codes** on page **49**

Fault number in the View	DTC Code
26	0x2680
27	0x2780
28	0x2880
29	0x2980
2A	0x2A80

Sealing the Digital Tachograph System

The motion sensor must be sealed at its connection to the gearbox. This is to ensure the integrity of the signal from the vehicle (through the gearbox) to the tachograph.

Sealing of the motion sensor may be achieved using the same methods as for an analogue system, i.e. by the use of sealing pliers and traditional seals. The retaining nut for the motion sensor is cross-drilled so that it may be wired and sealed to a suitable drilled bolt securing the gearbox. The actual sealing method must be authorised by the relevant authorities. If re-sealing is necessary it must be carried out by authorised holders of valid workshop cards.



1. Sensor cable
2. Wired seal
3. Gearbox
4. Retaining nut
5. Sensor
6. Sensor connector

Note!
If a workshop detects a broken seal, it must:

- **Inspect, calibrate and re-seal the tachograph system.**
- **Prepare a report about the cause of the broken seal and inform the relevant authorities in accordance to the actual country's legalisation.**

The installation plaque must also be sealed, unless it is of a type that cannot be removed without damaging it.

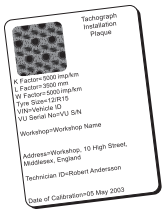
Installation Plaque

The final part of the digital 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:

- Constant of the tachograph, K factor (imp/km).
- Effective circumference of the wheel tyres, L factor (mm).
- Characteristic coefficient of the vehicle, W factor (imp/km).
- Tyre size.
- Vehicle Identification Number (VIN).
- Name, address or trade name of the approved fitter or workshop.
- Date of calibration.



Installation of shroud

In certain countries a shroud (part number 6800-007) that protects the connectors from tampering is required to be mounted at the rear of the tachograph.

Instructions can be obtained from your local importer.

Download Data

Downloading means to copy, together with a security digital signature, a partial or a complete set of data from the memory of a vehicle unit or from a driver card. The entire tachograph contents can be downloaded by a Workshop under the control of a valid workshop card. All downloading of stored data from a tachograph or from a driver card must be done when the vehicle is stationary and when the tachograph is in calibration mode of operation.

Stoneridge recommends using the CITO downloading equipment which significantly reduces the downloading time.

For more information about the CITO download equipment, contact Stoneridge After Market Head Office, see heading **Contact Stoneridge** on page **1**.

1. Remove the printer cassette, see heading **Printer Maintenance** on page **32**.
2. Attach the download equipment to the tachograph through the 6-pin front download connector, located behind the paper cassette, see heading **Calibration and Download Front Connector** on page **39**.
3. Start downloading data according to the instruction on the download equipment.

Note!
The download can also be performed through A-CAN and C-CAN on the rear connectors.

Which interface to be used is selectable in the setting menu for parameters, see heading **Change Parameters** on page **11**.

Care and Maintenance

To obtain a long and trouble-free lifetime for the tachograph please keep the following in mind:

- Keep the trays closed at all times and only open them to insert and withdraw a card.
- Do not place objects on the trays when they are open, otherwise they could be damaged.
- Keep the tachograph clean.
- Clean a dirty tachograph with a damp, soft cloth.

Avoid High Voltage

Interrupt the power supply to the tachograph if:

- Electrical welding operations are to be carried out on the vehicle.
- You expect that the vehicle will require several jump-starting attempts.

Note!
High voltage may lead to permanent damage and to failure of the tachograph's electronic components. Damage to the tachograph caused in this way invalidates the warranty.

Care of Cards

Treat your card with care and please note the following:

- Do not flex or bend the card.
- Ensure that the card contacts are kept free from dirt and dust.
- Clean it with a soft damp cloth if necessary.
- Protect it from damage.

Card damaged, lost or stolen

If the card is damaged, lost or stolen the owner has to request a replacement card from the responsible authority in the country where the card was issued.

If a card is stolen or if the owner suspects that an unauthorized person has access to the card, the owner has to report the incident to the local police and obtain a police report number.

A driver without a valid driver card is not permitted to drive a vehicle equipped with a digital tachograph.

Printer Maintenance

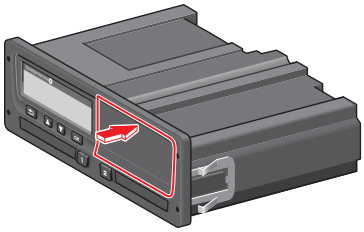
The only serviceable parts in the Stoneridge tachograph are the paper cassette and the printer paper. The printer heads may also be cleaned using a Stoneridge approved printer head cleaning pen. Do not attempt to service any other tachograph parts. If the paper cassette is damaged then the complete cassette must be replaced as a single item.

Note!
Cleaning the printer head must be done with the ignition switched off.

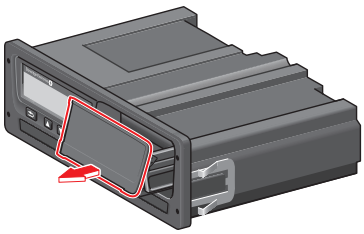
Change the Paper Roll

Note!
To avoid malfunctioning only use printer paper approved by Stoneridge.

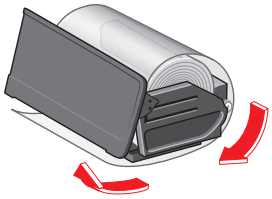
1. Press the upper edge of the front panel. The panel opens.



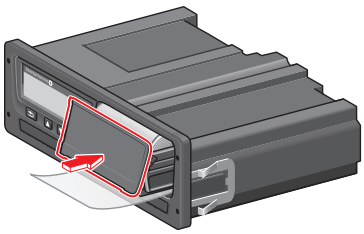
2. Hold the lower edge of the panel and carefully pullout the cassette.



