REPORT NUMBER 138-STF-09-003

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 138 TIRE PRESSURE MONITORING SYSTEMS

HYUNDAI MOTOR COMPANY
2009 HYUNDAI GENESIS
FOUR-DOOR PASSENGER CAR
NHTSA NO. C90501

U.S. DOT SAN ANGELO TEST FACILITY
131 COMANCHE TRAIL, BUILDING 3527
GOODFELLOW AFB, TEXAS 76908

March 13, 2009

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
NVS-220
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVENUE, SE
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16. Abstract Compliance tests were conducted on the subject 2009 Hyundai Genesis four-door passenger car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-138-03 for the determination of FMVSS 138 compliance. Test failures identified were as follows: NONE.		
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INTRODUCTION

1.1 PURPOSE OF COMPLIANCE TEST

A 2009 Hyundai Genesis four-door passenger car was tested to determine if the vehicle was in compliance with the requirements of FMVSS 138. All tests were conducted in accordance with NHTSA/Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure TP-138-03 dated July 12, 2007.

1.2 TEST VEHICLE

The test vehicle was a 2009 Hyundai Genesis four-door passenger car. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: KMHGC46E89U025598

B. NHTSA Number: C90501

C Manufacturer: Hyundai Motor Company, Ltd.

D. Manufacture Date: 06/2008

1.3 TEST DATE

The test vehicle was tested during the time period February 23 through March 3, 2009.

SECTION 2

TEST PROCEDURE AND SUMMARY OF RESULTS

2.1 TEST PROCEDURE

Prior to test, the test vehicle was inspected for completeness, systems operability, and appropriate fuel and liquid levels, i.e. oil and coolant. The vehicle was then photographically documented as required by the NHTSA/OVSC Test Procedure. Tire sidewall information was recorded. The owner's manual was reviewed, and pertinent tire and TPMS information were noted. Telltale's symbol, color, location and lamp function were checked.

Subsequent events included weighing the vehicle to establish the Unloaded Vehicle Weight (UVW) and the distribution of weight on the front and rear axles and each wheel position. The vehicle was loaded to its Lightly Loaded Vehicle Weight (LLVW) for three tire deflation scenarios. This LLVW included the weights of driver, one passenger, and test equipment. The vehicle was loaded to its Unloaded Vehicle Weight plus Vehicle Capacity Weight (VCW) for three additional tire deflation scenarios. The VCW included the weights of driver, one passenger, test equipment, ballast in the rear seat, and ballast in the rear cargo area. The vehicle is required to be loaded to its maximum capacity without exceeding either the Vehicle Capacity Weight or Gross Vehicle Weight Rating (GVWR). For determination of the telltale warning activation pressure, the recommended cold inflation pressure was identified from the vehicle placard.

The vehicle was instrumented with a Racelogic VBOX III 100 Hz GPS Data Logger and brake pedal trigger. The VBOX uses GPS to measure vehicle speed, time, and distance. Test data were recorded to a compact flash card. During the test, a stopwatch was used to determine the approximate "cumulative driving time" during each test phase. Cumulative driving time does not include time during the brake application or when the vehicle speed was below 50 km/h or above 100 km/h. Upon completion of a tire deflation scenario, graphs were generated by VBOX software showing vehicle speed versus time during the test procedures. The graphs furnish a second-by-second analysis of each calibration phase. The cumulative driving time was calculated by post-processing the VBOX graph data, and is reported in Section 3 (Test Data) as 'Total Driving Time'.

The tire deflation test scenario consisted of four phases:

1. Calibration phase: Tires were set at vehicle placard cold inflation pressure and the vehicle was driven for at least twenty minutes of cumulative driving time between 50 and 100 km/h.

2. Detection phase: Immediately after calibration phase, the selected tire(s) were deflated to seven kPa (one psi) below the Telltale Warning Activation Pressure. After one minute, the inflation pressure(s) of only deflated tire(s) were rechecked and adjusted if necessary. The vehicle was started and driven, if necessary, to ensure that the low inflation pressure telltale illuminated.
3. Cool down phase: Vehicle was parked in the San Angelo Test Facility (SATF) open bay shielded from direct sunlight. Tires were allowed to cool down for a minimum of one hour. After cool down, the vehicle was started and the low tire pressure telltale was checked for re-illumination.
4. Extinguishment phase: Tires were adjusted to vehicle placard cold inflation pressure. The vehicle was started and driven, if necessary, to ensure that the low inflation pressure telltale extinguished.

Two malfunction scenarios were performed on the Hyundai Genesis. The first scenario was performed with the vehicle loaded to its LLVW. The malfunction was simulated by placing the compact spare tire, with no TPMS sensor, on the right front wheel position. The second scenario was performed by removing a TPMS fuse.

2.2 SUMMARY OF RESULTS

Three tire deflation scenarios were performed on the test vehicle at LLVW:

A. Left front
B. Left front and left rear
C. Left front, left rear, right rear, and right front

Three tire deflation scenarios were performed on the test vehicle at UVW + VCW:

D. Right rear
E. Left front and right front
F. Left front, left rear, and right front

In all cases the low tire pressure warning symbol illuminated immediately after lamp check. Driving was not required for the low inflation pressure detection phase.

During the extinguishment phase of each scenario the low tire pressure warning symbol extinguished immediately after lamp check. Driving was not required for the extinguishment phase.

The data indicate compliance of the test vehicle's tire pressure monitoring system for the six tire deflation scenarios tested.

One malfunction detection scenario was performed on the test vehicle at LLVW:

G. Spare tire without TPMS sensor was applied to right front wheel position.

One malfunction detection scenario was performed on the test vehicle at UVW + VCW:

H. A TPMS fuse was removed.

In both scenarios, the vehicle's dedicated malfunction telltale properly operated within the requisite time period, per the standard's requirements.

SECTION 3

TEST DATA

FMVSS No. 138 – TEST DATA SUMMARY

TEST DATES: February 23 – March 3, 2009 LAB: U. S. DOT San Angelo Test Facility

VIN: KMHGC46E89U025598 VEHICLE NHTSA NUMBER: C90501

CERTIFICATION LABEL BUILD DATE: 06/2008

REQUIREMENTS	PASS/FAIL
LOW TIRE PRESSURE WARNING TELLTALE S138: S4.3.1 (a), (b); S4.3.3 (a), (b)	
Mounting	**PASS**
Symbol and color	**PASS**
Check of lamp function	**PASS**
MALFUNCTION TELLTALE S138: S4.4 (b) or (c)	
Mounting	**PASS**
Symbol and color	**PASS**
Check of lamp function	**PASS**
LOW TIRE PRESSURE WARNING - OPERATIONAL PERFORMANCE S138: S4.2, S4.3.1 (c), S4.3.2	
Telltale illumination	**PASS**
MALFUNCTION INDICATOR – OPERATIONAL PERFORMANCE S138: S4.4 (a)	
Telltale illumination	**PASS**
TPMS WRITTEN INSTRUCTIONS S138: S4.5	
Image of telltales	**PASS**
Verbatim statements	**PASS**

REMARKS: None

DATA SHEET 1 (Sheet 1 of 3)
TEST PREPARATION INFORMATION

TEST DATE: February 23, 2009 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501 VIN: KMHGC46E89U025598

CERTIFICATION LABEL BUILD DATE: 06/2008 ENGINE: 3.8 liter 6 cylinder

MY/MAKE/MODEL/BODY STYLE: 2009 Hyundai Genesis four-door passenger car

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 114 km (71 mi)

VEHICLE ALIGNMENT AND WHEEL BALANCING:

Alignment checked: ( ) Front ( ) Rear (X) COTR waived

Wheels balanced: ( ) Front ( ) Rear (X) COTR waived

TPMS IDENTIFICATION:

TPMS MAKE/MODEL: TRW (Entire Solution)
Sensor model Infineon SP-30, part #52933-2F000/

Source: Manufacturer supplied information

TPMS TYPE: (X) Direct ( ) Indirect ( ) Other

Does TPMS require execution of a learning/calibration driving phase? ( )YES (X)NO

Source: Manufacturer supplied information

Does TPMS have a manual reset control? ( )YES (X)NO

TPMS MALFUNCTION INDICATOR TYPE:

( ) None (X) Dedicated Telltale ( ) Combination low tire pressure/malfunction telltale

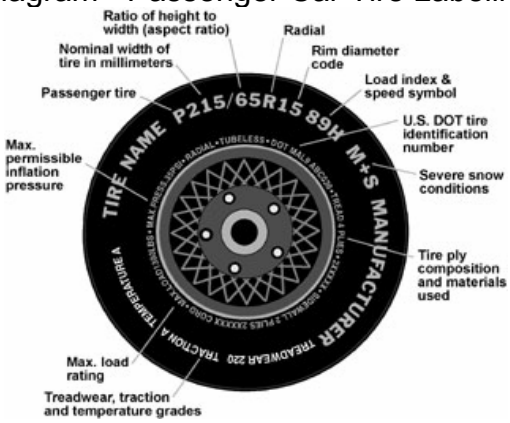
DATA SHEET 1 (Sheet 2 of 3)
TEST PREPARATION INFORMATION

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING AND OWNER'S MANUAL:

Axle	Tire Size	Recommended Cold Inflation Pressure	Source
Front	P225/55R17	230 kPa (33 psi)	Vehicle placard
Rear	P225/55R17	230 kPa (33 psi)	Vehicle placard

INSTALLED TIRE DATA

Diagram - Passenger Car Tire Labeling



Front and Rear Axles

Tire Size and Load Index / Speed Rating: P225/55R17 95H

Manufacturer/Tire Name: Dunlop SP Sport 5000M

Sidewall Max Load Rating: 690 kg (1,521 lbs)

Max Inflation Pressure: 350 kPa (51 psi)

Sidewall Construction (number of plies and ply material): 2 polyester

Tread Construction (number of plies and ply material): 2 polyester, 2 steel, 1 nylon

Do all installed tires have the same sidewall information? (X)YES ( )NO

Are all installed tires the same as designated by the vehicle manufacturer on the vehicle placard? (X)YES ( )NO

DATA SHEET 1 (Sheet 3 of 3)
TEST PREPARATION

Worksheet for Determining FMVSS No. 138 Telltale Warning Activation Pressure for Tires Installed on Vehicle		
Part	**Front Axle**	**Rear Axle**
(A) Recommended Inflation Pressure x .75	230 kPa x .75 = 172.5 kPa	230 kPa x .75 = 172.5 kPa
(B) Information from FMVSS 138 Table 1 below, Tire types are: Inflation pressure Minimum activation pressures from Table 1	(X) P-metric-Standard load ( ) P-metric-Extra Load Load Range ( ) C, ( ) D, or ( ) E (X) Maximum or ( ) Rated 350 kPa (51 psi) 140 kPa (20 psi)	(X) P-metric-Standard load ( ) P-metric-Extra Load Load Range ( ) C, ( ) D, or ( ) E (X) Maximum or ( ) Rated 350 kPa (51 psi) 140 kPa (20 psi)
(C) Telltale Warning Activation Pressure is the higher of Part (A) or (B)	172.5 kPa (25.0 psi)	172.5 kPa (25.0 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	165.5 kPa (24.0 psi)	165.5 kPa (24.0 psi)

FMVSS 138 Table 1 - Low Tire Pressure Warning Telltale - Minimum Activation Pressure

Tire Type	**Maximum or Rated Inflation Pressure**		**Minimum Activation Pressure**	
	(kPa)	**(psi)**	**(kPa)**	**(psi)**
P-metric -- Standard Load	240, 300, or 350	35, 44, or 51	140 140 140	20 20 20
P-metric - Extra Load	280 or 340	41 or 49	160 160	23 23
Load Range C	350	51	200	29
Load Range D	450	65	240	35
Load Range E	550	80	240	35

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: February 23, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 2 (Sheet 1 of 2)
LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE

TEST DATE: February 23, 2009 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

TPMS Low Tire Pressure Warning Telltale

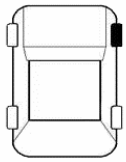
Telltale is mounted inside the occupant compartment in front of and in clear view of the driver?

