



HYUNDAI Technical Service Bulletin

Group	SUSPENSION - TPMS
Number	10-SS-002
Date	FEBRUARY, 2010
Model	ALL MODELS

Subject
**TPMS (TIRE PRESSURE MONITORING SYSTEM)
 GENERAL INFORMATION**

CIRCULATE TO:	<input type="checkbox"/> GENERAL MANAGER	<input checked="" type="checkbox"/> PARTS MANAGER	<input checked="" type="checkbox"/> TECHNICIAN
<input checked="" type="checkbox"/> SERVICE ADVISOR	<input checked="" type="checkbox"/> SERVICE MANAGER	<input checked="" type="checkbox"/> WARRANTY MGR	<input type="checkbox"/> SALES MANAGER

This TSB provides a general overview of TPMS systems, a diagnostic chart, GDS tool basic use instruction, and warranty policy.

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1. Tire Pressure Monitoring System (TPMS) Overview

The TPMS system is designed to monitor tire pressure and alert the driver when a tire is significantly underinflated. Hyundai vehicles feature 2 types of systems termed “High-Line” and “Low-Line”. High-Line systems are able to display a low pressure condition for each tire position, while Low-Line systems do not indicate which tire is underinflated.

Hyundai uses three suppliers for the TPMS systems across the vehicle line-up, TRW, Lear, and Siemens. Each of these systems operate in a very similar manner, but have some minor variations in operation as described in this TSB.

TPMS SYSTEM TYPE

MODEL	YEAR	SUPPLIER	HIGH	LOW
Accent (MC)*	All	TRW		X
Azera (TG)*	All	Lear		X
Elantra (HD)*	All	Lear		X
Elantra Touring (FD)	All	Siemens		X
Entourage (EP)	-08MY	Lear	X	
Genesis Coupe (BK)	10MY	Siemens		X
Genesis Sedan (BH)	09MY-	TRW	X	
Santa Fe (CM)	-08MY	Lear	X	
Santa Fe (CM)	09MY-	Lear		X
Sonata (NF)*	All	TRW		X
Sonata (YF)	11MY	Siemens		X
Tiburon (GK)*	All	TRW		X
Tucson (JM)*	All	TRW		X
Tucson (LM)	10MY	TRW		X
Veracruz (EN)	-08MY	Lear	X	
Veracruz (EN)	09MY	Lear		X

****If equipped with TPMS***








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TPMS Warning Lights

		LOW-Line	HIGH-Line	
Warning Light	Low tire pressure warning light		Low tire pressure warning light	
	TPMS malfunction warning light		TPMS malfunction warning light	
	Low pressure tire location light	Without	Low tire pressure location light	

NOTE: LM Tucson, YF Sonata, and 2010 CM Santa Fe do not have the 'TPMS' malfunction warning light. Instead, the low tire pressure warning light will blink for approximately 60 seconds then remain on when there is a system malfunction.



NOTE: It takes approximately 25 minutes of driving at speed (above 12 mph) for the TPMS malfunction lamp to illuminate if there is a malfunction.

2. TPMS Condition Diagnostic Chart

The following is a list of conditions and the appropriate course of action. For detailed information on repair procedures, see the section Detailed TPMS Information (pages 6-18)


CONDITION	DTC	POSSIBLE	ACTION
Wheel sensor malfunction	One or more of the following: C1312 C1313 C1314 C1315 All codes will not be present.	These are RF (radio frequency) codes, indicating that the TPMS module is not receiving a signal from the wheel sensor.	<ul style="list-style-type: none"> - Verify TPMS sensor operation by checking sensor status and checking pressure/temperature using the GDS (page 21). - If sensor data is incorrect or unavailable replacement is needed, be sure to register all 4 wheel sensors (page 20).
EMF Interference	These DTCs are typically found as history codes: C1312 (H) C1313 (H) C1314 (H) C1315 (H)	Electric signal disturbance. The source may be external (airports, military bases, etc.), or may originate within the vehicle (laptops, cell phone chargers, GPS, etc.)	<ul style="list-style-type: none"> - Inspect for possible sources of interference (page 13). - Check sensor status using GDS (page 21).
TPMS module malfunction	A combination of more than one of the following: C1312 C1313 C1314 C1315 C1341 C1342 C1343 C1344	A module malfunction usually is suspected when several DTC codes appear simultaneously.	<ul style="list-style-type: none"> - Verify TPMS sensor operation by confirming sensor status and checking pressure/temperature using the GDS (page 21). - If you are unable to communicate with the TPMS system replacement of the module could be required. - If replacement is needed for TRW systems, change the mode to Normal using the GDS (page 22).



