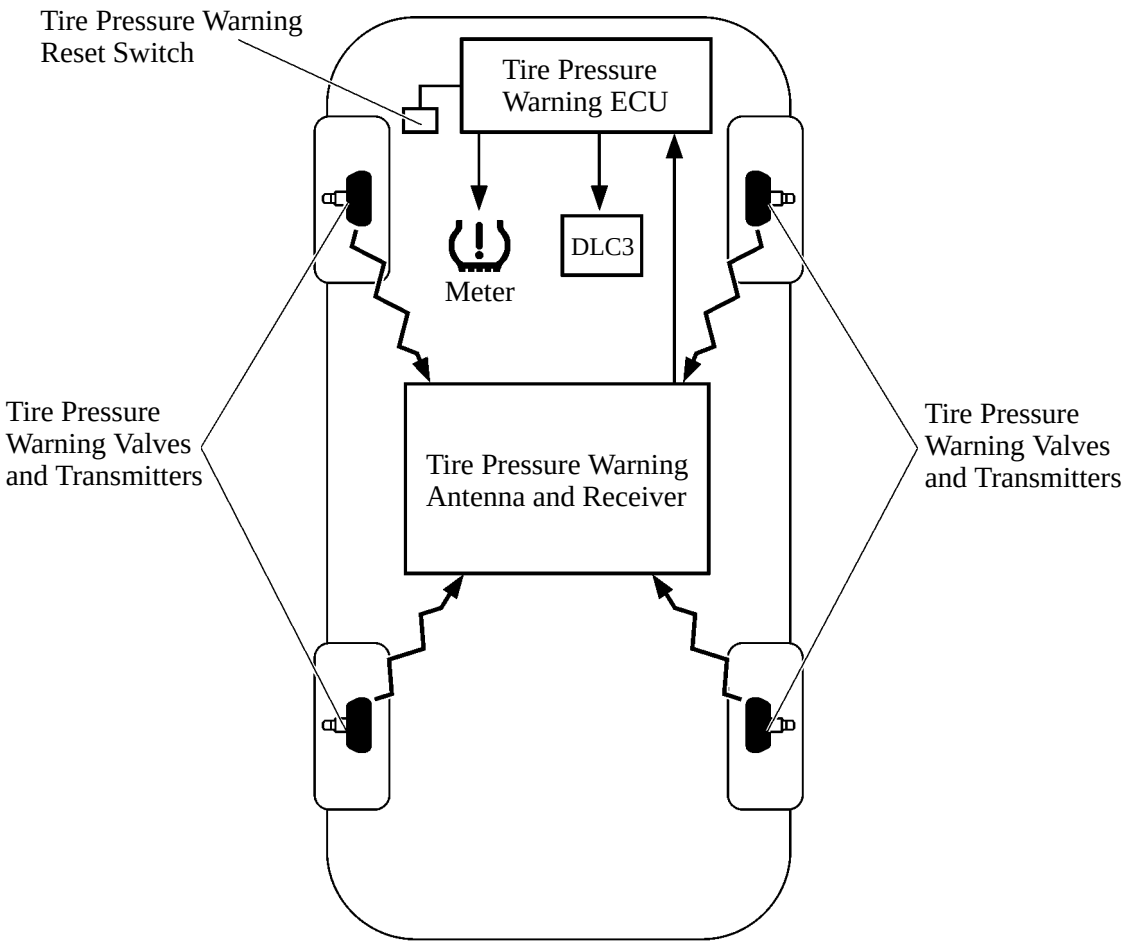
TIRE PRESSURE WARNING SYSTEM

■DESCRIPTION

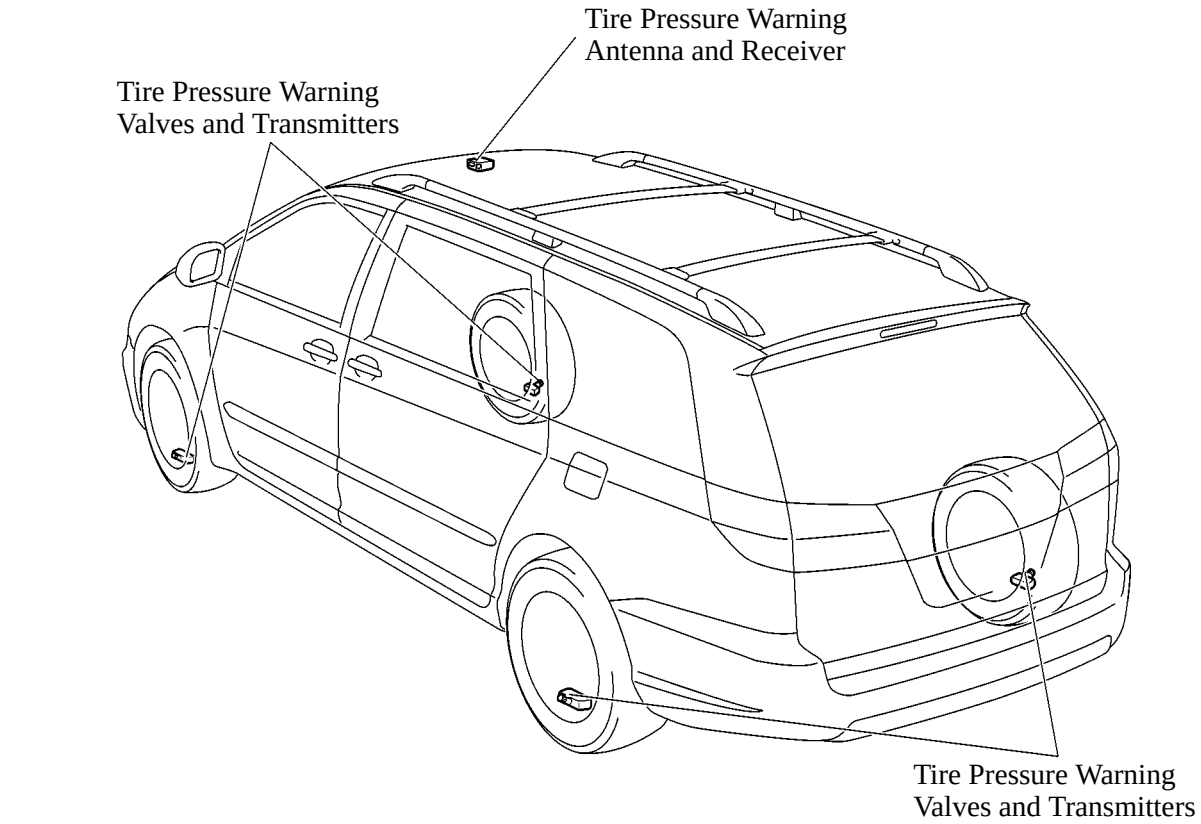
- A direct-sensing type tire pressure warning system is used on all models.
- If the vehicle continues to be driven with one or more of the four tires inflated to a low tire pressure that could cause problems in driving, this system will illuminate the tire pressure warning light to inform the driver 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 except for the spare tire.