(X)YES ( )NO (fail)

TPMS Low Tire Pressure Warning Telltale Location: Right of tachometer above the reconfigurable display (message information center)

Identify Telltale Symbol Used (check box above figure).

[X] 

[ ] 

[ ] OTHER (fail)
(describe below)

Note Any Words or Additional Symbols Used: The TPMS primary telltale is the cross section of a tire symbol. The reconfigurable display also provides a plan view of a vehicle that depicts which tire(s) is(are) under-inflated.

Telltale is part of a reconfigurable display? ( )YES (X)NO

TPMS Malfunction Telltale

( ) None (X) Dedicated stand-alone ( ) Combined with low tire pressure telltale

TPMS Dedicated Malfunction Telltale Location: Slightly left of speedometer and above reconfigurable display (message information center)

Telltale is mounted inside the occupant compartment in front of and in clear view of the driver?

(X)YES ( )NO (fail)

Malfunction telltale is part of a reconfigurable display? ( )YES (X)NO

Identify Dedicated Telltale Symbol Used: (X) "TPMS" ( ) OTHER (fail)

Note any words or additional symbols used: None

DATA SHEET 2 (Sheet 2 of 2)
LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE

Check Telltale Lamp Functions:

LOW TIRE PRESSURE WARNING TELLTALE

Ignition locking system position when telltale illuminates:

[ ] OFF/LOCK [ ] Between OFF/LOCK and ON/RUN

[ ] ON/RUN [X] Between ON/RUN and START

Is the telltale yellow in color? (X)YES ( )NO (fail)

Time telltale remains illuminated 3 seconds.

DEDICATED MALFUNCTION TELLTALE

Ignition locking system position when telltale illuminates:

[ ] OFF/LOCK [ ] Between OFF/LOCK and ON/RUN

[ ] ON/RUN [X] Between ON/RUN and START

Is the telltale yellow in color? (X)YES ( )NO (fail)

Time telltale remains illuminated 3 seconds.

Starter Interlocks:

Does vehicle have any starter, transmission or other interlocks that affect operation of the telltale lamp check function? ( )YES (X)NO

Low Tire Pressure Warning and Malfunction Telltales (PASS/FAIL) PASS

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: February 23, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 1 of 22)
TPMS OPERATIONAL PERFORMANCE

TEST DATE: February 23, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Time:	Start:	9:51 am	End:	11:25 am
Ambient Temperature:	Start:	16.5°C (61.7°F)	End:	17.6°C (63.7°F)
Odometer Reading:	Start:	153 km (95 mi)		
Fuel Level:	Start:	Full		
Weather Conditions:		Clear and windy		

Time vehicle remained with engine off and tires shielded from direct sunlight (1 hour minimum): overnight minutes

PRE-TEST TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Pre-test cold measurements after ambient soak: Inflation Pressure	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	16.0°C (60.8°F)	16.2°C (61.2°F)	16.4°C (61.5°F)	16.2°C (61.2°F)

DATA SHEET 3 (Sheet 2 of 22)
TPMS OPERATIONAL PERFORMANCE

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,200 kg (4,850 lbs)

GAWR (front): 1,200 kg (2,646 lbs)

GAWR (rear): 1,250 kg (2,756 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 390 kg (860 lbs)

Measured Unloaded Vehicle Weight:

LF	458 kg (1,010 lbs)	LR	404 kg (891 lbs)
RF	439 kg (967 lbs)	RR	411 kg (907 lbs)
Front Axle	897 kg (1,977 lbs)	Rear Axle	815 kg (1,798 lbs)

Total Vehicle 1,712 kg (3,775 lbs)

Measured Test Weight: (X) LLVW (+50, -0 kg) ( ) UVW + VCW ( ) GVWR (+0, -50 kg)

LF	508 kg (1,121 lbs)		LR	452 kg (997 lbs)	
RF	490 kg (1,081 lbs)		RR	466 kg (1,028 lbs)	
Front Axle	998 kg (2,202 lbs)	(≤ GAWR)	Rear Axle	918 kg (2,025 lbs)	(≤ GAWR)

Total Vehicle 1,916 kg (4,227 lbs) (not greater than GVWR)

Note: For scenarios A, B, C, and G, this total vehicle weight measures the vehicle loaded to Lightly Loaded Vehicle Weight (LLVW), 204 kg (452 lbs) of driver, passenger, and test equipment.

DATA SHEET 3 (Sheet 3 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO A – Left Front Tire Deflation at LLVW

TEST DATE: February 24, 2009 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Note: See Data Sheet 3 (Sheet 2 of 22) for Test Weight.

TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES BEFORE CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 13.9°C (57.0°F) Vehicle cool down period: overnight				
Inflation Pressure	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	14.8°C (58.6°F)	14.8°C (58.6°F)	15.0°C (59.0°F)	15.0°C (59.0°F)
San Angelo Test Facility Shop Floor Temp	15.0°C (59.0°F)	15.4°C (59.7°F)	15.6°C (60.1°F)	15.2°C (59.4°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	14:41:23 UTC	End:	15:05:12 UTC
Trip Odometer Reading:	Start:	50.4 km (31.3 mi)	End:	82.4 km (51.2 mi)
Ambient Temperature:	Start:	13.3°C (55.9°F)	End:	16.1°C (61.0°F)
Roadway Temperature:	Start:	12.6°C (54.7°F)	End:	18.2°C (64.8°F)

Driving in first direction:

Starting point: Goodfellow Air Force Base (GAFB) north gate Direction: see chart, page 63

10:15 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 63

10:32 minutes (stopwatch time) 16.1 km (10. 0 mi) distance

Max speed: 100.9 km/h (62.7 mph)

Total Driving Time: 20:48 minutes (VBox time)

DATA SHEET 3 (Sheet 4 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO A – Left Front Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	252.9 kPa (36.7 psi)	252.0 kPa (36.5 psi)	252.2 kPa (36.6 psi)	251.5 kPa (36.5 psi)
Tire Sidewall Temp	27.4°C (81.3°F)	24.8°C (76.6°F)	26.4°C (79.5°F)	26.8°C (80.2°F)
San Angelo Test Facility Shop Floor Temp	15.4°C (59.7°F)	15.4°C (59.7°F)	15.4°C (59.7°F)	15.4°C (59.7°F)

SYSTEM DETECTION PHASE:

LOCATION AND PRESSURE(S) OF DEFLATED TIRE(S):

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF ( )LR ( )RR ( )RF Inflation Pressure	165.5 kPa (24.0 psi)			

TELLTALE ILLUMINATION:

Driving in first direction:

Starting point: San Angelo Test Facility shop

Time to Illuminate:

Illumination immediately after lamp check. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO (fail)

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

DATA SHEET 3 (Sheet 5 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO A – Left Front Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 19.4°C (66.9°F) Vehicle cool down period: 62 minutes				
Inflation Pressure	157.4 kPa (22.8 psi)	236.0 kPa (34.2 psi)	236.5 kPa (34.3 psi)	237.7 kPa (34.5 psi)
Tire Sidewall Temp	18.8°C (65.8°F)	19.0°C (66.2°F)	19.4°C (66.9°F)	19.0°C (66.2°F)
San Angelo Test Facility Shop Floor Temp	15.8°C (60.4°F)	16.6°C (61.9°F)	17.0°C (62.6°F)	16.2°C (61.2°F)

After the cool down period of a minimum of one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

TELLTALE EXTINGUISHMENT:

RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After illumination verification: Re-adjusted Inflation Pressure:	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.1 kPa (33.4 psi)	230.0 kPa (33.4 psi)

Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

TPMS Performance Test Results (PASS/FAIL) **PASS**
Left front tire was deflated at LLVW.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: February 24, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 6 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO B – Left Front and Left Rear Tire Deflation at LLVW

TEST DATE: February 24, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Note: See Data Sheet 3 (Sheet 2 of 22) for Test Weight.

TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES BEFORE CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 22.6°C (72.7°F) Vehicle cool down period: 60 minutes				
Inflation Pressure	230.1 kPa (33.4 psi)	230.1 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	18.8°C (65.8°F)	19.4°C (66.9°F)	20.8°C (69.4°F)	20.0°C (68.0°F)
San Angelo Test Facility Shop Floor Temp	15.6°C (60.1°F)	16.6°C (61.9°F)	17.0°C (62.6°F)	16.4°C (61.5°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	17:49:51 UTC	End:	18:13:45 UTC
Trip Odometer Reading:	Start:	90.0 km (55.9 mi)	End:	122.0 km (75.8 mi)
Ambient Temperature:	Start:	23.0°C (73.4°F)	End:	25.7°C (78.3°F)
Roadway Temperature:	Start:	32.0°C (89.6°F)	End:	29.2°C (84.6°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 64

10:12 minutes (stopwatch time) 15.8 km (9.8 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 64

10:21 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 99.5 km/h (61.8 mph)

Total Driving Time: 20:33 minutes (VBox time)

DATA SHEET 3 (Sheet 7 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO B – Left Front and Left Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	256.1 kPa (37.1 psi)	255.6 kPa (37.1 psi)	256.0 kPa (37.1 psi)	257.2 kPa (37.3 psi)
Tire Sidewall Temp	36.8°C (98.2°F)	34.4°C (93.9°F)	35.6°C (96.1°F)	35.2°C (95.4°F)
San Angelo Test Facility Shop Floor Temp	17.4°C (63.3°F)	17.8°C (64.0°F)	18.8°C (65.8°F)	17.8°C (64.0°F)

SYSTEM DETECTION PHASE:

LOCATION AND PRESSURE(S) OF DEFLATED TIRE(S):

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR ( )RR ( )RF Inflation Pressure	165.5 kPa (24.0 psi)	165.6 kPa (24.0 psi)		

TELLTALE ILLUMINATION:

Driving in first direction:

Time to Illuminate:

Illumination immediately after lamp check. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO (fail)

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

DATA SHEET 3 (Sheet 8 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO B – Left Front and Left Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 29.0°C (84.2°F) Vehicle cool down period: 64 minutes				
Inflation Pressure	155.8 kPa (22.6 psi)	155.6 kPa (22.6 psi)	239.1 kPa (34.7 psi)	240.3 kPa (34.9 psi)
Tire Sidewall Temp	24.8°C (76.6°F)	26.4°C (79.5°F)	26.8°C (80.2°F)	24.4°C (75.9°F)
San Angelo Test Facility Shop Floor Temp	18.2°C (64.8°F)	19.4°C (66.9°F)	19.6°C (67.3°F)	18.4°C (65.1°F)

After the cool down period of a minimum of one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

TELLTALE EXTINGUISHMENT:
RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After illumination verification: Re-adjusted Inflation Pressure:	230.1 kPa (33.4 psi)	230.1 kPa (33.4 psi)	230.1 kPa (33.4 psi)	230.1 kPa (33.4 psi)

Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

TPMS Performance Test Results (PASS/FAIL) **PASS**
Left front and left rear tires were deflated at LLVW.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: February 24, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 9 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO C – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at LLVW

TEST DATE: February 25, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Note: See Data Sheet 3 (Sheet 2 of 22) for Test Weight.

TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES BEFORE CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 15.6°C (60.1°F) Vehicle cool down period: overnight				
Inflation Pressure	230.1 kPa (33.4 psi)	230.1 kPa (33.4 psi)	230.1 kPa (33.4 psi)	230.1 kPa (33.4 psi)
Tire Sidewall Temp	16.6°C (61.9°F)	16.6°C (61.9°F)	16.4°C (61.5°F)	16.4°C (61.5°F)
San Angelo Test Facility Shop Floor Temp	17.0°C (62.6°F)	17.4°C (63.3°F)	17.4°C (63.3°F)	17.0°C (62.6°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	14:20:00 UTC	End:	14:43:54 UTC
Trip Odometer Reading:	Start:	129.6 km (80.5 mi)	End:	161.6 km (100.4 mi)
Ambient Temperature:	Start:	15.6°C (60.1°F)	End:	15.9°C (60.6°F)
Roadway Temperature:	Start:	13.4°C (56.1°F)	End:	15.6°C (60.1°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 65

10:14 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 65

10:31 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 98.8 km/h (61.4 mph)

Total Driving Time: 20:43 minutes (VBox time)

DATA SHEET 3 (Sheet 10 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO C – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	251.2 kPa (36.4 psi)	251.7 kPa (36.5 psi)	251.6 kPa (36.5 psi)	250.4 kPa (36.3 psi)
Tire Sidewall Temp	27.2°C (81.0°F)	25.0°C (77.0°F)	26.9°C (80.4°F)	26.6°C (79.9°F)
San Angelo Test Facility Shop Floor Temp	17.2°C (63.0°F)	17.4°C (63.3°F)	17.6°C (63.7°F)	16.8°C (62.2°F)

SYSTEM DETECTION PHASE:

LOCATION AND PRESSURE(S) OF DEFLATED TIRE(S):

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR (X)RR (X)RF Inflation Pressure	165.5 kPa (24.0 psi)	165.5 kPa (24.0 psi)	165.5 kPa (24.0 psi)	165.5 kPa (24.0 psi)

TELLTALE ILLUMINATION:

Driving in first direction:

Time to Illuminate:

Illumination immediately after lamp check. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO (fail)

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

DATA SHEET 3 (Sheet 11 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO C – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 19.2°C (66.6°F) Vehicle cool down period: 60 minutes				
Inflation Pressure	157.7 kPa (22.9 psi)	157.8 kPa (22.9 psi)	157.7 kPa (22.9 psi)	158.7 kPa (23.0 psi)
Tire Sidewall Temp	19.8°C (67.6°F)	19.8°C (67.6°F)	20.4°C (68.7°F)	19.6°C (67.3°F)
San Angelo Test Facility Shop Floor Temp	17.8°C (64.0°F)	18.2°C (64.8°F)	18.4°C (65.1°F)	18.2°C (64.8°F)

After the cool down period of a minimum of one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

TELLTALE EXTINGUISHMENT:
RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After illumination verification: Re-adjusted Inflation Pressure:	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)

Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL) **PASS**
Left front, left rear, right rear, and right front tires were deflated at LLVW.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: February 25, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 12 of 22)
TPMS OPERATIONAL PERFORMANCE

TEST DATE: February 26, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Time:	Start:	7:40 am	End:	8:57 am
Ambient Temperature:	Start:	15.4°C (59.7°F)	End:	17.2°C (63.0°F)
Odometer Reading:	Start:	285 km (177 mi)		
Fuel Level:	Start:	Full		
Weather Conditions:		Partly cloudy, light winds		

Time vehicle remained with engine off and tires shielded from direct sunlight:
(1 hour minimum): overnight

PRE-TEST TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Pre-test cold measurements after ambient soak: Inflation Pressure	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	16.2°C (61.2°F)	16.2°C (61.2°F)	15.8°C (60.4°F)	16.4°C (61.5°F)

DATA SHEET 3 (Sheet 13 of 22)
TPMS OPERATIONAL PERFORMANCE

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,200 kg (4,850 lbs)

GAWR (front): 1,200 kg (2,646 lbs)

GAWR (rear): 1,250 kg (2,756 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 390 kg (860 lbs)

Measured Unloaded Vehicle Weight:

LF	457 kg (1,007 lbs)	LR	405 kg (893 lbs)
RF	440 kg (970 lbs)	RR	411 kg (905 lbs)
Front Axle	897 kg (1,977 lbs)	Rear Axle	816 kg (1,798 lbs)

Total Vehicle 1,713 kg (3,775 lbs)

Measured Test Weight: ( ) LLVW (+50, -0 kg) (X) UVW + VCW ( ) GVWR (+0, -50 kg)

LF	516 kg (1,137 lbs)		LR	538 kg (1,186 lbs)	
RF	501 kg (1,105 lbs)		RR	548 kg (1,207 lbs)	
Front Axle	1,017 kg (2,242 lbs)	(≤ GAWR)	Rear Axle	1,086 kg (2,393 lbs)	(≤ GAWR)

Total Vehicle 2,103 kg (4,635 lbs) (not greater than GVWR)

Note: For scenarios D, E, and F, this Total Vehicle Weight measures the vehicle loaded to Unloaded Vehicle Weight (UVW) and Vehicle Capacity Weight (VCW), 390 kg (860 lbs) of driver, passenger, test equipment, and ballast.

DATA SHEET 3 (Sheet 14 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO D – Right Rear Tire Deflation at UVW + VCW

TEST DATE: March 2, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Note: See Data Sheet 3 (Sheet 13 of 22) for Test Weight.

TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES BEFORE CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to UVW + VCW, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 13.0°C (55.4°F) Vehicle cool down period: overnight				
Inflation Pressure	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	10.8°C (51.4°F)	11.2°C (52.2°F)	10.2°C (50.4°F)	10.2°C (50.4°F)
San Angelo Test Facility Shop Floor Temp	11.8°C (53.2°F)	12.2°C (54.0°F)	11.2°C (52.2°F)	11.4°C (52.5°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	16:36:02 UTC	End:	17:00:06 UTC
Trip Odometer Reading:	Start:	171.2 km (106.4 mi)	End:	203.4 km (126.4 mi)
Ambient Temperature:	Start:	12.5°C (54.5°F)	End:	15.8°C (60.4°F)
Roadway Temperature:	Start:	18.0°C (64.4°F)	End:	21.2°C (70.2°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 66

10:07 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 66

10:28 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 99.5 km/h (61.8 mph)

Total Driving Time: 20:35 minutes (VBox time)

DATA SHEET 3 (Sheet 15 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO D – Right Rear Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	261.3 kPa (37.9 psi)	263.6 kPa (38.2 psi)	265.2 kPa (38.5 psi)	260.8 kPa (37.8 psi)
Tire Sidewall Temp	31.2°C (88.2°F)	29.2°C (84.6°F)	27.6°C (81.7°F)	26.6°C (79.9°F)
San Angelo Test Facility Shop Floor Temp	12.4°C (54.3°F)	13.2°C (55.8°F)	12.6°C (54.7°F)	12.4°C (54.3°F)

SYSTEM DETECTION PHASE:

LOCATION AND PRESSURE(S) OF DEFLATED TIRE(S):

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: ( )LF ( )LR (X)RR ( )RF Inflation Pressure			165.5 kPa (24.0 psi)	

TELLTALE ILLUMINATION:

Driving in first direction:

Time to Illuminate:

Illumination immediately after lamp check. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO (fail)

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

DATA SHEET 3 (Sheet 16 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO D – Right Rear Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 19.0°C (66.2°F) Vehicle cool down period: 62 minutes				
Inflation Pressure	243.1 kPa (35.3 psi)	243.3 kPa (35.3 psi)	153.2 kPa (22.2 psi)	243.7 kPa (35.3 psi)
Tire Sidewall Temp	18.6°C (65.5°F)	19.0°C (66.2°F)	17.8°C (64.0°F)	17.2°C (63.0°F)
San Angelo Test Facility Shop Floor Temp	13.8°C (56.8°F)	14.8°C (58.6°F)	14.8°C (58.6°F)	14.0°C (57.2°F)

After the cool down period of a minimum of one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

TELLTALE EXTINGUISHMENT:
RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After illumination verification: Re-adjusted Inflation Pressure:	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)

Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL) **PASS**
Right rear tire was deflated at LLVW.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: March 2, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 17 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO E – Left Front, Right Front Tire Deflation at UVW + VCW

TEST DATE: March 2, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Note: See Data Sheet 3 (Sheet 13 of 22) for Test Weight.

TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES BEFORE CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to UVW + VCW, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 21.5°C (70.7°F) Vehicle cool down period: 60 minutes				
Inflation Pressure	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	19.0°C (66.2°F)	19.2°C (66.6°F)	18.2°C (64.8°F)	17.8°C (64.0°F)
San Angelo Test Facility Shop Floor Temp	15.2°C (59.4°F)	15.8°C (60.4°F)	15.4°C (59.7°F)	15.0°C (59.0°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	19:32:36 UTC	End:	19:56:49 UTC
Trip Odometer Reading:	Start:	204.9 km (127.3 mi)	End:	237.1 km (147.3 mi)
Ambient Temperature:	Start:	21.7°C (71.1°F)	End:	22.2°C (72.0°F)
Roadway Temperature:	Start:	32.8°C (91.0°F)	End:	34.0°C (93.2°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 67

10:08 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 67

10:20 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 98.5 km/h (61.2 mph)

Total Driving Time: 20:29 minutes (VBox time)

DATA SHEET 3 (Sheet 18 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO E – Left Front, Right Front Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	256.8 kPa (37.2 psi)	258.9 kPa (37.6 psi)	260.3 kPa (37.8 psi)	257.2 kPa (37.3 psi)
Tire Sidewall Temp	36.8°C (98.2°F)	34.2°C (93.6°F)	35.4°C (95.7°F)	34.2°C (93.6°F)
San Angelo Test Facility Shop Floor Temp	16.0°C (60.8°F)	16.4°C (61.5°F)	15.6°C (60.1°F)	15.2°C (59.4°F)

SYSTEM DETECTION PHASE:

LOCATION AND PRESSURE(S) OF DEFLATED TIRE(S):

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF ( )LR ( )RR (X)RF Inflation Pressure	165.5 kPa (24.0 psi)			165.5 kPa (24.0 psi)

TELLTALE ILLUMINATION:

Driving in first direction:

Time to Illuminate:

Illumination immediately after lamp check. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO (fail)

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

DATA SHEET 3 (Sheet 19 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO E – Left Front, Right Front Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 24.3°C (75.7°F) Vehicle cool down period: 61 minutes				
Inflation Pressure	154.6 kPa (22.4 psi)	237.9 kPa (34.5 psi)	237.8 kPa (34.5 psi)	154.7 kPa (22.4 psi)
Tire Sidewall Temp	22.6°C (72.7°F)	23.2°C (73.8°F)	20.4°C (68.7°F)	21.4°C (70.5°F)
San Angelo Test Facility Shop Floor Temp	16.6°C (61.9°F)	17.4°C (63.3°F)	17.0°C (62.6°F)	16.0°C (60.8°F)

After the cool down period of a minimum of one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

TELLTALE EXTINGUISHMENT:
RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After illumination verification: Re-adjusted Inflation Pressure:	230.0 kPa (33.4 psi)	230.1 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)

Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL) **PASS**
Left front and right front tires were deflated at UVW + VCW.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: March 2, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 20 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO F – Left Front, Left Rear, and Right Front Tire Deflation at UVW +VCW

TEST DATE: March 3, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Note: See Data Sheet 3 (Sheet 13 of 22) for Test Weight.