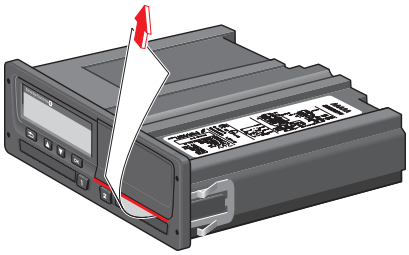
3. Feed the paper around the back of the paper cassette and forwards, passing the lower edge of the panel.



4. Insert the paper into the printer.
5. Slide the paper cassette into the tachograph and press the lower part of the panel to close.



6. Pull the paper upwards and tear it off.



Printer Paper

New printer paper and cassette can be ordered as below:

- Paper roll - 3 pack (Part No. 6800-032)
- Paper roll - 8 pack (Part No. 6800-002)
- Paper cassette (Part No. 6800-001)

Note!
Always store the printer paper in a dry and dark place at a low temperature.

Built-in Test

The built-in test can be used to check the following tachograph components for correct operation:

- Display
- Driver card
- Buttons
- Printer
- Invert display

Perform a built-in test in the following way, but please note that the built-in test is only available when the vehicle is stationary.

1. Press the **OK** button and select:
   SETTINGS
2. Press **OK** again.
3. Select:
   Built-in Test
4. Press **OK**.
5. Select one of the five test categories and press **OK**.

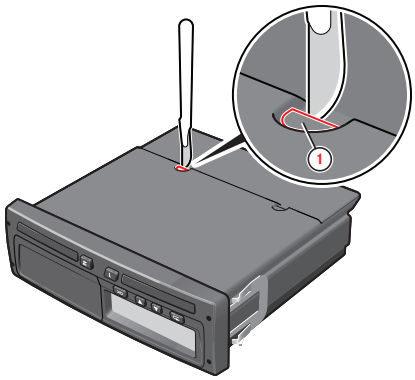
Type of Test	Description	Action if Test Failed
Display	**Display test** The display shows positive view, negative view and a pattern of rectangles for 1 second each.	
Driver card	**Test of the inserted driver cards** There must be a driver card in the relevant slot. The name of the card holder is read and displayed for 2 seconds.	If a card is reported as defective, check a different card to ensure that the tachograph is functioning. If the tachograph is defective and has to be decommissioned and replaced. If it is the driver card that is definitely defective, contact the responsible authority in the country where the driver card was issued.
Button	**Button test** You are prompted to press the buttons one by one from left to right within 2 seconds of each other, otherwise the test fails.	Carefully clean dirty buttons with a damp cloth and a mild detergent. If the buttons still fails the tachograph has to be decommissioned and replaced.
Printer	**Test page printed out**	Check the paper cassette, if necessary insert a new paper roll or replace the cassette. If the printer still fails the tachograph has to be decommissioned and replaced.
Inverted display	**Inverted display function test** The display view is inverted for 2 seconds.	If the tachograph is unreadable it has to be decommissioned and replaced.

Opening Failing Card Trays

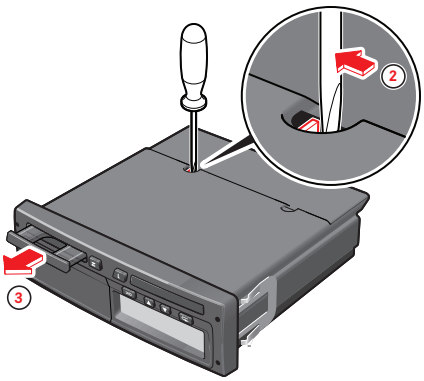
To open the card trays to get hold of the inserted card in the event of a tachograph tray failure or power failure do as follows:

1. Remove the tachograph from the dashboard, see heading on page **38**.
2. Ensure that the ignition is switched off.

On the bottom there are two small break out slots that gain access to the tray release mechanisms.



3. Identify the predeterminated breakpoint that corresponds to the card tray that is to be opened. Use a sharp knife to carefully cut a hole in the break out slot.



4. Insert a knife or a screwdriver in the hole and push the tray release mechanism sideways. The appropriate tray will now eject and the card can be removed.

Decommission of tachograph
This operation will damage the tachograph and therefore it must be decommissioned and replaced.

Inspection of Tachograph System

Inspection of a digital tachograph system must be carried out under the following circumstances:

- After any repair of the system.
- If the motion sensor seal is broken.
- After any alteration to either the vehicles characteristic coefficient (W factor) or the effective circumference of the drive wheels (L factor).
- If the tachograph UTC clock time is inaccurate by more than 20 minutes.
- If the vehicle registration number (VRN) has changed.
- When it has been 2 years since the last system inspection.

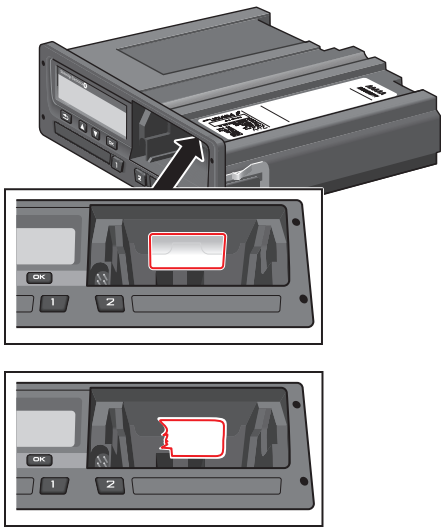
Inspecting Procedure

Follow this procedure to confirm that the function of the recording equipment is correct.

1. Check the ability to store driver data on the driver card.
2. Determine that the tachograph operates within maximum tolerances for both speed and distance.
3. Check the tyre size and the actual circumference of the drive wheel tyres.
4. Check the calibration, see heading **Checking Calibration Data** on page **27**

Also, perform the following visual checks:

1. Ensure that there is no damage to or drill-holes in the entire exterior casing of the tachograph, including rubber acorn, so that a security breach attempt could be made.
2. Check for evidence of tampering with the tachograph seals and labels.
3. Check for additional seals and labels that do not belong to the tachograph, as they might cover drill-holes.
4. Check that the heat seal is present.
5. Check the tachograph type approval mark.
6. Check that the system seals are intact. Confirm the presence of installation plaque and that the information is correct according to the checks in this procedure.
7. Check that the label and the logotype hologram is present and in one piece. The position of the label is shown in the illustration below. The hologram is only visible in strong light.



