

NASCAR TPMS User Manual

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Statement of compliance to FCC regulations

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.

Statement of compliance to Industry Canada regulations

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 System and functional description

1.1 System description

The NASCAR Tire Pressure Monitoring System (TPMS) monitors vehicle tire pressures and temperatures. The system is comprised of the following components:

- 1 Motorsport DigiTyre ECU (MDE)
- 4 Sets of wheel electronics including mounting system
- 2 Digital antennae
- 4 Trigger transmitters

The wheel electronics mounted on the wheel rim measure tire pressure and temperature at regular intervals and transfers the values telemetrically via a HF transmission line to the reception antennae. The current pressure and temperature values can be requested specifically via the trigger function. In the digital antennae, the radio data telegram is decoded and transferred to the MDE unit as a digital signal. The MDE 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 and/or tire tension adjustment.

1.2 Functional description

The wheel electronics are mounted on the wheel and measure tire pressure, temperature and wheel electronic status. The measured data is sent from the wheel via a transmit 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 minimal power draw and thus maximize battery life.

All wheel electronics have a unique ID code that is forwarded along with data at each transfer. The HF transfer occurs in the 433MHz range, referred to as the ISM range. The trigger functionality is achieved by the use of a 125kHz LF channel.

The control unit calls up the wheel electronics via the trigger transmitters when power is supplied to the MDE. When a pressure loss > 0.2 bar on the previously sent pressure value is detected, the wheel electronics switch immediately to fast-send mode. In this situation, the wheel electronics measure and send every 0.8 seconds.

The TPMS system measures and transfers considerably more data than is necessary to ensure reliable basic function. It can therefore use a data transfer path this is not assigned for the error-free transfer of each individual data protocol. Using the trigger function, an implausible and/or non-received data message can be requested again from the corresponding wheel electronics.

The data sent by the wheel electronics is received via the digital antennae and is subsequently decoded. The decoded data is transferred onwards to the MDE unit via a digital interface (LIN interface). The MDE 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 tension adjustments.

The main functional characteristics of the control unit are:

- A central warning algorithm and an algorithm for the wheel manager.
- The vehicle-specific connection for the power supply system and manufacturer-specific operation and display philosophy.

The essential feature of wheel management is the self-learning system with automatic individual wheel detection and the detection of the corresponding installed positions (wheel position detection). Due to fast triggering of the wheel electronics when active, the system can detect a flat tire far in advance to the start of a journey.

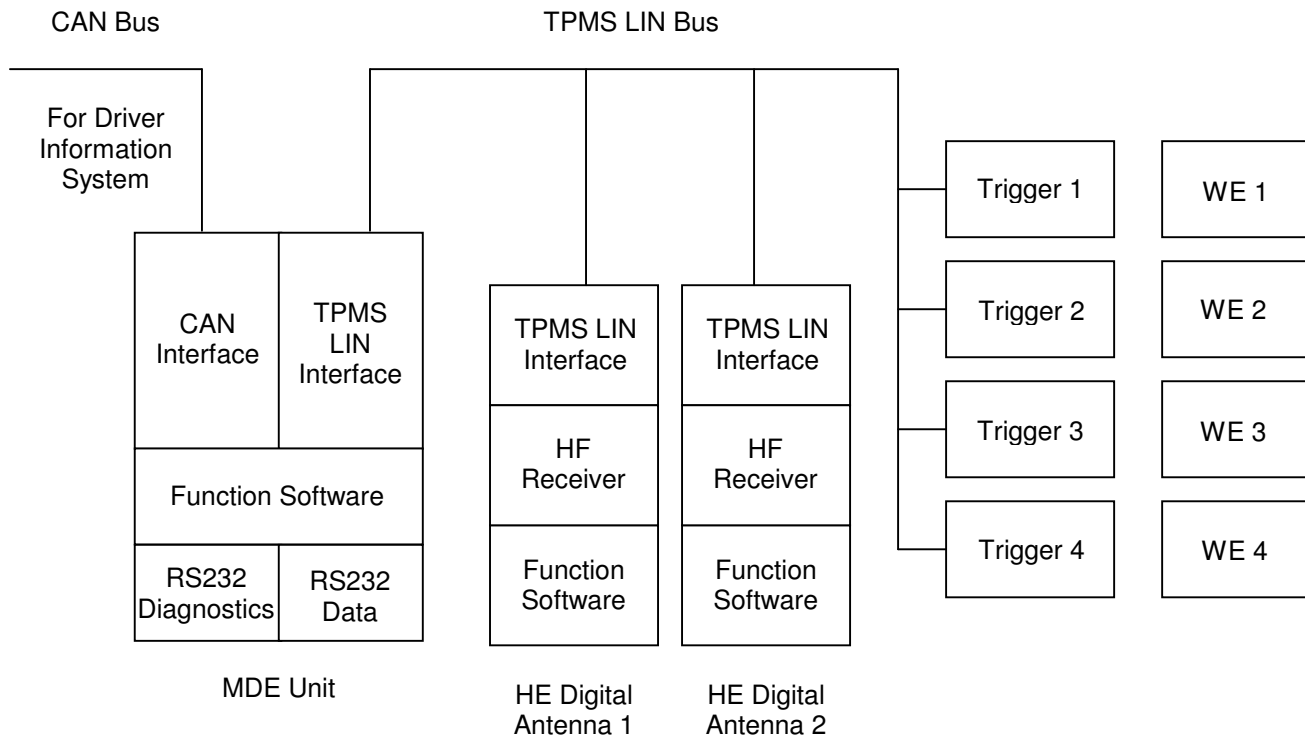


Figure 1: Block diagram, NASCAR TPMS system

2 Warning algorithm

The system monitors a nominal pressure, which is set automatically when the tire speed exceeds 30kph, and a fixed set minimum warning pressure. The higher value in each case is used to generate the breakdown warning.

2.1 Warning limit “Minimum pressure”

At this warning limit, a check is made against the minimum warning pressure $Abs_{Pressure\ Minimum}$, which is programmed into the system as a fixed value.

The corresponding warning bit is set, if the measured pressure lies below this threshold twice in succession.

2.2 Warning limit “Nominal pressure minus relative deviation” (Nominal pressure – 25 %)

This warning limit is calculated from the nominal pressure less a relative deviation of 25% of the nominal pressure. The nominal pressure is specified by the driver.

An accuracy reserve of 0.1 bar is added to the warning limit.

The corresponding warning bit is set if the measured pressure lies below this threshold twice in succession.