TIRE INFLATION PRESSURES AND TIRE/SURFACE TEMPERATURES BEFORE CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to UVW + VCW, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 9.2°C (48.6°F) Vehicle cool down period: overnight				
Inflation Pressure	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	10.2°C (50.4°F)	9.8°C (49.6°F)	9.8°C (49.6°F)	10.4°C (50.7°F)
San Angelo Test Facility Shop Floor Temp	13.2°C (55.8°F)	13.4°C (56.1°F)	13.4°C (56.1°F)	13.2°C (55.8°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	14:20:35 UTC	End:	14:44:39 UTC
Trip Odometer Reading:	Start:	238.5 km (148.2 mi)	End:	270.7 km (168.2 mi)
Ambient Temperature:	Start:	9.2°C (48.6°F)	End:	11.4°C (52.5°F)
Roadway Temperature:	Start:	9.4°C (48.9°F)	End:	11.6°C (52.9°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 68

10:07 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 68

10:19 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 99.4 km/h (61.8 mph)

Total Driving Time: 20:26 minutes (VBox time)

DATA SHEET 3 (Sheet 21 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO F – Left Front, Left Rear, and Right Front Tire Deflation at UVW +VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	257.5 kPa (37.3 psi)	260.6 kPa (37.8 psi)	260.3 kPa (37.8 psi)	255.2 kPa (37.0 psi)
Tire Sidewall Temp	26.2°C (79.2°F)	24.6°C (76.3°F)	23.4°C (74.1°F)	23.4°C (74.1°F)
San Angelo Test Facility Shop Floor Temp	12.6°C (54.7°F)	13.2°C (55.8°F)	13.4°C (56.1°F)	12.6°C (54.7°F)

SYSTEM DETECTION PHASE:

LOCATION AND PRESSURE(S) OF DEFLATED TIRE(S):

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR ( )RR (X)RF Inflation Pressure	165.5 kPa (24.0 psi)	165.5 kPa (24.0 psi)		165.5 kPa (24.0 psi)

TELLTALE ILLUMINATION:

Driving in first direction:

Time to Illuminate:

Illumination immediately after lamp check. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO (fail)

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ( )NO (fail)

DATA SHEET 3 (Sheet 22 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO F – Left Front, Left Rear, and Right Front Tire Deflation at UVW +VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 15.8°C (60.4°F) Vehicle cool down period: 60 minutes				
Inflation Pressure	156.0 kPa (22.6 psi)	153.3 kPa (22.2 psi)	242.0 kPa (35.1 psi)	157.8 kPa (22.9 psi)
Tire Sidewall Temp	16.0°C (60.8°F)	16.4°C (61.5°F)	16.4°C (61.5°F)	16.4°C (61.5°F)
San Angelo Test Facility Shop Floor Temp	14.8°C (58.6°F)	15.0°C (59.0°F)	15.0°C (59.0°F)	14.6°C (58.3°F)

After the cool down period of a minimum of one hour, restart the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

TELLTALE EXTINGUISHMENT:
RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After illumination verification: Re-adjusted Inflation Pressure:	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)	230.0 kPa (33.4 psi)

Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL) **PASS**
Left front, left rear, and right front tires were deflated at UVW +VCW.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: March 3, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 1 of 4)
Scenario G – Malfunction Detection Test at LLVW

TEST DATE: February 23, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Time:	Start:	1:20 pm	End:	1:32 pm
Trip Odometer Reading:	Start:	38.3 km (23.8 mi)	End:	42.3 km (26.3 mi)
Ambient Temperature:	Start:	21.6°C (70.9°F)	End:	22.4°C (72.3°F)
Roadway Temperature:	Start:	33.6°C (92.5°F)	End:	35.8°C (96.4°F)
Fuel Level:	Start:	Full		

Note: See Data Sheet 3 (Sheet 2 of 22) for Test Weight.

TPMS TYPE: (X) Direct ( ) Indirect ( ) Other Describe:

TPMS MALFUNCTION TELLTALE:
(X) Dedicated stand-alone ( ) Combination low tire pressure warning/malfunction telltale

METHOD OF MALFUNCTION SIMULATION:

Describe method of malfunction simulation: Spare tire without TPMS sensor was applied to right front at LLVW.

MALFUNCTION TELLTALE ILLUMINATION
(after ignition locking system is activated to "On" ("Run") position):

Dedicated Malfunction Telltale

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: see chart , page 69

4.0 km (2.5 mi) distance

Max speed: 68.8 km/h (42.8 mph)
Total Driving Time: 0:14 minutes (VBox time)

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO

DATA SHEET 4 (Sheet 2 of 4)
Scenario G – Malfunction Detection Test at LLVW

After 5 minutes with the ignition locking system in the "Off" or "Lock" position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated for at least 60 seconds when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

Extinguishment Phase:

Restore the TPMS to normal operation. Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

DEDICATED MALFUNCTION TELLTALE EXTINGUISHED:
(X)YES ( )NO (FAIL)

TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL) **PASS**
Spare without TPMS sensor was applied to right front at LLVW.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: February 23, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 3 of 4)
Scenario H – Malfunction Detection Test

TEST DATE: March 3, 2009 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C90501

Time:	Start:	12:14 pm	End:	12:15 pm
Trip Odometer Reading:	Start:	270.9 km (168.3 mi)	End:	270.9 km (168.3 mi)
Ambient Temperature:	Start:	19.6°C (67.3°F)	End:	19.6°C (67.3°F)
Fuel Level:	Start:	Full		

TPMS TYPE: (X) Direct ( ) Indirect ( ) Other Describe:

TPMS MALFUNCTION TELLTALE:
(X) Dedicated stand-alone ( ) Combination low tire pressure warning/malfunction telltale

METHOD OF MALFUNCTION SIMULATION:

Describe method of malfunction simulation: TPMS fuse was removed.

MALFUNCTION TELLTALE ILLUMINATION
(after ignition locking system is activated to "On" ("Run") position):

Dedicated Malfunction Telltale

Driving in first direction:

Illumination at lamp check. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: (X)YES ( )NO

DATA SHEET 4 (Sheet 4 of 4)
Scenario H – Malfunction Detection Test

After 5 minutes with the ignition locking system in the "Off" or "Lock" position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated for at least 60 seconds when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

Extinguishment Phase:

Restore the TPMS to normal operation. Is it necessary to drive the vehicle to extinguish the telltale? ( )YES (X)NO

DEDICATED MALFUNCTION TELLTALE EXTINGUISHED:
(X)YES ( )NO (FAIL)

TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL) **PASS**
TPMS fuse was removed.

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: March 3, 2009

APPROVED BY: Kenneth H. Yates

DATA SHEET 5 (Sheet 1 of 3)
TPMS WRITTEN INSTRUCTIONS

TEST
DATE: February 23, 2009 LAB: San Angelo Test Facility VEHICLE NHTSA NO: C90501

The following statement, in the English language, is provided verbatim in the Owner's Manual. (X)YES ( )NO

"Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label. (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should determine the proper tire inflation pressure for those tires.)

As an added safety feature, your vehicle has been equipped with a tire pressure monitoring system (TPMS) that illuminates a low tire pressure telltale when one or more of your tires is significantly under-inflated. Accordingly, when the low tire pressure telltale illuminates, you should stop and check your tires as soon as possible, and inflate them to the proper pressure. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.

Please note that the TPMS is not a substitute for proper tire maintenance, and it is the driver's responsibility to maintain correct tire pressure, even if under-inflation has not reached the level to trigger illumination of the TPMS low tire pressure telltale."

DATA SHEET 5 (Sheet 2 of 3)
TPMS WRITTEN INSTRUCTIONS

As specified, the following sections, in the English language, are required verbatim in paragraph form in the Owner's Manual:

The following statement is required for all vehicles certified to the standard starting on September 1, 2007 and for vehicles voluntarily equipped with a compliant TPMS MIL before that time.

"Your vehicle has also been equipped with a TPMS malfunction indicator to indicate when the system is not operating properly."

The above statement in the English language is provided verbatim in owner's manual:
(X)YES ( )NO

For vehicles with a dedicated MIL telltale, add the following statement:

"The TPMS malfunction indicator is provided by a separate telltale, which displays the symbol "TPMS" when illuminated."

The above statement in the English language is provided verbatim in owner's manual:
(X)YES ( )NO ( )N/A

For vehicles with a combined low tire pressure/MIL telltale, add the following statement:

"The TPMS malfunction indicator is combined with the low tire pressure telltale. When the system detects a malfunction, the telltale will flash for approximately one minute and then remain continuously illuminated. This sequence will continue upon subsequent vehicle start-ups as long as the malfunction exists."

The above statement in the English language is provided verbatim in owner's manual:
( )YES ( )NO (X)N/A

The following statement is required for all vehicles certified to the standard starting on September 1, 2007 and for vehicles voluntarily equipped with a compliant TPMS MIL before that time.

"When the malfunction indicator is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of replacement or alternate tires or wheels on the vehicle that prevent the TPMS from functioning properly. Always check the TPMS malfunction telltale after replacing one or more tires or wheels on your vehicle to ensure that the replacement or alternate tires and wheels allow the TPMS to continue to function properly."

The above statement in the English language is provided verbatim in owner's manual:
(X)YES ( )NO

DATA INDICATES COMPLIANCE: PASS/FAIL: **PASS**

DATA SHEET 5 (Sheet 3 of 3)
TPMS WRITTEN INSTRUCTIONS

Does the Owner's Manual provide an image of the Low Tire Pressure Warning Telltale symbol (and an image of the TPMS Malfunction Telltale warning ("TPMS"), if a dedicated telltale is utilized for this function)? (X)YES ( )NO

Does the Owner's Manual include the following (allowable) information?