A tampered label

If any of the following event & faults is found to have occurred since last inspection, a check with a reference cable has to be performed.

- !09, Motion data error
- !11, Motion sensor authentication failure
- !13, Unauthorised change of motion sensor
- !20, Motion sensor internal error
- !21, Motion sensor internal error, authentication failure.
- !22, Motion sensor internal error, stored data integrity failure
- x35, Motion sensor communication error.
- !0A, Vehicle Motion Conflict (Will be available in 7.6)

Any unit that fails an inspection must be decommissioned and replaced with another unit.

After each inspection a tachograph test certificate must be issued to the owner of the tachograph. The information on the certificate includes:

- The tachograph owner.
- The tachograph manufacturer, model and serial number.
- The VIN and VRN.
- The inspection result.
- The certificate issue date.

Note!
The test certificate is not mandatory in all countries.

Finally, as a legal requirement, a new installation plaque must be fitted to the vehicle in place of the previous one.

For more information on the installation plaque, see heading **Installation Plaque** on page **29**.

Repairs and Decommissioning

Due to digital tachograph system requirements the only allowable repair that can be carried out is the replacement of the paper cassette, see heading **Printer Maintenance** on page **32**.

Note!
The tachograph case must never be opened, as it would be a breach of the digital tachograph security.

When it is not possible to repair a faulty tachograph, then it must be decommissioned and replaced with a new one.

Decommission Procedure

1. Download the entire data from the tachograph memory, see heading **Download Data** on page **30**.
2. Remove the tachograph from the vehicle.
3. Store the data in a secure data store following guidelines as set by the relevant authorities.

If it is not possible to download data from a decommissioned tachograph all workshops will have a manual issued by their relevant transport authority detailing what is the requirement. Usually it is to issue an undownloadability certificate.

If a faulty tachograph has driver cards stored in either of the trays and these cannot be removed by the normal method of pressing the appropriate eject button, then see the following chapter, see heading **Built-in Test** on page **34**.

All faulty units must be returned to Stoneridge, unless another arrangement with Stoneridge is made.

Replacement of the Tachograph

It is recommended to replace a tachograph only with a unit having the same part number. Do not fit a replacement tachograph with a different part number unless it is confirmed by Stoneridge as an equivalent to the one it is replacing.

Information about actual part number is visible on a technical printout, see heading **Printouts** on page **13**.

1. Make a technical printout to see the warranty time and save print out.
2. Remove the tachograph, see heading **Opening Failing Card Trays** on page **37**.
3. If the removed tachograph is faulty, then download all data and return it to the owner, see heading **Download Data** on page **30**.
4. Update the replacement unit with the remaining warranty time for the replaced unit.
5. Install the replacement unit, see heading **Installation** on page **22**.

Warranty Handling

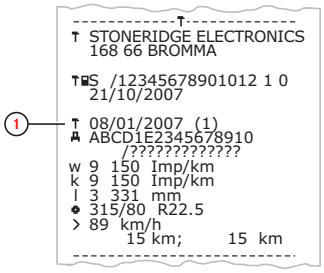
When a tachograph is replaced it is important that the new tachograph is programmed with the remaining warranty time from the old one. Use available equipment to set the parameters, for example an MKII which is used in these instructions.

1. Read the remaining Warranty Validity Time (WVT) for the old unit, using a MKII.
2. If the Warranty Time (WT) has passed the replacement unit's WT, then the replacement unit's WVT parameter must be set to 0.

To control the WVT do the following:

- Perform a technical printout from the old tachograph and check the activation date, see heading **Technical Parameters** on page **39**.
- Calculate the remaining WT by taking the current UTC time minus the activation date.
- If the obtained value does not match the WVT, then someone has modified the parameters.

3. Program the new tachograph, with the calculated remaining WT, using a MKII.



1. Date of activation

Removal of Tachograph

Once fully mounted, a Stoneridge digital tachograph can be removed from its mounting cage using a pair of tachograph extraction tools (6350-023).

1. Insert the extracting tools perpendicular into the two pair of holes at the sides of the plastic front fascia.

2. Push the extraction tools sideways towards the sides and at the same time pull the tachograph out of the cage.
3. Carefully disconnect the rear socket connections.

Technical Data

Technical Parameters

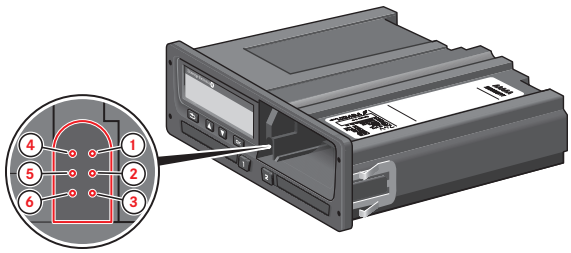
Voltage	
Non-ADR (operating)	9-32 V
ADR (operating)	17-32 V
24 V (recommended)	18-32 V
12 V (recommended)	9.5-16 V
Temperature	
Non-ADR (operating)	-25°C to +75°C
ADR (operating)	-40°C to +65°C
Storage	-40°C to +85°C
Weight (including paper roll)	Less than 1100 g
Dimensions	188 x 218 x 59 mm
Current	
Ignition **On** + motion sensor	24 V - 100 mA
	12 V - 65 mA
Ignition **Off** + motion sensor)	24 V - 9 mA
	12 V 12 mA
LCD	
Dot Matrix	19 x 98 pixels
Visible area	72 x 16.6 mm
No. rows and characters	2 - 16
Printer	
Paper width	57-58 mm
Paper roll diameter	30 mm (max)
Characters per line	24

Calibration and Download Front Connector

The calibration and download front connector is a 6-pin connector and the pin pitch is 2.54 mm.

The connector is located behind the paper cassette.

