REPORT NUMBER 138-STF-10-008

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

CHRYSLER GROUP, LLC
2010 DODGE RAM 1500
CREW CAB TRUCK
NHTSA NO. CA0303

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

OCTOBER 19, 2010

FINAL REPORT

PREPARED FOR

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
NVS-220
OFFICE OF VEHICLE SAFETY COMPLIANCE
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INTRODUCTION

1.1 PURPOSE OF COMPLIANCE TEST

A 2010 Dodge Ram 1500 crew cab truck 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 2010 Dodge Ram 1500 crew cab truck. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: 1D7RB1CP9AS157442

B. NHTSA Number: CA0303

C Manufacturer: Chrysler Group, LLC

D. Manufacture Date: 11/2009

1.3 TEST DATE

The test vehicle was tested during the time period June 15 through June 17, 2010.

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 and vehicle labeling information were 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 and low inflation pressure detection phase (as appropriate). 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 to ensure that the low inflation pressure telltale extinguished.

Two malfunction scenarios were performed on the Dodge Ram 1500. The first scenario was performed with the vehicle loaded to its LLVW. The malfunction was simulated by placing the spare tire, with no TPMS sensor, on the right front wheel position. The second scenario was performed by removing the TPMS receiver module 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 right 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, right rear, and right front

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. Fuse for TPMS receiver module was removed.

In both scenarios, the vehicle's combination malfunction telltale properly operated per the standard's requirements.

SECTION 3

TEST DATA

FMVSS No. 138 – TEST DATA SUMMARY

TEST DATES: June 15 – June 17, 2010 LAB: U.S. DOT San Angelo Test Facility

VIN: 1D7RB1CP9AS157442 VEHICLE NHTSA NUMBER: CA0303

CERTIFICATION LABEL BUILD DATE: 11/2009

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: June 15, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303 VIN: 1D7RB1CP9AS157442

CERTIFICATION LABEL BUILD DATE: 11/2009 ENGINE: 4.7 liter, V8

MY/MAKE/MODEL/BODY STYLE: 2010 Dodge Ram 1500 crew cab truck

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 145 km (90 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: Sensors, ECU, and receiver: Schrader Electronics

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:

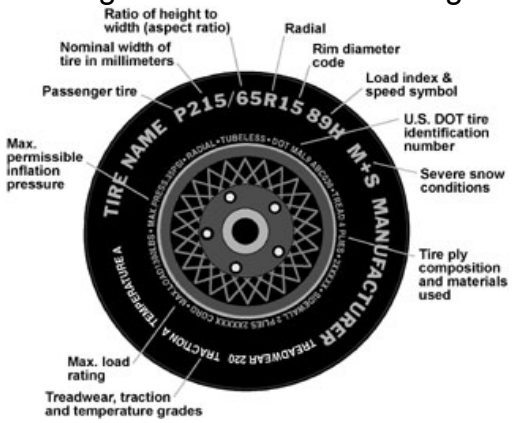
( ) None ( ) Dedicated Telltale (X) Combination low tire pressure/malfunction telltale

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	P265/70R17	276 kPa (40 psi)	Vehicle placard
Rear	P265/70R17	276 kPa (40 psi)	Vehicle placard

INSTALLED TIRE DATA
Diagram - MPV Tire Labeling



Front and Rear Axles

Tire Size and Load Index / Speed Rating: P265/70R17 113R

Manufacturer/Tire Name: Goodyear Wrangler SR-A

Sidewall Max Load Rating: 1,150 kg (2,535 lbs)

Max Inflation Pressure: 300 kPa (44 psi)

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

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

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	276 kPa x .75 = 207 kPa	276 kPa x .75 = 207 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 300 kPa (44 psi) 140 kPa (20 psi)	(X) P-metric-Standard load ( ) P-metric-Extra Load Load Range ( ) C, ( ) D, or ( ) E (X) Maximum or ( ) Rated 300 kPa (44 psi) 140 kPa (20 psi)
(C) Telltale Warning Activation Pressure is the higher of Part (A) or (B)	207 kPa (30 psi)	207 kPa (30 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	200 kPa (29 psi)	200 kPa (29 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: Todd P. Groghan DATE: June 15, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: June 15, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

TPMS Low Tire Pressure Warning Telltale

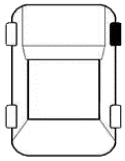
Telltale is mounted inside the occupant compartment in front of and in clear view of the driver?

(X)YES ( )NO (fail)

TPMS Low Tire Pressure Warning Telltale Location: Lower left corner of instrument panel

Identify Telltale Symbol Used (check box above figure).

[X] 

[ ] 

[ ] OTHER (fail)
(describe below)

Note any words or additional symbols used: None

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

TPMS Malfunction Telltale

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

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

Check Telltale Lamp Functions:

LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE

Ignition locking system position when telltale illuminates:

[ ]	OFF/LOCK	[ ]	Between OFF/LOCK and ON/RUN
[X]	ON/RUN	[ ]	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: Todd P. Groghan DATE: June 15, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: June 15, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

Time:	Start:	7:15 am	End:	8:47 am
Ambient Temperature:	Start:	24.2°C (75.6°F)	End:	23.9°C (75.0°F)
Odometer Reading:	Start:	145 km (90 mi)		
Fuel Level:	Start:	Full		
Weather Conditions:		Cloudy, light breeze		

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

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	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	26.8°C (80.2°F)	26.6°C (79.9°F)	26.6°C (79.9°F)	26.8°C (80.2°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 3,085 kg (6,800 lbs)

GAWR (front): 1,679 kg (3,700 lbs)

GAWR (rear): 1,770 kg (3,900 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight: 680 kg (1,501 lbs)

Measured Unloaded Vehicle Weight:

LF	664 kg (1,464 lbs)	LR	546 kg (1,204 lbs)
RF	649 kg (1,430 lbs)	RR	523 kg (1,152 lbs)
Front Axle	1,313 kg (2,894 lbs)	Rear Axle	1,069 kg (2,356 lbs)

Total Vehicle 2,382 kg (5,250 lbs)

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

LF	724 kg (1,596 lbs)	LR	582 kg (1,283 lbs)
RF	702 kg (1,547 lbs)	RR	558 kg (1,230 lbs)
Front Axle	1,426 kg (3,143 lbs) (≤ GAWR)	Rear Axle	1,140 kg (2,513 lbs) (≤ GAWR)

Total Vehicle 2,566 kg (5,656 lbs) (not greater than GVWR)

Note: For scenarios A through C, this Total Vehicle Weight measures the vehicle loaded to Lightly Loaded Vehicle Weight (LLVW), 184 kg (406 lbs) of driver, passenger, and test equipment.

RECORDED BY: Todd P. Groghan DATE: June 15, 2010

APPROVED BY: Kenneth H. Yates

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

SCENARIO A – Left Front Tire Deflation at LLVW

TEST DATE: June 15, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

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 LLVW, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 24.3°C (75.7°F) Vehicle cool down period: overnight				
Inflation Pressure	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	26.8°C (80.2°F)	26.6°C (79.9°F)	26.6°C (79.9°F)	27.0°C (80.6°F)
San Angelo Test Facility Shop Floor Temp	28.0°C (82.4°F)	28.2°C (82.8°F)	28.2°C (82.8°F)	28.2°C (82.8°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time of Data Acquisition: Start: 15:00:31 UTC End: 15:26:07 UTC

Trip Odometer Reading: Start: 145.8 km (90.6 mi) End: 177.8 km (110.5 mi)

Ambient Temperature: Start: 24.3°C (75.7°F) End: 24.5°C (76.1°F)

Roadway Temperature: Start: 28.6°C (83.5°F) End: 28.2°C (82.8°F)

Driving in first direction:

Starting point: Goodfellow Air Force Base (GAFB) north gate Direction: see chart, page 62

10:16 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 62

10:16 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 101.7 km/h (63.2 mph)

Total Driving Time: 20:30 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	291.6 kPa (42.3 psi)	288.7 kPa (41.9 psi)	287.2 kPa (41.7 psi)	290.8 kPa (42.2 psi)
Tire Sidewall Temp	34.4°C (93.9°F)	31.4°C (88.5°F)	31.0°C (87.8°F)	34.4°C (93.9°F)
San Angelo Test Facility Shop Floor Temp	28.0°C (82.4°F)	28.0°C (82.4°F)	28.2°C (82.8°F)	28.8°C (83.8°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	200.0 kPa (29.0 psi)			

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 11 seconds (stopwatch time – non-cumulative)

Driving was not necessary.

TEST RESULTS

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: 26.8°C (80.2°F)	Vehicle cool down period: 62 minutes			
Inflation Pressure	195.4 kPa (28.3 psi)	281.2 kPa (40.8 psi)	280.8 kPa (40.7 psi)	282.8 kPa (41.0 psi)
Tire Sidewall Temp	30.8°C (87.4°F)	29.8°C (85.6°F)	30.2°C (86.4°F)	32.2°C (90.0°F)
San Angelo Test Facility Shop Floor Temp	28.8°C (83.8°F)	29.2°C (84.6°F)	29.4°C (84.9°F)	29.4°C (84.9°F)

After the cool down period of a minimum of one hour, 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:	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)

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

Starting point: San Angelo Test Facility shop

1:46 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

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

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: June 15, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: June 15, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

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 LLVW, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 28.7°C (83.7°F) Vehicle cool down period: 60 minutes				
Inflation Pressure	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	31.2°C (88.2°F)	30.6°C (87.1°F)	30.8°C (87.4°F)	32.2°C (90.0°F)
San Angelo Test Facility Shop Floor Temp	29.4°C (84.9°F)	29.6°C (85.3°F)	30.2°C (86.4°F)	29.8°C (85.6°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time of Data Acquisition: Start: 18:01:42 UTC End: 18:27:08 UTC

Trip Odometer Reading: Start: 180.2 km (112.0 mi) End: 212.1 km (131.8 mi)

Ambient Temperature: Start: 28.7°C (83.7°F) End: 30.5°C (86.9°F)

Roadway Temperature: Start: 39.4°C (102.9°F) End: 44.2°C (111.6°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 63

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 63

10:21 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 100.3 km/h (62.3 mph)

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

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

SCENARIO B – Left Front, Right 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	294.7 kPa (42.7 psi)	293.0 kPa (42.5 psi)	292.3 kPa (42.4 psi)	294.4 kPa (42.7 psi)
Tire Sidewall Temp	43.2°C (109.8°F)	40.8°C (105.4°F)	40.4°C (104.7°F)	43.6°C (110.5°F)
San Angelo Test Facility Shop Floor Temp	31.4°C (88.5°F)	31.4°C (88.5°F)	31.8°C (89.2°F)	31.6°C (88.9°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 (X)RR ( )RF Inflation Pressure	200.0 kPa (29.0 psi)		200.0 kPa (29.0 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 10 seconds (stopwatch time – non-cumulative)

Driving was not necessary.