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CONDITION	DTC	POSSIBLE	ACTION
DTC after replacing a wheel sensor (low-line system)	One or more of the following: C1312 C1313 C1314 C1315	For TRW systems, the wheel sensors are shipped in storage mode.	<ul style="list-style-type: none">- Using the GDS change the mode of the TPMS sensors to low-line.- Register all 4 wheel sensors (page 20).
Air leak	Low tire pressure warning light ON. 	Poor seal due to damage or reuse of TPMS nut.	<ul style="list-style-type: none">- Inspect the tire.- Ensure a new TPMS nut is used and torqued to 3 lbs-ft. (page 9)- Replace any damaged parts.
Corrosion		Corrosion of the TPMS wheel sensor assembly.	<ul style="list-style-type: none">- Replace any damaged parts.- Replace metal valve stem caps with plastic ones (page 12).
Valve stem damage		Broken	<ul style="list-style-type: none">- Take care when checking inflation, and removing/installing tires.- Do not exceed the 3 lb.ft torque on the TPMS valve nut (page 9).

3. Detailed TPMS Information

a. Low Tire Pressure Warning Light ON - Low Tire Pressure



The low tire pressure warning light will illuminate when there is a significant low-pressure condition within a tire, or if a rapid loss of air pressure is detected. There are a number of environmental factors that can affect the tire pressure, and therefore potentially illuminate a low pressure warning light.

The main two environmental factors are air temperature and location elevation. Colder air will reduce tire pressure, while hotter air will increase tire pressure. High elevation may also increase tire pressure.

If a customer comments that the TPMS (Tire Pressure Monitoring System) tire pressure warning lamp is "ON" for the first few miles of driving after a cold start or stays "ON" continuously, particularly in cold ambient temperatures, please be sure to inform the customer that the system is operating correctly to warn of a low tire pressure condition, and a system diagnosis may not be required. The customer should be made aware of the following:

- This condition may be caused by low tire pressure if the tire pressure falls below the low warning threshold for any reason including **low temperature**.

NOTE: For vehicles equipped with the TPMS, the threshold pressure limit is 25% below the vehicle's recommended cold tire pressure, shown on the placard located on the driver side B-pillar.

- Recommend that the customer inflate tires when they are cold or compensate for being **hot** by inflating the tire to a pressure to 3 or 4 psi above specification.
- Tire pressures should be checked after traveling between areas at significantly different elevations. Adjust tire pressures accordingly.

IMPORTANT: Tire pressure must be set at the specification found on the placard located on the driver side B-pillar when the tires are COLD.



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NOTE: The tire pressure will vary with temperature by approximately 1 psi (6.9 kPa) for every 12°F (6.5°C).

- Recommend that the customer check and adjust all tire pressures, including the spare tire, **once a month**. (For additional information, suggest that the customer refer to the vehicle owner's manual).

NOTE: Adjusting the tire air pressure is included in the PDI process and is not covered under normal warranty. Tire air pressure adjustment is a normal maintenance item.

NOTE: If you need to verify that your dealership air pressure gauge matches the TPMS sensor air pressure readings, you can use the “Current Data” mode on the TPMS checker to read the current pressure in a tire. Then read the tire pressure with your gauge. The readings should be within 2 psi. If not, calibrate or replace the gauge. Another potential reason for a reading difference is elevation. Repeat for all gauges normally used during PDI.

b. NF Sonata TPMS Sensors: 2008 vs. 2009 model year Part Number Change

Confirm that the vehicle is equipped with TPMS and verify that the replacement sensor service part is the correct application for the model year of the vehicle and is in 'Low Normal' mode when installing onto the vehicle (for example, an 08 MY Sonata TPMS sensor is not interchangeable with the 09 MY Sonata TPMS sensor). Please verify the applicable MY part number as shown below.

- 08' MY Valve - TPMS Sensor P/N = 52933-1F000
- 09' MY Valve - TPMS Sensor P/N = 52933-2F000





c. TPMS VALVE STEM DAMAGE

Case #1: TPMS valve stem breakage

The valve stem may break during tire inflation or deflation while improperly using a long air-filling nozzle tube as shown.

Symptom: Valve stem broken by improper use of air nozzle.