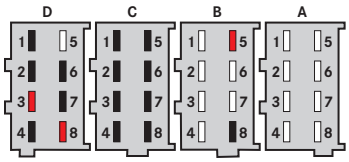
The pins are viewed in the figure and a description of the functions are listed below.



Pin	Name	Description
1	Battery (-)	Connected to battery (-), A5.
2	Data comm	The configuration of this interface is in accordance with ISO 14230. This is used for bi-directional K-line I/O.
3	RxD comm	Serial data to recording equipment, tachograph . Complies with RS232 specifications at baud rates from 9600 - 115 200 bps.
4	Calibration I/O	Calibration signal input/output.
5	Battery (+)	Permanent power output. voltage range is battery supply - 3 V at 40 mA.
6	TxD comm	Serial data from recording equipment, tachograph . Complies with RS232 specifications at baud rates from 9600 - 115 200 bps.

Rear socket connections

The rear connector is a 32-pin device and the connector pin-outs according to the ISO16844 connector format.



Pins marked in red (B5, D3 and D8) are optional pins/functions added by Stoneridge to the connector format ISO16844-1.

Pins marked in black (B8, C1 to C8 and D1, D2, D4, D6 and D7) are optional pins/functions defined by ISO16844-1.

Note!
The corresponding plugs for connection to sockets A, B, C and D are keyed and colour coded (white, yellow, red and brown respectively) and have different guide pins to prevent incorrect insertion.

Pin	Name	Description
A1	Battery plus +	Permanent power supply line powering the tachograph.
A2	Illumination	Connection to illumination power supply. For this tachograph it is an analogue input.
A3	Ignition supply	Power supply line connection.
A4	CAN_H	CAN bus HIGH signal line.
A5	Battery (-)	Return line for the permanent power supply (A1).
A6	Ground, GND	Return line for ignition supply, normally connected to local chassis ground.
A7	CAN_GND	CAN bus GND line, which is connected to tachograph GND (A5) via a series combination of a 1W resistor and 680nF capacitor.
A8	CAN_L	CAN bus LOW signal line.
B1	Positive supply to motion sensor	Motion sensor supply signal that is derived from the permanent power supply.

Pin	Name	Description
B2	Battery (-) to motion sensor	Return line for motion sensor supply (B1).
B3	Motion sensor speed signal	Real time speed signal from the motion sensor.
B4	Speed data signal	Encrypted channel (bi-directional) from the motion sensor. Is used to verify the signal integrity.
B5		Not used.
B6	Speed pulse output	Positive going pulse output signal triggered by each pulse from the motion sensor. Can be used as an alternative customer speed signal.
B7	Speed pulse output	Positive going pulse output signal triggered by each pulse from the motion sensor. The standard ISO speed signal.
B8	Distance signal, 4 pulses/m	An output string of positive going pulses generated at a rate corresponding to 4 pulses per metre.
C1	Battery (+) with current limitation	Power supply to Stoneridge telematic unit. Current limitation is 400 mA in 10-30V range.
C2	Battery (-)	Return line for the battery supply.
C3	Revs signal input/ 2nd source of motion	This input signal is monitored by the processor and is used to determine engine speed. The input line is connected to the W terminal of the alternator, KL_W. This input can also be used as 2nd source of motion input.
C4		Not used.
C5	C-CAN_H	Alternative CAN bus HIGH signal line.
C6		Alternative CAN bus GND line, which is connected to tachograph GND (A5) via a series combination of a 1W resistor and 680nF capacitor.
C7	C-CAN_L	Alternative CAN bus LOW signal line.
C8	Internal resistor to CAN_H	Connected to CAN_H on C5 via a 120W resistor.
D1	Status input 1	Input, which signals that an event may be recorded.
D2	Status input 2	Alternative event input, which signals that an event may be recorded.
D3	Positive supply	An output supply suitable for status inputs.
D4	General	This is a general open collector
	tachograph warning output	output controlled by theprocessor.
D5	Over speed output	An output which is active when an over speed condition is detected.
D6	Speedometer output	An open collector output or an ISO16844 output controlled by the processor.It is a rectangular waveform that is used to drive a vehicle's speedometer.
D7	Data comml/O K-line	Speedometer/K-line interface according to ISO-14230.
D8	Serial data output line	Serial data output channel continuously transmitting (in key on) speed, distance, time, date engine revs, driver and co-driver activity information in a Stoneridge Electronics proprietary format.

The CAN bus (Controller Area Network) is a versatile vehicle communications system. It is a serial bus system that is used as an open communication system for intelligent devices. It functions as an interface between the tachograph, the vehicle instrument cluster and other systems within a vehicle. The CAN bus transmission line CAN_H and CAN_L are protected against short circuits and electrical transients, which may occur in an automotive environment. In case of short circuit (CAN_H to CAN_L or ground and vice-versa) the protection circuit recognises this fault and the CAN transmitter output stages are disabled. It should also be noted that CAN bus via the rear connector could be used for programming a tachograph with calibration parameters instead of the front calibration (6-pin) connector.

Note!
The primary CAN bus of the vehicle must be connected to the A-CAN Bus on the tachograph! The C-CAN is used for telematic devices. Cables can be purchased from Stoneridge for most vehicle types.

ADR Tachograph

Hazardous Goods Vehicles

The ADR version of the tachograph is approved for use in hazardous goods vehicles. It differs from the standard tachograph as it has explosion protection and is certified in accordance with EU Directive 94/9/EC.

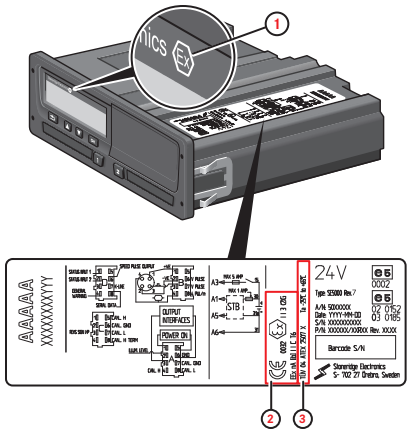
TÜV (Technischer Überwachungs Verein) test certificate number: ATEX 2507 X, with corresponding supplements.