TEST RESULTS

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, Right 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: 32.7°C (90.9°F)	Vehicle cool down period: 61 minutes			
Inflation Pressure	193.9 kPa (28.1 psi)	282.8 kPa (41.0 psi)	195.1 kPa (28.3 psi)	283.1 kPa (41.1 psi)
Tire Sidewall Temp	36.4°C (97.5°F)	35.2°C (95.4°F)	35.8°C (96.4°F)	37.4°C (99.3°F)
San Angelo Test Facility Shop Floor Temp	32.2°C (90.0°F)	31.8°C (89.2°F)	32.4°C (90.3°F)	31.8°C (89.2°F)

After the cool down period of a minimum of one hour, 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:	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)

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

Starting point: San Angelo Test Facility shop

1:19 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

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

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: June 15, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: June 16, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

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 LLVW, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 24.8°C (76.6°F) Vehicle cool down period: overnight				
Inflation Pressure	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	26.4°C (79.5°F)	26.4°C (79.5°F)	26.6°C (79.9°F)	26.8°C (80.2°F)
San Angelo Test Facility Shop Floor Temp	28.0°C (82.4°F)	28.2°C (82.8°F)	28.2°C (82.8°F)	28.2°C (82.8°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time of Data Acquisition: Start: 12:16:28 UTC End: 12:42:24 UTC

Trip Odometer Reading: Start: 214.2 km (133.1 mi) End: 246.2 km (153.0 mi)

Ambient Temperature: Start: 24.7°C (76.5°F) End: 24.9°C (76.8°F)

Roadway Temperature: Start: 26.2°C (79.2°F) End: 26.8°C (80.2°F)

Driving in first direction:

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

10:12 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

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

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

Max speed: 98.3 km/h (61.1 mph)

Total Driving Time: 20:45 minutes (VBox time)

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

SCENARIO C – Left Front, Left Rear, Right Rear, and 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	291.6 kPa (42.3 psi)	288.1 kPa (41.8 psi)	288.6 kPa (41.9 psi)	291.2 kPa (42.2 psi)
Tire Sidewall Temp	36.8°C (98.2°F)	34.0°C (93.2°F)	32.8°C (91.0°F)	35.2°C (95.4°F)
San Angelo Test Facility Shop Floor Temp	28.8°C (83.8°F)	28.8°C (83.8°F)	29.2°C (84.6°F)	29.2°C (84.6°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	200.0 kPa (29.0 psi)	200.0 kPa (29.0 psi)	200.0 kPa (29.0 psi)	200.0 kPa (29.0 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 11 seconds (stopwatch time – non-cumulative)

Driving above 50 km/h was not necessary.

TEST RESULTS

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, and 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: 26.3°C (79.3°F)	Vehicle cool down period: 60 minutes			
Inflation Pressure	194.1 kPa (28.2 psi)	195.7 kPa (28.4 psi)	195.0 kPa (28.3 psi)	194.7 kPa (28.2 psi)
Tire Sidewall Temp	29.4°C (84.9°F)	28.4°C (83.1°F)	29.2°C (84.6°F)	31.0°C (87.8°F)
San Angelo Test Facility Shop Floor Temp	28.6°C (83.5°F)	28.6°C (83.5°F)	29.2°C (84.6°F)	29.0°C (84.2°F)

After the cool down period of a minimum of one hour, 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:	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)

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

Starting point: San Angelo Test Facility shop

3:09 minutes (stopwatch time – non-cumulative) 1.0 km (0.6 mi) distance

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: Todd P. Groghan DATE: June 16, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: June 16, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

Time: Start: 11:09 am End: 1:27 pm

Ambient Temperature: Start: 32.3°C (90.1°F) End: 33.1°C (91.6°F)

Odometer Reading: Start: 272 km (169 mi)

Fuel Level: Start: Full

Weather Conditions: Sunny, light breeze

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

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	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	34.8°C (94.6°F)	34.8°C (94.6°F)	35.0°C (95.0°F)	35.6°C (96.1°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 3,085 kg (6,800 lbs)

GAWR (front): 1,679 kg (3,700 lbs)

GAWR (rear): 1,770 kg (3,900 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight: 680 kg (1,501 lbs)

Measured Unloaded Vehicle Weight:

LF	663 kg (1,461 lbs)	LR	548 kg (1,208 lbs)
RF	649 kg (1,430 lbs)	RR	523 kg (1,152 lbs)
Front Axle	1,312 kg (2,891 lbs)	Rear Axle	1,071 kg (2,360 lbs)

Total Vehicle 2,383 kg (5,251 lbs)

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

LF	747 kg (1,646 lbs)		LR	809 kg (1,784lbs)	
RF	730 kg (1,609 lbs)		RR	777 kg (1,713 lbs)	
Front Axle	1,477 kg (3,255 lbs)	(≤ GAWR)	Rear Axle	1,586 kg (3,497 lbs)	(≤ GAWR)

Total Vehicle 3,063 kg (6,752 lbs) (not greater than GVWR)

Note: For scenarios D through F, this Total Vehicle Weight measures the vehicle loaded to Unloaded Vehicle Weight (UVW) and Vehicle Capacity Weight (VCW), 680 kg (1,501 lbs) of driver, passenger, test equipment, and ballast.

RECORDED BY: Todd P. Groghan DATE: June 16, 2010

APPROVED BY: Kenneth H. Yates

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

SCENARIO D – Right Rear Tire Deflation at UVW + VCW

TEST DATE: June 17, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

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: 24.0°C (75.2°F) Vehicle cool down period: overnight				
Inflation Pressure	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	25.6°C (78.1°F)	25.6°C (78.1°F)	26.0°C (78.8°F)	26.2°C (79.2°F)
San Angelo Test Facility Shop Floor Temp	27.2°C (81.0°F)	27.4°C (81.3°F)	27.6°C (81.7°F)	27.4°C (81.3°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time of Data Acquisition: Start: 12:17:30 UTC End: 12:43:37 UTC

Trip Odometer Reading: Start: 273.3 km (169.8 mi) End: 305.3 km (189.7 mi)

Ambient Temperature: Start: 24.1°C (75.4°F) End: 24.4°C (75.9°F)

Roadway Temperature: Start: 26.4°C (79.5°F) End: 25.6°C (78.1°F)

Driving in first direction:

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

10:11 minutes (stopwatch time) 15.8 km (9.8 mi) distance

Driving in opposite direction:

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

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

Max speed: 99.6 km/h (61.9 mph)

Total Driving Time: 20:33 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	293.3 kPa (42.5 psi)	293.1 kPa (42.5 psi)	291.8 kPa (42.3 psi)	292.3 kPa (42.4 psi)
Tire Sidewall Temp	38.4°C (101.1°F)	35.4°C (95.7°F)	34.4°C (93.9°F)	35.8°C (96.4°F)
San Angelo Test Facility Shop Floor Temp	28.6°C (83.5°F)	28.8°C (83.8°F)	28.8°C (83.8°F)	29.2°C (84.6°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			200.0 kPa (29.0 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination in 11 seconds (stopwatch time – non-cumulative)

Driving was not necessary.

TEST RESULTS

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: 26.1°C (79.0°F)	Vehicle cool down period: 60 minutes			
Inflation Pressure	282.4 kPa (41.0 psi)	280.7 kPa (40.7 psi)	194.5 kPa (28.2 psi)	283.0 kPa (41.0 psi)
Tire Sidewall Temp	29.8°C (85.6°F)	28.8°C (83.8°F)	29.6°C (85.3°F)	31.2°C (88.2°F)
San Angelo Test Facility Shop Floor Temp	28.8°C (83.8°F)	28.6°C (83.5°F)	29.2°C (84.6°F)	29.2°C (84.6°F)

After the cool down period of a minimum of one hour, 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:	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 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 UVW + VCW.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: June 17, 2010

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: June 17, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

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: 26.3°C (79.3°F) Vehicle cool down period: 65 minutes				
Inflation Pressure	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	29.4°C (84.9°F)	28.6°C (83.5°F)	29.4°C (84.9°F)	30.6°C (87.1°F)
San Angelo Test Facility Shop Floor Temp	28.4°C (83.1°F)	28.6°C (83.5°F)	29.0°C (84.2°F)	28.8°C (83.8°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time of Data Acquisition: Start: 14:09:56 UTC End: 14:35:20 UTC

Trip Odometer Reading: Start: 306.9 km (190.7 mi) End: 338.8 km (210.5 mi)

Ambient Temperature: Start: 26.3°C (79.3°F) End: 27.7°C (81.9°F)

Roadway Temperature: Start: 31.4°C (88.5°F) End: 35.6°C (96.1°F)

Driving in first direction:

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

10:14 minutes (stopwatch time) 15.8 km (9.8 mi) distance

Driving in opposite direction:

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

10:19 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 99.1 km/h (61.6 mph)

Total Driving Time: 20:33 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	292.5 kPa (42.4 psi)	293.6 kPa (42.6 psi)	293.3 kPa (42.5 psi)	291.8 kPa (42.3 psi)
Tire Sidewall Temp	41.6°C (106.9°F)	40.6°C (105.1°F)	39.6°C (103.3°F)	40.0°C (104.0°F)
San Angelo Test Facility Shop Floor Temp	29.6°C (85.3°F)	29.6°C (85.3°F)	30.4°C (86.7°F)	30.2°C (86.4°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	200.0 kPa (29.0 psi)			200.0 kPa (29.0 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination in 11 seconds (stopwatch time – non-cumulative)

Driving was not necessary.