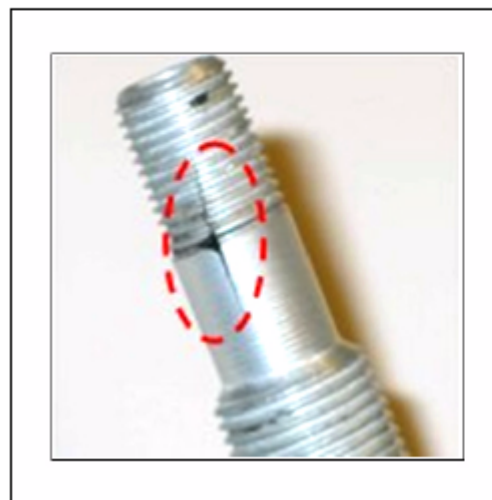


Cause: Excessive bending force applied



Case #2: TPMS valve stem fractured

Symptom: Valve stem is fractured as shown



Cause: Over torque of the valve



CAUTION: DO NOT reuse the valve core if it has been removed. If the valve core has been removed, install only a NON BRASS type valve core as a replacement.

Cautions during TPMS sensor removal and installation:

1. Removal:

- (1) Start unseating the tire bead about 6 inches (15cm) from the TPMS valve stem.
- (2) Make sure that the removal tool does not touch the TPMS sensor while unseating the tire bead.
- (3) When unfastening the TPMS sensor, hold it securely without rocking.



2. Installation:

- (1) Do not exceed the allowed torque and DO NOT use electric or pneumatic tools. **Tightening torque = 3.0 lb. ft. (4 Nm, 0.4 Kg. m)**

NOTE: Always use a new TPMS valve nut.

- (2) Attach the sensor to the rim firmly.
- (3) Hold the sensor and assemble the valve stem to the sensor by hand.
- (4) Secure the TPMS sensor by rotating the valve stem clockwise with a torque wrench.
- (5) After installing the TPMS sensor, check to ensure it is attached to the rim firmly.
- (6) Start seating the tire bead about 15cm (6 inches) from the TPMS valve stem.
- (7) Make sure that the tool does not touch the TPMS sensor while seating the tire bead.



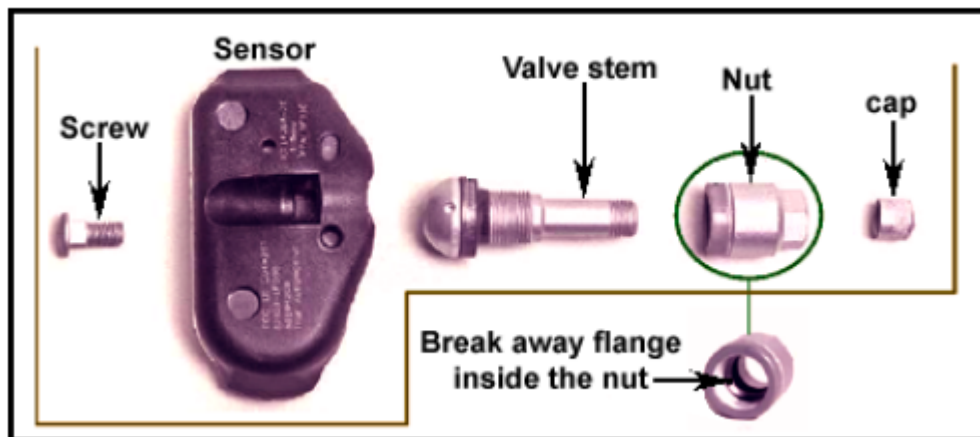
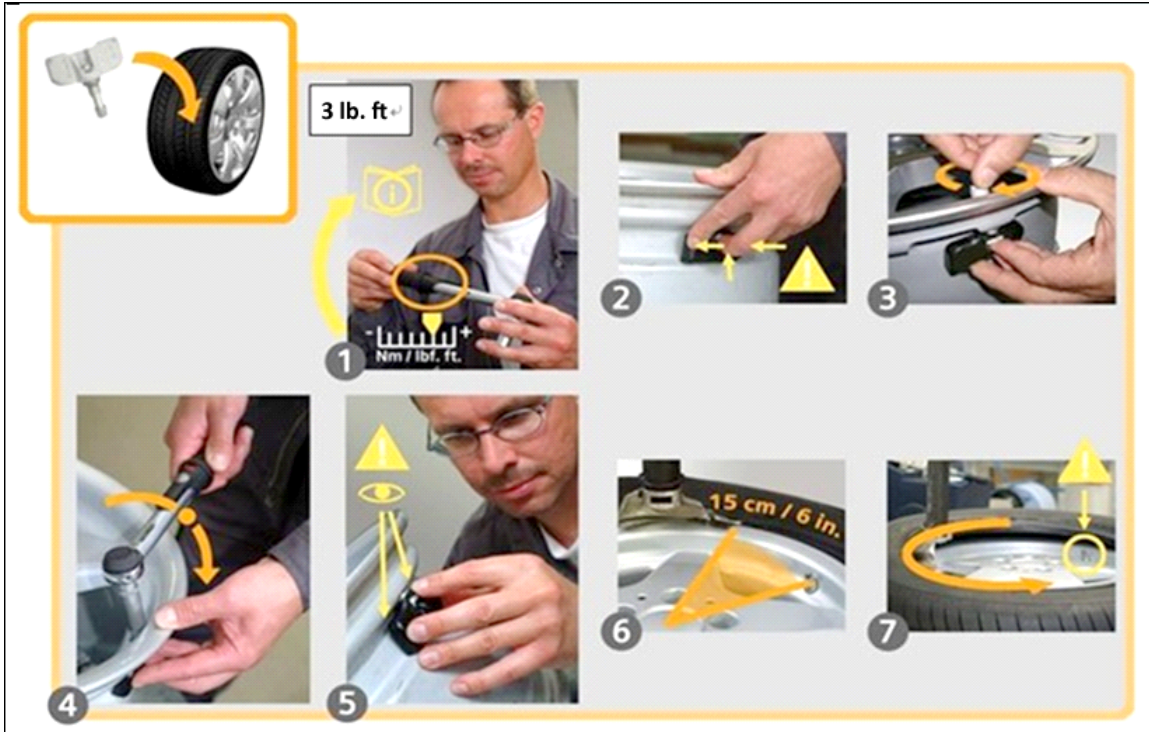
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d. TPMS Valve Stem Cap Corrosion:



Some vehicles are equipped with aluminum valve stem caps. If aluminum valve stem caps corrode, they may become difficult to remove and may lead to unnecessary replacement of the TPMS wheel sensor assembly.

Instead of replacing the assembly, it is recommended to replace only the aluminum tire valve stem cap with a grey-colored plastic part. Part number: 52933-1F400.



e. Electromagnetic Interference

Symptom/Condition:

The TPMS malfunction indicator lamp may be illuminated and the trouble codes C1312~C1315 (TPMS sensor RF, Radio Frequency, channel failure) may be stored if the vehicle is moving around electric power supply cables or radio transmitters at police stations, government and public offices, broadcasting stations, military installations, airports, transmitting towers, etc. External electronic devices connected to the vehicle's power outlets (notebook computer, seat warmer, massager, coolers, GPS navigation, mobile phone charger, etc.) may also cause this condition.

Countermeasure/Action:

The TPMS malfunction indicator light generally turns off after the vehicle is removed from such interference.

NOTE: In the case of the TRW TPMS, the TPMS indicator lamp turns off after the vehicle is removed from the interference and the ignition switch is turned off and on.

C1312~C1315 (TPMS initiator RF channel failure) set condition

- If the TPMS sensor learning fails or no RF signal is transmitted from the learned TPMS sensor, while driving the vehicle for 25 minutes over 20 kph (12 mph), the trouble codes C1312, C1313, C1314 or C1315 will be set. In addition, as mentioned above, the trouble codes may be set by electromagnetic interference with the TPMS.
- Check communication between the TPMS sensors and a scan tool. If a TPMS sensor does not transmit any data to the scan tool, replace the TPMS sensor.
- If all four TPMS sensors are checked and working correctly, trace the cause of electromagnetic interference. Drive the vehicle out of the strong electric field or remove the external electronic devices that may cause the condition. Drive the vehicle for about 5 minutes to verify that the condition is corrected.

f. TRW TPMS Sensor and Module Replacement Procedures

Replacing TPMS Wheel Sensors

TRW TPMS wheel sensor service parts can be configured for either high-line or low-line systems. However, they are set to HIGH-line mode for shipping. After replacing TRW TPMS wheel sensors, follow the procedures below in the order described using the GDS.

- 1) Register the sensors (page 20).
- 2) Set sensor status (page 21) - Verify that the sensors are in the correct mode (high-line or low-line).