- [x] Significance of the low tire pressure warning telltale illuminating
- [x] A description of corrective action to be undertaken
- [x] Whether the tire pressure monitoring system functions with the vehicle's spare tire (if provided)
- [ ] How to use a reset button, if one is provided
- [x] The time for the TPMS telltale(s) to extinguish once the low tire pressure condition or the malfunction is corrected

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: February 23, 2009

APPROVED BY: Kenneth H. Yates

SECTION 4

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO	CAL. DATE	NEXT CAL. DATE
STOPWATCH	WESTCLOX QUARTZ STOPWATCH	NONE	N/A	N/A
VBOX RECORDING DEVICE	RACELOGIC VBOX III	SERIAL # 030209	3/20/2008	3/20/2009
AMBIENT TEMPERATURE GAUGE	FLUKE 50D K/J THERMOMETER	SERIAL # 80840101	3/10/2008	3/10/2009
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	RAYTEK MINITEMP MT6 INFRARED THERMOMETER	SERIAL # MAGR000042598	4/11/2008	4/11/2009
AIR PRESSURE GAUGE	ASHCROFT GENERAL PURPOSE DIGITAL GAUGE	MODEL # D1005PS 02L 100 PSI SERIAL # 20017398-01	11/20/2008	11/20/2009
FLOOR SCALES (VEHICLE)	INTERCOMP SW DELUXE SCALES	PART # 100156 SERIAL # 27032382	8/5/2008	8/5/2009
PLATFORM SCALE (BALLAST)	HOWE RICHARDSON	MODEL # 6401 SERIAL # 0181-5509-26	8/5/2008	8/5/2009

SECTION 5

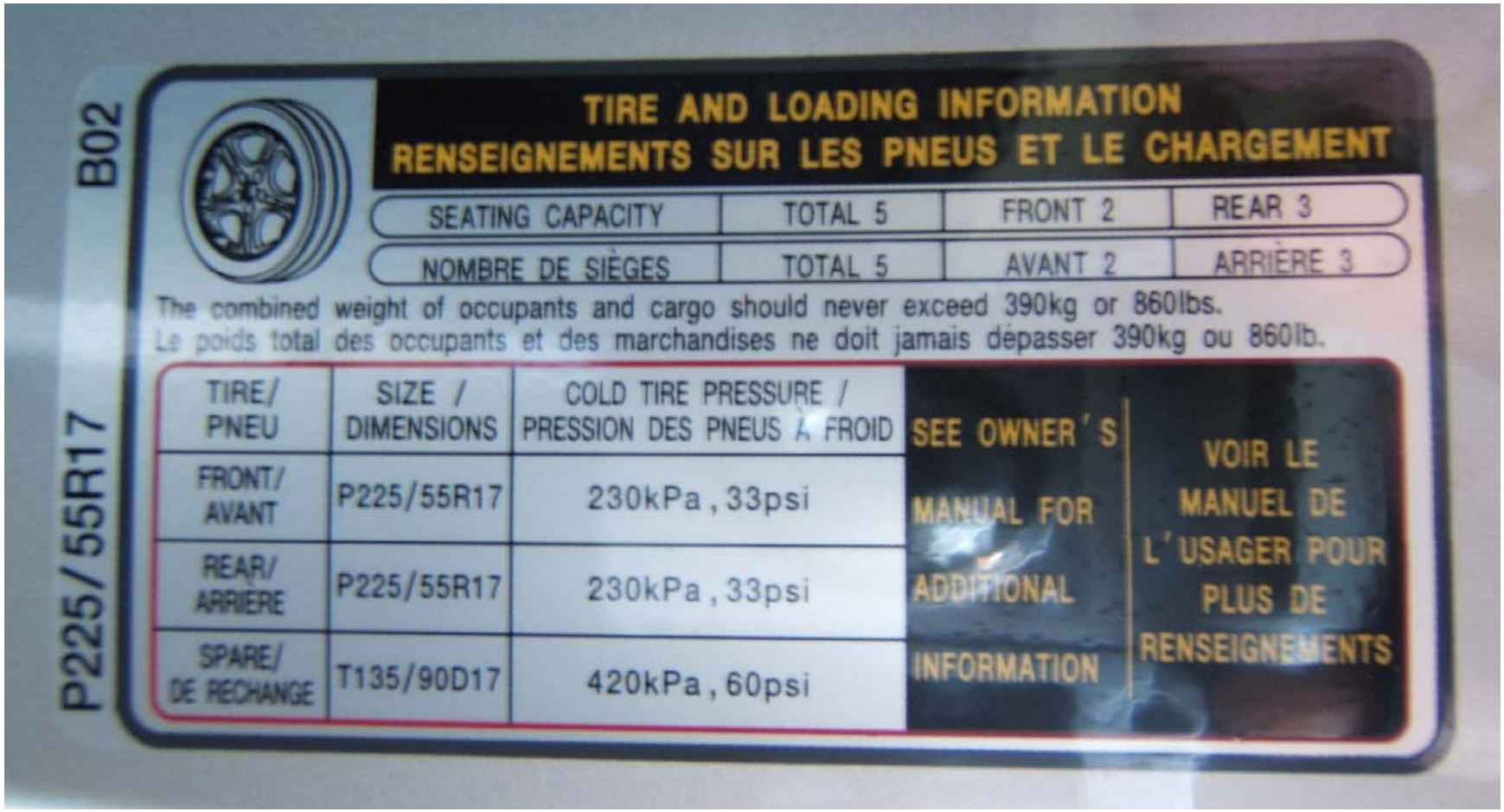
PHOTOGRAPHS

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO.138

FIGURE 5.1
¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO.138

FIGURE 5.2
VEHICLE CERTIFICATION LABEL



2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.3
VEHICLE PLACARD

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.4
TIRE SHOWING BRAND

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

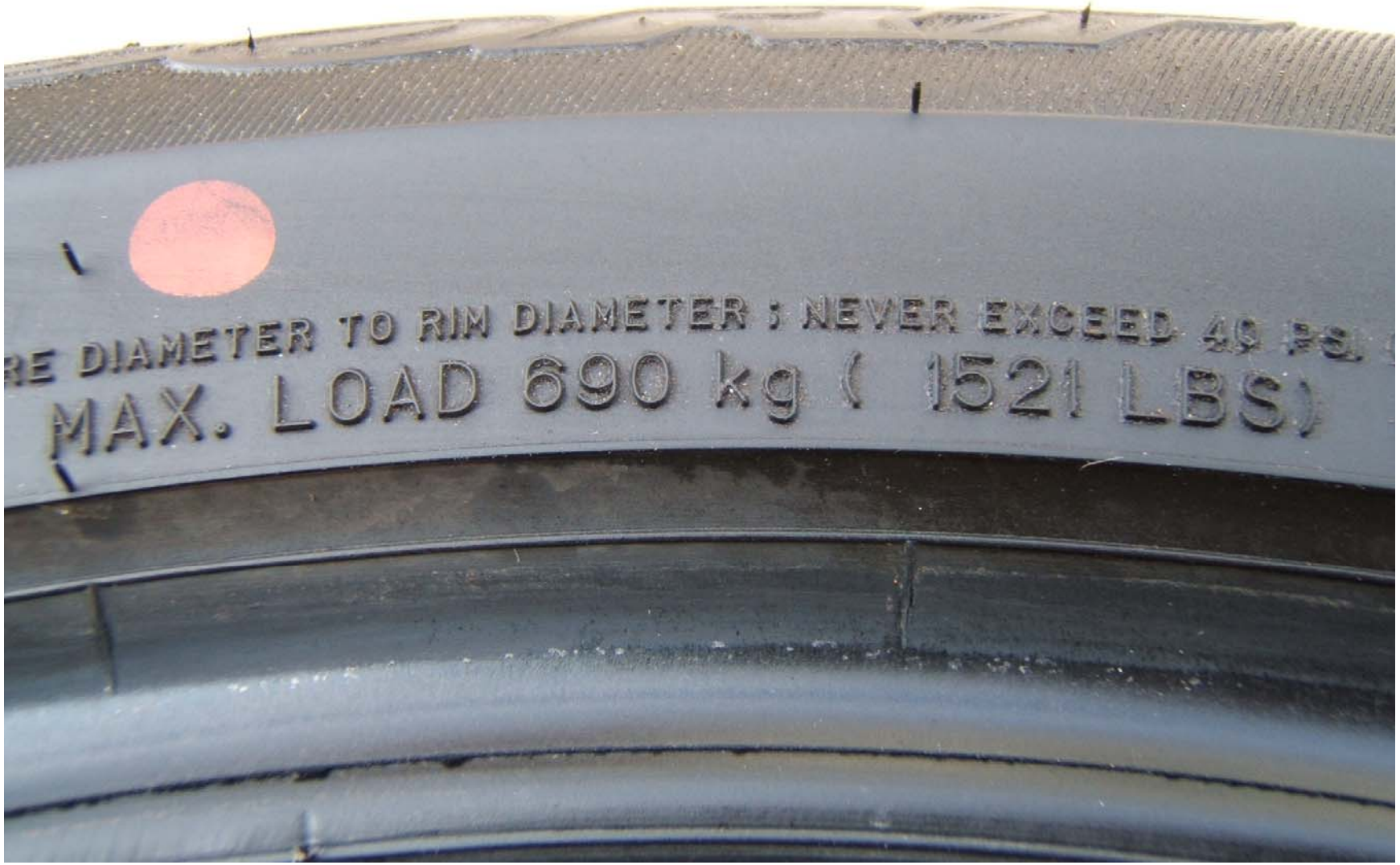
FIGURE 5.5
TIRE SHOWING MODEL

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.6
TIRE SHOWING SIZE AND LOAD INDEX / SPEED RATING

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.7
TIRE SHOWING DOT SERIAL NUMBER



2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.8
TIRE SHOWING MAX LOAD RATING

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.9
TIRE SHOWING MAX COLD
INFLATION PRESSURE

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.10
TIRE SHOWING SIDEWALL / TREAD CONSTRUCTION

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.11
RIM SHOWING VALVE STEM

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.12
RIM SHOWING TPMS SENSOR

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.13
RIM CONTOUR FOR FULL WIDTH OF CROSS SECTION

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.14
DISPLAY SHOWING LOW
TIRE PRESSURE WARNING

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.15
DISPLAY SHOWING DEDICATED
TPMS MALFUNCTION WARNING

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO 138

FIGURE 5.16
TEST INSTRUMENTATION ON VEHICLE

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.17
VEHICLE REAR SEAT BALLAST
FOR UVW + VCW LOAD

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.18
VEHICLE TRUNK BALLAST FOR UVW + VCW LOAD