TEST RESULTS

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: 29.3°C (84.7°F)	Vehicle cool down period: 60 minutes			
Inflation Pressure	191.9 kPa (27.8 psi)	279.5 kPa (40.5 psi)	278.9 kPa (40.5 psi)	193.0 kPa (28.0 psi)
Tire Sidewall Temp	31.4°C (88.5°F)	31.2°C (88.2°F)	32.0°C (89.6°F)	33.4°C (92.1°F)
San Angelo Test Facility Shop Floor Temp	29.4°C (84.9°F)	29.4°C (84.9°F)	30.2°C (86.4°F)	30.0°C (86.0°F)

After the cool down period of a minimum of one hour, 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:	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 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: Todd P. Groghan DATE: June 17, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: June 17, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

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: 30.2°C (86.4°F) Vehicle cool down period: 115 minutes				
Inflation Pressure	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)
Tire Sidewall Temp	31.8°C (89.2°F)	31.8°C (89.2°F)	32.4°C (90.3°F)	33.0°C (91.4°F)
San Angelo Test Facility Shop Floor Temp	30.4°C (86.7°F)	30.6°C (87.1°F)	31.2°C (88.2°F)	30.9°C (87.6°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time of Data Acquisition: Start: 16:50:36 UTC End: 17:15:11 UTC

Trip Odometer Reading: Start: 340.2 km (211.4 mi) End: 372.2 km (231.3 mi)

Ambient Temperature: Start: 30.2°C (86.4°F) End: 31.6°C (88.9°F)

Roadway Temperature: Start: 42.0°C (107.6°F) End: 47.6°C (117.7°F)

Driving in first direction:

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

10:13 minutes (stopwatch time) 15.8 km (9.8 mi) distance

Driving in opposite direction:

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

10:25 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 101.0 km/h (62.8 mph)

Total Driving Time: 20:38 minutes (VBox time)

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

SCENARIO F – Left Front, Right Rear, 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	295.8 kPa (42.9 psi)	297.1 kPa (43.1 psi)	298.4 kPa (43.3 psi)	296.1 kPa (42.9 psi)
Tire Sidewall Temp	43.8°C (110.8°F)	43.4°C (110.1°F)	44.8°C (112.6°F)	45.4°C (113.7°F)
San Angelo Test Facility Shop Floor Temp	31.4°C (88.5°F)	32.0°C (89.6°F)	33.0°C (91.4°F)	32.8°C (91.0°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 ( )LR (X)RR (X)RF Inflation Pressure	200.0 kPa (29.0 psi)		200.0 kPa (29.0 psi)	200.0 kPa (29.0 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination in 11 seconds (stopwatch time – non-cumulative)

Driving was not necessary.

TEST RESULTS

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, Right Rear, 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: 32.1°C (89.8°F)	Vehicle cool down period: 60 minutes			
Inflation Pressure	191.0 kPa (27.7 psi)	281.3 kPa (40.8 psi)	191.0 kPa (27.7 psi)	191.9 kPa (27.8 psi)
Tire Sidewall Temp	35.4°C (95.7°F)	35.2°C (95.4°F)	35.6°C (96.1°F)	36.8°C (98.2°F)
San Angelo Test Facility Shop Floor Temp	32.0°C (89.6°F)	32.2°C (90.0°F)	32.6°C (90.7°F)	32.4°C (90.3°F)

After the cool down period of a minimum of one hour, 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:	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)	276.0 kPa (40.0 psi)

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

Starting point: San Angelo Test Facility shop

1:16 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL) **PASS**

Left front, right rear, and right front tires were deflated at UVW + VCW.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: June 17, 2010

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 1 of 4)
Scenario G – Malfunction Detection Test at LLVW –
Spare Installed on Right Front

TEST DATE: June 16, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

Time:	Start:	15:03:49 UTC	End:	15:16:39 UTC
Trip Odometer Reading:	Start:	249.1 km (154.8 mi)	End:	262.5 km (163.1 mi)
Ambient Temperature:	Start:	28.5°C (83.3°F)	End:	28.5°C (83.3°F)
Roadway Temperature:	Start:	37.2°C (99.0°F)	End:	38.0°C (100.4°F)

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

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

TPMS MALFUNCTION TELLTALE:
( ) Dedicated stand-alone (X) 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. (See Figure 5.17)

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

Combination Malfunction Telltale

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: see chart, page 68

8:48 minutes (stopwatch time) 13.4 km (8.3 mi) distance

Max speed: 98.0 km/h (60.9 mph)
Total Driving Time: 8:47 minutes (VBox time)

COMBINATION MALFUNCTION TELLTALE ILLUMINATES (FLASHING AND ILLUMINATION SEQUENCE) WITHIN 20 MINUTES:
(X)YES ( )NO

DATA SHEET 4 (Sheet 2 of 4)
Scenario G – Malfunction Detection Test at LLVW –
Spare Installed on Right Front

After 5 minutes with the ignition locking system in the "Off" or "Lock" position, does the combination low tire pressure/malfunction telltale flash for a period of at least 60 seconds but no longer than 90 seconds, and then remain illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

Time it takes before telltale starts flashing 12 seconds

Time telltale remains flashing 76 seconds

Time telltale remains illuminated >60 seconds
(Verified for a minimum of 60 seconds)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale's illumination sequence repeat when the ignition locking system is activated and the engine running? (X)YES ( )NO (fail)

Extinguishment Phase:

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

Starting point: San Angelo Test Facility shop

2:22 minutes (stopwatch time – non-cumulative) 0.6 km (0.4 mi) distance

COMBINATION 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: Todd P. Groghan DATE: June 16, 2010

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 3 of 4)
Scenario H – Malfunction Detection Test –
TPMS Receiver Module Fuse Removed

TEST DATE: June 16, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0303

Time:	Start:	2:35 pm	End:	2:46 pm
Trip Odometer Reading:	Start:	272.6 km (169.4 mi)	End:	272.6 km (169.4 mi)
Ambient Temperature:	Start:	34.3°C (93.7°F)	End:	34.3°C (93.7°F)

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

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

METHOD OF MALFUNCTION SIMULATION:

Describe method of malfunction simulation: Fuse M28 in under-hood fuse block was removed, eliminating power to the TPMS receiver module. (See Figure 5.19)

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

Combination Malfunction Telltale

Starting point: San Angelo Test Facility shop

Illumination was immediate – driving was not necessary

COMBINATION MALFUNCTION TELLTALE ILLUMINATES (FLASHING AND ILLUMINATION SEQUENCE) WITHIN 20 MINUTES:
(X)YES ( )NO

DATA SHEET 4 (Sheet 4 of 4)
Scenario H – Malfunction Detection Test –
TPMS Receiver Module Fuse Removed

After 5 minutes with the ignition locking system in the "Off" or "Lock" position, does the combination low tire pressure/malfunction telltale flash for a period of at least 60 seconds but no longer than 90 seconds, and then remain illuminated when the ignition locking system is activated to the "On" or "Run" position? (X)YES ( )NO (fail)

Time it takes before telltale starts flashing 0 seconds

Time telltale remains flashing 77 seconds

Time telltale remains illuminated >60 seconds
(Verified for a minimum of 60 seconds)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale's illumination sequence repeat when the ignition locking system is activated and the engine running? (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

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

TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL) **PASS**

Fuse was removed from tire pressure receiver module.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: June 16, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: June 15, 2010 LAB: San Angelo Test Facility VEHICLE NHTSA NO: CA0303

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:
( )YES ( )NO (X)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:
(X)YES ( )NO ( )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: Todd P. Groghan DATE: June 15, 2010

APPROVED BY: Kenneth H. Yates

SECTION 4

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO	CAL. DATE	NEXT CAL. DATE
STOPWATCH	CHAMPION SPORTS TIMER	910 R	N/A	N/A
VBOX RECORDING DEVICE	RACELOGIC VBOX III	SERIAL # 030209	2/3/2010	2/3/2011
AMBIENT TEMPERATURE GAUGE	FLUKE 50D DIGITAL THERMOMETER	SERIAL #80840101	4/2/2010	4/2/2011
AIR PRESSURE GAUGE	ASHCROFT GENERAL PURPOSE DIGITAL GAUGE	MODEL # D1005PS 02L 100 PSI SERIAL # 20017398-01	12/9/2009	12/9/2010
FLOOR SCALES (VEHICLE)	INTERCOMP SW DELUXE SCALES	PART # 100156 SERIAL # 24032382	7/28/2009	7/28/2010
PLATFORM SCALE (BALLAST)	HOWE RICHARDSON	MODEL # 6401 SERIAL # 0181-5509-26	7/28/2009	7/28/2010
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	MINITEMP MT6	SERIAL # MAGR000042598	4/6/2010	4/6/2011

