E-TRIP®

Onboard Computer
for Fleet Management

Mounting Guidelines

Version: 2004/08/16 Order No.: 9526

1) E-TRIP Onboard Unit
2) E-TRIP Operating Manual
3) Cable set
4) Built-in frame
5) Clamps
6) PSRR antenna
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8) GSM antenna
9) Driver card

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1 INTRODUCTION

E-TRIP® is a high-performance onboard computer for motor vehicles such as trucks, buses or cars. Having the size of a car radio, the onboard unit collects vehicle operation data, driver and environmental data and transfers them to the fleet via GSM (Global System for Mobile Communications, SMS - Short Message Service). It supports all administration tasks occurring in a modern fleet and is a basic part of a digital fleet management system.

E-TRIP® may also serve for toll collection or work as accident data recorder. The unit is able to display limit and threshold values as well as indicate alarm conditions.

E-TRIP® is a manipulation-safe unit. You are able to analyze the fuel economy of your vehicle's fleet while the driver can check the vehicle's operating data.

E-TRIP® has been designed as a modular unit. You can configure the unit according to your individual requirements.

1.1 System architecture and components

E-TRIP® comprises the following components:

- LCD (Liquid Crystal Display)
- Operation keys
- Signal generator
- LED´s
- GPS module
  for the exact location and tracing of vehicles, RSE (Road Side Equipment) is not required
- GSM (Global System for Mobile Communications) module for the data transfer through the mobile telephone network
- PSRR module
- OrbComm module (option)
- **E-TRIP Service Tool** – the **E-TRIP®** configuration program that runs under MS Windows® on your PC
- System cards - one system card for the company - supplied by your service center
- Driver cards - one driver card for each driver

1.2 Functions

Using the full range **E-TRIP®** allows you to:

- log to vehicle data, tracking data and environmental data securely,
- store these data securely,
- transfer these data automatically and securely,
- display data "driver-friendly", i.e. clearly and easily legible,
- check data, and
- control engine, fuel consumption and efficiency.

LCD (Liquid Crystal Display): two lines, each of 16 characters length, for digital readouts, menu functions and submenus, messages

Operation keys: for manual inputs, menu control, operations.

Acoustic signals: to confirm correct operation actions or signal errors.

RTC (Real-Time Clock): battery-backed, For the correct time information. Switches between standard time and daylight saving time.

GPS receiver: Use of the GPS (Global Positioning System) satellite signals for vehicle's positioning, either upon request or at adjustable intervals.

PSRR: (Private Short Range Radio). The automatic data transfer between the onboard unit and the dispatcher can be realized in a short range (approximately 150 ft.).

Serial external interface: allows the connection of a temperature sensor, for example in the loading space of the vehicle.

SAEJ1708 interface: collection of vehicle data

Acceleration and gyro sensors for three axles are important if you would like to use **E-TRIP®** as accident data recorder (future implementation).

Digital input 0/12 V: storage and recall of the brake block erosion by using the brake pedal

ARO (Auxiliary Relay Output): Customized relay function to switch a relay via GSM (see signal: ARO_A and ARO_B in chapter 3.4).

⚠ **It is not allowed to control the motor management via this function!**

Smart card reader: for bringing into service, driver identification, programming, service application

2 STATEMENTS

1. **Statement according to FCC part 15.19:**

   This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2. **Statement according to FCC part 15.21:**

   Modifications not expressly approved by this company could void the user's authority to operate the equipment.

3. **Statement according to FCC part 15.105:**

   NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

   - Reorient or relocate the receiving antenna.
   - Increase the separation between the equip-ment and receiver.
   - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
   - Consult the dealer or an experienced radio/TV technician for help.

4. **RF Exposure mobile:**

   The external antennas used for this mobile transmitter must provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

5. **Statement according to road safety:**

   The use of the function ARO (Auxiliary Relay Output) of the **E-TRIP®** is not permissible in the member countries of the Economic Commission for Europe (ECE) to control the engine. It is not permitted, with the help of relay functions, to influence the control of engine management or to influence other functions affecting vehicle or road safety, in vehicles participating in public transport.

3 INSTALLATION

E-TRIP® has to be installed by service personnel of a special workshop only. The correct connection and first software installation as well as configuration are reserved to specialists and mandatory for the proper and fault-free function of the unit.

The location of installation is optional and can be chosen according to your individual requirements.