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

FIGURE 5.19
VEHICLE ON WEIGHT SCALES

2009 HYUNDAI GENESIS
NHTSA NO. C90501
FMVSS NO. 138

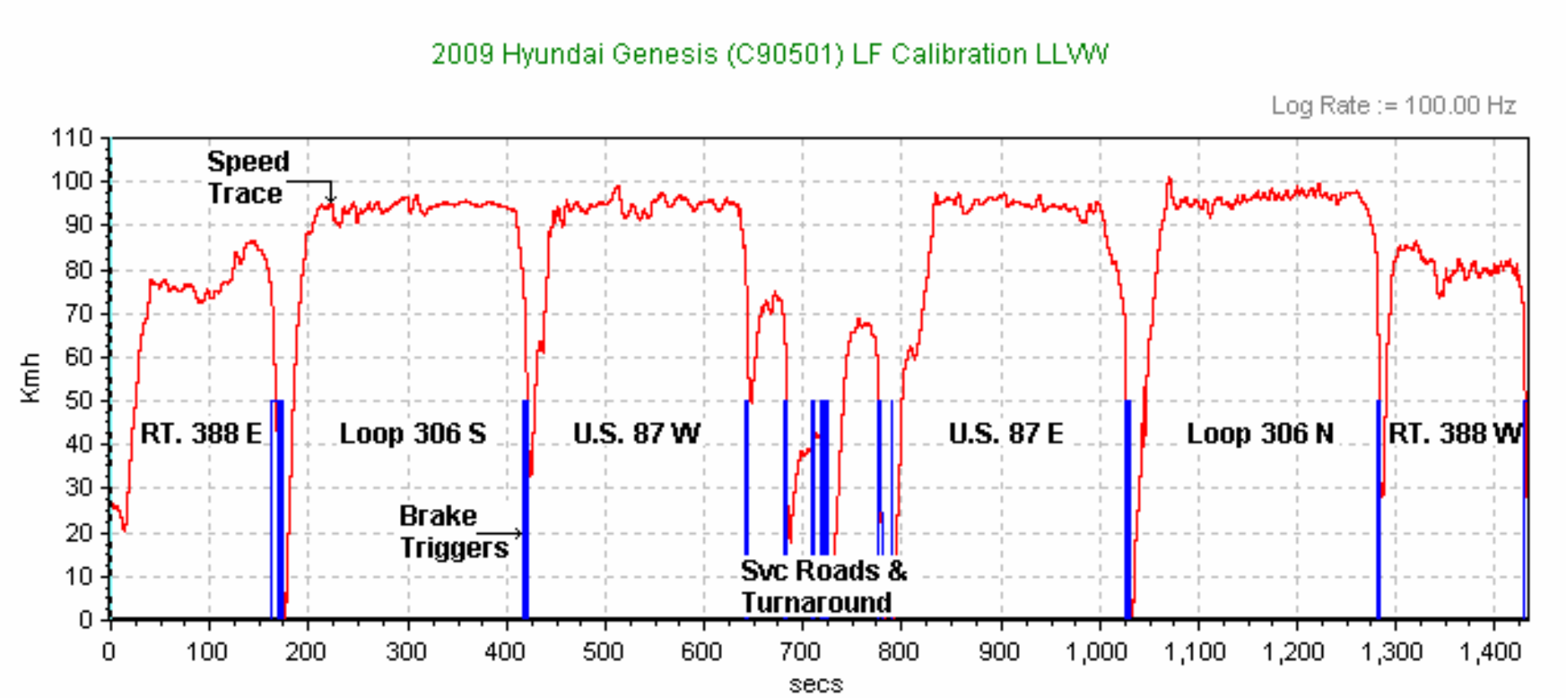
FIGURE 5.20
SPARE INSTALLED ON RIGHT FRONT
FOR MALFUNCTION DETECTION TEST

SECTION 6

TEST PLOTS

Scenario A:	Left Front Tire at LLVW
Test Date:	2/24/09
Data File Time:	23:54 minutes
Cumulative Driving Time:	20:48 minutes
Start Point:	GAFB North Gate

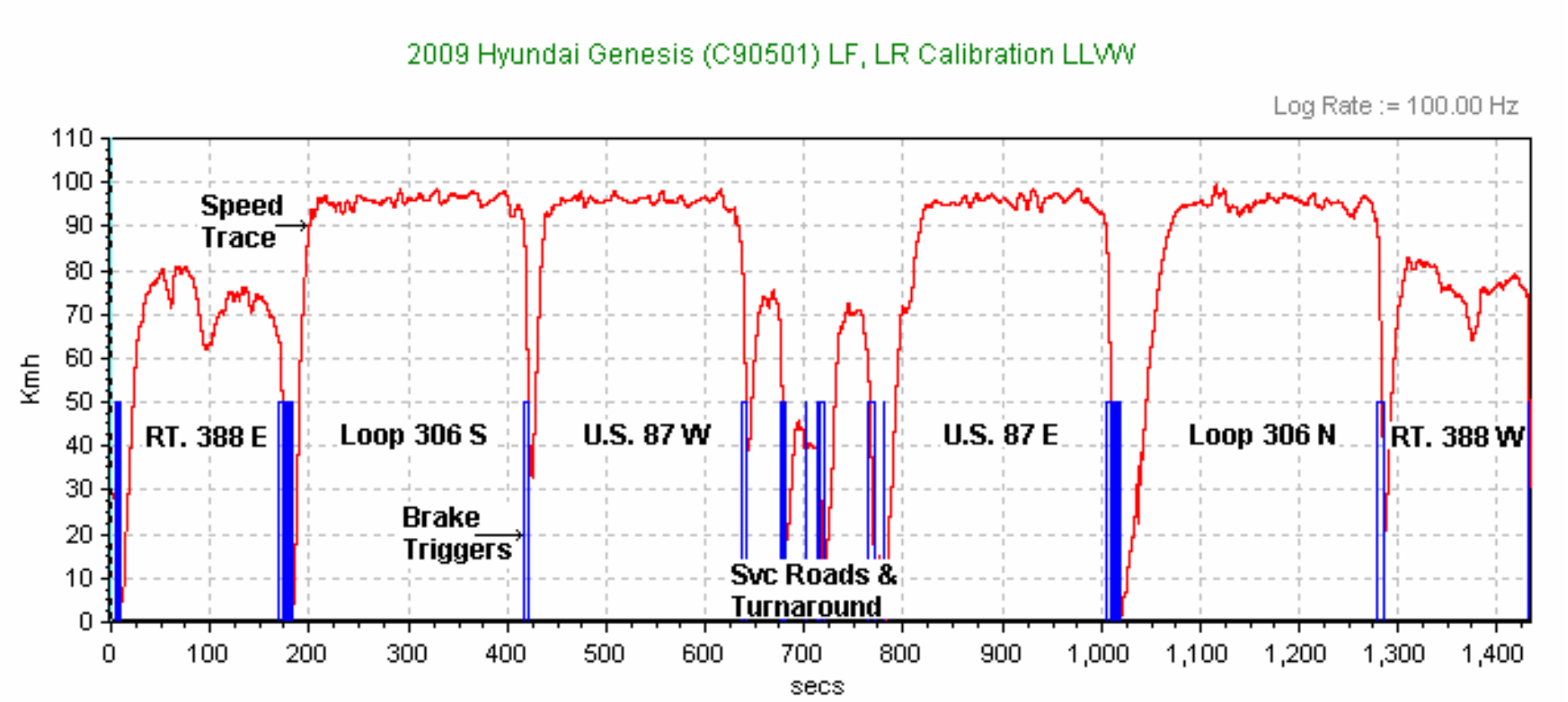
Calibration Phase:



LF Detection Phase: Illumination immediately after lamp check. Driving was not required.

Scenario B:	Left Front, Left Rear Tires at LLVW
Test Date:	2/24/09
Data File Time:	23:54 minutes
Cumulative Driving Time:	20:33 minutes
Start Point:	GAFB North Gate

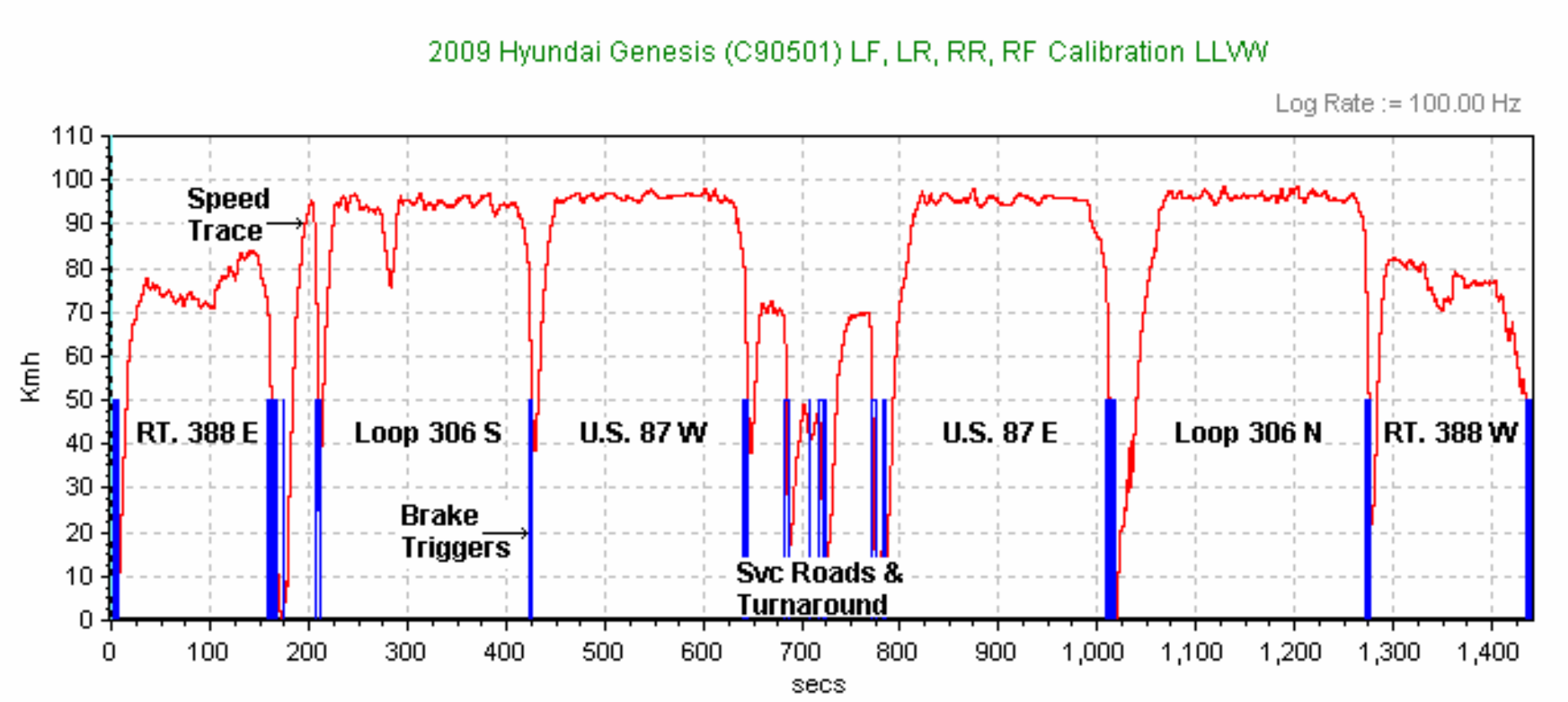
Calibration Phase:



LF, LR Detection Phase: Illumination immediately after lamp check. Driving was not required.

Scenario C:	Left Front, Left Rear, Right Rear, Right Front Tires at LLVW
Test Date:	2/25/09
Data File Time:	24:02 minutes
Cumulative Driving Time:	20:43 minutes
Start Point:	GAFB North Gate