Note!
The ADR tachograph explosion protection is only guaranteed when the vehicle is stationary and the battery isolating switch is open.

Visible Differences

The following visible differences between a standard Tachograph and an ADR Tachograph:

1. **Ex** symbol on the Tachograph front
2. ADR classification
3. TÜV test certificate number



The ADR Tachograph

For the ADR Tachograph some functions are disabled immediately when the ignition is switched off:

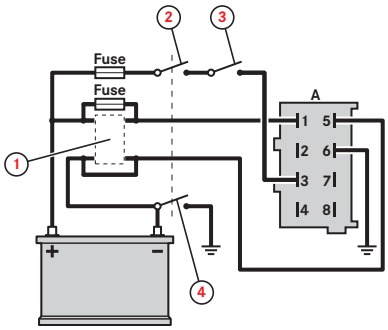
- Card trays cannot be ejected.
- Printouts are not possible.
- Background illumination for buttons and display is switched off.

Note!
The ADR Tachograph will enter the power saving mode immediately after the ignition is switched off.

To have the ADR Tachograph fully operational, the ignition key must be in position key-on or ignition on, depending on your vehicle manufacturer.

Fitting an ADR Tachograph

When fitting a Stoneridge ADR tachograph the unit must be fitted within the truck cabin. To ensure that the tachograph conforms to IP54, the unit must be fitted in horizontal level. If a tachograph is to be fitted at an angle, the front fascia must be lower than the rear of the tachograph. It should also be noted that ADR vehicles might have a safety network integrated into the tachograph wiring system as well as a battery master switch. If fitted, then the safety network will be connected between the main supply from the battery and the tachograph itself. The battery master switch may be at A only, B only or at both A and B.



1. Safety device (optional)
2. Master switch (A)
3. Ignition switch
4. Master Switch (B)

Technical and Electrical Data Specifications (all rear connectors).

Supply circuit (permanent supply from the vehicle battery), A1 (+) and A5 (-); Un=24 volts.

Ignition system (supply via the battery master switch and the ignition switch from the battery), A2 (illumination), A3 (ignition supply) and A6 (chassis ground); Un=24 volts.

Motion sensor connections (compliant with intrinsic safety Eex ib IIC protection), B1 (sensor +ve), B2 (sensor -ve), B3 (sensor signal) and B4 (sensor encryption).

Note!
The motion sensor data is only valid for connection to motion sensor type KITAS 2171.xx according to EU type examination certificate number TÜV 02 ATEX 1842 X).

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 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 if tachograph not can be recording. 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
	Message Entry not possible while driving. Related to the operator.	Stop the vehicle and try the entry again. If the symbol still is present when vehicle stopped, disconnect and reconnect the tachograph and retry. If the symbol still is present after reconnect, tachograph must be decommissioned.
Activation	Message The tachograph is being activated for use (Workshop card).Related to the tachograph	Wait until the automatic activation is completed.
✓ Activation complete	Message The tachograph activation process has been completed (Workshop card).Related to the tachograph	
× Activation failed	Message The tachograph activation process has failed (Workshop card). Related to the tachograph	Eject the workshop card from the tachograph. Check system connections. Re-insert the workshop card to retry the activation. Disconnect the tachograph for 30 seconds and retry. If the tachograph will not activate it must be decommissioned and replaced.
! Already in calibration mode	Message Two workshop cards inserted. The second card will be ejected without being processed (authenticated). Related to the operator.	Insert only one Workshop card.
×1 Card 1 fault	Fault The card in tray 1 is defective. Similar message for tray 2. Related to the card.	Eject the card and check it visually. Check the tachograph with a functional card.
!1 Card 1 time overlap	Warning The last withdrawal time of the inserted driver card is later than the date/time of the tachograph. Related to the tachograph.	Check the date/time of the tachograph and change if necessary. Wait for the overlap period to elapse. If UTC time differs more than 20 minutes, a calibration has to be performed.
!1 Card 1	Fault	Check that the inserted card is valid and cor-

Display	Description	Action
auth.failure	The tachograph security check for the card in tray 1 failed. Similar message for tray 2. Related to the tachograph.	rectly inserted. Check if the card works in another tachograph. Try to insert another card.
!▪▪ Card conflict	Warning An invalid card combination has been detected. Related to the card.	Withdraw the offending card.
!▫←▪2 Card integrity error	Fault Corrupt data detected when reading data from the card in tray 2 to the tachograph. Similar message for tray 1. Related to the card.	Clean the card 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.
!▪→×2 Card eject without saving	Message Data could not be stored on the card withdrawn from tray 1 due to an error. Similar message for tray 2. Related to the card.	Clean the card 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.
◔▪1 Card expired	Message The card in tray 1 has expired. Similar message for tray 2. Related to the operator.	Remove the card and replaced it with a valid one.
1!◔▪ Card expiry	Message The card in tray 1 will expire (Day/Month) . Similar message for tray 2. Related to the operator.	Contact the responsible authority to get a new card.
1 Card expires in xx days	Message The card inserted in tray 1 expires in xx days, where xx is a number between 0 and 30. Similar message for tray 2. Related to the operator.	Contact the responsible authority to get a new card. The message disappears automatically after 5 seconds or when a button is pressed.
!▪⊡ Card ins. while driving	Warning A tachograph card is inserted in any slot while driving. Related to the operator.	No further action required.
!▫A/A Data integrity error	Fault Corrupted files have been detected in the tachograph. These files will not have a valid signature when downloaded. Related to the tachograph.	Check for evidence of tampering with the tachograph. If there is evidence of tampering the tachograph must be decommissioned and replaced.
?⊡▮▶ daily drive time	Pre-warning - 9h daily drive time Warning - 9h daily drive time Pre-warning - daily drive time Warning - end of daily driving time Four different warnings for reaching the allowed driving time.	
1!▪↧ d/m download card	Message Indicates the time to next download of the card (Day/Month).	Prepare for download.
!A↧ d/m download vehicle	Message Indicates the time to next download from the tachograph (Day/Month).	Prepare for download.
↧✓↧ Download complete	Message The tachograph download process has been completed successfully.	No further action required.
↧×↧ 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.

