REPORT NUMBER 138-STF-10-001

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

GENERAL MOTORS CORPORATION
2010 CHEVROLET CAMARO
TWO-DOOR PASSENGER CAR
NHTSA NO. CA0106

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

October 22, 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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16. Abstract Compliance tests were conducted on the subject 2010 Chevrolet Camaro two-door passenger car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure Number 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 2010 Chevrolet Camaro two-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 2010 Chevrolet Camaro two-door passenger car. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: 2G1FA1EV1A9178422

B. NHTSA Number: CA0106

C Manufacturer: General Motors Corporation

D. Manufacture Date: 12/2009

1.3 TEST DATE

The test vehicle was tested during the time period March 9 through April 9, 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, test equipment, and ballast. 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 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 Chevrolet Camaro. 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 TPMS fuses.

2.2 SUMMARY OF RESULTS

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

A. Right rear
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 front
E. Left front and right rear
F. Left front, left 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. TPMS fuses were removed.

In both scenarios, the vehicle's combination malfunction telltale properly operated per the standard's requirements. It is noted that after the original wheel was re-installed on the vehicle in place of the spare tire, the vehicle ignition had to be cycled twice for the malfunction telltale to extinguish. According to General Motors, cycling the ignition twice is required to restore the system to normal operation.

SECTION 3

TEST DATA

FMVSS No. 138 – TEST DATA SUMMARY

TEST DATES: March 9 – April 9, 2010 LAB: U.S. DOT San Angelo Test Facility

VIN: 2G1FA1EV1A9178422 VEHICLE NHTSA NUMBER: CA0106

CERTIFICATION LABEL BUILD DATE: 12/2009

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: March 9, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106 VIN: 2G1FA1EV1A9178422

CERTIFICATION LABEL BUILD DATE: 12/2009 ENGINE: 3.6 liter, V6

MY/MAKE/MODEL/BODY STYLE: 2010 Chevrolet Camaro two-door passenger car

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 269 km (167 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: Sensor: Schrader; receiver: Bosch

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
(See Note)

TPMS MALFUNCTION INDICATOR TYPE:

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

Note: The vehicle is not equipped with a manual reset control. However, the vehicle does have a reset or re-learn procedure that must be followed anytime one or more of the TPMS sensors are replaced or relocated.

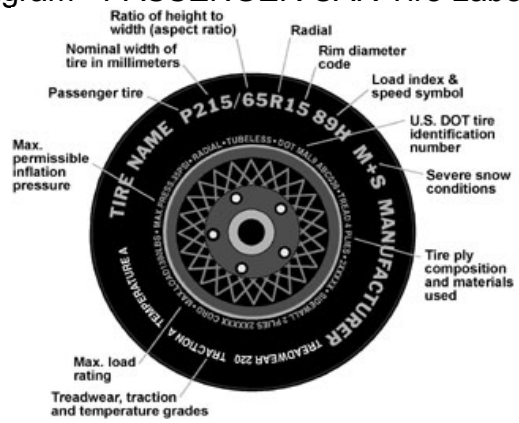
DATA SHEET 1 (Sheet 2 of 3)
TEST PREPARATION INFORMATION

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

Axle	Tire Size	Recommended Cold Inflation Pressure	Source
Front	P245/55R18	240 kPa (35 psi)	Vehicle placard
Rear	P245/55R18	240 kPa (35 psi)	Vehicle placard

INSTALLED TIRE DATA

Diagram - PASSENGER CAR Tire Labeling



Front and Rear Axles

Tire Size and Load Index / Speed Rating: P245/55R18 102T

Manufacturer/Tire Name: BFGoodrich Radial T/A Spec

Sidewall Max Load Rating: 850 kg (1,874 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, 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	240 kPa x .75 = 180 kPa	240 kPa x .75 = 180 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)	180 kPa (26 psi)	180 kPa (26 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	173 kPa (25 psi)	173 kPa (25 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: March 9, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: March 11, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

TPMS Low Tire Pressure Warning Telltale

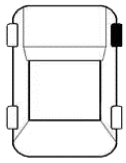
Telltale is mounted inside the occupant compartment in front of and in clear view of the driver?