Please ask your dealer for more information.

The detailed description of the installation is given in a separate document. This document is available from your vendor or service partner.

3.1 Antennas

For the installation of the antennas for E-TRIP only the following two antennas are permissible:

1) **AEB 2400** for PSRR (DECT)
   Technical Data:

Frequencies:	2.1/2.8 GHz UMTS-BLUETOOTH
Impedance:	50 Ohms
Gain:	2.65 dBi

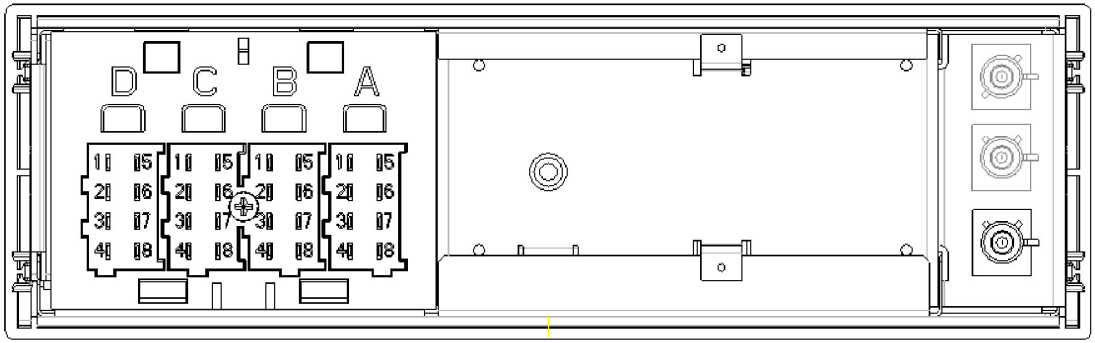
2) **MCA 18 90 STRIPE** for GSM
   Technical Data:

Frequency range:	AMPS:	824 - 894 MHz
	GSM 900:	880 - 960 MHz
	GSM 1800:	1710 - 1880 MHz
	GSM 1900:	1850 – 1990 MHz
Impedance:	50 Ohms	
Gain:	2.1 dBi	

3.2 Maintenance

To clean the unit's front panel, use a clean cloth only. It should be soft, dust-laying and antistatic. Don't apply any cleaning agents, in order to prevent the surface from being damaged. Special cleaning measures or procedures are not required.

3.3 Connection of the device



Chamber D	
D1	TEMP_Sens_A
D2	TEMP_Sens_B
D3	NMEA_TxD
D4	GND
D5	AUX_SER_TxD
D6	AUX_SER_RxD
D7	AUX_SER_DSR
D8	AUX_SER_DTR

Chamber C	
C1	DIGI_IN_1
C2	DIGI_IN_2
C3	DIGI_IN_3
C4	DIGI_IN_4
C5	ALARM_A
C6	ALARM_B
C7	ARO_A
C8	ARO_B

Chamber B	
B1	Speed Pulse
B2	-
B3	-
B4	RPM
B5	-
B6	SAE_J1708_A
B7	SAE_J1708_GND
B8	SAE_J1708_B

Chamber A	
A1	Battery +
A2	Light
A3	Ignition
A4	-
A5	GND
A6	(GND)
A7	-
A8	-

3.4 Description of signals

Chamber A:

A1 Battery+ :	Vehicle on-board supply system +9V ...+36V
A2 Light:	for switching on the OBU through the vehicle light.
A3 Ignition:	for switching on the OBU through the ignition.
A5 GND:	Vehicle on-board supply system: ground

Chamber B:

B1 Speed Pulse:	Available speed signal in sine-shaped or rectangular form. $V_{L\ max.}$ = 3.0V $V_{H\ min.}$ = 4.5V (tolerant up to 40V)

NOTE: If the speed is metered via input B1, then input B4 shall be connected with a respective RPM sensor or connected to ground.