Display	Description	Action
		Replace or repair the download equipment if required. If the tachograph is faulty beyond repair it must be decommissioned and replaced.
Driving can't open slot	Message An attempt was made to open the slot while the vehicle was in motion. Related to the operator.	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 remove inappropriate card.
! end of daily drive	Warning Maximum daily driving time	
! end of weekly drive	Warning Maximum weekly driving time	
! end of weekly work	Warning The weekly working time is reached according to the 60 h WTD rule.	
! end of 2-week drive	Warning Maximum 2-week driving time	
fn Function not possible	Message The desired function cannot be carried out. Related to the tachograph.	No further action required.
! Hardware sabotage	Fault Authenticated card has been removed by force or a tampering with the hardware has been detected.Related to the operator.	Check for evidence of tampering with the tachograph. If there is evidence of tampering the tachograph must be decommissioned and replaced.
! Insertion of a non valid card	Warning A non-valid card has been inserted to a slot. Related to the operator.	Check that the card has not been inserted upside down or is expired.
! 1 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 tray 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 the responsible authority in the country in which you are at present in.
! 30' max interruption	Indication of the remaining interruption time	
M.....! Memory full!	Message Manual entries memory full. Related to the operator.	Modify the manual entries so that the total number of entries is less.
New time? 03:01	Message Daylight saving time changes.	Answer **YES** to start or end daylight saving time. Answer **NO** or press the **Back** button to cancel.
!Td/m next calibration	Warning Next mandatory calibration has to be carried out (d/m = Day /Month)	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.	Insert a driver or workshop card.
! ? No	Fault	Replace the motion sensor.

Display	Description	Action
further details	An unknown type of sensor error occurred. Related to the motion sensor.	
>> Over speeding	Warning The vehicle speed has exceeded the speed limit set for 1 minute and will be stored. Related to the operator.	Find out the maximum speed allowed for the vehicle.
>>? Overspeeding pre-warning	Message The vehicle is exceeding the over speed limit set. After 1 (one) minute of continuous over speeding the warning will be stored. Related to the operator.	Driver related message. Observe the specified speed limit
Л→А...✓ Pairing complete	Message The motion sensor - tachograph pairing process has been completed successfully. [Workshop card]. Related to the tachograph or motion senor.	No further action required.
Л→А...× Pairing failed	Message The motion sensor - tachograph pairing process has failed. [Workshop card]. Related to the tachograph or motion sensor.	Remove the workshop card from the tachograph. Check the system connections. Re-insert the workshop card to retry pairing. Replace the sensor if required. If the message is shown repeatedly the tachograph might be faulty beyond repair and must be decommissioned and replaced.
PIN?	Message Enter a PIN code to: • Activate a tachograph • Enter the tachograph calibration mode [Workshop card]. Related to the tachograph.	Enter a valid PIN code.
!ϟ 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.	Check the vehicle and tachograph power supply levels. Check the power supply cables. Check the vehicle´s battery and replace if necessary.
▼↑□ 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.	Wait until the printer temperature is in allowable range and try to print again.
▼↓ϟ Printer low power	Message The ongoing printing has been interrupted because the tachograph input voltage is too low. Related to the vehicle.	Check that the ignition is on. Check the vehicle battery voltage, connections, etc.
▼↓□ Printer low temperature	Message The printing could not start because the temperature of the printer is too low. Related to the printer.	Wait until the printer temperature is in allowable range and try to print again.
▼ℓ× Printer out	Message	Replace paper.

Display	Description	Action
of paper	The ongoing printing has been interrupted because the printer is out of paper.	If fault remains active for no apparent reason the tachograph must be decommissioned and replaced.
▼×▼ Printing cancelled	Message The ongoing printing has been cancelled.	No further action required.
>4 1/2h? Quarter left reminder	Message The driver has 15 minutes left until the legal maximum continuous driving time of 4½ hours will be exceeded.	Find a suitable place to take a break in the next 15 minutes.
?*6h reminder break	Pre-warning A reminder for a break according to the 6 h WTD rule.	
?▶Ih reminder daily rest	Pre-warning A reminder for the daily rest.	
!▶Ihh reminder weekly rest	Pre-warning A reminder for the weekly rest.	
×⍋⎍ secondary sensor fault	Fault No or erroneous data from the second source motion sensor. Related to the motion sensor.	Check second source sensor operation and wiring.
!⍾⎍⍋ Sensor auth. failure		Check motion sensor operation and all wiring. Check for evidence of tampering. Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
!⎍=0 Sensor cable fault	Warning Sensor data error. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
!⎍>0 Sensor cable fault	Warning Motion sensor data error. Related to the motion sensor.	Check the motion sensor operation and wiring. Replace the motion sensor if necessary.
!⍾⎍/⎍ 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. If the error remains active for no apparent reason, decommission and replace the tachograph.
×⎍ Sensor fault	Fault A data link error between the motion sensor and the tachograph. Related to the motion sensor.	Check the motion sensor operation and all wiring. - replace sensor if faulty Check for evidence of tampering. Pair the motion sensor and the tachograph again.
!⍾⎍/⎍ Sensor data integrity error	Fault Internal motion sensor error, stored data integrity	Replace the motion sensor if necessary.