(X)YES ( )NO (fail)

TPMS Low Tire Pressure Warning Telltale Location: Inside speedometer ring, at 9 o'clock position (See Figure 5.11)

Identify Telltale Symbol Used (check box above figure).

[X] 

[ ] 

[ ] OTHER (fail)
(describe below)

Note any words or additional symbols used: Message information center (MIC) provides additional TPMS information. (See Remarks.)

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

TPMS Malfunction Telltale

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

TPMS Combined Malfunction Telltale Location: Inside speedometer ring, just below 9 o'clock position (See Figure 5.11)

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 5 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: In addition to the required telltale, the Camero also provides low inflation pressure and malfunction information in a Message Information Center (MIC) , also located in the dashboard in clear view of the driver, (See figures 5.12 and 5.13)

RECORDED BY: Todd P. Groghan DATE: March 11, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: March 9, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

Time:	Start:	2:04 pm	End:	2:20 pm
Ambient Temperature:	Start:	22.6°C (72.7°F)	End:	22.6°C (72.7°F)
Trip Odometer Reading:	Start:	269 km (167 mi)		
Fuel Level:	Start:	Full		
Weather Conditions:		Sunny and windy		

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	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)
Tire Sidewall Temp	21.8°C (71.2°F)	23.8°C (74.8°F)	26.8°C (80.2°F)	21.8°C (71.2°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,079 kg (4,582 lbs)

GAWR (front): 975 kg (2,149 lbs)

GAWR (rear): 1,104 kg (2,433 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 332 kg (732 lbs)

Measured Unloaded Vehicle Weight:

LF	445 kg (982 lbs)	LR	416 kg (918 lbs)
RF	441 kg (973 lbs)	RR	412 kg (909 lbs)
Front Axle	886 kg (1,955 lbs)	Rear Axle	828 kg (1,827 lbs)

Total Vehicle 1,714 kg (3,782 lbs)

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

LF	488 kg (1,075 lbs)		LR	466 kg (1,027 lbs)	
RF	480 kg (1,059 lbs)		RR	461 kg (1,017 lbs)	
Front Axle	968 kg (2,134 lbs)	(≤ GAWR)	Rear Axle	927 kg (2,044 lbs)	(≤ GAWR)

Total Vehicle 1,895 kg (4,178 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), 181 kg (396 lbs) of driver, passenger, ballast, and test equipment.

RECORDED BY: Todd P. Groghan DATE: March 9, 2010

APPROVED BY: Kenneth H. Yates

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

SCENARIO A – Right Rear Tire Deflation at LLVW

TEST DATE: March 11, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

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: 8.4°C (47.1°F) Vehicle cool down period: overnight				
Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	10.4°C (50.7°F)	9.6°C (49.3°F)	9.8°C (49.6°F)	10.2°C (50.4°F)
San Angelo Test Facility Shop Floor Temp	12.8°C (55.0°F)	12.6°C (54.7°F)	12.4°C (54.3°F)	12.6°C (54.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	14:49:24 UTC	End:	15:14:38 UTC
Trip Odometer Reading:	Start:	271.7 km (168.8 mi)	End:	303.4 km (188.5 mi)
Ambient Temperature:	Start:	8.4°C (47.1°F)	End:	11.3°C (52.3°F)
Roadway Temperature:	Start:	10.6°C (51.1°F)	End:	13.2°C (55.8°F)

Driving in first direction:

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

10:28 minutes (stopwatch time) 15.6 km (9.7 mi) distance

Driving in opposite direction:

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

10:05 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 99.4 km/h (61.8 mph)

Total Driving Time: 20:34 minutes (VBox time)