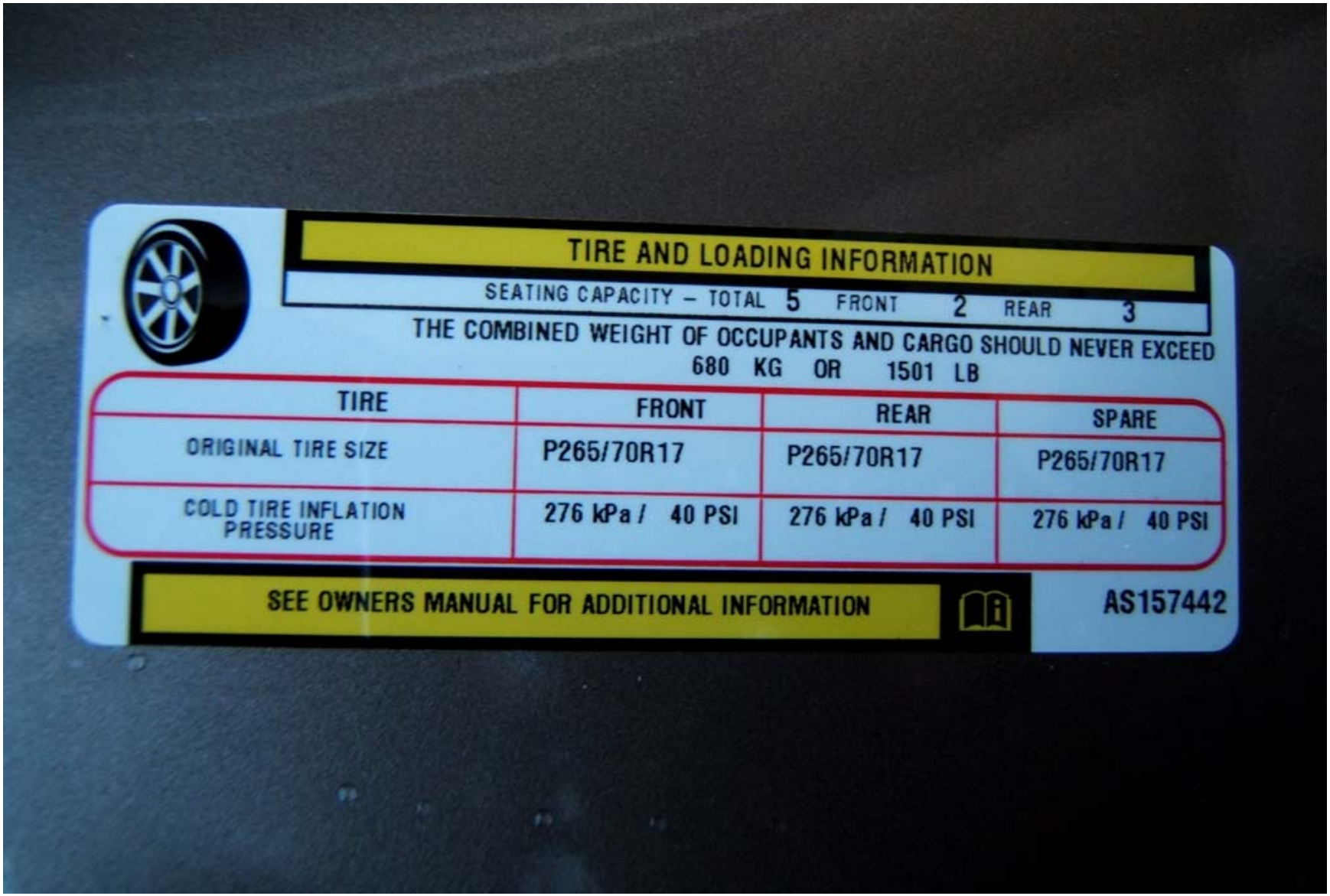
SECTION 5
PHOTOGRAPHS

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO.138

FIGURE 5.1
¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO.138

FIGURE 5.2
VEHICLE CERTIFICATION LABEL



2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.3
VEHICLE PLACARD

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.4
TIRE SHOWING BRAND

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.5
TIRE SHOWING MODEL

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.6
TIRE SHOWING SIZE AND LOAD INDEX / SPEED RATING

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

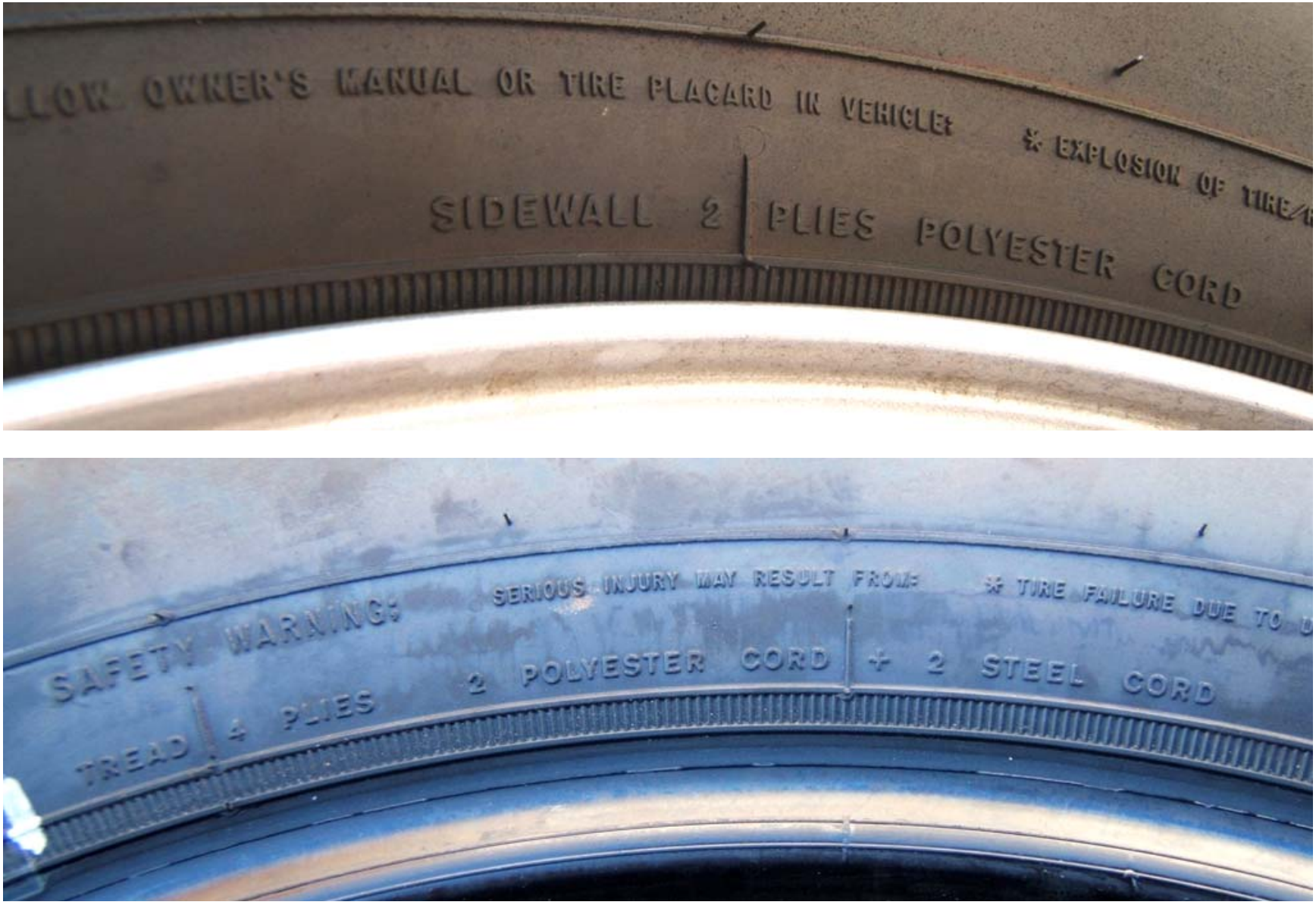
FIGURE 5.7
TIRE SHOWING DOT SERIAL NUMBER

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.8
TIRE SHOWING MAX LOAD RATING

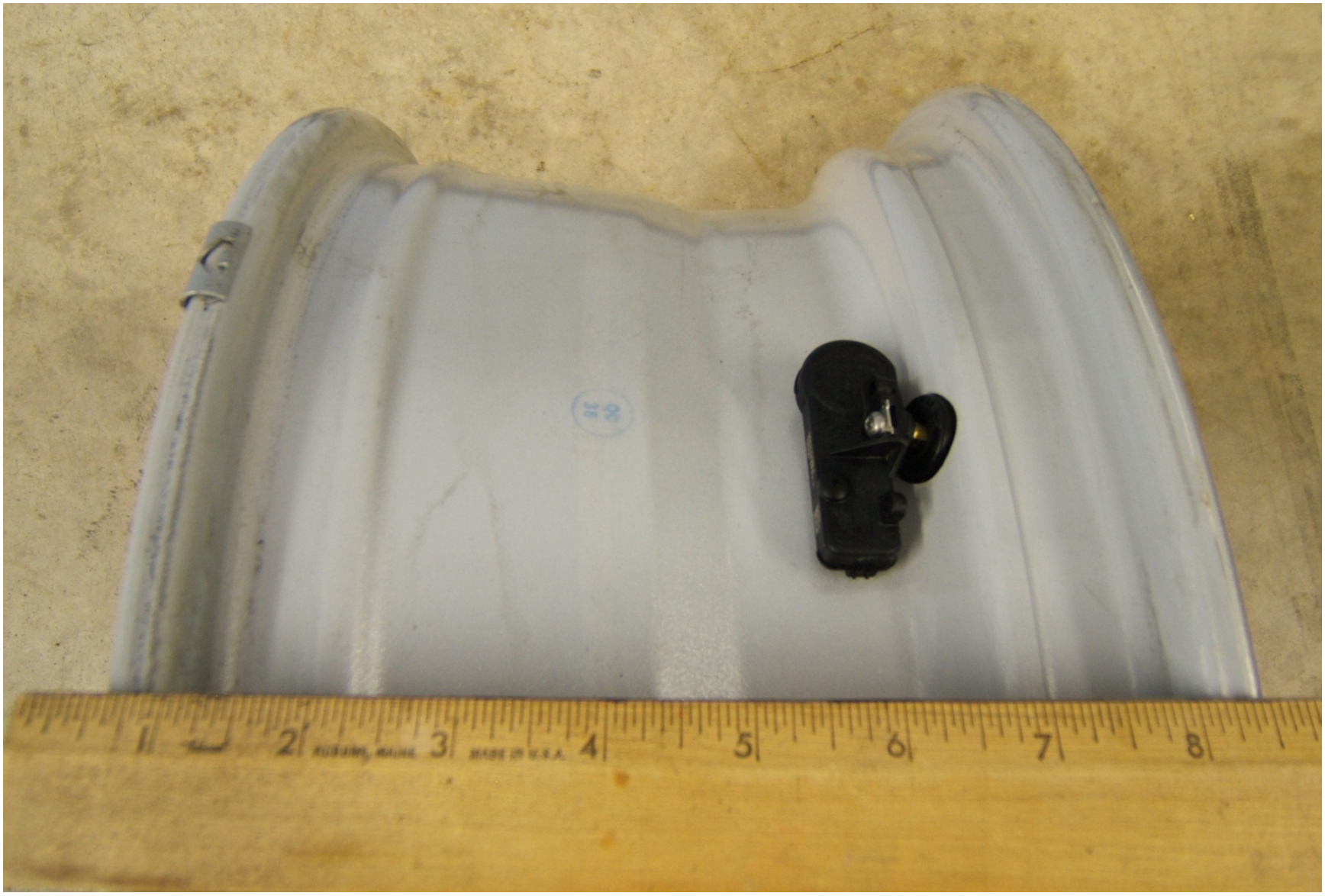
2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.9
TIRE SHOWING MAX COLD INFLATION PRESSURE



2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.10
TIRE SHOWING SIDEWALL / TREAD CONSTRUCTION



2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.11
RIM SHOWING TPMS SENSOR AND RIM
CONTOUR FOR FULL WIDTH OF CROSS SECTION

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.12
RECONFIGUREABLE DISPLAY AND COMBINATION LOW TIRE PRESSURE/ TPMS MALFUNCTION WARNING TELLTALE

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO 138

FIGURE 5.13
TEST INSTRUMENTATION INSTALLED IN VEHICLE

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.14
VEHICLE REAR SEAT
BALLAST FOR UVW + VCW LOAD

