

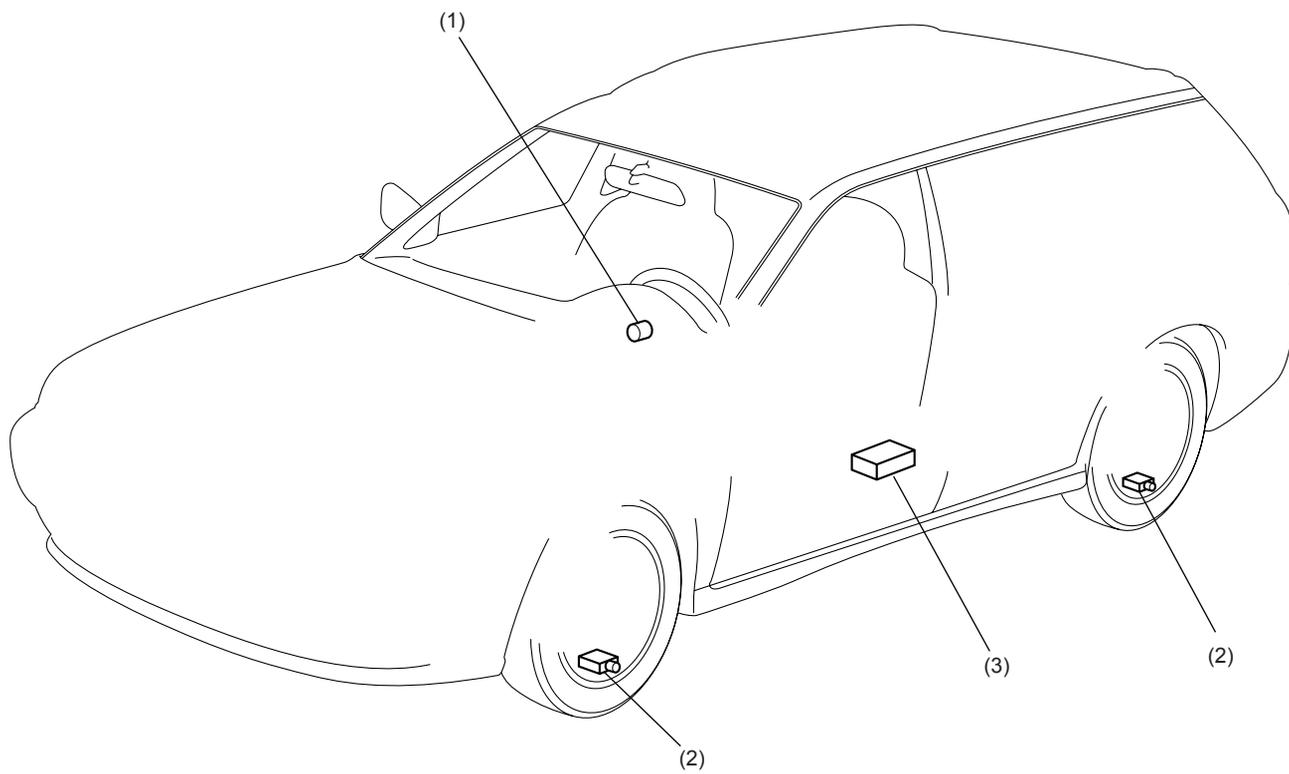
TIRE PRESSURE MONITORING SYSTEM

WHEEL AND TIRE SYSTEM

2. Tire Pressure Monitoring System

A: GENERAL

To comply with the requirements of FMVSS No. 138, a direct detecting type tire pressure monitoring system, which consists of four transmitters (each integrated with a tire air valve) and a receiver (installed under the driver's seat) is introduced.