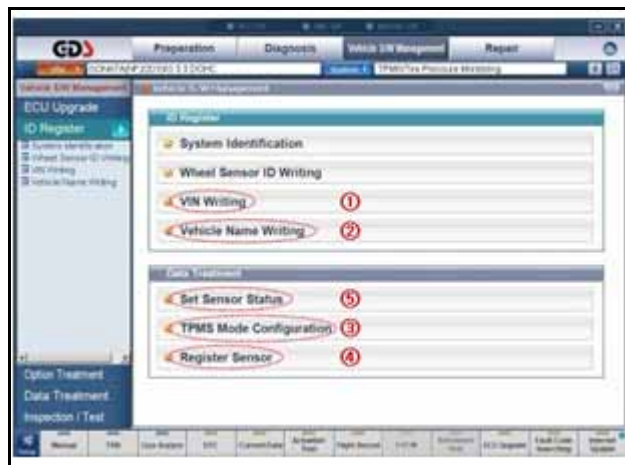
NOTE: When reading the sensors under Set Sensor Status, the TPMS tool will set the wheel sensor to the appropriate mode (high or low) according to the vehicle selected.

NOTE: When reading a TPMS sensor, make sure that the vehicle is at least 10 feet away from other vehicles to prevent interference with other TPMS systems.

Replacing a TPMS Module

When replacing a TRW TPMS module, follow the procedures below in the order described using GDS.

1. Write the VIN (page 16).
2. Write the vehicle name (page 17).
3. Configure the TPMS module mode (page 22). This applies to both HIGH & LOW lines.
4. Register all 4 wheel sensors (page 20).
5. Set the sensor status (page 21).



NOTE: The 'TPMS Mode Configuration' procedure is used to change the mode of TPMS the receiver from 'Storage' to 'Normal'. This procedure is required only when TRW TPMS receivers (both HIGH & LOW lines) are replaced. Lear and Continental TPMS receivers do not need the TPMS receiver mode setting.



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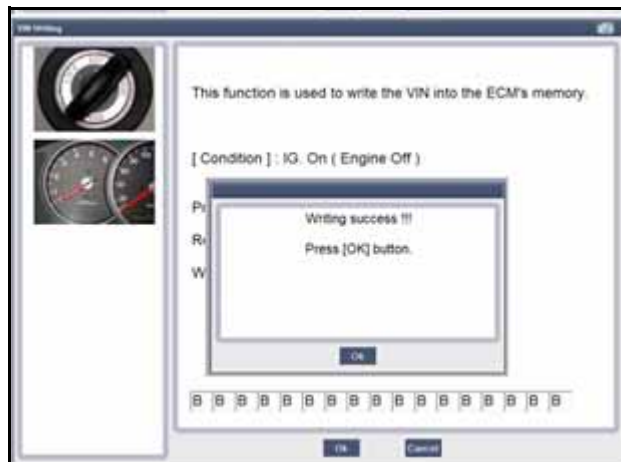
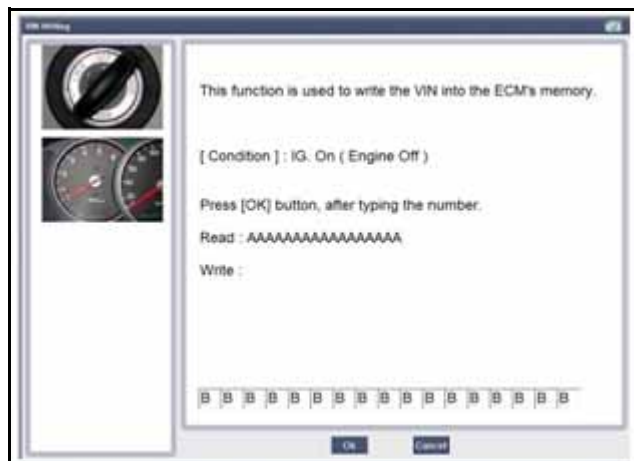
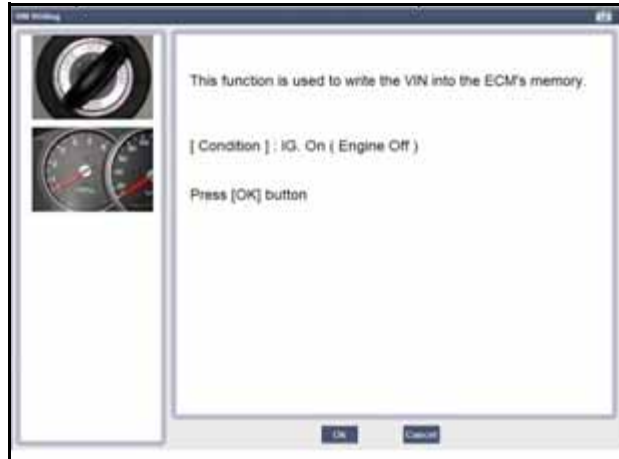
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NOTE: See GDS section on pages (19-22) for procedures for registering sensors, setting sensor status, and setting TPMS mode configuration.