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.15
VEHICLE CARGO AREA BALLAST FOR UVW + VCW LOAD

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

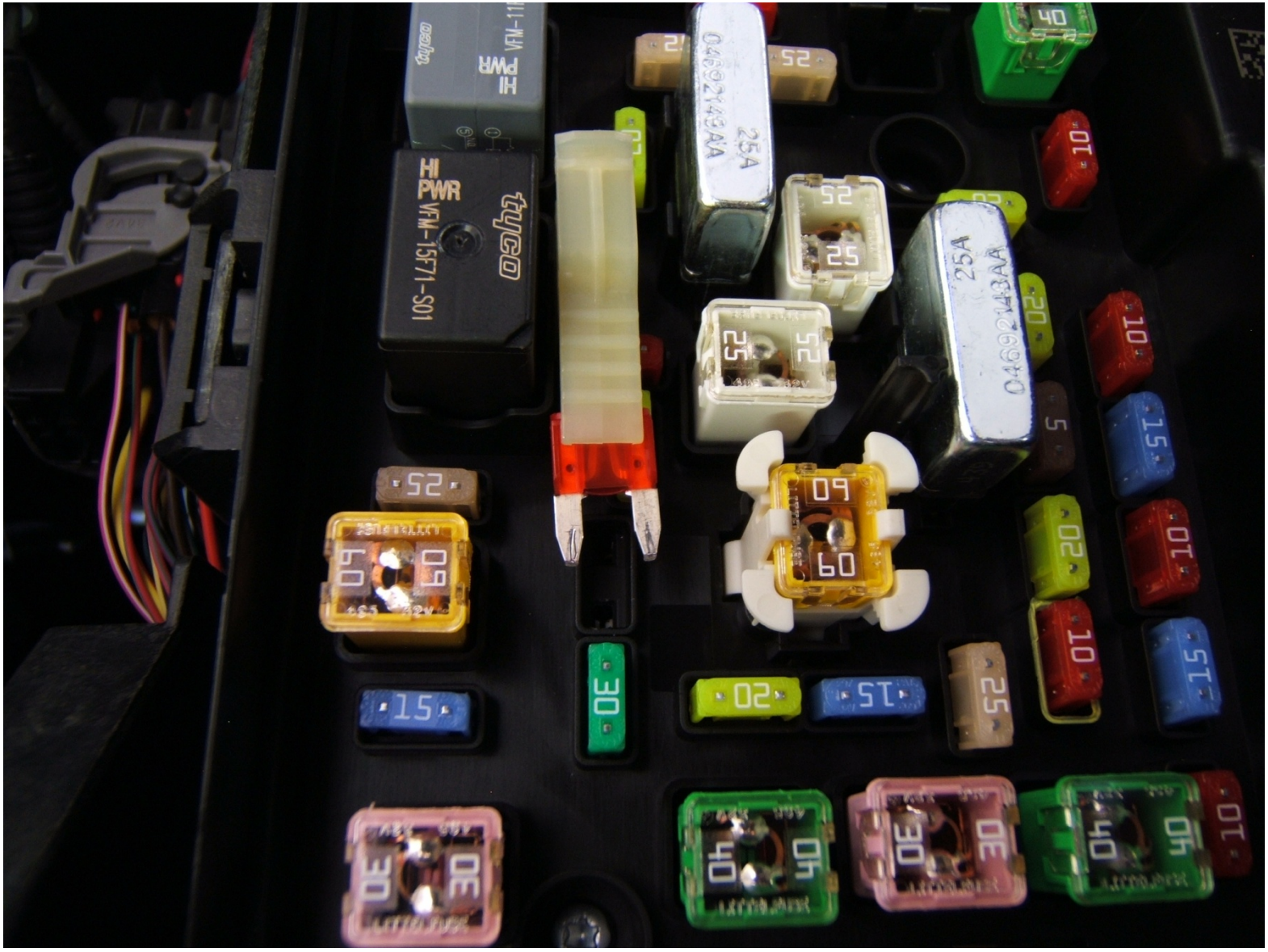
FIGURE 5.16
VEHICLE ON WEIGHT SCALES

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.17
SPARE INSTALLED ON RIGHT FRONT

2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.18
RECONFIGURABLE DISPLAY SHOWING
TPMS MALFUNCTION SCREENS



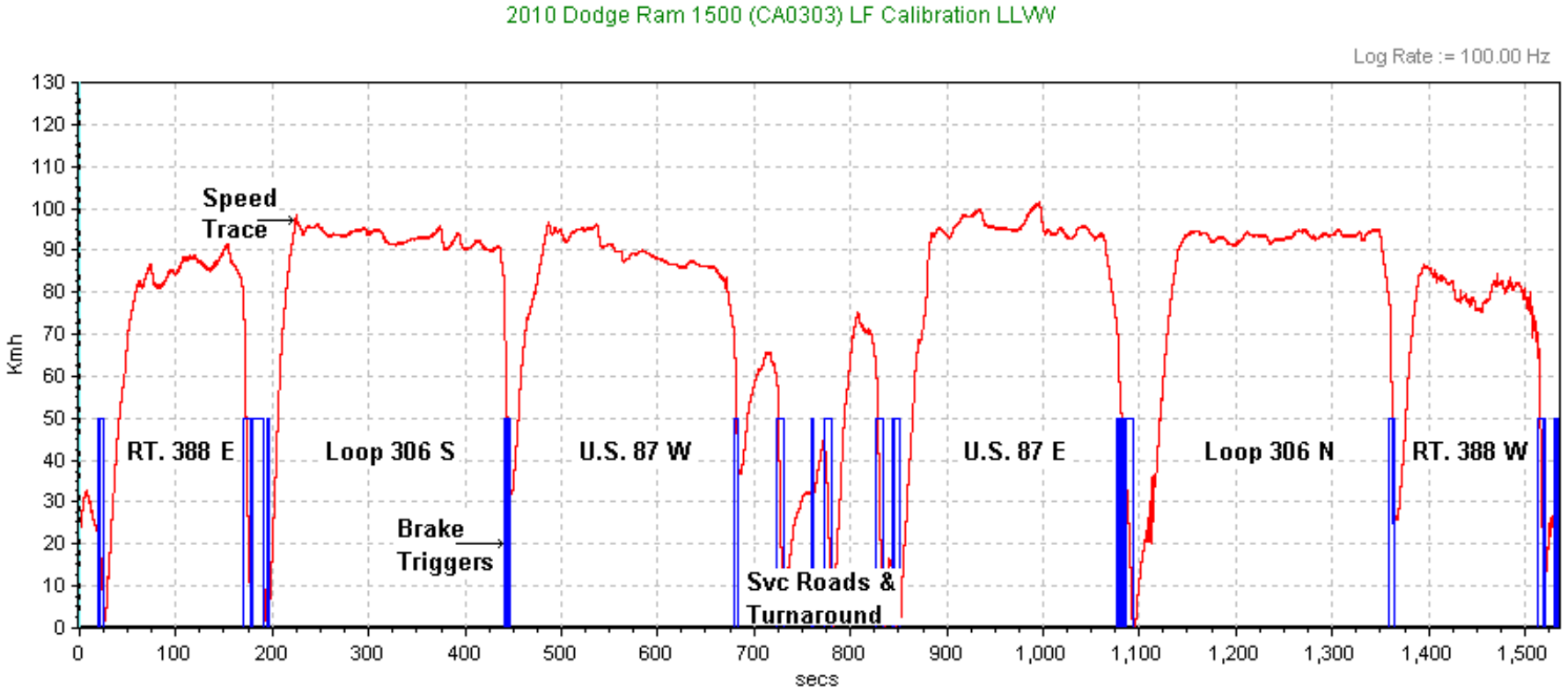
2010 DODGE RAM 1500
NHTSA NO. CA0303
FMVSS NO. 138

FIGURE 5.19
TPMS RECEIVER MODULE FUSE REMOVED

SECTION 6
TEST PLOTS

Scenario A: Left Front Tire at LLVW
Test Date: 6/15/10
Data File Time: 25:36 minutes
Cumulative Driving Time: 20:30 minutes
Start Point: GAFB north gate

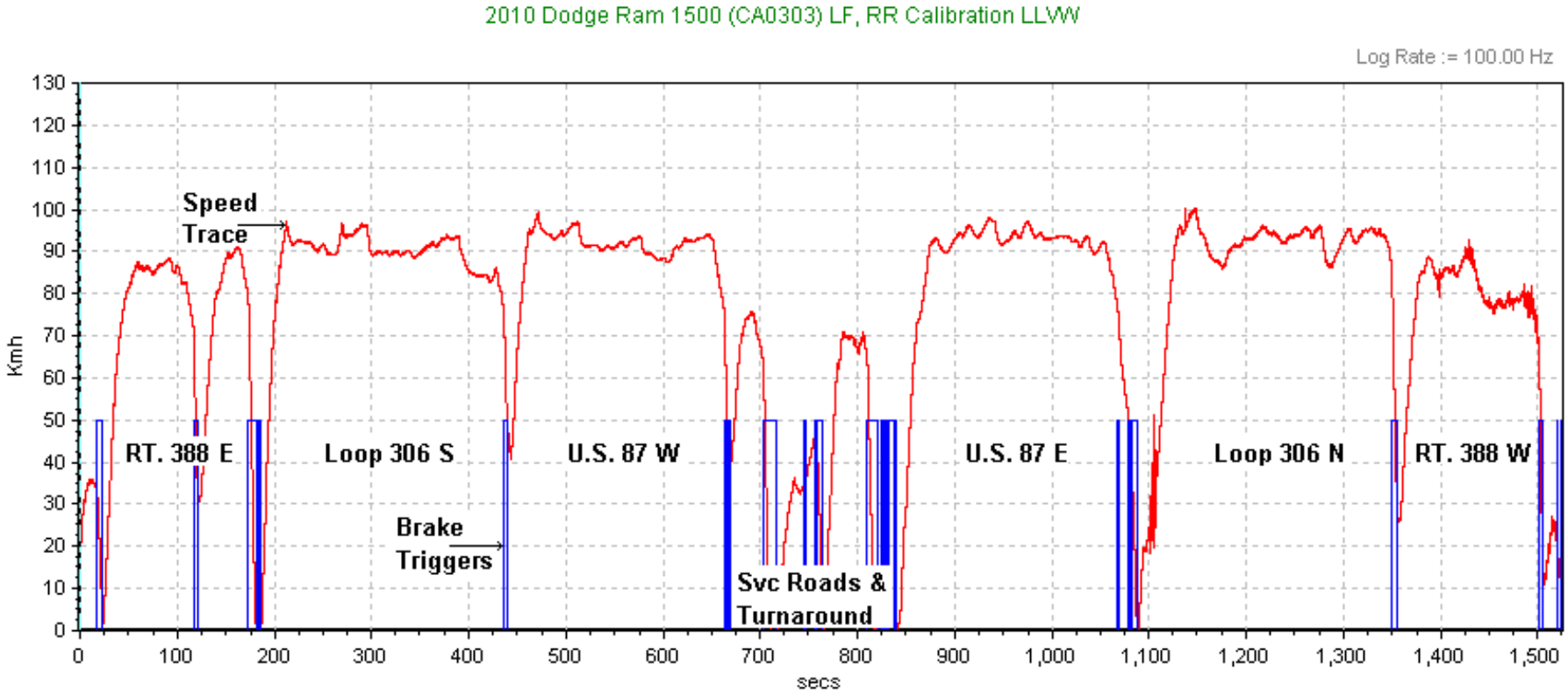
Calibration Phase:



LF Detection Phase: Telltale illuminated in 11 seconds. Driving was not necessary.