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

SCENARIO A – 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	262.8 kPa (38.1 psi)	265.7 kPa (38.5 psi)	265.8 kPa (38.6 psi)	262.4 kPa (38.1 psi)
Tire Sidewall Temp	22.8°C (73.0°F)	22.2°C (72.0°F)	19.8°C (67.6°F)	19.6°C (67.3°F)
San Angelo Test Facility Shop Floor Temp	12.6°C (54.7°F)	13.8°C (56.8°F)	13.6°C (56.5°F)	13.6°C (56.5°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			173.0 kPa (25.1 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 0.2 km (0.1 mi) distance (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 5 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO A – 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: 15.3°C (59.5°F)	Vehicle cool down period: 62 minutes			
Inflation Pressure	253.5 kPa (36.8 psi)	252.9 kPa (36.7 psi)	165.7 kPa (24.0 psi)	253.5 kPa (36.8 psi)
Tire Sidewall Temp	17.0°C (62.6°F)	17.2°C (63.0°F)	17.8°C (64.0°F)	17.4°C (63.3°F)
San Angelo Test Facility Shop Floor Temp	15.4°C (59.7°F)	15.6°C (60.1°F)	15.4°C (59.7°F)	15.4°C (59.7°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:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 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: Todd P. Groghan DATE: March 11, 2010

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: March 11, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

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: 15.3°C (59.5°F) Vehicle cool down period: 63 minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	17.2°C (63.0°F)	17.2°C (63.0°F)	17.4°C (63.3°F)	17.2°C (63.0°F)
San Angelo Test Facility Shop Floor Temp	15.2°C (59.4°F)	15.2°C (59.4°F)	15.2°C (59.4°F)	15.2°C (59.4°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	16:59:46 UTC	End:	17:24:26 UTC
Trip Odometer Reading:	Start:	305.6 km (189.9 mi)	End:	337.5 km (209.7 mi)
Ambient Temperature:	Start:	16.2°C (61.2°F)	End:	16.2°C (61.2°F)
Roadway Temperature:	Start:	22.4°C (72.3°F)	End:	18.4°C (65.1°F)

Driving in first direction:

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

10:09 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

10:23 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 99.4 km/h (61.8 mph)

Total Driving Time: 20:32 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	253.9 kPa (36.8 psi)	257.0 kPa (37.3 psi)	255.0 kPa (37.0 psi)	254.7 kPa (36.9 psi)
Tire Sidewall Temp	25.2°C (77.4°F)	23.8°C (74.8°F)	24.0°C (75.2°F)	24.6°C (76.3°F)
San Angelo Test Facility Shop Floor Temp	14.4°C (57.9°F)	14.8°C (58.6°F)	14.8°C (58.6°F)	14.8°C (58.6°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 ( )RR ( )RF Inflation Pressure	173.0 kPa (25.1 psi)	173.0 kPa (25.1 psi)		

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated at lamp check. 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 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: 14.4°C (57.9°F)	Vehicle cool down period: 61 minutes			
Inflation Pressure	164.1 kPa (23.8 psi)	162.9 kPa (23.6 psi)	238.3 kPa (34.6 psi)	240.4 kPa (34.9 psi)
Tire Sidewall Temp	16.4°C (61.5°F)	15.8°C (60.4°F)	16.4°C (61.5°F)	16.2°C (61.2°F)
San Angelo Test Facility Shop Floor Temp	14.6°C (58.3°F)	15.0°C (59.0°F)	15.2°C (59.4°F)	15.4°C (59.7°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:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 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: Todd P. Groghan DATE: March 11, 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: March 12, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

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: 7.5°C (45.5°F) Vehicle cool down period: overnight				
Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	9.6°C (49.3°F)	9.6°C (49.3°F)	9.6°C (49.3°F)	10.2°C (50.4°F)
San Angelo Test Facility Shop Floor Temp	11.4°C (52.5°F)	11.2°C (52.2°F)	11.2°C (52.2°F)	11.6°C (52.9°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	15:00:40 UTC	End:	15:25:40 UTC
Trip Odometer Reading:	Start:	339.6 km (211.0 mi)	End:	371.6 km (230.9 mi)
Ambient Temperature:	Start:	7.5°C (45.5°F)	End:	9.4°C (48.9°F)
Roadway Temperature:	Start:	11.2°C (52.2°F)	End:	12.4°C (54.3°F)

Driving in first direction:

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

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 65

10:18 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 99.2 km/h (61.6 mph)