B4 RPM	Alternatively to bus J1708, the OBU can meter the engine speed also via the pulse output of the RPM sensor.
B6 SAE_J1708_A:	SAE J1708 Interface, Line A
B7 SAE_J1708_GND:	SAE J1708 Interface, GND
B8 SAE_J1708_B:	SAE J1708 Interface, Line B
	B6 – B8: see subchapter 3.4.1

Chamber C:

C1 DIGI_IN_1:	Input: +9V ... +36V DC
	C1 – C4: see subchapter 3.4.2
C2 DIGI_IN_2:	Input: +9V ... +36V DC
C3 DIGI_IN_3:	Input: +9V ... +36V DC
C4 DIGI_IN_4:	Input: +9V ... +36V DC
C5 ALARM_A:	Relais output
C6 ALARM_B:	C5 – C6: see subchapter 3.4.3
C7 ARO_A:	Auxiliary Relay Output
C8 ARO_B:	C7 – C8: see subchapter 3.4.3.2

Chamber D:

D1 TEMP_Sens_A:	Input of temperature sensor
D2 TEMP_Sens_B:	D1 – D2: see subchapter 3.4.4
D3 NMEA_TxD:	RS232 - port for connection of external navigation devices with NMEA input; see subchapter 3.4.5
D4 GND:	Ground NMEA output resp. PIN 5 D-SUB9 ORBCOMM
D5 Aux_Ser_TxD:	PIN 3 D-SUB9 ORBCOMM
D6 Aux_Ser_RxD:	PIN 2 D-SUB9 ORBCOMM
D7 Aux_Ser_DSR:	PIN 6 D-SUB9 ORBCOMM
D8 Aux_Ser_DTR:	PIN 4 D-SUB9 ORBCOMM
	D4 – D8: see subchapter 3.4.6

3.4.1 SAE J1708 Interface

The onboard unit can record the following information via the vehicle interface SAE J1708:

1) Speed
2) Engine speed
3) Fuel consumption
4) PTO
5) Brake Indicator
6) Reverse gear

The speed can be recorded through J1708 or a speed pulse input. The Onboard Unit also registers the engine speed and PTO status. With help of the PC program **E-TRIP Service Tool** it is possible to determine which input of the Onboard Unit shall be used.

3.4.2 Digital Input

The digital inputs allow to have below functions recorded by the Onboard computer:

1) PTO
2) Direction indicator {Turn Indicator}
3) Brake indicator {Brake Indicator}
4) AUX 1 Input

   This input offers to collect and record any digital information delivered by the Onboard Unit.
5) AUX 2 Input
   like with 4)

The inputs C1 ... C4 can be configured with help of the PC program **E-TRIP Service Tool**. For further information on this topic please refer to the Service Tool Manual.

3.4.3 Digital Output

3.4.3.1 ALARM interface

If the external temperature sensor indicates that the real temperature has exceeded the programmed temperature limit or fallen below a minimum value, the ALARM output will be activated and displayed as alarm message.

Upon wiring of output C6, C7, the following limits must not be exceeded.

Relais Rating:

- Nominal switching capacity: 2A 30V DC
- Max. switching power: 60W
- Max. switching voltage: 220 V DC

3.4.3.2 ARO interface

The ARO (Auxiliary Relay Output) serves for triggering a vehicle relay which control any customized function. To use this function, it is necessary to enter a PIN upon setting the specific vehicle data set under **E-TRIP Master**.

Recommendation to the workshop personnel:

The workshop card offers to select from the onboard unit menu the function ARO relay. It allows to enable resp. disable the ARO function.

Menu -> Services -> System -> Aux.RelayOutput

- If the ARO function is disabled, the Onboard Unit switches through the ARO if a High signal is applied to the input of clamp A3.
- In case the ARO function is initiated by the Office, the Onboard Unit activates the function after the engine has been switched off. For this, it is relevant that the engine speed input is adequately switched.

The ARO represents a galvanically separated contact.

Upon wiring of output C7, C8, the following limits must not be exceeded.

Relais Rating:

- Nominal switching capacity: 2A 30V DC
- Max. switching power: 60W
- Max. switching voltage: 220 V DC

3.4.4 Temperature sensor

The clip contacts D1 and D2 permit connection of an external temperature sensor that can be acquired from your supplier under order no. 9514. After installation of the hardware and activation through the PC program **E-TRIP Service Tool**, the temperature value can be indicated by the Onboard Unit. The activation is carried out with help of *Cargo Temperature* on the register card *HW Settings*.

3.4.5 NMEA interface

The control of peripheral PC equipment (laptops, PDAs, etc.) by using navigation software can be executed via output D3/D4 of the Onboard Unit in a way that the current vehicle position is transmitted via this interface. In addition to the output D3/D4, the vehicle position is also sent out via the service interface on the front panel of the Onboard Unit. The vehicle position data can be sent only then if below smart cards: *System Card* and *Workshop Card* are not inserted und the **E-TRIP Service Tool** is not linked with the Onboard Unit.