Scenario B:	Left Front, Right Rear Tires at LLVW
Test Date:	6/15/10
Data File Time:	25:26 minutes
Cumulative Driving Time:	20:33 minutes
Start Point:	GAFB north gate

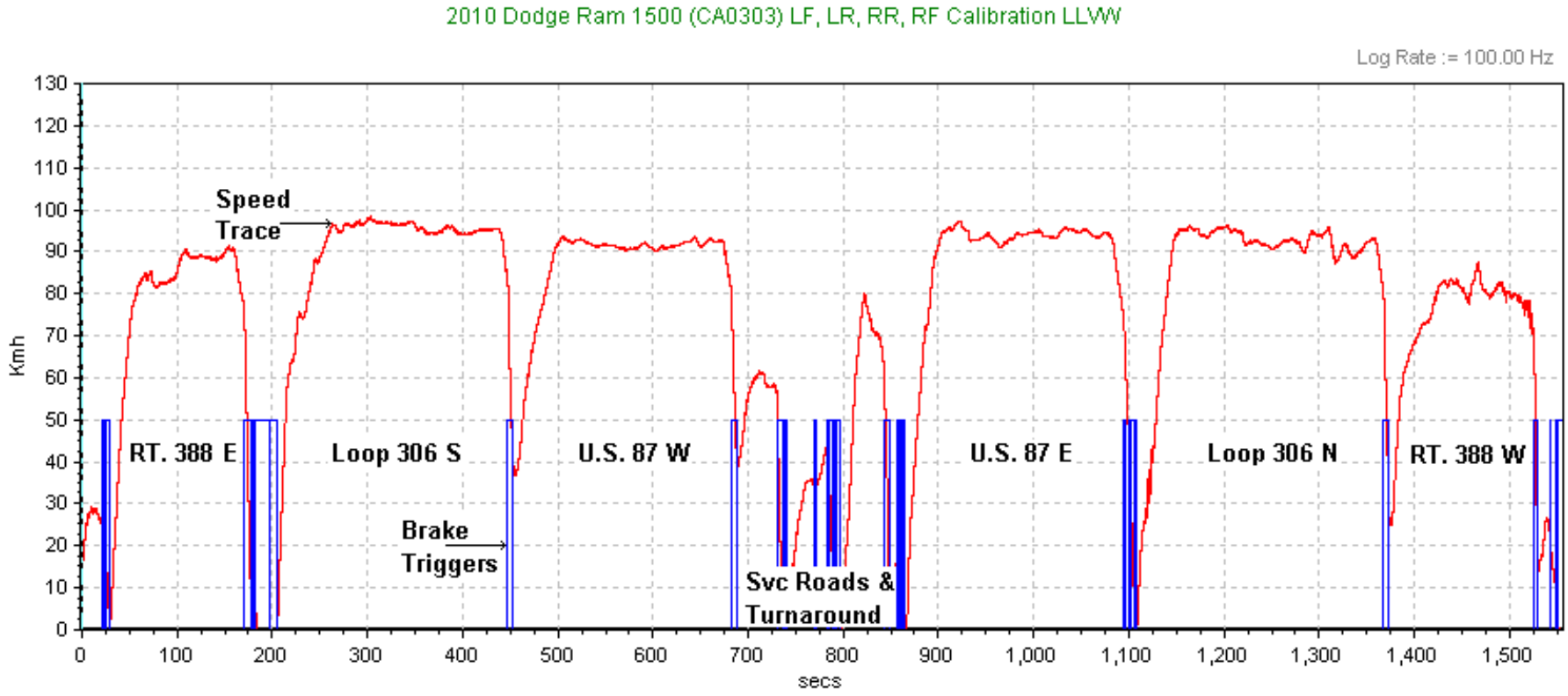
Calibration Phase:



LF, RR Detection Phase: Telltale illuminated in 10 seconds. Driving was not necessary.

Scenario C:	Left Front, Left Rear, Right Rear, Right Front Tires at LLVW
Test Date:	6/16/10
Data File Time:	25:56 minutes
Cumulative Driving Time:	20:45 minutes
Start Point:	GAFB north gate

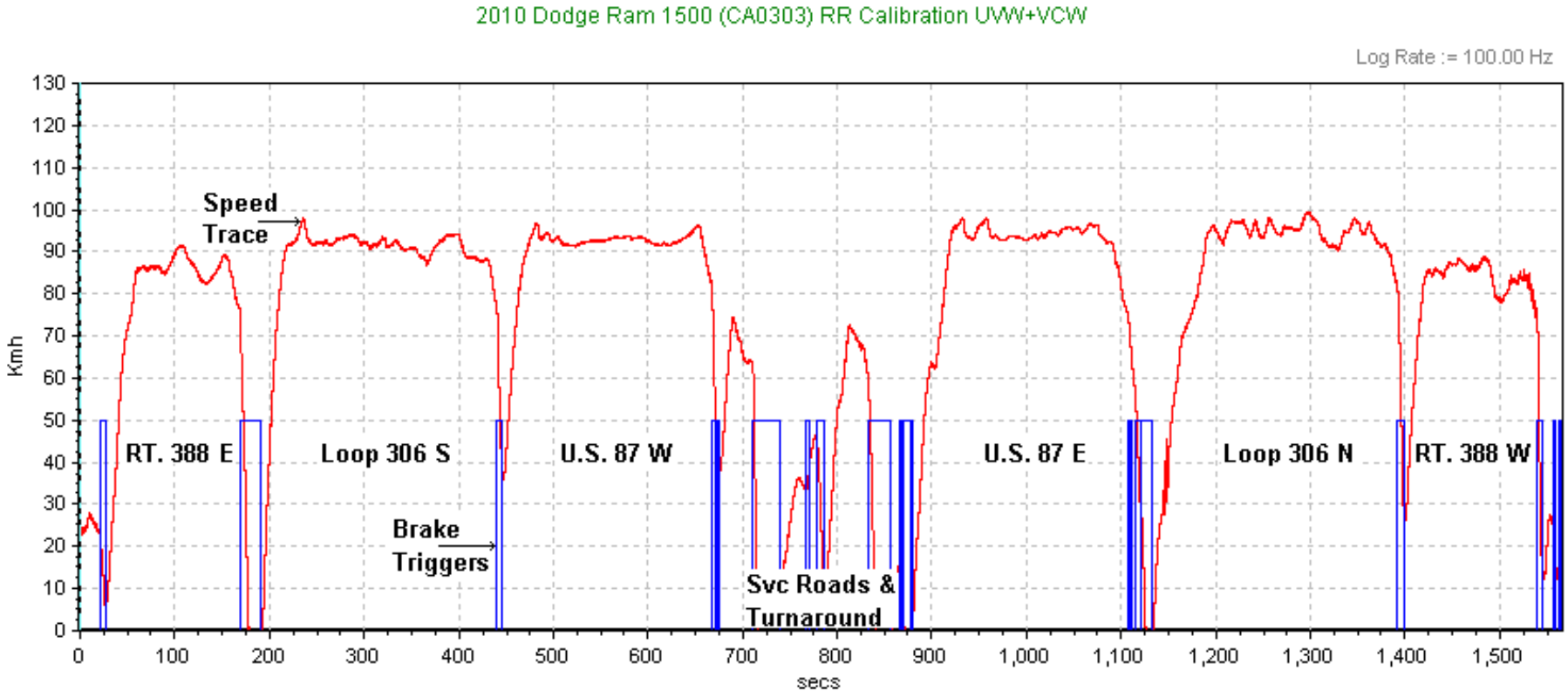
Calibration Phase:



LF, LR, RR, RF Detection Phase: Telltale illuminated in 11 seconds. Driving was not necessary.

Scenario D:	Right Rear Tire at UVW + VCW
Test Date:	6/17/10
Data File Time:	26:07 minutes
Cumulative Driving Time:	20:33 minutes
Start Point:	GAFB north gate

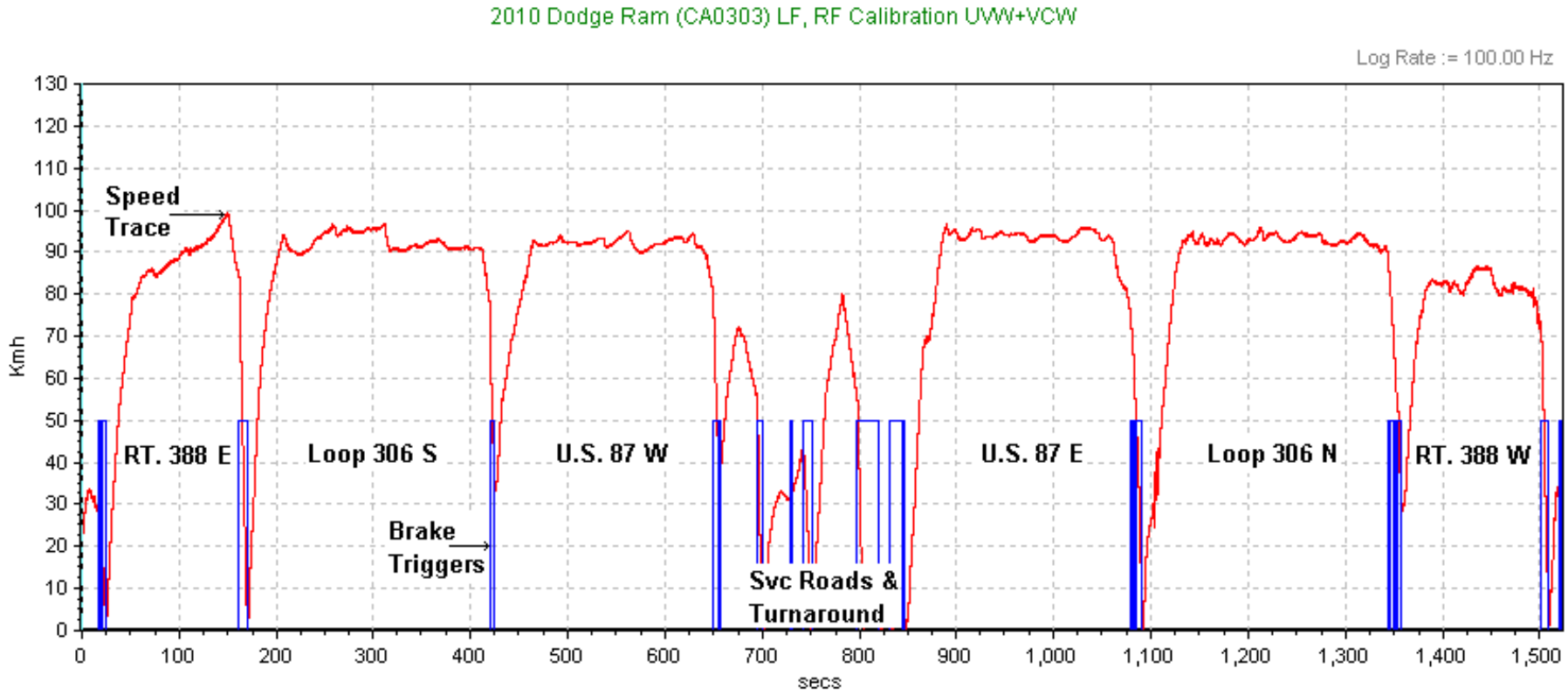
Calibration Phase:



RR Detection Phase: Telltale illuminated in 11 seconds. Driving was not necessary.