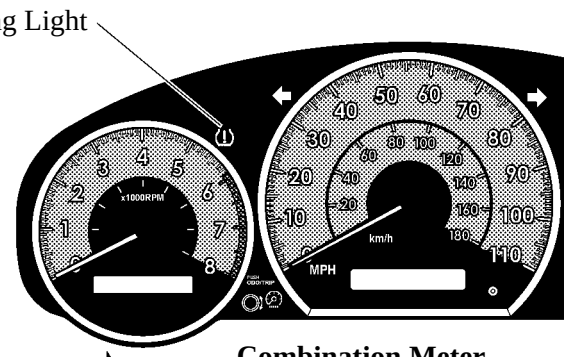
■CONSTRUCTION AND OPERATION

1. System Diagram

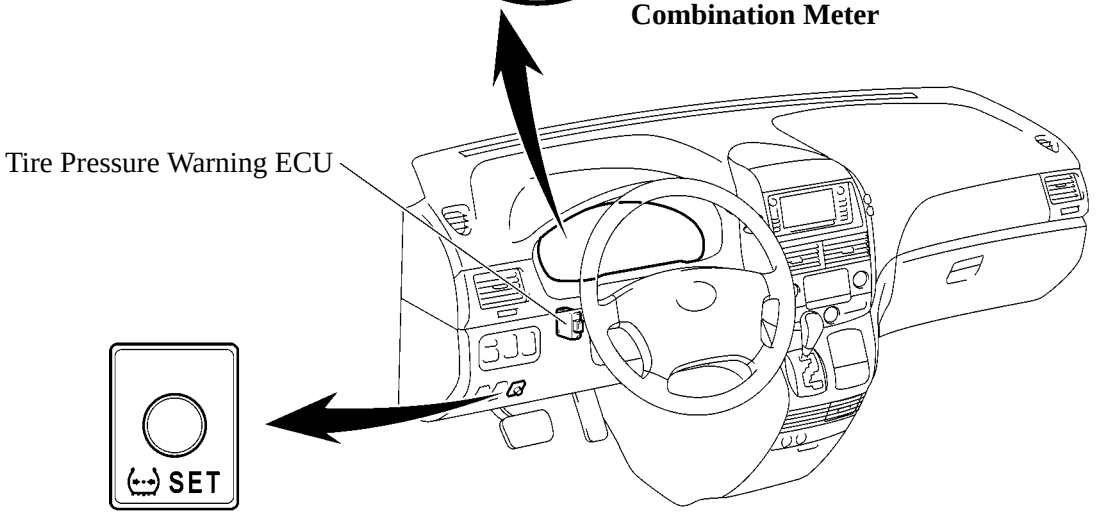


2. Layout of Main Components





Combination Meter



Tire Pressure Warning Reset Switch

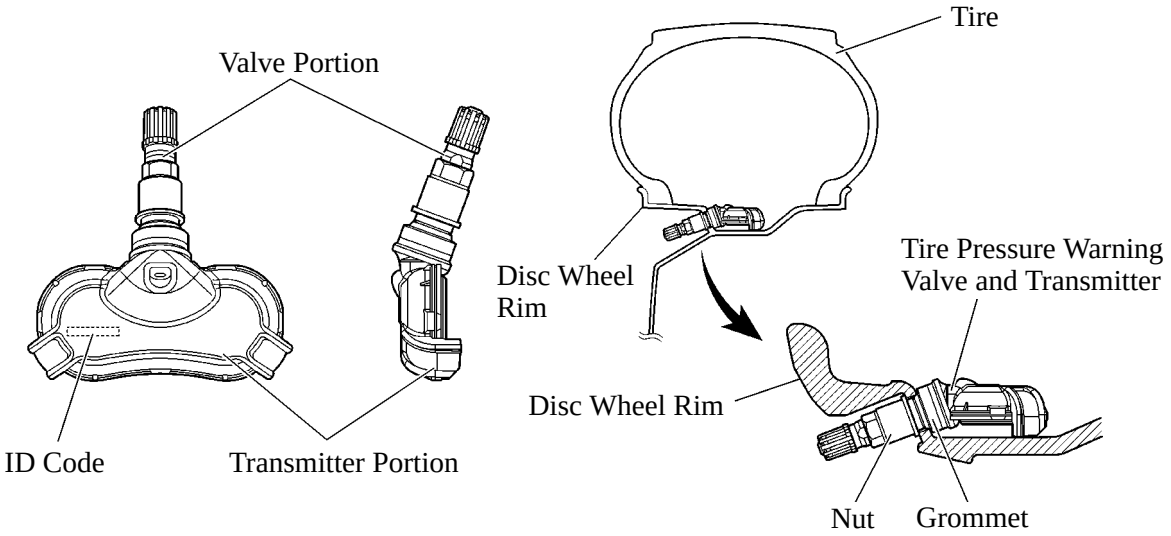
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3. Function of Main Components

Component		Outline
Combination Meter		Transmits the vehicle speed signal to the tire pressure warning ECU for vehicle speed correction.
	Tire pressure Warning Light	● Turns ON immediately or after blinking for 1 minute to warn the driver in accordance with the signal from the tire pressure warning ECU. ● Displays the 2-digit DTC (Diagnostic Trouble Code).
Tire Pressure Warning Valve and Transmitter		Detects the air pressure and internal temperature of the tire and transmits the measured value and the ID code to the tire pressure warning antenna and receiver.
Tire Pressure Warning Antenna and Receiver		Receives the tire pressure warning valve and transmitter signal and transmits this data to the tire pressure warning ECU.
Tire Pressure Warning Reset Switch		The appropriate air pressures of the tires currently mounted on the vehicle are stored in the tire pressure warning ECU by operating the tire pressure warning reset switch.
Tire Pressure Warning ECU		● Receives the data from the tire pressure warning antenna and receiver and monitors the tire air pressure. ● When the tire pressure warning ECU detects a drop in the tire air pressure or a system malfunction, it outputs the respective signal to the combination meter.