The following NMEA 0183 records will be sent to the navigation software:

1) $GPGGA
2) $GPVTG
3) $GPRMC

3.4.6 Auxiliary Serial Port

The „Auxiliary Serial Port“ represents a serial interface (RS232) with two control wires DSR and DTR. This interface allows, i.a., connection of an ORBCOMM module. For this, please use the cable set provided as part of the OrbComm supply package.

3.5 Installation of the Onboard Unit

Safety precautions :

Upon device installation make sure to keep a minimum distance of 20 cm between the radio antenna(e) and the workplace.

Any application of the device other than for its contractual use may cause not only property damage. Therefore always make sure to apply our product only for the intended use !

During installation and connection please observe the following safety precautions:

- Disconnect negative pole of the battery!
  Observe the safety instructions from the respective car manufacturer. Note that, upon disconnecting, devices with volatile memory will lose their information. Therefore it is necessary, before disconnection, to write down all relevant data and to notify the car owner that there may be need for reprogramming.
- When drilling holes, make sure not to damage any car parts or electric wires.
- The cross section of both positive and negative cable must not be less than 0.5 mm².
- Improper installation may cause interferences with the Onboard Unit and other electronic systems of the vehicle.
- E-TRIP shall be connected to the in-car outlets as recommended by the car manufacturer only through the cable set provided as part of the supply.

Installation in the car dashboard and other mounting slots provided:

1. Remove holding frame (figure 1) after having unlocked the arresters.

   Insert the two clamps (figure 2) until stop into the designated holes in the faceplate. Then remove holding frame.

Holding frame

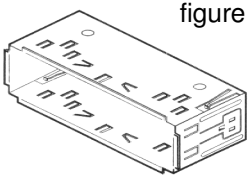


figure 1

Clamps

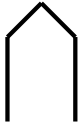


figure 2

2. Install holding frame in the dashboard.

   Note :
   Before installation of the holding frame, pull cable trunks through the holding frame!

   After proper installation of the holding frame in the dashboard, turn the respective latches to lock the holding frame safely in its place (see figure 3).

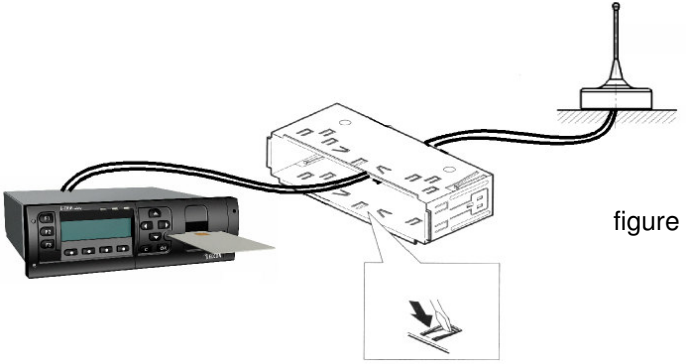


figure 3

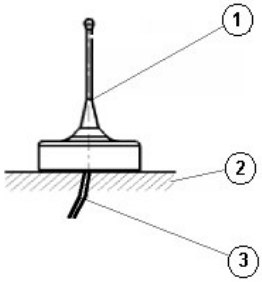
3. Now establish the required electrical connections to the car outlets as recommended by the car manufacturer.

   Before connection :
   Please check carefully the wiring inside your vehicle. Improper wiring may cause not only damage to the device, but also cable fires or battery explosions.

4. Choose an appropriate position for the GPS / GSM antenna. Make sure to direct the GPS antenna towards the sky, i.e. it must have free sight to the sky.

   Make the fastening holes and the cable grommets for the GPS / GSM antenna.

   The bending radius of the cables must not be less than 1 cm. Pay attention to above safety precautions!



(1) GPS-/GSM-antenna
(2) Car roof
(3) GPS /GSM cable

Connect the antenna cables (blue for GPS, violet for GSM, fawn for PSRR), until they noticeably snap in.

Connect the cable trunks with the four plugs of different colours to the device, until they noticeably snap in.

(A-white, B-yellow, C-red, D-brown). Note the proper fitting as shown in figure 4.