WT-00075

- (1) Indicator lights
- (2) Transmitter
- (3) Receiver

TIRE PRESSURE MONITORING SYSTEM

WHEEL AND TIRE SYSTEM

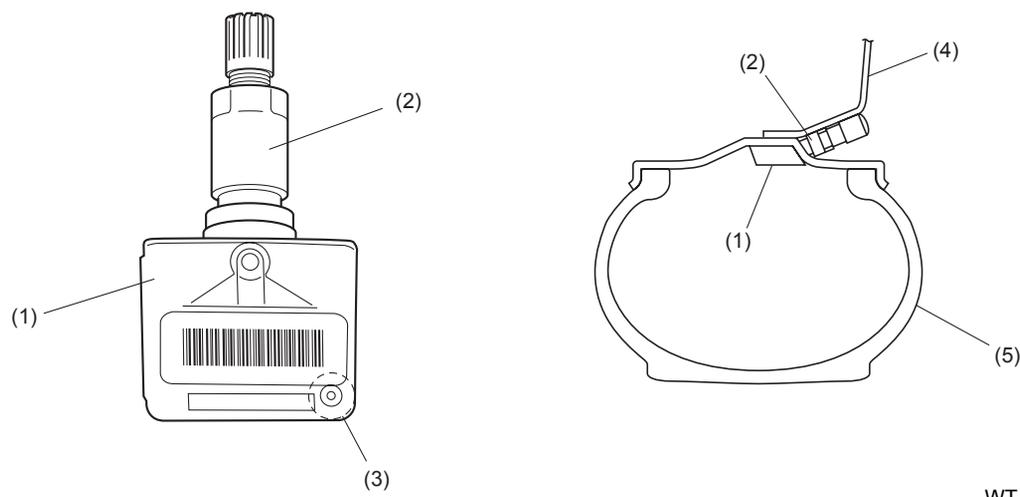
B: TRANSMITTER (TIRE PRESSURE SENSOR)

Detects the tire pressure with the sensor built inside the transmitter, which is integrated with the tire air valve.

The sensor contains a battery as a power source.

The battery life is 10 years or 160,000 km (100,000 miles).

The battery cannot be replaced separately; when the battery becomes weak the whole sensor assembly must be replaced.



WT-00076

- (1) Transmitter (tire pressure sensor)
- (2) Nut
- (3) Tire pressure sensor built-in part
- (4) Wheel
- (5) Tire

When the vehicle speed increases to 11 — 32 km/h (7 — 20 MPH), the roll switch built in the sensor turns ON, and the sensor starts to transmit pressure data*¹ together with the ID code*² and function code*³.

When the switch is turned ON, the transmitter takes measurement once in every 30 seconds, and sends the result once in every minute.

When the vehicle is stopped for 15 minutes or more, the sensor enters sleep mode to minimize battery consumption.

*1: Detected tire pressure data

*2: ID code allocated to each transmitter

*3: A code indicating the current transmitter mode

The transmitter switches its mode according to its condition as follows.

These condition information are referred to as “function codes”.

TIRE PRESSURE MONITORING SYSTEM

WHEEL AND TIRE SYSTEM

Function codes

Mode	Code	Function
Learn mode	000	This is the initial mode when the transmitter is turned ON using a transmission activation tool (ST).
Low battery mode	001	Enters this mode when the transmitter battery voltage drops. This code is transmitted when the transmitter voltage becomes low.
OFF mode	010	Transmitter is OFF (no pressure detection, no data transmission).
Re-measure mode	011	This code is transmitted if the detected pressure differs by 8.4 kPa (0.086 kgf/cm ² , 1.218 psi) or more compared with the previous data. (sudden change in pressure due to tire burst, tire pressure adjustment, etc.)
Wake mode	101	This code is transmitted when the condition changes from vehicle stopped (transmitter roll switch OFF and data not transmitted) to vehicle running (transmitter roll switch turns ON and data transmission starts).
Normal pressure mode	111	This code is transmitted when the condition is none of the above; vehicle normally running or stopped (within 15 minutes after stopped).