Tire Pressure Warning valve and Transmitter

- The tire pressure warning valve and transmitter is integrated in the air valve of a disc wheel.
- The tire pressure warning valve and transmitter has a unique recognition ID code. Therefore, 4 different ID codes are used on one vehicle.
- The tire pressure warning valve and transmitter measures the pressure and the temperature of the air in the tire and transmits the measured values and ID code to the tire pressure warning antenna and receiver.
- Frequency of the tire pressure warning valve and transmitter is 315 MHz.
- The tire pressure warning valve and transmitter operates with a lithium battery. If the battery voltage drops, the tire pressure warning ECU stores the DTC (Diagnostic Trouble Code) in memory. At the same time, the tire pressure warning ECU turns ON the tire pressure warning light after blinking for 1 minute to alert the driver.



NOTICE

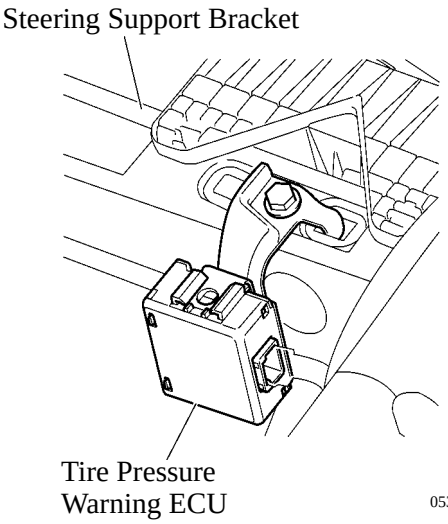
- Make sure to install the tire pressure warning valves and transmitters to the disc wheel in accordance with the prescribed procedure. Failure to do so could result in the incorrect measurement of the tire pressure. (Except for the spare tire.)
- Make sure to replace the tires in accordance with the prescribed procedure. Failure to do so could damage the tire pressure warning valves and transmitters.
- For further details regarding the above, see the 2007 Sienna Repair Manual (Pub. No. RM0530U).

Service Tip

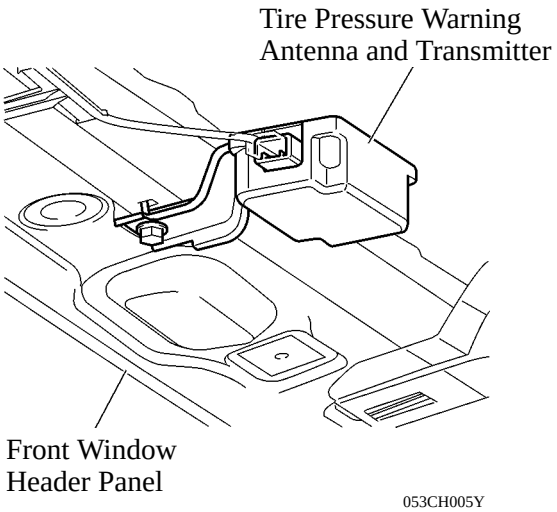
- If the lithium battery is depleted, replace the entire tire pressure warning valve and transmitter assembly.
- After a tire pressure warning valve and transmitter has been replaced, the ID code of the tire pressure warning valve and transmitter must be registered in the tire pressure warning ECU. Use the hand-held tester to register the ID code. ID code is indicated on the transmitter portion.
- A new tire pressure warning valve and transmitter that is available as a service part is shipped in the sleep mode 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.
- For further details regarding the above, see the 2007 Sienna Repair Manual (Pub. No. RM0530U).

Tire Pressure Warning Antenna and Receiver and Tire Pressure Warning ECU

- The tire pressure warning antenna and receiver is located inside the ceiling, it receives signals from the tire pressure warning valve and transmitter, and transmits them to tire pressure warning ECU.
- The tire pressure warning ECU receives the signals from the tire pressure warning antenna and receiver and determines whether the signals are coming from the vehicle's own wheels.
- If the measured values fall below the specified value, the tire pressure warning ECU transmits signal to illuminate the tire pressure warning light in the combination meter.