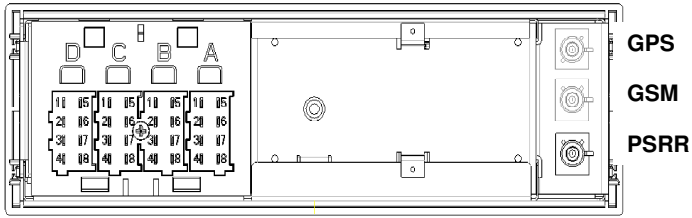


figure 4

5. Carefully push the device into the holding frame until it noticeably locks in place. With this, the cables must not be jammed nor crimped!

6. **Note :**
   In case your vehicle is not equipped with the special terminal clamps for connection, it shall be respectively retrofitted by an authorized car workshop, or by the Technical service (see *Agency Information*, Page 21).

3.6 SIM card installation

⚠ Make sure you have got a plug-in SIM card.

Insert the SIM card into the provided SIM card holder, see figure 5 .

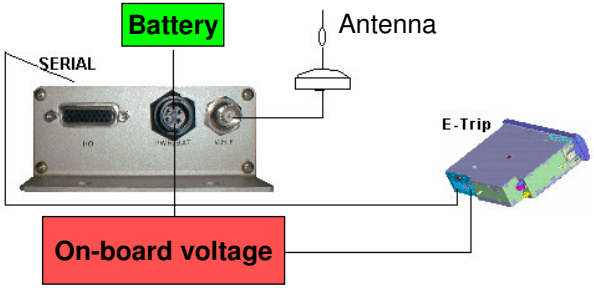
figure 5

After this, insert the SIM card holder into the Onboard Unit as shown in figure 6, until the card holder snaps in. Make sure that the chip points to the top (cf. also figure 5).

figure 6

3.7 Installation of Orbcomm modem (Option)

Modul type: ST 2500 Data Communicator



1. Please choose an appropriate mounting position for the modem und the battery in the vehicle. Make sure that modem and the related battery are situated not too far from each other.
2. Fasten the modem by means of screws at the four designated fixing points; see (A) figure 7. After this, fasten the battery with the provided holding angle.

figure 7

3. When laying the cables, take care not to jam or cut-off the cable by moving parts such as seat rails, doors etc.
4. Fix the antenna in a suitable position on the vehicle roof and lay the cable in such a way that it will not be damaged. The bending radius of the antenna cable must not be less than 1 cm.
5. Link the Onboard Unit and the ORBCOMM Modem through chamber D with the modem´s 9-pole connection socket (SERIAL).

figure 8

6. Finally, connect the cable set to the outlets recommended by the car manufacturer (+V and – Ground). After this, link the circular connector of the Orbcomm Modems (figure 7, PWR/BAT) and the battery with the modem.

3.7.1 LED Codes of Stella ST 2500

L1 LED:

- While the unit is searching the satellite downlink, L1 flashes in red.
- Once a downlink is captured, the LED turns green.
- Green flash signals indicate that a transmission attempt has been made.

L2 LED:

- This LED shines in yellow when the original buffer contains a message

3.8 Configuration of the Onboard Unit

After installation of the Onboard Unit, it has to be configured for the specific vehicle via the provided service interface cable. For detailed configuration description please refer to the the PC program manual **E-TRIP ServiceTool**.

3.8.1 Setting of date and time

The configuration procedure shall be completed by setting the RTC (Real Time Clock) that forms integral part of the Onboard Unit. For this, insert your workshop card into the Onboard Unit and press button M / OK, to enter the menu. Via the cursor keys you can now select the following menu items:

Menu -> Services -> Date/Time -> Adjustment

which shall be respectively acknowledged by pressing the button M / OK.

After selecting the function (Adjustment) for setting the RTC, at first you shall enter the time.

☝ When doing so, pay attention not to enter the local time, but GMT (Greenwich Mean Time).

Use the cursor keys to set the correct time. Acknowledge your input via button M / OK. Then you may enter the date the same way.

3.8.2 Setting of time zone

After selection of the menu items:

Menu -> Services -> Date/Time -> Time zone

you can enter the value of the local time zone. After this, check the local time by leaving the menu (via button C), to display a driver information that would show time and date in the upper line.

3.8.3 Check GPS function

Insert the workshop card into the Onboard Unit and select the driver information „GPS Data“ via cursor keys ◀ and ▶. Wait until „GPS: no signal“ disappears from the display. When putting the device into service for the very first time, this may take up to 10 minutes.

4 AGENCY INFORMATION

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