Scenario E: Left Front, Right Front Tires at UVW + VCW
Test Date: 6/17/10
Data File Time: 25:24 minutes
Cumulative Driving Time: 20:33 minutes
Start Point: GAFB north gate

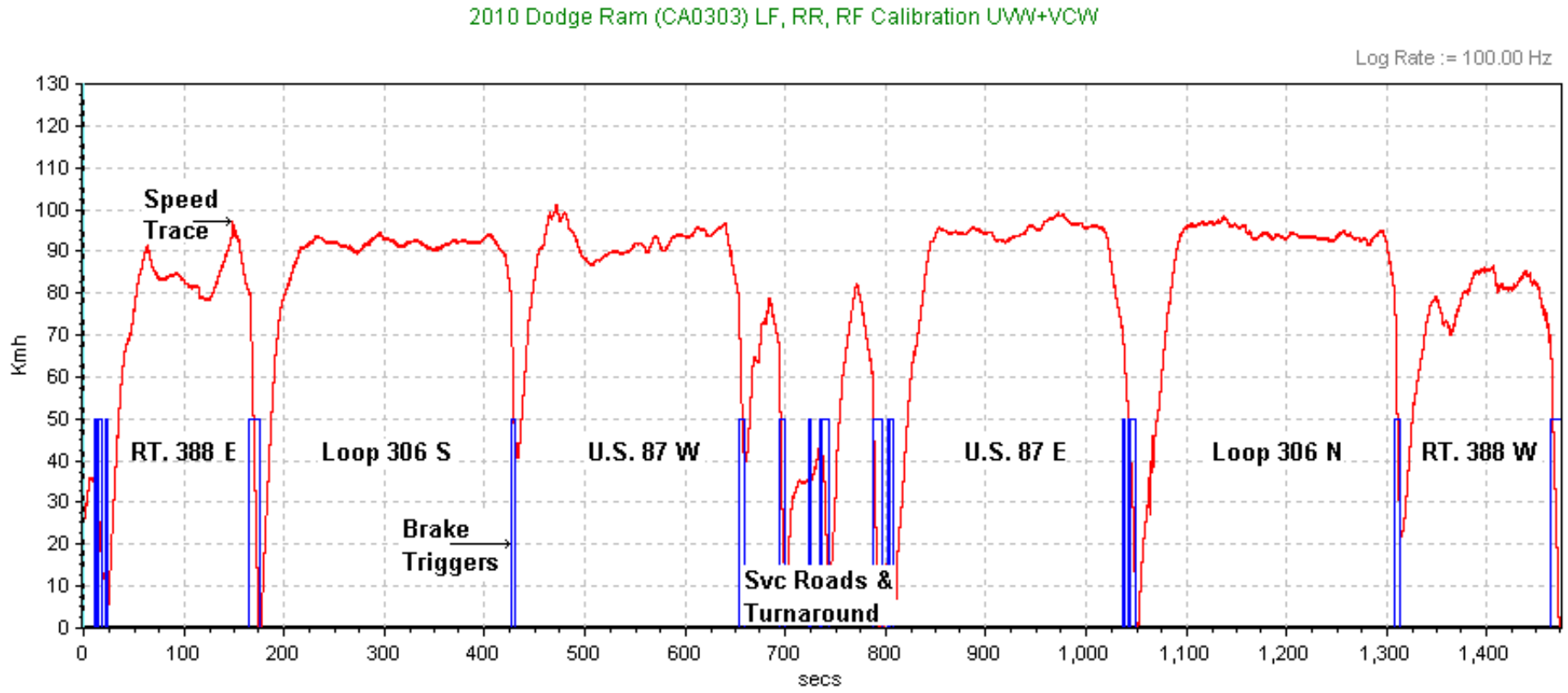
Calibration Phase:



LF, RF Detection Phase: Telltale illuminated in 11 seconds. Driving was not necessary.

Scenario F:	Left Front, Right Rear, Right Front Tires at UVW + VCW
Test Date:	6/17/10
Data File Time:	24:35 minutes
Cumulative Driving Time:	20:38 minutes
Start Point:	GAFB north gate

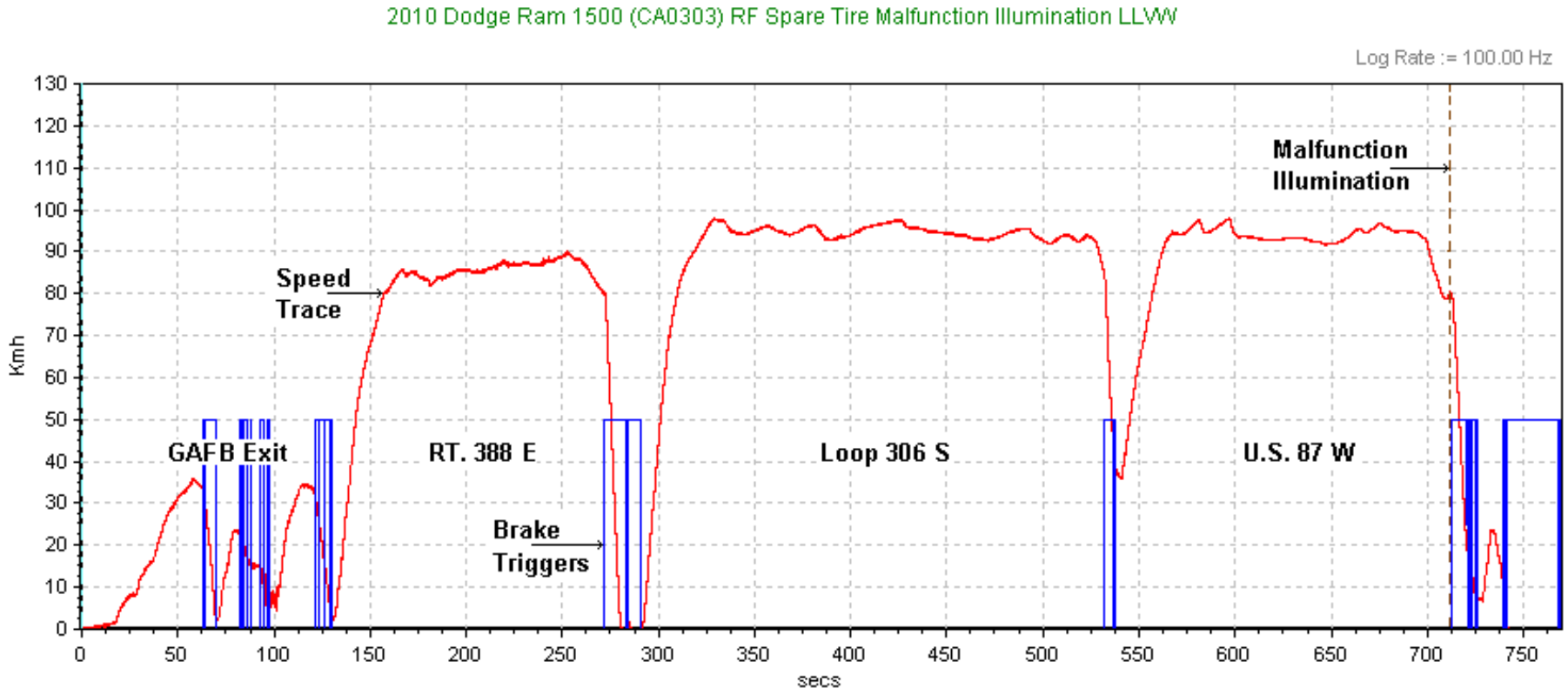
Calibration Phase:



LF, RR, RF Detection Phase: Telltale illuminated in 11 seconds. Driving was not necessary.

Scenario G:	Malfunction Detection Test at LLVW - Spare Installed on Right Front
Test Date:	6/16/10
Data File Time:	12:50 minutes
Cumulative Driving Time:	8:47 minutes
Start Point:	San Angelo Test Facility shop

Malfunction Telltale Illumination:



SECTION 7

OWNER'S MANUAL PAGES

The light also will turn on when the parking brake is applied with the ignition switch in the ON position.

NOTE: This light shows only that the parking brake is applied. It does not show the degree of brake application.

24. *Oil Pressure Warning Light*

This light indicates low engine oil pressure. The light should turn on momentarily when the engine is started. If the light turns on while driving, stop the vehicle and shut off the engine as soon as possible. A chime will sound for four minutes when this light turns on.

Do not operate the vehicle until the cause is corrected. This light does not indicate how much oil is in the engine. The engine oil level must be checked under the hood.

For vehicles equipped with a premium cluster this indicator will display in the Electronic Vehicle Information Center (EVIC). Refer to "Electronic Vehicle Information Center (EVIC) — If Equipped" in this section for more information.

25. *Tire Pressure Monitoring Telltale Light*

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 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. 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.

CAUTION!

3500 Dual Rear Tires have only one approved direction of rotation. This is to accommodate the asymmetrical design (tread pattern) of the On/Off-Road tire and the use of Outline White Letter (OWL) tires.

- **When replacing a flat, the spare tire may have to be remounted on the rim, or installed at a different location, to maintain the correct placement of the tire on the wheel relative to the tire/wheel position on the truck. For example, if the spare is used to replace an outer rear tire it will have to be remounted on the rim so that the wheel is dished inward. That way the tread design of asymmetrical tires and the white writing of the OWL tires will maintain proper position.**

TIRE PRESSURE MONITOR SYSTEM (TPMS)

The Tire Pressure Monitoring System (TPMS) will warn the driver of a low tire pressure based on the vehicle recommended cold tire inflation placard pressure. The placard pressure is defined on the Tire and Loading Information label. The Tire and Loading Information label is located on the drivers side B-pillar.

The tire pressure will vary with temperature by approximately 1 psi (6.9 kPa) for every 12°F (6.5°C). This means that when the outside temperature decreases, the tire pressure will decrease. Tire pressure should always be set based on cold inflation tire pressure. This is defined as the tire pressure after a vehicle has not been driven for more than three hours, or driven less than one mile after a three hour period. For information on how to properly inflate the vehicle's tires, refer to "Tire Pressure" under "Tires – General Information" in this section. The tire

pressure will also increase as the vehicle is driven - this is normal and there should be no adjustment for this increased pressure.

The TPMS will warn the driver of a low tire pressure if the tire pressure falls below the low pressure warning threshold for any reason, including low temperature effects, or natural pressure loss through the tire.

The TPMS will continue to warn the driver of low tire pressure as long as the condition exists and will not turn off until the tire pressure is at or above recommended cold placard pressure. Once the low tire pressure warning has been illuminated, the tire pressure must be increased to the recommended cold placard pressure in order for the TPMS warning lamp to be turned off. The system will automatically update and the TPMS warning lamp will extinguish once the updated tire pressures have been received. The vehicle may need to be driven for up to 20 minutes above 15 mph (25 km/h) to receive this information.

