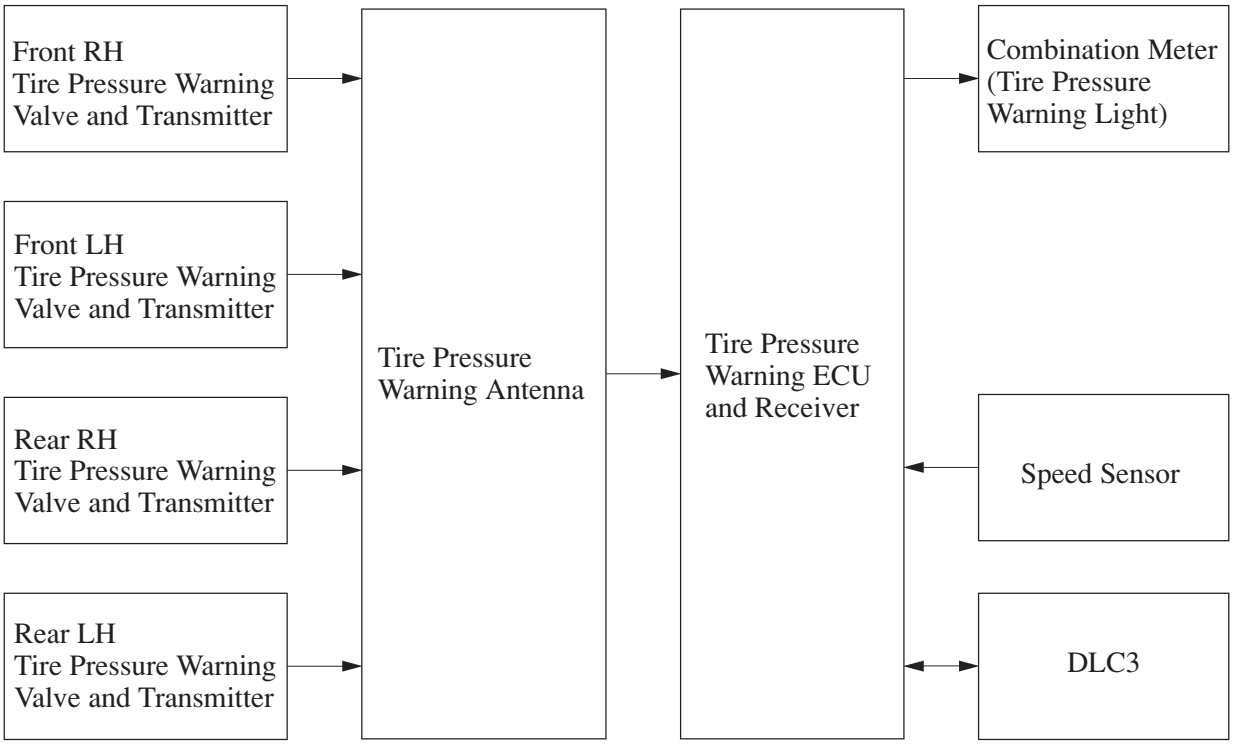
TIRE PRESSURE WARNING SYSTEM

■ DESCRIPTION

- A direct-sensing type tire pressure warning system has been newly adopted as standard equipment on 2AD-FHV engine models with run-flat tire.
- If the vehicle continues to be driven with one or more of the four tires inflated to a low tire pressure that could cause problems in driving, this system will illuminate the tire pressure warning light to inform the driver of the low tire pressure.
- Furthermore, this system directly senses the each tire pressure through a tire pressure warning valve and transmitter that is attached to each wheel.