TPMS SYSTEM TYPE

MODEL	YEAR	SUPPLIER	HIGH	LOW
Accent (MC)*	All	TRW		X
Azera (TG)*	All	Lear		X
Elantra (HD)*	All	Lear		X
Elantra Touring (FD)	All	Siemens		X
Entourage (EP)	-08MY	Lear	X	
Genesis Coupe (BK)	10MY	Siemens		X
Genesis Sedan (BH)	09MY-	TRW	X	
Santa Fe (CM)	-08MY	Lear	X	
Santa Fe (CM)	09MY-	Lear		X
Sonata (NF)*	All	TRW		X
Sonata (YF)	11MY	Siemens		X
Tiburon (GK)*	All	TRW		X
Tucson (JM)*	All	TRW		X
Tucson (LM)	10MY	TRW		X
Veracruz (EN)	-08MY	Lear	X	
Veracruz (EN)	09MY	Lear		X

NOTE: VIN Writing: Write the Vehicle's ID number into the ECM memory.





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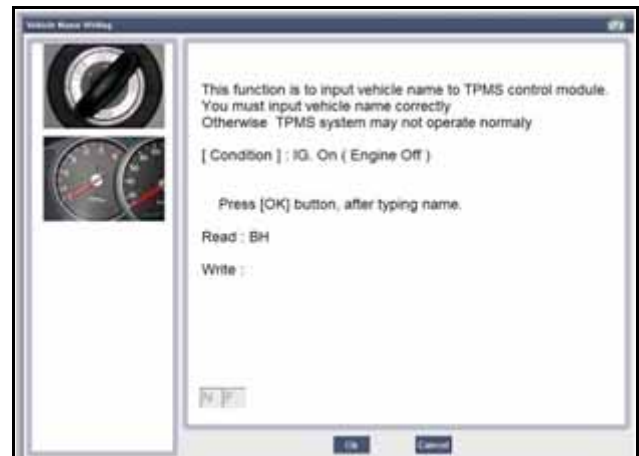
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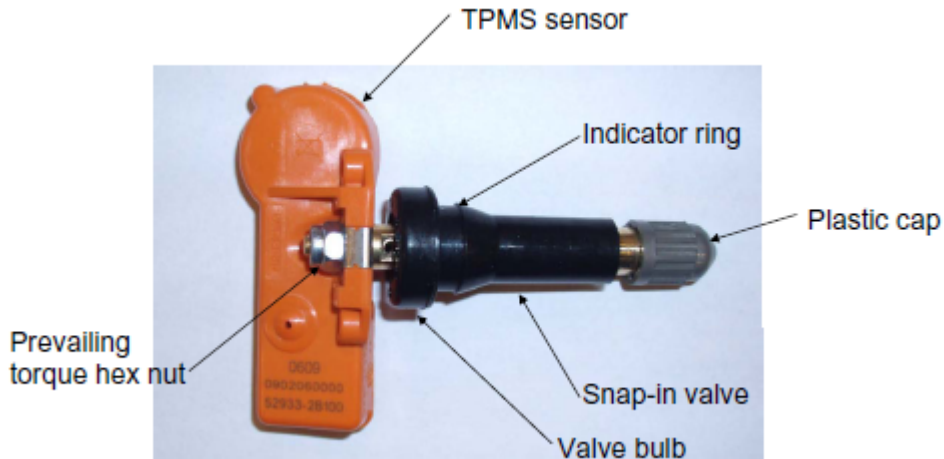
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NOTE: Vehicle Name Writing: Input the vehicle's name to the TPMS receiver.