TIRE PRESSURE MONITORING SYSTEM

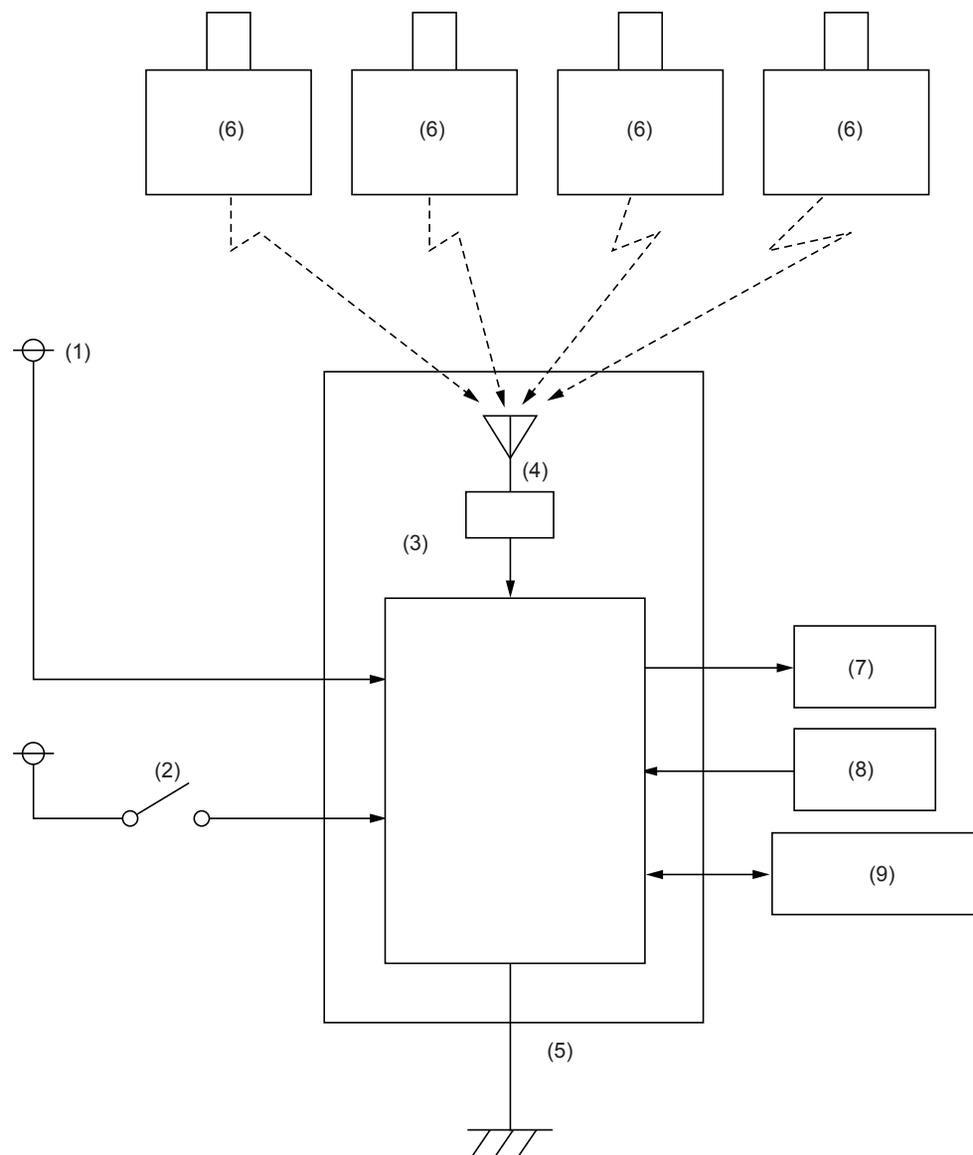
WHEEL AND TIRE SYSTEM

C: RECEIVER

The receiver has a built-in antenna.

The receiver collects tire pressure data from the transmitters, and turns on the indicator to warn the driver when it concludes that the tire pressure has dropped below a certain value.

The receiver is provided with a system fault diagnosis function.