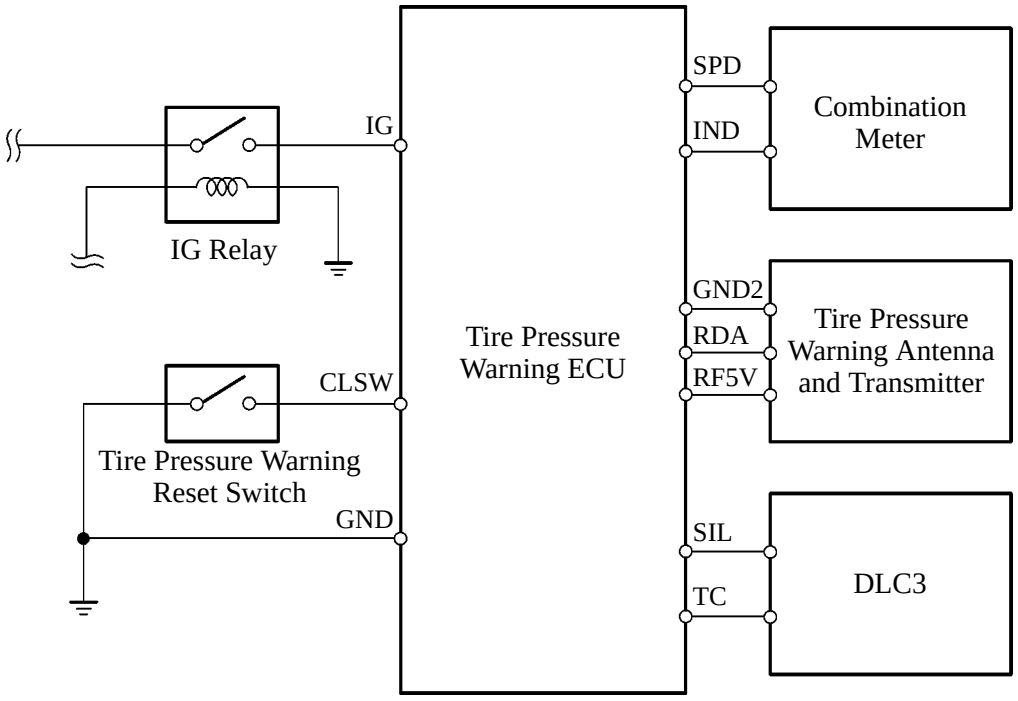


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▶ Wiring Diagram ◀



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Tire Pressure Warning Reset Switch

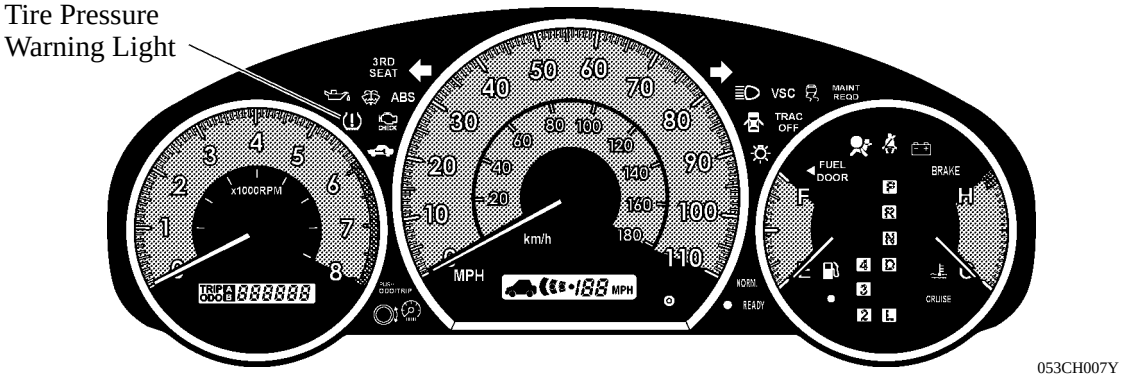
- By operating the tire pressure warning reset switch, the tire pressure warning ECU can be set to issue a warning at the air pressure that corresponds to the type of tires. Therefore, the dealer must set the warning threshold to the proper value in order to comply with the local regulations.
- The tire pressure warning reset switch can be operated only after the air pressure of all 4 tires has been adjusted on the vehicle.
- The system will be initialized when the tire pressure warning reset switch is pressed and held for 3 seconds or longer with the ignition switch turned ON. When initialization begins, the warning light blinks 3 times at 0.5 Hz.
- During initialization, the tire pressure warning valve and transmitter measures the air pressure, and registers the signals that are transmitted into the tire pressure warning ECU. The initialization process is completed when the signals from the 4 tires have been received.