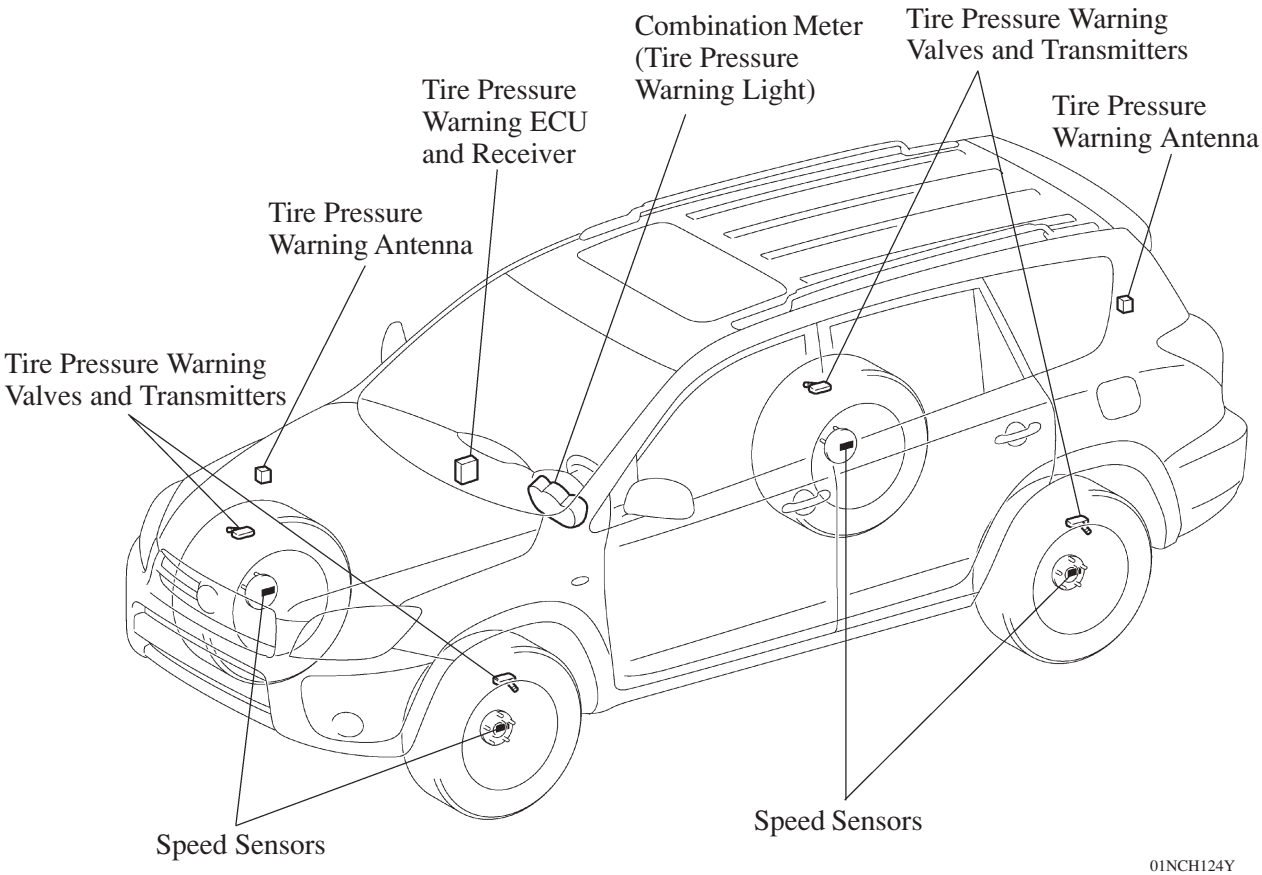
■ CONSTRUCTION AND OPERATION

1. System Diagram



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2. Layout of Main Components



3. Function of Main Components

Component	Function
Tire Pressure Warning Valve and Transmitter	Integrated in the air valve on the disc wheel, this transmitter measures the tire pressure and transmits the measured value and an ID code for identifying the wheel.
Tire Pressure Warning Antenna	Tire pressure warning antenna receives signals from the transmitters, and transmits them to tire pressure warning ECU and receiver.
Tire Pressure Warning ECU and Receiver	Recognizes that the signals are from the vehicle's own wheels based on the received ID code signals. If the measured values exceed a specified value, this ECU transmits signals to illuminate the tire pressure warning light in the combination meter.
Speed Sensor	Detects the wheel speed of each wheel.
Tire Pressure Warning Light	Located in the combination meter, this light informs the driver of a low tire pressure or a system failure.