WT-00079

- | | |
|---------------------|---------------------------|
| (1) Power supply | (6) Transmitter |
| (2) Ignition switch | (7) Integrated unit |
| (3) Receiver | (8) Vehicle speed |
| (4) Antenna | (9) Subaru select monitor |
| (5) Ground | |

TIRE PRESSURE MONITORING SYSTEM

WHEEL AND TIRE SYSTEM

1. RECEIVER FUNCTIONS

- Receiving function: Receives data from the transmitters and decides whether the data is valid or not.
- Pressure judgment function: The indicator turns ON to warn the driver if the tire pressure drops below the preset value (180 kPa, 1.835 kgf/cm², 26.11 psi). At the same time, a diagnostic trouble code is stored in the memory inside the receiver to identify which tire has low pressure. (low pressure detection turns ON at 180 kPa (1.835 kgf/cm², 26.11 psi), turns OFF at 200 kPa (2.039 kgf/cm², 29.01 psi))
- Diagnosis function: The indicator flashes and a diagnostic trouble code is stored in the memory inside the receiver if a system abnormality such as data reception failure, bad received data, or bad transmitter condition is detected.

2. CONDITIONS JUDGED AS A FAILURE

The receiver decides that the system has failed when any of the following conditions is met.

- EEPROM abnormal: The written data does not coincide with the loaded data when the ID is registered.
- Data reception failure: Transmitter data could not be received for 10 minutes or more while driving at a speed exceeding 40 km/h (24.9 MPH).
- Function code abnormal: "Re-measure" function code is received for 5 times in series, though the pressure change compared to the last data was within 7 kPa (0.071 kgf/cm², 1.02 psi) while driving at a speed exceeding 40 km/h (24.9 MPH).
- Air pressure data abnormal: "FFH"* pressure data has been received for 5 times in series while driving at a speed exceeding 40 km/h (24.9 MPH).
- Low battery: Function code for the "low battery" mode has been received for 20 times or more in series.
- Vehicle speed sensor abnormal: Function code for the "wake" mode has been received while the vehicle speed signal is 6 km/h (3.7 MPH) or lower.

*FFH is transmitted when the pressure data exceeds the upper limit (352kPa, 3.59 kgf/cm², 51.05 psi) of pressure detection.

If the indicator comes ON due to low tire pressure, the indicator will turn OFF when the under-inflated tire is inflated to normal pressure.

TIRE PRESSURE MONITORING SYSTEM

WHEEL AND TIRE SYSTEM

D: SUBARU SELECT MONITOR

The Subaru Select Monitor (SSM) enables the user to perform the following operations.

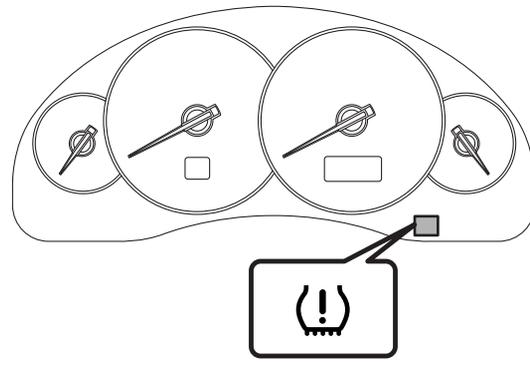
- Transmitter ID registration: The new ID can be registered when the transmitter is replaced due to battery life, etc.
- Data monitoring: The status of the function code, tire pressure, vehicle speed, indicator illuminating pressure, or I/O signal can be displayed.
- ID data display: The registered four IDs and the currently received data for each ID can be displayed.
- Diagnostic trouble codes display: Stored diagnostic trouble codes can be read.
- Erasing diagnostic trouble codes: Diagnostic trouble codes can be erased after repair work is completed.

TIRE PRESSURE MONITORING SYSTEM

WHEEL AND TIRE SYSTEM

E: INDICATOR LIGHT

The indicator light warns the driver when the tire pressure drops or a failure occurs in the system.