Display	Description	Action
	failure. Related to the motion sensor	
×⎍✓× 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.
×⎙←⎍ 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.
⎍→⎙... Sensor pairing	Message The motion sensor and tachograph is in the process of pairing. Related to the motion sensor.	Wait until the automatic pairing is completed.
×⎙⎍ǂ↑ Sensor power high	Fault Motion sensor power too high. Related to the motion sensor.	Check the vehicle battery voltage, wiring, etc. Replace the motion sensor if necessary.
×⎙⎍ǂ↓ Sensor power low	Fault Motion sensor power too low. Related to the motion sensor.	Check the vehicle battery voltage, wiring, etc. Replace the motion sensor if necessary.
!⎍ǂ Sensor no power signal	Fault Motion sensor has no power. Related to the motion sensor.	Check the vehicle battery voltage, wiring, etc. Replace the motion sensor if necessary.
⎙→T? Service pre-warning	Message Next calibration, pre-warning.	Perform a calibration.
>4 1/2h Time for break	Message The legal maximum continuous driving time of 4½ hours has elapsed.	
!✻6h time for break	Warning Take a break according to the 6 h WTD rule	Minimum break 15 min
!⎙→T Time for service	Message The tachograph is out of calibration.	Perform a calibration.
!▶Ih time for daily rest	Warning A warning for start of daily rest.	
!▶Ihh time for weekly rest	Warning A warning for start of weekly rest.	
▪→◷ Timeout no key pressed	Message The tachograph is waiting for input.	Press the appropriate buttons and complete the process.
! UTC Time adjust not allowed	Message UTC time adjustment more than +/- 1 (one) minute once a week is not allowed.	If the UTC time in the tachograph has deviated by more than 20 minutes, it must be calibrated by a digital tachograph workshop.
×▮/▮∠× Unable to open slot	Message The card tray concerned cannot be opened. Related to the tachograph.	Check that the ignition is on. If the tray is still faulty - Visit a digital tachograph workshop to have the equipment checked.
!▮⎍⎍ Unauth. change of sensor	Fault The sensor has been changed since last pairing. Related to the motion sensor.	Check the motion sensor operation and all wiring. - replace sensor if faulty Check for evidence of tampering. Pair the motion sensor and the tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
×⎙ VU	Fault	The tachograph has to be decommissioned

Display	Description	Action
internal fault	The tachograph has detected an internal fault. Related to the tachograph.	and replaced.
! Wrong PIN! Attempts left:2	Message Wrong PIN entered but still attempts left. [Workshop card].Related to the card	Press **OK** and try again.
×▲Ⅱ Vehicle Motion Conflict	Message 2nd source of motion sensor and primary motions sensor data contradicts. Related to the motion sensor.	Check second source sensor operation and wiring. Check for evidence of tampering. Use reference cables.
Wrong PIN! Card locked 1	Message Wrong PIN entered too many times. [Workshop Card] Related to the card	Eject the card and replace it with a valid one.
?✱▮ weekly work time	Pre-warning Reaching the weekly working time according to the 60 h WTD rule.	

Event, Fault and Diagnostic Trouble Codes

A list of all DTCs that are stored in the Stoneridge digital 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.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
			General events	
0x02		Card conflict	An invalid card combination has been detected. For example a company and a workshop card.	Withdraw the offending card.
0x03		Time overlap	The last withdrawal time of the inserted driver card, as read from the inserted card, is later than the UTC time of the tachograph.	Check the UTC time of the tachograph. Wait for the overlap period to elapse. If UTC time differs more than 20 minutes, a calibration has to be performed.
0x04	0x1260	Driving without an appropriate card	Driving without a valid card or with an invalid card combination.	Stop and insert a valid card and/or remove inappropriate card.
0x05		Card inserted while driving	A tachograph card is inserted in any slot while driving.	No further action required.
0x06		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.	No further action required.
0x07		Overspeeding	The speed of the vehicle has exceeded the highest speed allowed for the vehicle. This has been active during at least 60 seconds.	Get information on the maximum speed allowed is for the vehicle.
0x08	0x0004	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.	Check the vehicle and tachograph power supply levels. Check the power supply cables.
	0x2004	Power supply interruption (MS)	Power supply to motion sensor has been interrupted for more than 200 ms.	Check the vehicle and motion sensor power supply levels. Check the motion sensor operation and all the wiring, replace the sensor if faulty.
0x09	0x2180	Motion data error (No CNTR)	Motion sensor data incorrect. Tachograph receives speed value from motion sensor without receiving any pulses.	Check motion sensor operation and all wiring. Check for evidence of tampering.
	0x2280	Motion data error (CNTR	Motion sensor data incorrect. Tachograph receives speed counter value from motion sensor that differs from value calculated by the tachograph.	Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system.
	0x2452	Motion data error (Event)	Motion data incorrect. Tachograph signature mismatch.	Replace the sensor if found faulty.
		VU Security breach attempts		
0x11	0x2452	Motion sensor authentication failure	An unsuccessful authentication attempt of the motion sensor has	Check motion sensor operation and all wiring.

Code	DTC	Type of event or fault	Description	Suggested action to be taken
			been detected.	Check for evidence of tampering. Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
0x12		Tachograph card authentication failure:	The inserted card cannot be authenticated by the tachograph.	Check that the inserted card is valid and correctly inserted. Check that the card works in another tachograph. Try to insert another card.
0x13	0x2452	Unauthorised change of motion sensor	The sensor has been changed since last pairing.	Check motion sensor operation and all wiring. Check for evidence of tampering. Pair the motion sensor and tachograph again. Perform a new calibration of the tachograph system. Replace the sensor if found faulty.
0x14		Card data input integrity	The cryptographic communication with the card inserted (in slot 1 or 2) is unsuccessful.	To check the card, insert it in another tachograph. Try to insert another card.
0x15		Stored data integrity error	The stored data is erroneous. Most likely, the tachograph is tampered with.	Check for evidence of tampering with the tachograph.
0x18		Hardware sabotage (Security violation)	Card has been removed by force or tampering with the hardware has been detected.	Check for evidence of tampering with the tachograph Decommission and replace the tachograph.
Motion sensor related events				
0x0A	0x2680	Motion Senor Conflict	Motion sensor and 2nd source of motion contradict	Check the motion sensor operation and all wiring. Check for evidence of tampering. Pair the motion sensor and the tachograph again. Perform a new calibration of the tachograph system. Replace sensor if found faulty.
0x0A	0x2780	Motion Sensor Conflict (Speed contradict)	Motion sensor and 2nd source of motion speed values contradict	Check the motion sensor operation and all wiring. Check for evidence of tampering. Check DTC related to 2nd source in the vehicle for example ABS. Pair the motion sensor and the tachograph again.

