

Truck TSS

Tire Safety System TSS for trucksfor trucks

Dept. BEE



User Manual TSS User Manual TSS	Dokument Nr.: Document no.:	Änderungsstand: Status of modification:	Index: Index:
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Section 15.19: Labelling requirements

This device complies with Part15 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.

Section 15.21: Information to the user

The user manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC statement according to RSS210

5.11 User Manual

Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device

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1 User Manual

1.1 System description

The Tire Safety System (TSS) controls and monitors tire pressures.
The system comprises the following components:

- 1 TSS control unit
- 2 - 17 sets of wheel electronics including valve or mounting stud
- 1 - 3 digital antennas

The wheel electronics mounted inside the tire measures tire pressure and temperature at regular intervals and transfers the values telemetrically via a HF transmission line to a reception antenna. In the receiver antenna, the radio data telegram is decoded and transferred to the control unit as a digital signal. The control unit evaluates the received data and forwards the information to the driver as required. This provides the driver with information on the necessary tire pressure or tire tension adjustments.

The benefits offered by the tire pressure control system are:

- Safety
 - An early warning in case of fast pressure loss is given.
 - "Blow-outs" caused by excessive flexing and driving too fast on inadequate tire pressure are avoided.
 - The driver is prompted to adjust the tire pressure where necessary.
- Comfort
 - Tire handling is made simple. Using the filling equipment at the fuel station and removing the valve cap is only necessary for correcting the tire pressure.
- New tire developments
 - Tires with limp-home features avoid having to change a wheel immediately and render the spare wheel superfluous. They do, however, require permanent monitoring of the tire pressure.
- Service life and economy
 - Tire wear is minimized through correct air pressure. Fuel consumption is reduced having the correct pressure. Pressure can be adapted to the load requirements by the driver at every temperature condition of the tire.

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2 Functional description

The wheel electronics are mounted within the tires and measure tire pressure, temperature and wheel electronics. The measured data is sent from the wheel via a send stage in the wheel electronics. A system with relatively seldom measured data transfer is adequate for tire pressure monitoring provided it features the additional option of detecting sudden pressure loss. This enables the electronics in the wheel to be designed for minimum power draw and battery operation.

All wheel electronics have their own code (ID) that is forwarded with the data at each transfer. The HF transfer occurs in the 433 MHz range, referred to as the ISM range. The optional trigger receiver (125kHz LF channel receiver inside the wheel electronic) can be used to implement future auto location functionality in Truck TSS.

Tire pressure and wheel electronics temperature are measured every 5 seconds and were transmitted periodically every 60 seconds together with Wheel electronic identification and additional wheel electronic status information. When a pressure loss > 0.4 bar on the last sent pressure value is detected, the wheel electronics switch immediately to fast-transmitting mode. In this operation mode, the wheel electronic measures and sends every 0.8 seconds.

The TSS measures and transfers considerably more data than is necessary to ensure reliable basic function. It can therefore use a data transfer path that is not assigned for the error-free transfer of each individual data protocol. In case of a critical pressure loss, fast transmitting mode enables the generation of a warning immediately.

The data sent by the wheel electronics is received via the digital antenna and is decoded. The decoded data is transferred onwards to the control unit via a digital interface (LIN interface).

The control unit evaluates the received data and forwards the information to the driver information system as required. This provides the driver with information on the necessary tire pressure or tire tension adjustments.

The main functional characteristics of the control unit are:

- A central warning algorithm
- Generation of wheel position specific, pressure and temperature based warnings
- The vehicle-specific connection for the power supply system and OEM specific operation and display integration.

The essential feature of adaption to several wheel configurations is the possibility to adapt the truck TSS to the numerous truck applications available into the market.