(1)

WT-00078

(1) Tire pressure monitoring indicator light

TIRE PRESSURE MONITORING SYSTEM

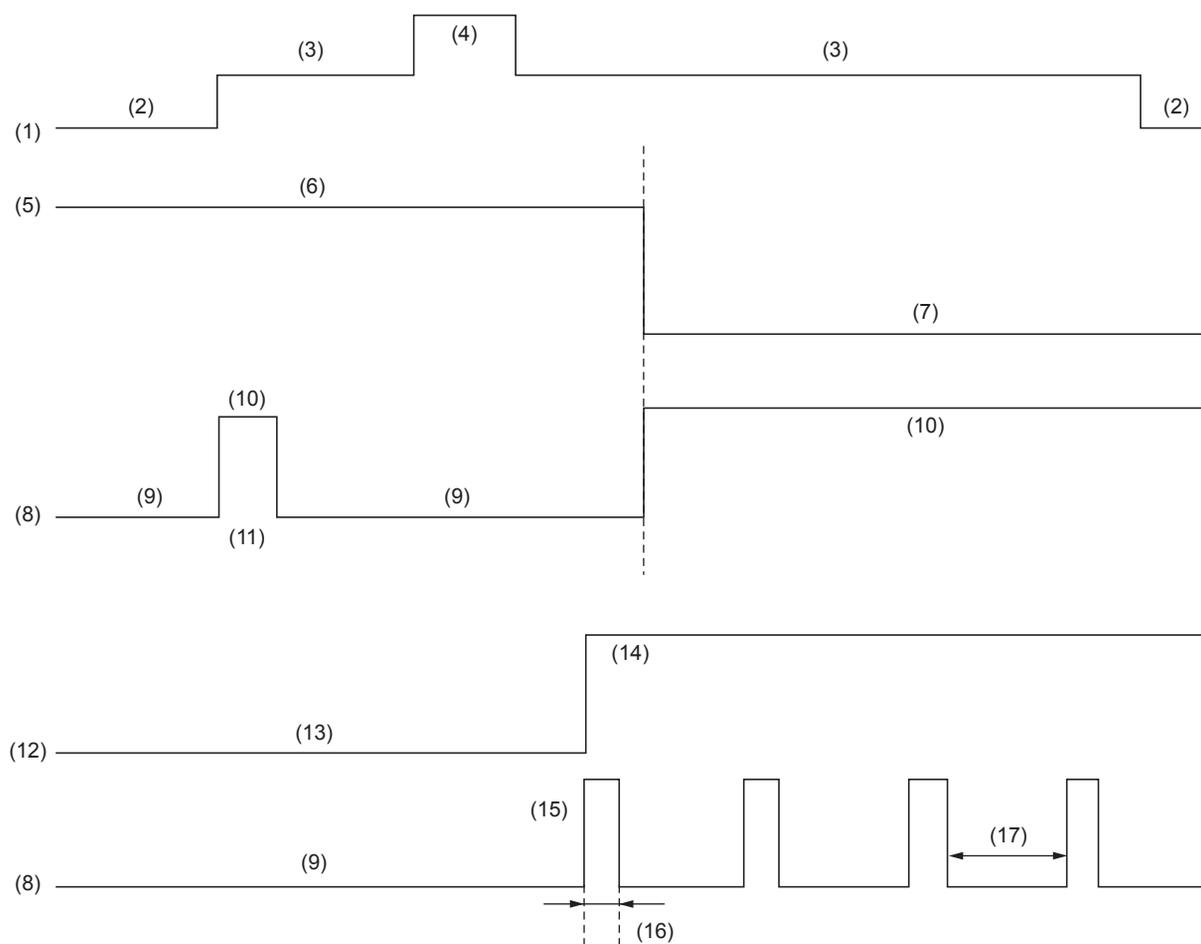
WHEEL AND TIRE SYSTEM

1. FAULT DISPLAY PATTERNS

When normal: indicator turns OFF at 2 seconds after the ignition switch has been turned ON

When low pressure is detected: illuminates

When system abnormality is detected: flashes (3 seconds OFF, 1 second ON)



WT-00077

- | | |
|---|--------------------|
| (1) Ignition switch | (10) Illuminates |
| (2) OFF | (11) 2 seconds |
| (3) ON | (12) System status |
| (4) Start | (13) Normal |
| (5) Tire pressure | (14) Abnormal |
| (6) Within standards | (15) Flash |
| (7) 180 kPa (1.835 kgf/cm ² , 26.11 psi) or less | (16) 1 second |
| (8) Tire pressure warning light | (17) 3 seconds |
| (9) OFF | |