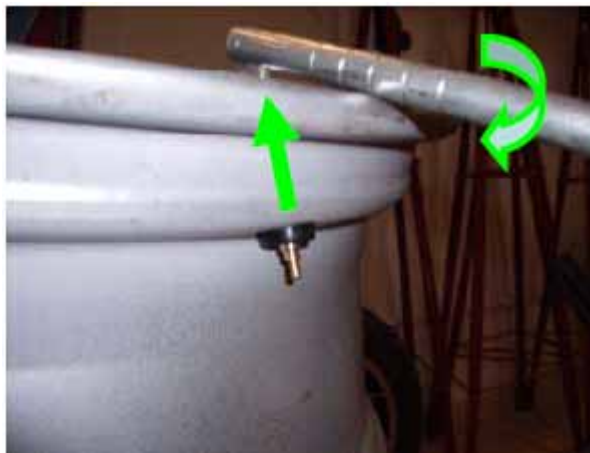
g. Lear Snap-In Valves

Beginning with 2010 Santa Fe, a Lear TPMS valve does not use a nut to mount to the wheel. These new valves are “snap-in.”



The TPMS sensor and snap-in valve are separable by removing the 7mm prevailing torque hex nut. This hex nut should never be reused.

To remove and install the snap-in valve, a standard valve stem puller tool is required.



CAUTION: When installing a snap-in valve, ensure that the valve bulb is fully seated and resting on the rim.

CAUTION: Torque the prevailing torque hex nut to 1.2 Nm (10.6 Lb-Inches). Do not overtorque.



4. GDS TPMS Functions



NOTE: Before performing diagnostics with GDS, ensure that the GDS software is up to date with the latest version.

GDS and TPMS Tool Functions:

- Read/write wheel sensor IDs
- Wheel Sensor ID Writing
- Monitor TPMS system components' current data - Current Data
- Read wheel sensor pressure, temperature, battery level, mode (high/low) data - Current Data; Set Sensor Status
- Register wheel sensors to TPMS module
- Set TPMS control module mode - Storage/Normal
- Set TPMS wheel sensor status - High/Low-Line
- Test TPMS system warning lamps
- Check and clear DTCs

NOTE: These options are accessible through the “Vehicle S/W Management” tab. Please see the following screen shot. Alternatively, this screen can be accessed from the main GDS page by selecting “System Option.”

NOTE: The GDS TPMS tool must be powered ON, be in a good state of charge, and be connected to the GDS via the USB port for the systems to communicate.

NOTE: When using the GDS TPMS tool, ensure that the vehicle is not located near any others. It is possible that the tool may read another vehicle's TPMS sensors. Allow a minimum distance of 10 feet when reading sensors between cars.



a. Register Sensors

6. To register TPMS wheel sensors using the GDS and GDS TPMS tool, click the "Vehicle S/W Management " tab along the top of the screen. Select "Register Sensor."
7. With the vehicle ignition ON, engine OFF, disconnect the GDS TPMS tool from the GDS, as instructed.
8. The TPMS tool's red LED will blink a specific number of times, indicating which number sensor it is ready to read (#1-#4). Starting with sensor #1 (front left), hold the tool within 3 inches of the wheel sensor and press the ENTER key.
9. The red LED will turn on solidly without blinking for a few seconds. When it starts blinking again, it is ready to read the next sensor.



NOTE: Depending on the system, it may take up to 2 minutes to read a TPMS wheel sensor.

10. Continue to read the sensors in the order defined by the GDS (FL, FR, RR, RL).
11. After reading all sensors, reconnect the TPMS tool to the GDS. The GDS will display the read sensor IDs. Click "Write" to complete the registration process.

b. Set Sensor Status

1. To set the wheel sensor status, select "Set Sensor Status" from the Vehicle S/W Management screen.
2. Similar to registering sensors, the GDS will prompt the user to walk around the vehicle starting at the front left wheel to read the TPMS wheel sensors.
3. When finished reading the sensors, the GDS will display the 4 sensors' information as shown.



4. From this screen, the user is able to view each sensor's status: ID; temperature, pressure, mode (high or low), etc.

IMPORTANT: It is critical that the sensor status is correct according to the vehicle TPMS system (high or low line). If it is set incorrectly the TPMS malfunction indicator will illuminate. Verify that the wheel sensors are in the correct mode.

NOTE: When reading the sensors under Set Sensor Status, the TPMS tool will set the wheel sensor to the appropriate mode (high or low) according to the vehicle selected.

c. Set TPMS Module Mode

NOTE: TPMS module mode setting is required for TRW systems only. This is necessary to do when replacing a TRW TPMS module, as the modules are shipped in storage mode. The TPMS malfunction lamp will blink when a new module is installed. This indicates that the module mode must be changed from storage to Normal mode.