Service Tip

- The system must be initialized under any of the following conditions:
  1) New vehicle delivery
  2) Replacement with tires of different size (air pressure)
  3) Tire pressure warning valve and transmitter replacement
  4) Tire pressure warning ECU replacement
- Before operating the tire pressure warning reset switch, make sure to adjust the air pressure of the 4 tires to the specified value.

Tire Pressure Warning Light

- The tire pressure warning light is located in the combination meter.
- This warning light operates in accordance with signals from the tire pressure warning ECU if the vehicle's tires are underinflated or if a malfunction occurs in the system.



▶ Tire Pressure Warning Light Illumination Pattern ◀

Condition	Light Illumination Pattern
System check (Ignition switch turned ON)	After illuminating for 3 seconds, it turns OFF (When system is normal)
Low air pressure detected	Illuminates
Air pressure initialization (When tire pressure warning reset switch is pressed for 3 seconds or longer with ignition switch turned ON)	Blinks 3 times at 0.5 Hz
System failure	Illuminates after blinking for 1 minute

4. Self-diagnosis

- If the tire pressure warning ECU detects a malfunction, the tire pressure warning ECU makes a diagnosis and memorizes the failed section. Furthermore, the tire pressure warning light in the combination meter illuminates after blinking for 1 minute to inform the driver.
- The DTC (Diagnostic Trouble Code) can be read by connecting a hand-held tester to the DLC3, or by connecting the SST (09843-18040) between the TC and CG terminals of the DLC3, and observing the blinking of the tire pressure warning light.

For details, see the 2007 Sienna Repair Manual (Pub. No. RM0530U).

DTC No.	Detection Item
C2121/21	No signal from transmitter ID1 in main mode
C2122/22	No signal from transmitter ID2 in main mode
C2123/23	No signal from transmitter ID3 in main mode
C2124/24	No signal from transmitter ID4 in main mode
C2141/41	Transmitter ID1 error
C2142/42	Transmitter ID2 error
C2143/43	Transmitter ID3 error
C2144/44	Transmitter ID4 error
C2165/65	Abnormal temperature inside ID1 tire
C2166/66	Abnormal temperature inside ID2 tire
C2167/67	Abnormal temperature inside ID3 tire
C2168/68	Abnormal temperature inside ID4 tire
C2171/71	Transmitter ID not registered in main mode
C2176/76	Receiver error
C2177/77	Initialization not completed
C2178/78	Abnormal battery voltage
C2181/81	Transmitter ID1 not received (test mode DTC)
C2182/82	Transmitter ID2 not received (test mode DTC)
C2183/83	Transmitter ID3 not received (test mode DTC)
C2184/84	Transmitter ID4 not received (test mode DTC)
C2191/91	Vehicle speed signal error (test mode DTC)

- The detection conditions of the DTCs (Diagnostic Trouble Codes) and the restoring conditions are as follows.

DTC No.	DTC Detecting Condition	Restoring Condition
C2111/11	When the ECU receives the data indicating that the transmitter is in the sleep mode.	When the ECU receives the regular correspondence data from transmitter.
C2112/12		
C2113/13		
C2114/14		
C2121/21	When the ECU could not receive the data from the transmitter for more than 20 minutes continuously with the vehicle running.	When the ECU receives the regular correspondence data from transmitter.
C2122/22		
C2123/23		
C2124/24		
C2141/41	When the ECU receives the data three successive times from the transmitter indicating that the transmission has malfunctioned.	When the ECU receives the data indicating that the transmitter is normal.
C2142/42		
C2143/43		
C2144/44		
C2165/65	When the ECU receives the data from the transmitter indicating that the transmission is normal and the temperature inside the tire is more than 119°C (246°F).	When the ECU receives the data from the transmitter indicating that the temperature inside the tire is less than 107°C (225°F).
C2166/66		
C2167/67		
C2168/68		
C2171/71	When the ID codes haven't been registered in the ECU for 3 minutes in the normal mode (not in the test mode).	When the ID codes have been registered.
C2176/76	When the memory in the ECU has an error.	When the memory in the ECU is normal as the ignition switch is turned from OFF to ON.
C2177/77	When the ECU could not receive the data from the transmitter for 20 minutes continuously with the vehicle running in the initialization mode.	When the initialization is performed again and completed.
C2178/78	When the ignition voltage is less than 10 V for 20 minutes or more, or the ignition voltage is more than 16 V for 0.5 seconds or more while the ignition switch is ON.	When the ignition switch is turned from OFF to ON, or when the ignition voltage is between 10 V and 16 V for 2 seconds or more.