4. Tire Pressure Warning System Composition

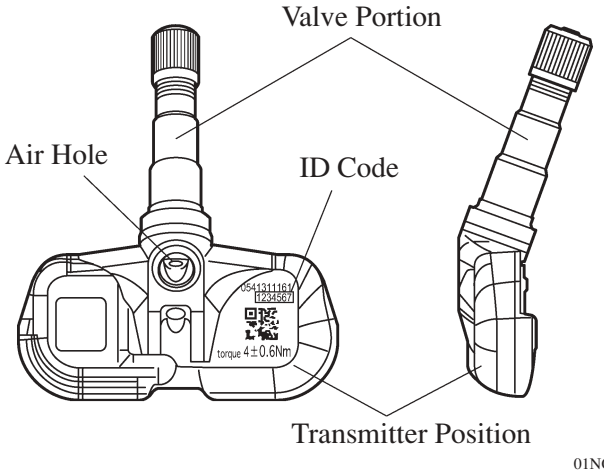
- The tire pressure warning system consists of the tire pressure warning valve and transmitter, tire pressure warning antenna, tire pressure warning ECU and receiver, and tire pressure warning light.
- The four tire pressure warning valves and transmitters measure the pressure of the respective tires, and transmit the ID codes of the transmitters and the measurement results through radio wave signals. The tire pressure warning ECU and receiver compares the measurement results with the standard values, and illuminates the tire pressure warning light in the combination meter if the pressures are below the lower limit of the standard values.

5. Stricture of Tire Pressure Warning Valve and Transmitter

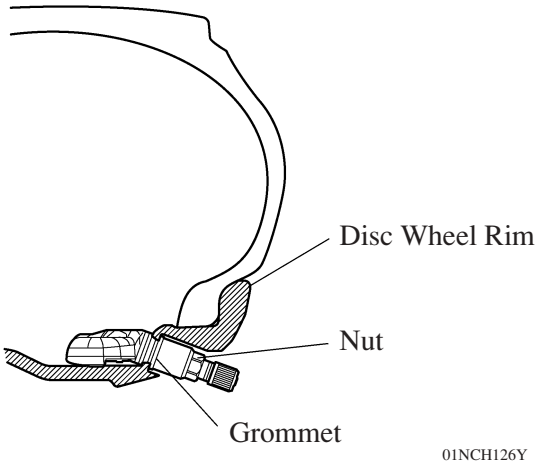
- The tire pressure warning valve and transmitter is integrated in the air valve of a disc wheel.
- This transmitter operates with a lithium battery, which lasts approx. 10 years. If the battery voltage drops, the tire pressure warning antenna and receiver stores the DTC (Diagnostic Trouble Code) in its memory. If the voltage drops even further and the transmitter stops working, it stores the DTC in memory and illuminates the tire pressure warning light to alert the driver.
- Transmitters with four different ID code ranges are used on one vehicle.
- Each transmitter has a built-in semiconductor to directly measure the tire pressure.
- In addition to the measured pressure, the identification data of the transmitter is included in the data that is transmitted to the tire pressure warning ECU and receiver. This is to enable the tire pressure warning ECU and receiver receive to determine that the received data came from its own tires.
- Frequency of the sensor is 433.92 MHz.

REFERENCE

- Make sure to install the tire pressure warning valves and transmitters to the disc wheels in accordance with the prescribed procedure. Failure to do so could result in the incorrect measurement of the tire pressure.