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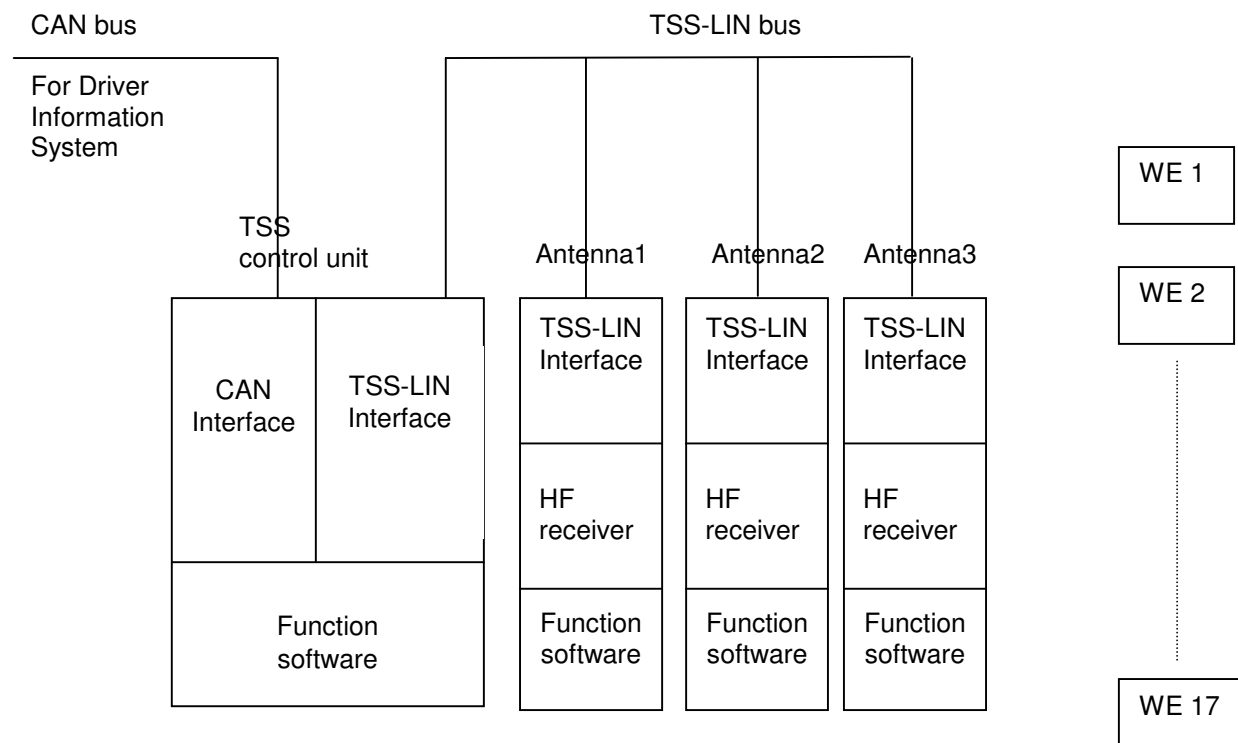


Figure 1: Block diagram of the Tire Safety System TSS for trucks

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3 Warning algorithm

The system monitors a target pressure, which is set by the operator, and a fixed minimum target pressure. The target pressure is temperature evaluated. The fixed minimum target pressure is temperature independent. The driver sets the target pressure (for cold tire condition) in a axle wise manner. This enables the driver to adapt the pressure axle by axle dependent on the different axle load and tire size.

3.1 Warning limit “Nominal pressure minus 0,7bar”

Yellow warning is set if the measured pressure is 0,7bar lower the temperature evaluated target pressure or 0,7bar lower the fixed minimum pressure and 10 telegrams fulfilling this condition were received coherently.

3.2 Warning limit “Nominal Pressure minus 1,2bar”

Red warning is set if the measured pressure is 1,2bar lower the temperature evaluated target pressure or 1,2bar lower the fixed minimum pressure and 2 telegrams fulfilling this condition were received coherently.

3.3 Warning “Fast Pressure loss – damaged tire”

Wheel electronic changes from normal transmitting mode to fast transmitting mode, if pressure change of >0,4bar/Min. happens. ECU monitors pressure change. If pressure from last received normal transmitting mode telegram to actual received fast transmitting mode telegram is lower 0,4bar and fast transmitting mode telegram is received twice fast pressure loss warning is set and indicates damaged tire.