As an example, assume your vehicle has a recommended cold tire inflation placard pressure (parked for more than 3 hours) of 35 psi (241 kPa). If the ambient temperature is 68°F (20°C) and the measured tire pressure is 30 psi (207 kPa), a temperature drop to 20°F (-7°C) will decrease the tire pressure to approximately 26 psi (179 kPa). This tire pressure is sufficiently low enough to turn ON the Tire Pressure Monitoring lamp. Driving the vehicle may cause the tire pressure to rise to approximately 30 psi (207 kPa), but the Tire Pressure Monitoring lamp will still be ON. In this situation, the Tire Pressure Monitoring lamp will turn OFF only after the tires have been inflated to the vehicle's recommended cold tire placard pressure value.

CAUTION!

- **The TPMS has been optimized for the original equipment tires and wheels. TPMS pressures have been established for the tire size equipped on your vehicle. Undesirable system operation or sensor damage may result when using replacement equipment that is not of the same size, type, and/or style. After-market wheels can cause sensor damage. Do not use aftermarket tire sealants or balance beads if your vehicle is equipped with a TPMS, as damage to the sensors may result.**
- **After inspecting or adjusting the tire pressure always reinstall the valve stem cap. This will prevent moisture and dirt from entering the valve stem, which could damage the Tire Pressure Monitoring Sensor.**

NOTE:

- The TPMS is not intended to replace normal tire care and maintenance, nor to provide warning of a tire failure or condition.
- The TPMS should not be used as a tire pressure gauge while adjusting your tire pressure.
- Driving on a significantly underinflated tire causes the tire to overheat and can lead to tire failure. Underinflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.
- 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 "Tire Pressure Monitoring Telltale Light."

- Seasonal temperature changes will affect tire pressure, and the TPMS will monitor the actual tire pressure in the tire.

Tire Pressure Monitor System Components

The TPMS uses wireless technology with wheel rim mounted electronic sensors to monitor tire pressure levels. Sensors, mounted to each wheel as part of the valve stem transmit tire pressure readings to the Receiver Module.

NOTE: It is particularly important for you to check the tire pressure in all of your tires regularly and to maintain the proper pressure.

The TPMS consists of the following components:

- Receiver Module
- Four Wheel Sensors
- Tire Pressure Monitoring Telltale Lamp

Tire Pressure Monitoring Low Pressure Warnings

The Tire Pressure Monitoring Telltale Lamp will illuminate in the instrument cluster, and an audible chime will be activated when one or more of the four active road tire pressures are low. Should this occur, you should stop as soon as possible, check the inflation pressure of each tire on your vehicle and inflate each tire to the vehicle's recommended cold placard pressure value. The system will automatically update and the Tire Pressure Monitoring Lamp will extinguish once the updated tire pressures have been received. The vehicle may need to be driven for up to 20 minutes above 15 mph (25 km/h) to receive this information.

Check TPMS Warnings

The "Tire Pressure Monitoring Telltale Light" located in the instrument cluster will flash on and off for 75 seconds and will remain on solid when a system fault is detected. The system fault will also sound a chime. If the ignition key is cycled, this sequence will repeat, providing the system fault still exists. A system fault can occur by any of the following scenarios:

1. Signal interference due to electronic devices or driving next to facilities emitting the same radio frequencies as the TPMS sensors.

2. Installing aftermarket window tinting that affects radio wave signals.

3. Accumulation of snow or ice around the wheels or wheel housings.

4. Using tire chains on the vehicle.

5. Using wheels/tires not equipped with TPM sensors.

6. Loss of communication with the tire pressure monitoring sensors.

NOTE: Your vehicle is equipped with a non-matching full size spare wheel and tire assembly.

1. This spare tire does not have a tire pressure monitoring sensor. Therefore, the TPMS will not monitor the tire pressure in the spare tire.

2. If you install the full size spare tire in place of a road tire that has a pressure below the low-pressure warning limit, upon the next ignition key cycle, a chime will sound and the "TPM Telltale Light" will still turn ON due to the low tire.

3. However, after driving the vehicle for up to 20 minutes above 15 mph (25 km/h), the "TPM Telltale Light" will flash on and off for 75 seconds and then remain on solid.

4. For each subsequent ignition key cycle, a chime will sound and the "TPM Telltale Light" will flash on and off for 75 seconds and then remain on solid.

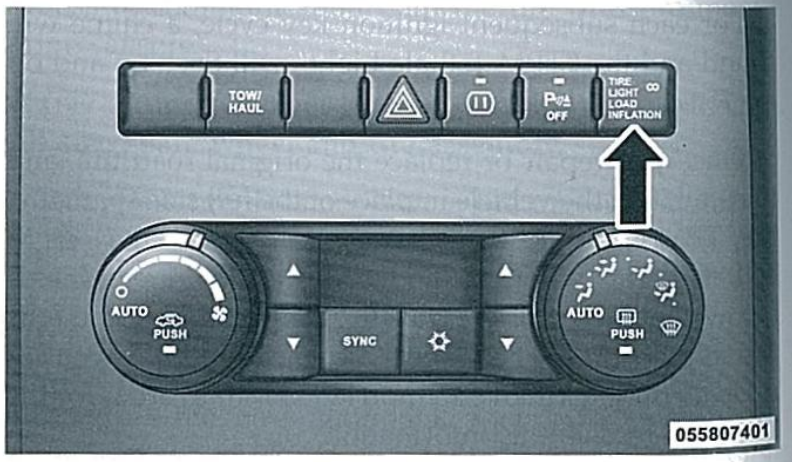
5. Once you repair or replace the original road tire, and reinstall it on the vehicle in place of the full size spare tire, the TPMS will update automatically and the "TPM Telltale Light" will turn OFF, as long as no tire pressure is below the low-pressure warning limit in any of the four active road tires. The vehicle may need to be driven for up to 20 minutes above 15 mph (25 km/h) in order for the TPMS to receive this information.

Tire Pressure Monitor System (TPMS) Tire Light Load Inflation Switch Description (2500 Models) – If Equipped

WARNING!

Never operate your vehicle with the TPMS and tire pressures set to the Light Load Inflation Pressure settings if carrying more than two occupants (150 lbs [68 kg] each) plus 200 pounds (91 kg) of cargo. The vehicle "Light Load Definition" is found in the Supplemental Tire Pressure Information Label which is located on the rear face of the driver door. Failure to do so may cause you to lose control resulting in an accident, causing serious or fatal injury.

The TPMS tire light load inflation switch will allow the driver to switch between the max load inflation pressure (cold) low pressure warning threshold and the light load inflation pressure (cold) low pressure warning threshold depending on the vehicle's load condition. The Tire and Loading Information label defines the recommended front and rear cold tire inflation pressures for the vehicle when operating in the Max Load condition. A Supplemental Tire Pressure Information label is also available defining Light Load tire inflation pressures when operating in the Light Load condition. When the tire light load inflation switch LED is ON, the TPMS is using the light load inflation pressure (cold) low inflation warning thresholds.



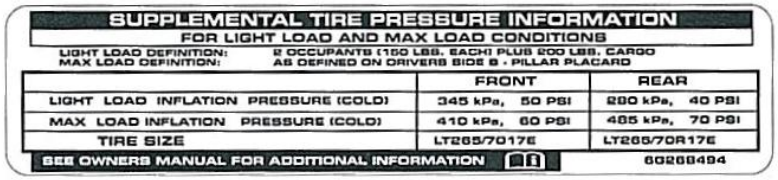
Tire Light Load Inflation Switch

Tire Light Load Inflation Switch Operation – If Equipped

- This vehicle may have different recommended tire pressure values between the front and rear tires as shown in both the Tire Loading Information Label and the Supplemental Tire Pressure Information Label. It is

also equipped to be driven with tire pressures appropriate to either a Light Load condition or the vehicle Max Load condition.

- The tire light load inflation switch will allow the driver to change between the max load inflation pressure (cold) low pressure warning threshold and the light load inflation pressure (cold) low pressure warning threshold depending on the vehicle's load condition. Refer to the "Supplemental Tire Pressure Information" label for the vehicle's Light Load inflation pressures and "Tire and Loading Information" label for the vehicle's Max Load inflation pressures.



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Example Supplemental Tire Pressure Label

To switch from the max load inflation pressure (cold) low pressure warning threshold to the light load inflation pressure (cold) low pressure warning threshold, begin by placing the ignition switch in the RUN position. Next, lower all four road tire pressures to the Light Load Inflation Pressure values as listed on the Supplemental

Tire Pressure Information label. The Supplemental Tire Pressure Information label is located on the rear face of the driver door. Use an accurate tire gauge to check the tire pressures when lowering all four tire pressures. After all four tire pressures have been lowered to the Light Load inflation pressures, press the tire light load inflation switch. If the tire light load inflation switch's amber colored LED turns ON, the TPMS is using the light load inflation pressure (cold) low pressure warning thresholds.

If the tire light load inflation switch amber colored LED flashes on and off for 10 seconds, after all four tire pressures have been lowered to the Light Load inflation pressures, the pressure in any one of the four tires may not be at the light load inflation pressure (cold) values as indicated for the Light Load condition as defined on the Supplemental Tire Pressure Information label located on the rear face of the driver door. Using an accurate tire pressure gauge, re-check the tire pressures for the light load inflation pressure (cold) value.

WARNING!

It is the driver's responsibility to change to the max load inflation pressure (cold) low pressure warning threshold condition when not driving in the light load condition as defined as two occupants (150 lbs [68 kg] each) plus 200 pounds (91 kg) of cargo. The vehicle "Light Load Definition" is found in the Supplemental Tire Pressure Information label located on the rear face of the driver door. Failure to do so may cause you to lose control resulting in an accident, causing serious or fatal injury.

To switch back to the max load inflation pressure (cold) low pressure warning threshold, press the tire light load inflation switch. It is not necessary to first fill the tires to

the max load inflation pressure (cold) values to switch the TPMS system to the max load inflation pressure (cold) low pressure warning threshold. If after pressing the tire light load inflation switch, and tire pressures are below the max load inflation pressure (cold) low pressure warning thresholds, the TPMS low pressure warning telltale light (located in the instrument cluster) will turn ON and a chime will sound. The tire pressures are now required to be inflated to the max load inflation pressure (cold) values described on the Tire and Loading Information label. The Tire and Loading Information label is located on the drivers side B-pillar. If the tire light load inflation switch LED turns OFF, the TPMS has been reset and the TPMS is using the max load inflation pressure (cold) low pressure warning thresholds.

General Information

This device complies with part 15 of the FCC rules and RSS 210 of Industry Canada. Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

The tire pressure sensors are covered under one of the following licenses:

United States KR5S120123
Canada 2671-S120123

FUEL REQUIREMENTS

3.7L and 4.7L Engine

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All engines (except 5.7L engines) are designed to meet all emissions regulations and provide excellent fuel economy and performance when using high quality unleaded "regular" gasoline having an octane rating of 87. The use of premium