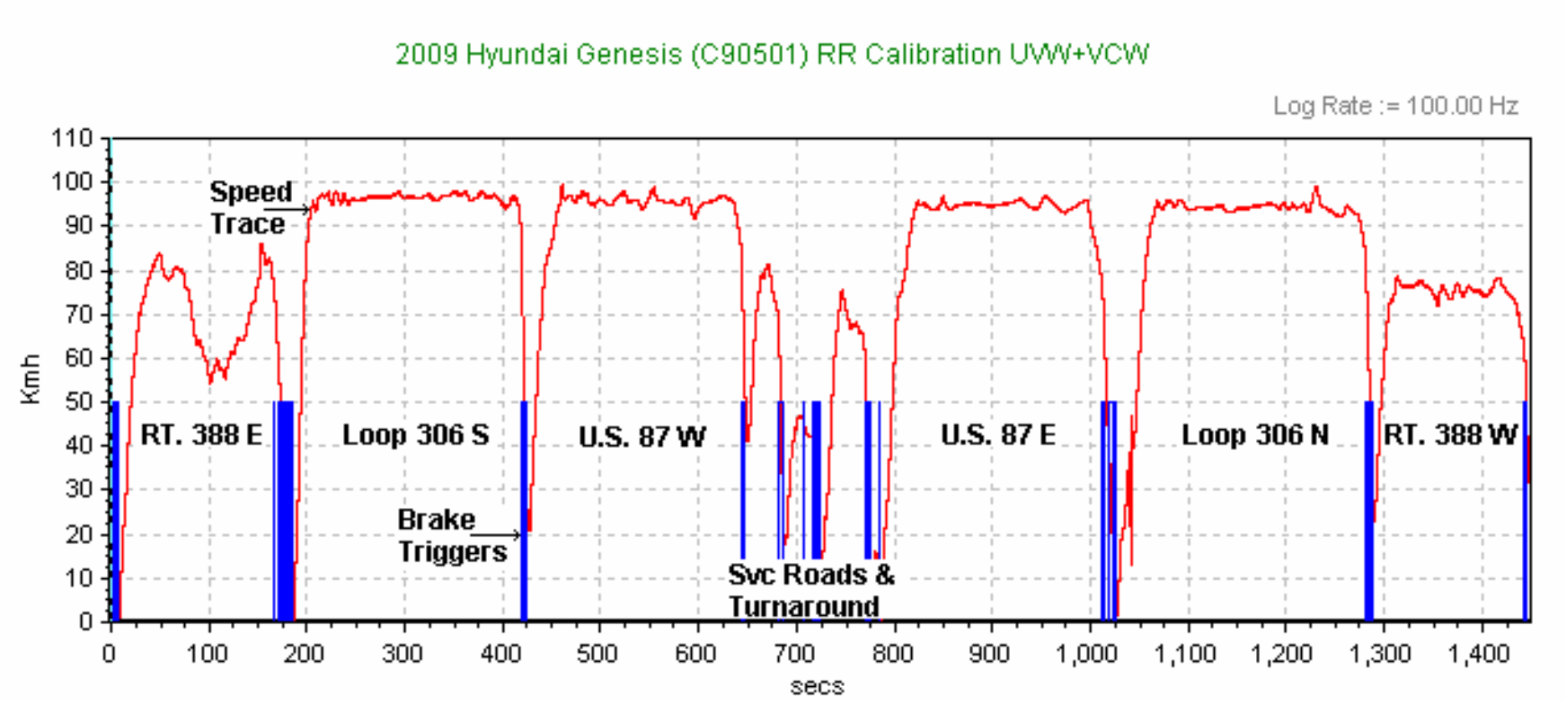
Calibration Phase:



LF, LR, RR, RF Detection Phase: Illumination immediately after lamp check. Driving was not required.

Scenario D:	Right Rear Tire at UVW + VCW
Test Date:	3/2/09
Data File Time:	24:10 minutes
Cumulative Driving Time:	20:35 minutes
Start Point:	GAFB North Gate

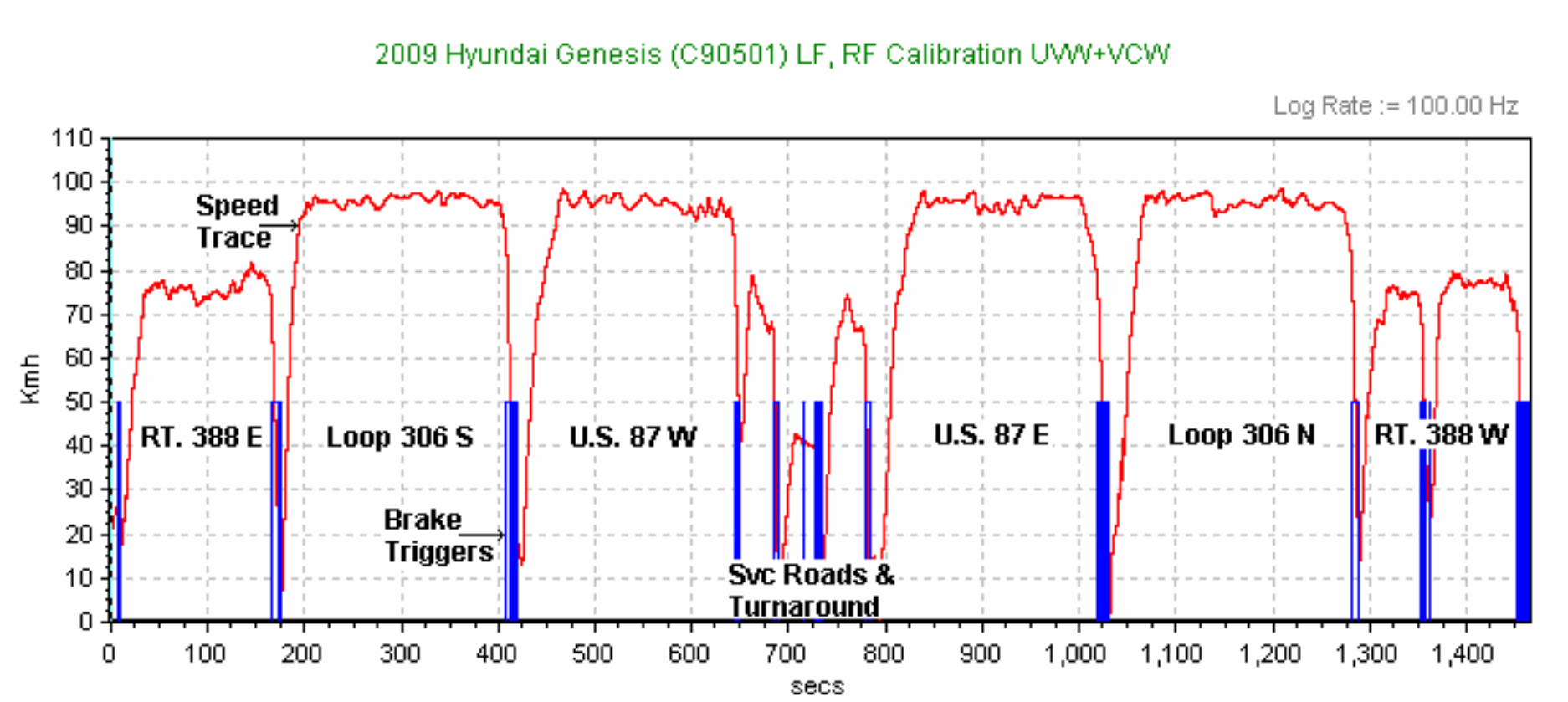
Calibration Phase:



RR Detection Phase: Illumination immediately after lamp check. Driving was not required.

Scenario E:	Left Front, Right Front Tires at UVW + VCW
Test Date:	3/2/09
Data File Time:	24:26 minutes
Cumulative Driving Time:	20:29 minutes
Start Point:	GAFB North Gate

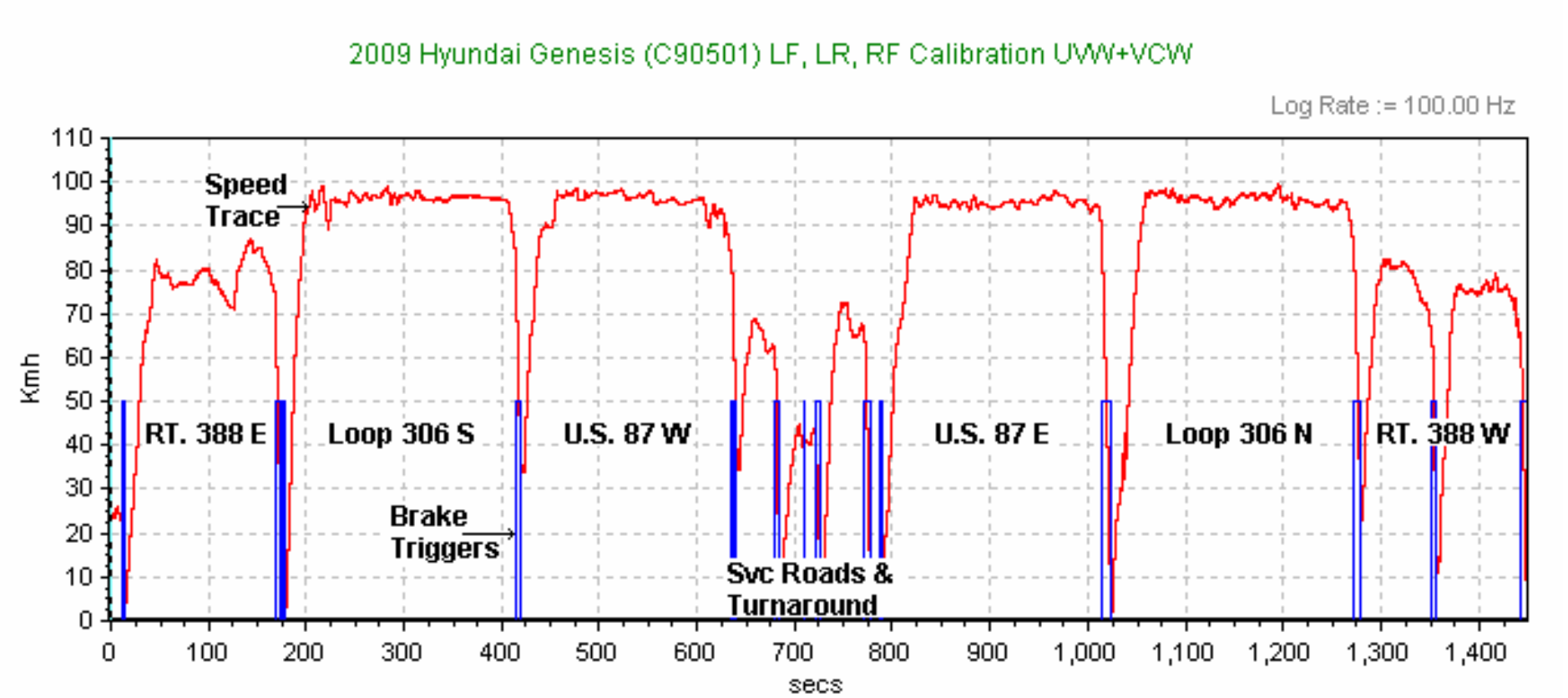
Calibration Phase:



LF, RF Detection Phase: Illumination immediately after lamp check. Driving was not required.