NOTE: When replacing a TPMS module for a TRW system, follow the procedure on page 14.

1. To set the TPMS module mode, select “TPMS Mode Configuration” from the Vehicle S/W Management screen.
2. With the vehicle ignition ON, engine OFF, use the drop down menu to select the ‘Normal’ mode for the TPMS Control Module.



d. Check and Clear DTCs

1. To set the wheel sensor status, select the “DTC” tab along the bottom of the GDS screen.
2. The DTC screen will display any codes present, their description, and state (current or history).

To clear DTCs, select “Erase ALL DTC.”



4. TPMS Training Online

More information can be found online through the Hyundai Motor America Technical Training website, located at:

<https://www.hyundaitacs.com/GUI/TACS.html#>

TPMS-specific information is found in the “Chassis Course” section.



5. WARRANTY INFORMATION

The warranty policy is designed to ensure proper diagnosis before performing a repair. This will avoid repeated visits for the same condition.

Parts do not have to be replaced to receive compensation for work using the stand alone GDS OP CODE:

- 52933RQ0; 0.3 hours - For TPMS Wheel Sensor Diagnostics

IMPORTANT: Review the TPMS Policy and Procedure below and retain the GDS screen shots as documentation.

TPMS Policy & Procedure

- It is required that all TPMS claims must list appropriate DTC code(s).
- Checking tire pressure is not warrantable.
- **It is required that GDS screen prints are included (before and after TPMS replacement) for documentation.** These shots are taken from the Set Sensor Status results screen showing TPMS information for all 4 wheel sensors.

VIN : 5NMSH13E98H200353, Maker : HY, Vehicle : SANTAFE(CM)

Model Year : 2008, Engine Type : G 3.3 DOHC

Date Time: 2009.02.25 10:24:21

(ECU:N-H-01-05-1.59, Source:N-H-01-05-1.59, Info:N-H-01-05-1.59, VCI:2009 01 15 1.61)

Sensor Status

No. 1

ITEM	VALUE	UNIT
ID	C9A48129	
Pressure	33.2	psi
Temperature	68	F
Battery Level	OK	
Sensor Option	HIGH	
Sensor Status	NORMAL	
Transmission	LF INMATE TM	
Tire Type	65 psi	

Retry

No. 2

ITEM	VALUE	UNIT
ID	C9A48120	
Pressure	33.2	psi
Temperature	68	F
Battery Level	OK	
Sensor Option	HIGH	
Sensor Status	NORMAL	
Transmission	LF INMATE TM	
Tire Type	65 psi	

Retry

No. 3

ITEM	VALUE	UNIT
ID	C9A480F8	
Pressure	31.8	psi
Temperature	64	F
Battery Level	OK	
Sensor Option	HIGH	
Sensor Status	NORMAL	
Transmission	LF INMATE TM	
Tire Type	65 psi	

Retry

No. 4

ITEM	VALUE	UNIT
ID	C98CC39D	
Pressure	37.8	psi
Temperature	68	F
Battery Level	OK	
Sensor Option	HIGH	
Sensor Status	NORMAL	
Transmission	LF INMATE TM	
Tire Type	65 psi	

Retry

Cancel



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- It is required that a GDS screen print is included that shows the DTC list and VIN number, as seen from the DTC tab.

VIN : KMHGC46FX9U029614, Maker : HY, Vehicle : GENESIS(BH)
Model Year : 2009, Engine Type : G 4.6 DOHC
Date Time: 2008.12.10 10:11:00
(ECU:N-H-01-05-1.54, Source:N-H-01-05-1.54, Info:N-H-01-05-1.54, VCI:2008 10 15 1.59)

Description	State
C1312 Front Left Sensor RF Channel Failure	
C1312 Front Left Sensor RF Channel Failure	H

- TPMS IDs must be listed in Tech Comments.
- TPMS module and wheel sensor replacement can NOT be claimed together.
- Claims with 2 or more wheel sensor replacements are subject to PWA.
- For diagnosis without parts replacement, use the standalone 52933RQ0 GDS op code. No parts replacement is necessary for this op code.

NOTE: After diagnosis, any DTC should be cleared before releasing the vehicle.

NOTE: To ensure that a vehicle has been repaired, it is required to test drive the vehicle a minimum of 25 minutes above 12 MPH to ensure the DTC does not return.