Cod-e	DTC	Type of event or fault	Description	Suggested action to be taken
				Performa a new calibration of the tacho-graph system. Replace sensor if found faulty.
-	0x2880	Motion Sensor Conflict due to no 2nd Source received (No2ndSource)	Loss of 2nd source speed value.	Check DTCs related to 2nd source in the vehicle. Check CAN communication/gateway.
-	0x2980	Motion Sensor Conflict due to not valid 2nd Source received (No2ndSource)	Loss of 2nd source speed value.	Check DTCs related to 2nd source in the vehicle. Check CAN communication/gateway.
-	0x2A80	Motion Sensor Conflict due to erroneous 2nd Source received (No2ndSource)	Loss of 2nd source speed value.	Check DTCs related to 2nd source in the vehicle. Check CAN communication/gateway.
0x20	0x2508	No further details	Motion sensor internal error	Replace the motion sensor.
0x21	0x2508	Authentication failure	Motion sensor internal error, authentication failure.	Replace the motion sensor.
0x22	0x2508	Stored data integrity error	Motion sensor internal error, stored data integrity failure	Replace the motion sensor
Recording equipment faults				
0x31	0x0139 0x0800 0x2007	VU internal fault	Internal fault in the tachograph	If DTC remains active for no apparent reason, decommission and replace the tachograph.
0x35	0x2280	Sensor fault Error response or ACK	Motion sensor communication error. Content of ACK or response is not correct.	Check motion sensor operation and all wir-ing. Check for evidence of tampering. Pair the motion sensor and tachograph again.
	0x2003 (4 sec)	Sensor fault (MS Power to Low)	Motion sensor power supply too low.	Perform a new calibration of the tacho-graph system. Replace the sensor if found faulty.
	0x2380	Sensor fault (No ACK)	Motion sensor communication error. No ACK received when expected.	
	0x2380	Sensor fault (No response)	Motion sensor communication error. No response received when expected	
Card faults				
0x40		Card fault - No further details		Withdraw the card and check it. Insert the card into another tachograph and verify functionality.
	0x0200	Slot 1	Error detected on inserted card in slot 1.	Insert another card and verify func-tionality.
	0x0300	Slot 2	Error detected on inserted card in slot 2.	
Manufacturer specific events and faults, i.e. pop-ups				
	0x0660	Printing stopped, out of paper	Printer is out of paper.	Insert a new paper roll.
	0x01C0	Overspeeding pre warn-ing	The speed of the vehicle has exceeded the highest speed	Driver related message.

Cod-e	DTC	Type of event or fault	Description	Suggested action to be taken
			allowed for the vehicle. This has been active during less than 60 seconds and the overspeeding event is not yet activated.	
	0x0D40	Calibration error	Calibration error, time for periodic inspection. Two years has passed since last calibration.	Perform a calibration.
	0x0B78	CAN bus off	CAN bus off, A connector, also named TCO-CAN.	Check cables, especially A connector at the back of the tachograph.
	0xFD0B	CAN bus off, FMS CAN	CAN bus off, C connector, also named FMS-CAN.	Check cables, especially C connector at the back of the tachograph.
	0x0007	VU power supply high	Tachograph power supply voltage is higher than maximum value.	Check vehicle power supply levels. Check power supply input to tachograph. Check all connections and tachograph operation.
	0x0003	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. Check power supply input to tachograph. Check all connections and tachograph operation.
	0x0900	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 motion sensor operation and all wiring – replace sensor if faulty. Check speed pulses are not being injected through front connector.

Frequently asked Questions, FAQ

In the list below the most common questions asked and their corresponding answers are listed.

Frequently asked questions	Answers
What digital tachograph can be fitted in this vehicle?	Please contact customer support workshop.support@stoneridge.com Workshop Support +44(0) 870 887 9200
The tachograph will not read / recognise the card.	Ensure that the card is correctly inserted, see heading **Insert a Workshop Card** on page **7**. Clean the card and retry. Try the card in both slots and in another tachograph . Is the card valid? Driver cards are only read if the Tachograph is activated. If a workshop card is inserted in a non-activated Tachograph, it will accept it and ask for the PIN. If the PIN is OK it will then automatically activate the Tachograph. Check displayed messages when card is inserted, see heading on page **42**.
I cannot download data from the tachograph .	Check that the workshop card is inserted and accepted, i.e the tachograph is in calibration mode. Remove the power to the tachograph and retry after reconnecting. Decommission the tachograph if the fault remains.
My card is stuck in the tachograph , how do I retrieve my card?	Remove the power to the tachograph and retry after reconnecting, heading **Opening Failing Card Trays** on page **35**.
Data integrity error on the display.	Contact your Stoneridge dealer for actions.
Why does the printout at the end of the day show more driving time than the driver thinks is done?	Because of the EU one minute rule, i.e any minute that contains at least one second of driving results in the whole minute being registered as driving.
Drivers are warned to take a break after inserting their card for a new shift due to not changing activities when removing their card at the end of the previous shift.	Before removing the driver card, ensure that the mode is changed to rest, or add Manual Entries with the activity “Rest”. (rest until now?-> yes).
The illumination does not work.	Turn on the illumination using the MKII programmer.
Why can I not program all the SE5000 functions using SVDO programmer?	Only the functions necessary to calibrate the SE5000 are included in the SVDO programmer.
Where do you plug in the programmer / download tool?	Behind the printer cassette, see heading **Calibration and Download Front Connector** on page **39**.

STONERIDGE - EVERY ANGLE COVERED

Stoneridge | SE5000 Exakt *Duo²*

Stoneridge Electronics Ltd

Charles Bowman Avenue
Claverhouse Industrial Park
Dundee DD4 9UB, Scotland

Tel: +44 (0)1382 866 400
Fax: +44 (0)1382 866 401
E-mail: amsales@stoneridge.com

www.stoneridge-electronics.com

Stoneridge

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