Total Driving Time: 20:31 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	260.2 kPa (37.7 psi)	265.0 kPa (38.4 psi)	264.1 kPa (38.3 psi)	260.4 kPa (37.8 psi)
Tire Sidewall Temp	21.2°C (70.2°F)	20.2°C (68.4°F)	18.2°C (64.8°F)	18.4°C (65.1°F)
San Angelo Test Facility Shop Floor Temp	8.8°C (47.8°F)	9.2°C (48.6°F)	9.4°C (48.9°F)	9.4°C (48.9°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 (X)LR (X)RR (X)RF Inflation Pressure	173.0 kPa (25.1 psi)	173.0 kPa (25.1 psi)	173.0 kPa (25.1 psi)	173.0 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated at lamp check. 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 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: 14.4°C (57.9°F)	Vehicle cool down period: 62 minutes			
Inflation Pressure	167.6 kPa (24.3 psi)	165.7 kPa (24.0 psi)	166.2 kPa (24.1 psi)	168.2 kPa (24.4 psi)
Tire Sidewall Temp	15.4°C (59.7°F)	15.4°C (59.7°F)	15.6°C (60.1°F)	14.8°C (58.6°F)
San Angelo Test Facility Shop Floor Temp	13.4°C (56.1°F)	13.4°C (56.1°F)	13.6°C (56.5°F)	13.2°C (55.8°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:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 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: Todd P. Groghan DATE: March 12, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: March 24, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

Time: Start: 11:45 am End: 12:29 pm

Ambient Temperature: Start: 19.9°C (67.8°F) End: 21.2°C (70.2°F)

Odometer Reading: Start: 706 km (438.6 mi)

Fuel Level: Start: Full

Weather Conditions: Partly 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	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	21.6°C (70.9°F)	22.6°C (72.7°F)	23.6°C (74.5°F)	21.6°C (70.9°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,079 kg (4,582 lbs)

GAWR (front): 975 kg (2,149 lbs)

GAWR (rear): 1,104 kg (2,433 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 332 kg (732 lbs)

Measured Unloaded Vehicle Weight:

LF	445 kg (980 lbs)	LR	417 kg (920 lbs)
RF	442 kg (975 lbs)	RR	413 kg (911 lbs)
Front Axle	887 kg (1,955 lbs)	Rear Axle	830 kg (1,831 lbs)

Total Vehicle 1,717 kg (3,786 lbs)

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

LF	488 kg (1,077 lbs)		LR	542 kg (1,195 lbs)	
RF	485 kg (1,069 lbs)		RR	534 kg (1,177 lbs)	
Front Axle	973 kg (2,146 lbs)	(≤ GAWR)	Rear Axle	1,076 kg (2,372 lbs)	(≤ GAWR)

Total Vehicle 2,049 kg (4,518 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), 332 kg (732 lbs) of driver, passenger, test equipment, and ballast.

RECORDED BY: Todd P. Groghan DATE: March 24, 2010

APPROVED BY: Kenneth H. Yates

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

SCENARIO D – Right Front Tire Deflation at UVW + VCW

TEST DATE: April 8, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

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: 61 minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	16.4°C (61.5°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	16.6°C (61.9°F)	16.6°C (61.9°F)	16.4°C (61.5°F)	16.6°C (61.9°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	15:49:07 UTC	End:	16:16:10 UTC
Trip Odometer Reading:	Start:	769.4 km (478.1 mi)	End:	801.5 km (498.0 mi)
Ambient Temperature:	Start:	13.0°C (55.4°F)	End:	13.9°C (57.0°F)
Roadway Temperature:	Start:	24.6°C (76.3°F)	End:	26.2°C (79.2°F)

Driving in first direction:

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

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 66

10:16 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 100.0 km/h (62.1 mph)

Total Driving Time: 20:30 minutes (VBox time)