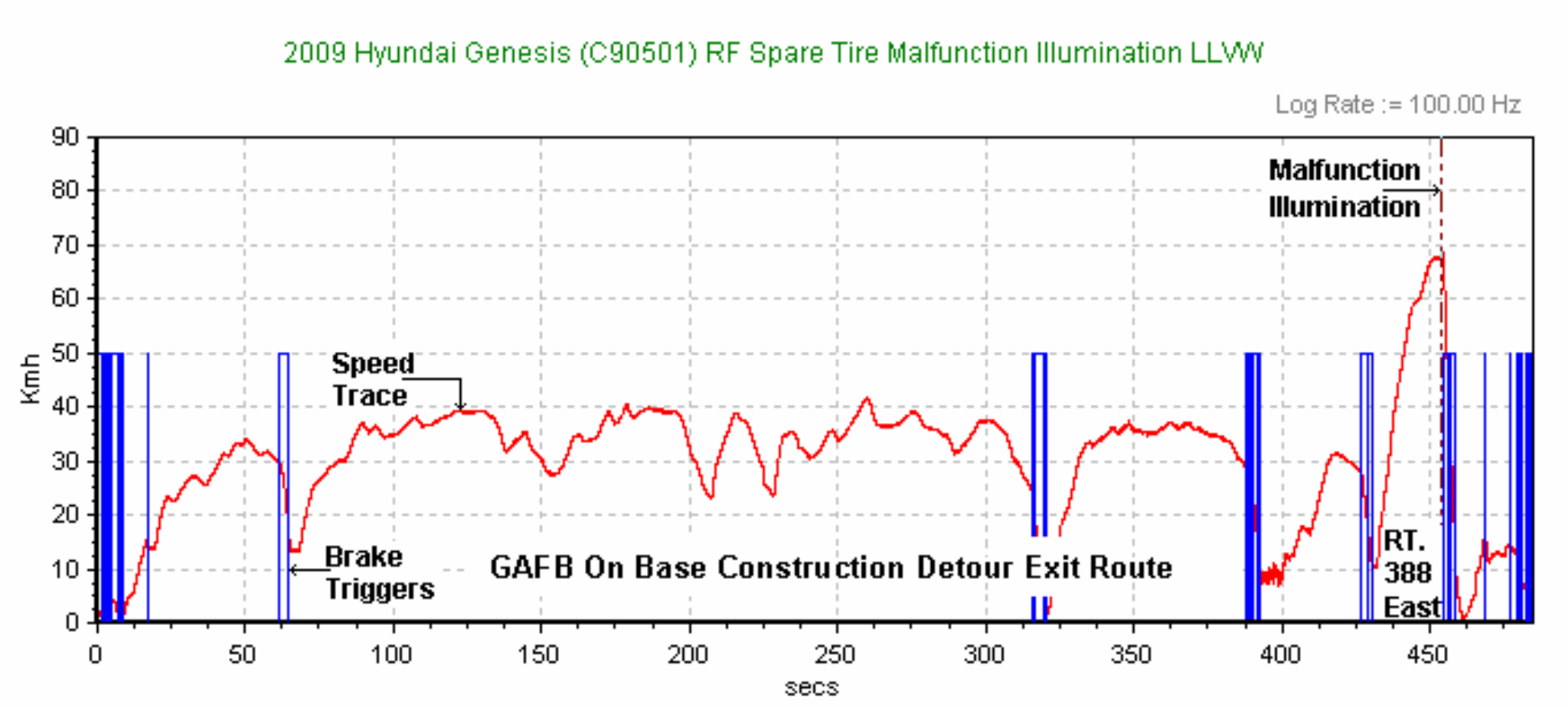
Scenario F:	Left Rear, Right Rear, Right Front Tires at UVW + VCW
Test Date:	3/3/09
Data File Time:	24:11 minutes
Cumulative Driving Time:	20:26 minutes
Start Point:	GAFB North Gate

Calibration Phase:



LR, RR, RF Detection Phase: Illumination immediately after lamp check. Driving was not required.

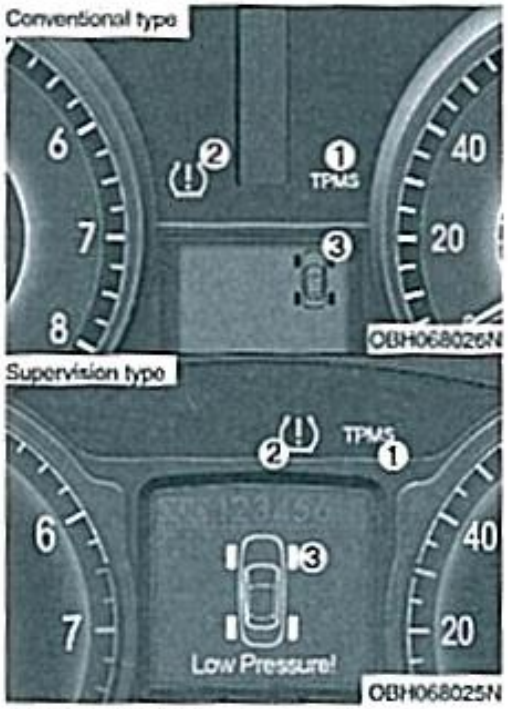
Scenario G Malfunction Illumination:	Spare Tire without TPMS Sensor Applied to Right Front at LLVW.
Test Date:	2/23/09
Data File Time:	08:05 minutes
Cumulative Driving Time:	0:14 minutes
Start Point:	GAFB North Gate



SECTION 7

OWNER'S MANUAL PAGES

TIRE PRESSURE MONITORING SYSTEM (TPMS)



(1) TPMS Malfunction Indicator
(2) Low Tire Pressure Telltale
(3) Low Tire Pressure Position indicator (if equipped)

F060000AEN

Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label. (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should determine the proper tire inflation pressure for those tires.)

As an added safety feature, your vehicle has been equipped with a tire pressure monitoring system (TPMS) that illuminates a low tire pressure telltale when one or more of your tires is significantly under-inflated. Accordingly, when the low tire pressure telltale illuminates, you should stop and check your tires as soon as possible, and inflate them to the proper pressure. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.

Please note that the TPMS is not a substitute for proper tire maintenance, and it is the driver's responsibility to maintain correct tire pressure, even if under-inflation has not reached the level to trigger illumination of the TPMS low tire pressure telltale.

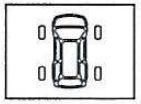
Your vehicle has also been equipped with a TPMS malfunction indicator to indicate when the system is not operating properly. The TPMS malfunction indicator is provided by a separate telltale, which displays the symbol "TPMS" when illuminated. When the malfunction indicator is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of replacement or alternate tires or wheels on the vehicle that prevent the TPMS from functioning properly. Always check the TPMS malfunction telltale after replacing one or more tires or wheels on your vehicle to ensure that the replacement or alternate tires and wheels allow the TPMS to continue to function properly.

✻ NOTICE

If the TPMS, Low Tire Pressure telltale do not illuminate for 3 seconds when the ignition switch is turned to the ON position or engine is running, or if they remain illuminated after coming on for approximately 3 seconds, take your car to your nearest authorized HYUNDAI dealer and have the system checked.

F060100ABH

Low tire pressure telltale



Low tire pressure position indicator

When the tire pressure monitoring system warning indicators are illuminated, one or more of your tires is significantly under-inflated. The low tire pressure position indicator (supplemental) will indicate which tire is significantly under-inflated by illuminating the corresponding position on the LCD screen (if equipped).

If either telltale illuminates, immediately reduce your speed, avoid hard cornering and anticipate increased stopping distances. You should stop and check your tires as soon as possible. Inflate the tires to the proper pressure as indicated on the vehicle's placard or tire inflation pressure label located on the driver's side center pillar outer panel. If you cannot reach a service station or if the tire cannot hold the newly added air, replace the low pressure tire with the compact spare tire.

The Low Tire Pressure and Position indicator will remain on until you have the low pressure tire repaired and replaced on the vehicle.

✻ NOTICE

The compact spare tire is not equipped with a tire pressure sensor.

⚠ CAUTION

In winter or cold weather, the low tire pressure telltale may be illuminated if the tire pressure was adjusted to the recommended tire inflation pressure in warm weather. It does not mean your TPMS is malfunctioning because the decreased temperature leads to a proportional lowering of tire pressure.

When you drive your vehicle from a warm area to a cold area or from a cold area to a warm area, or the outside temperature is greatly higher or lower, you should check the tire inflation pressure and adjust the tires to the recommended tire inflation pressure.

⚠ WARNING - Low pressure damage

Significantly low tire pressure makes the vehicle unstable and can contribute to loss of vehicle control and increased braking distances.

Continued driving on low pressure tires can cause the tires to overheat and fail.

F060200ABH

TPMS **TPMS (Tire Pressure Monitoring System) malfunction indicator**

The TPMS malfunction indicator comes on and stays on when there is a problem with the Tire Pressure Monitoring System. The system is able to correctly detect an under-inflation warning at the same time as system failure then it will illuminate both the TPMS malfunction and the low tire pressure telltale. If the Front Left sensor fails, the TPMS malfunction indicator illuminates, but if the Front Right, Rear Left, or Rear Right tire is under-inflated, the low tire pressure and position telltales may illuminate together with the TPMS malfunction indicator.

Have the system checked by an authorized HYUNDAI dealer as soon as possible to determine the cause of the problem.

⚠ CAUTION

- ***The TPMS malfunction indicator may be illuminated if the vehicle is moving around electric power supply cables or radios transmitter such as at police stations, government and public offices, broadcasting stations, military installations, airports, or transmitting towers, etc. This can interfere with normal operation of the Tire Pressure Monitoring System (TPMS).***
- ***The TPMS malfunction indicator may be illuminated if some electronic devices, such as notebook computers, are used in the vehicle. This can interfere with normal operation of the Tire Pressure Monitoring System (TPMS).***
- ***If there is a failed tire sensor, it is possible for TPMS to temporarily learn a replacement sensor when you drive closely to another vehicle equipped with TPMS too. In rare cases, this may temporarily delay the TPMS malfunction turning on.***

F060300ABH

Changing a tire with TPMS

If you have a flat tire, the Low Tire Pressure and Position telltales will come on. Have the flat tire repaired by an authorized HYUNDAI dealer as soon as possible or replace the flat tire with the compact spare tire.

⚠ CAUTION

NEVER use a puncture-repairing agent to repair and/or inflate a low pressure tire. The tire sealant can damage the tire pressure sensor. If used, you will have to replace the tire pressure sensor.

Each wheel is equipped with a tire pressure sensor mounted inside the tire behind the valve stem. You must use TPMS specific wheels. It is recommended that you always have your tires serviced by an authorized HYUNDAI dealer as soon as possible.

The spare tire is not equipped with a tire pressure monitoring sensor. When you replace the low pressure tire with the spare tire, the Low Tire Pressure telltale and Position indicator will remain on until the low pressure tire is repaired and placed on the vehicle.

The TPMS malfunction indicator may remain on until the original tire equipped with a tire monitoring sensor is reinflated to the recommended pressure and reinstalled on the vehicle then driving for a few minutes.

Once the low pressure tire is reinflated to the recommended pressure and installed on the vehicle, the TPMS malfunction indicator and the low tire pressure and position telltales will extinguish within a few minutes of driving.

If the indicators are not extinguished after a few minutes, please visit an authorized HYUNDAI dealer.

You may not be able identify a low tire by simply looking at it. Always use a good quality tire pressure gauge to measure the tire's inflation pressure. Please note that a tire that is hot (from being driven) will have a higher pressure measurement than a tire that is cold (from sitting stationary for at least 3 hours and driven less than 1 mile (1.6km) during that 3 hour period).

Allow the tire to cool before measuring the inflation pressure. Always be sure the tire is cold before inflating to the recommended pressure.

A cold tire means the vehicle has been sitting for 3 hours and driven for less than 1 mile (1.6km) in that 3 hour period.

⚠ CAUTION

- *Do not use any tire sealant if your vehicle is equipped with a Tire Pressure Monitoring System. The liquid sealant can damage the tire pressure sensors.*
- *In order to correctly monitor the tires with inflation, the 4 tire pressure monitoring sensors should be exactly fitted to each of the 4 driven wheel. There should be no other sensors in the vehicle include spare tire, it may cause the system couldn't monitor the tires with inflation correctly. The low tire pressure position indicator may extinguish and the TPMS malfunction indicator may illuminate after restarting and within 20 minutes of continuous driving.*

⚠ WARNING - TPMS

- **The TPMS cannot alert you to severe and sudden tire damage caused by external factors such as nails or road debris.**
- **If you feel any vehicle instability, immediately take your foot off the accelerator, apply the brakes gradually and with light force, and slowly move to a safe position off the road.**

⚠ WARNING - Protecting TPMS

Tampering with, modifying, or disabling the Tire Pressure Monitoring System (TPMS) components may interfere with the system's ability to warn the driver of low tire pressure conditions and/or TPMS malfunctions. Tampering with, modifying, or disabling the Tire Pressure Monitoring System (TPMS) components may void the warranty for that portion of the vehicle.

This device complies with Part 15 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.

⚠ WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.