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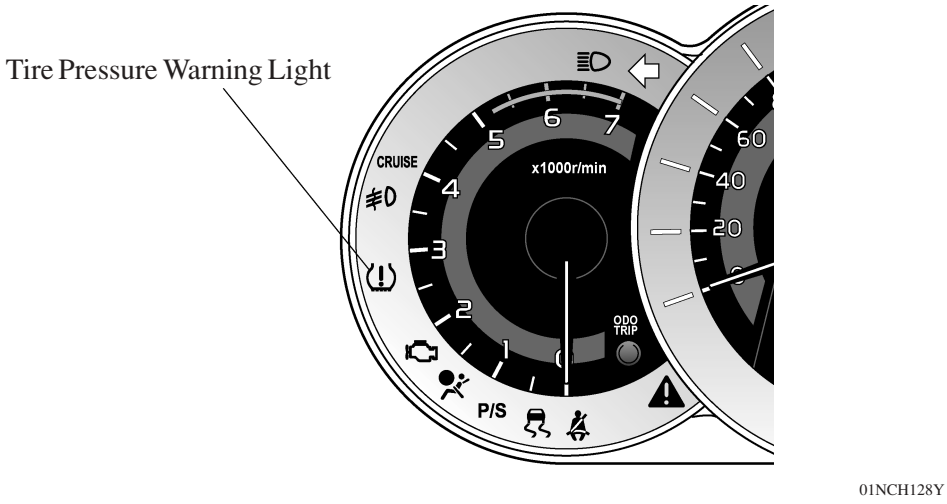
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Service Tip

- If the lithium battery is depleted, replace the entire tire pressure warning valve and transmitter assembly.
- When replacing the tire pressure warning valve and transmitter, select them so that all the four transmitters will have different ID codes.
- A new tire pressure warning valve and transmitter that is available as a service part is in the sleep mode in its initial state to prevent the battery from depleting. After the tire pressure warning valve and transmitter and the tire are correctly mounted on the disc wheel, inflating the tire to the specified pressure causes the sleep mode to cancel.

6. Tire Pressure Warning Light

- The tire pressure warning light is located in the combination meter.



- This warning light illuminates or blinks in accordance with signals from the tire pressure warning ECU and receiver if the vehicle's own tires are inflated with low pressure or if a malfunction occurs in the system.
- The output operations of the tire pressure warning light are listed below.

Condition	Outline
System check	Illuminates for 3 seconds (Power source mode selected to ON, when system is normal)
Low tire pressure detected	Illuminates
System failure	Blinks (or illuminates if there is an open circuit in the warning light)

7. Diagnosis

The new diagnostic system features improved serviceability. For details on the diagnostic methods and diagnostic items, refer to the RAV4 Repair Manual (Pub No. RM01N0E).

8. Fail-safe

In the event of the malfunction in the tire pressure warning valve and transmitter circuits or tire pressure warning ECU and receiver, the tire pressure warning system is prohibited, and the tire pressure warning light illuminates or blinks to inform the driver of the failure.

9. Precautions on Tire Pressure Warning System

- If the tire pressure warning light illuminates, reduce the vehicle speed as soon as possible.
- Avoid making sudden steering or braking maneuvers because low-pressure tires could negatively affect handling and braking performance.
- Make sure to use only the supplied valve caps (made of aluminum) on the tire pressure warning valve and transmitter. If a metal cap (made of brass) is used, the cap could become seized.
- Do not use a flat tire sealant as it could cause the tire pressure warning valve and transmitter to malfunction.
- To protect the tire pressure warning valve and transmitter from damage, make sure to follow the instructions in the Repair Manual to dismount a tire from a wheel.
- Perform pre-driving inspection and regular inspection in the same manner as for ordinary vehicles.
- If the tire pressure warning light blinks when the power source mode selected to ON, the tire pressure warning system is not working properly. The system will be disabled in the following conditions: (When the condition becomes normal, the system will work properly.)

Tires not equipped with tire pressure warning valves and transmitters are used.
The ID code on the tire pressure warning valves and transmitters in not registered.
Electric devices or facilities using similar radio wave frequencies are nearby.
If a radio set at similar frequencies is in use in the vehicle.
If a window tint that affects the radio wave signals is installed.
There is a lot of snow or ice on the vehicle, in particular around the wheels or wheel housings.
Non-genuine Toyota wheels is are used.
If a special set of tires is used.
Tire chains are used.