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

SCENARIO D – 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	252.6 kPa (36.6 psi)	261.2 kPa (37.9 psi)	259.0 kPa (37.6 psi)	254.2 kPa (36.9 psi)
Tire Sidewall Temp	27.2°C (81.0°F)	27.9°C (82.2°F)	25.6°C (78.1°F)	24.0°C (75.2°F)
San Angelo Test Facility Shop Floor Temp	16.2°C (61.2°F)	16.2°C (61.2°F)	16.4°C (61.5°F)	16.2°C (61.2°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: ( )LF ( )LR ( )RR (X)RF Inflation Pressure				173.0 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated immediately after lamp check. 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 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: 15.7°C (60.3°F)	Vehicle cool down period: 62 minutes			
Inflation Pressure	243.7 kPa (35.3 psi)	245.8 kPa (35.7 psi)	244.8 kPa (35.5 psi)	167.4 kPa (24.3 psi)
Tire Sidewall Temp	18.8°C (65.8°F)	18.8°C (65.8°F)	18.8°C (65.8°F)	18.8°C (65.8°F)
San Angelo Test Facility Shop Floor Temp	17.8°C (64.0°F)	17.6°C (63.7°F)	17.6°C (63.7°F)	17.6°C (63.7°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:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 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 front tire was deflated at UVW + VCW.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: April 8, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: April 8, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

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: 8.0°C (46.4°F) Vehicle cool down period: overnight minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	12.4°C (54.3°F)	11.4°C (52.5°F)	11.4°C (52.5°F)	11.6°C (52.9°F)
San Angelo Test Facility Shop Floor Temp	15.6°C (60.1°F)	15.6°C (60.1°F)	15.2°C (59.4°F)	15.4°C (59.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	13:50:12 UTC	End:	14:17:17 UTC
Trip Odometer Reading:	Start:	735.3 km (456.9 mi)	End:	767.2 km (476.7 mi)
Ambient Temperature:	Start:	8.0°C (46.4°F)	End:	9.0°C (48.2°F)
Roadway Temperature:	Start:	11.4°C (52.5°F)	End:	14.2°C (57.6°F)

Driving in first direction:

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

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 67

10:27 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 99.8 km/h (62.0 mph)

Total Driving Time: 20:40 minutes (VBox time)

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

SCENARIO E – Left Front and 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	257.1 kPa (37.3 psi)	263.5 kPa (38.2 psi)	262.7 kPa (38.1 psi)	257.4 kPa (37.3 psi)
Tire Sidewall Temp	22.2°C (72.0°F)	22.2°C (72.0°F)	19.0°C (66.2°F)	18.8°C (65.8°F)
San Angelo Test Facility Shop Floor Temp	15.0°C (59.0°F)	15.2°C (59.4°F)	14.8°C (58.6°F)	14.8°C (58.6°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 ( )LR (X)RR ( )RF Inflation Pressure	173.0 kPa (25.1 psi)		173.0 kPa (25.1 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 0.2 km (0.1 mi) distance (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 19 of 22)
TPMS OPERATIONAL PERFORMANCE

SCENARIO E – Left Front, 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: 13.0°C (55.4°F)	Vehicle cool down period: 61 minutes			
Inflation Pressure	168.6 kPa (24.5 psi)	249.9 kPa (36.2 psi)	166.5 kPa (24.1 psi)	250.0 kPa (36.3 psi)
Tire Sidewall Temp	16.6°C (61.9°F)	16.8°C (62.2°F)	16.8°C (62.2°F)	16.4°C (61.5°F)
San Angelo Test Facility Shop Floor Temp	16.8°C (62.2°F)	16.6°C (61.9°F)	16.8°C (62.2°F)	16.8°C (62.2°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:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 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 rear tires were deflated at UVW + VCW.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: April 8, 2010

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: April 8, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

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: 15.7°C (60.3°F) Vehicle cool down period: 61 minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	18.8°C (65.8°F)	19.2°C (66.6°F)	18.9°C (66.0°F)	18.8°C (65.8°F)
San Angelo Test Facility Shop Floor Temp	17.8°C (64.0°F)	17.6°C (63.7°F)	17.8°C (64.0°F)	17.8°C (64.0°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	17:38:48 UTC	End:	18:05:37 UTC
Trip Odometer Reading:	Start:	802.9 km (498.9 mi)	End:	834.8 km (518.7 mi)
Ambient Temperature:	Start:	15.0°C (59.0°F)	End:	17.8°C (64.0°F)
Roadway Temperature:	Start:	35.2°C (95.4°F)	End:	36.6°C (97.9°F)

Driving in first direction:

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

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

Driving in opposite direction:

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

10:20 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 99.5 km/h (61.8 mph)

Total Driving Time: 20:34 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	252.9 kPa (36.7 psi)	260.7 kPa (37.8 psi)	259.0 kPa (37.6 psi)	253.5 kPa (36.8 psi)
Tire Sidewall Temp	28.4°C (83.1°F)	29.8°C (85.6°F)	29.0°C (84.2°F)	26.0°C (78.8°F)
San Angelo Test Facility Shop Floor Temp	18.2°C (64.8°F)	18.6°C (65.5°F)	18.8°C (65.8°F)	18.2°C (64.8°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 (X)LR ( )RR (X)RF Inflation Pressure	173.0 kPa (25.1 psi)	173.0 kPa (25.1 psi)		173.0 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated after lamp check. 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, 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: 19.9°C (67.8°F) Vehicle cool down period: 62 minutes				
Inflation Pressure	168.2 kPa (24.4 psi)	163.7 kPa (23.7 psi)	244.6 kPa (35.5 psi)	168.4 kPa (24.4 psi)
Tire Sidewall Temp	21.8°C (71.2°F)	22.0°C (71.6°F)	22.6°C (72.7°F)	21.6°C (70.9°F)
San Angelo Test Facility Shop Floor Temp	19.4°C (66.9°F)	19.8°C (67.6°F)	19.6°C (67.3°F)	19.4°C (66.9°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:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 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: Todd P. Groghan DATE: April 8, 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: March 23, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

Time:	Start:	13:27:23 UTC	End:	13:49:42 UTC
Trip Odometer Reading:	Start:	498.6 km (309.8 mi)	End:	524.0 km (325.6 mi)
Ambient Temperature:	Start:	11.3°C (52.3°F)	End:	12.8°C (55.0°F)
Roadway Temperature:	Start:	9.6°C (49.3°F)	End:	13.6°C (56.5°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:
( ) 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 5.19.)

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 69

15:58 minutes (stopwatch time – non-cumulative) 25.4 km (15.8 mi) distance

Max speed: 101.8 km/h (63.3 mph)
Total Driving Time: 16.00 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	6	seconds
Time telltale remains flashing	64	seconds
Time telltale remains illuminated (Verified for a minimum of 60 seconds)	>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

Driving in first direction:

Starting point: San Angelo Test Facility shop

1:45 minutes (non-cumulative) 0.3 km (0.2 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: After malfunction condition is corrected, vehicle must be driven a distance for system to accept malfunction correction and to reset message center malfunction message, then ignition must be cycled for TPMS malfunction telltale to extinguish.

RECORDED BY: Todd P. Groghan DATE: March 23, 2010

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 3 of 4)
Scenario H – Malfunction Detection Test - TPMS Fuses Removed

TEST DATE: March 29, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA0106

Time:	Start:	1:28 pm	End:	1:43 pm
Odometer Reading:	Start:	661.1 km (454.5 mi)	End:	661.1 km (454.5 mi)
Ambient Temperature:	Start:	24.7°C (72.5°F)	End:	24.7°C (72.5°F)
Roadway Temperature:	Start:	NA	End:	NA
Fuel Level:	Start:	Full		

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: TPMS fuses F6 and F25 (BCM 1 and 2 for body computer, which supplies power to TPMS module) were removed. (See Figure 5.20.)

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

Combination Malfunction Telltale

Illumination upon start-up - 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 Fuses 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	5	seconds (lamp check)
Time telltale remains flashing	65	seconds
Time telltale remains illuminated (Verified for a minimum of 60 seconds)	>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? ( )YES ( )NO (fail) (X)see Remarks

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**
TPMS fuses were removed.

REMARKS: With BCM fuses F6 and F25 pulled, ignition key cannot be turned to "Lock".

It is necessary to replace fuses F6 and F25 in order to start the engine.

RECORDED BY: Todd P. Groghan DATE: March 29, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: March 9, 2010 LAB: San Angelo Test Facility VEHICLE NHTSA NO: CA0106

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
- [ ] 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: March 9, 2010

APPROVED BY: Kenneth H. Yates

SECTION 4

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

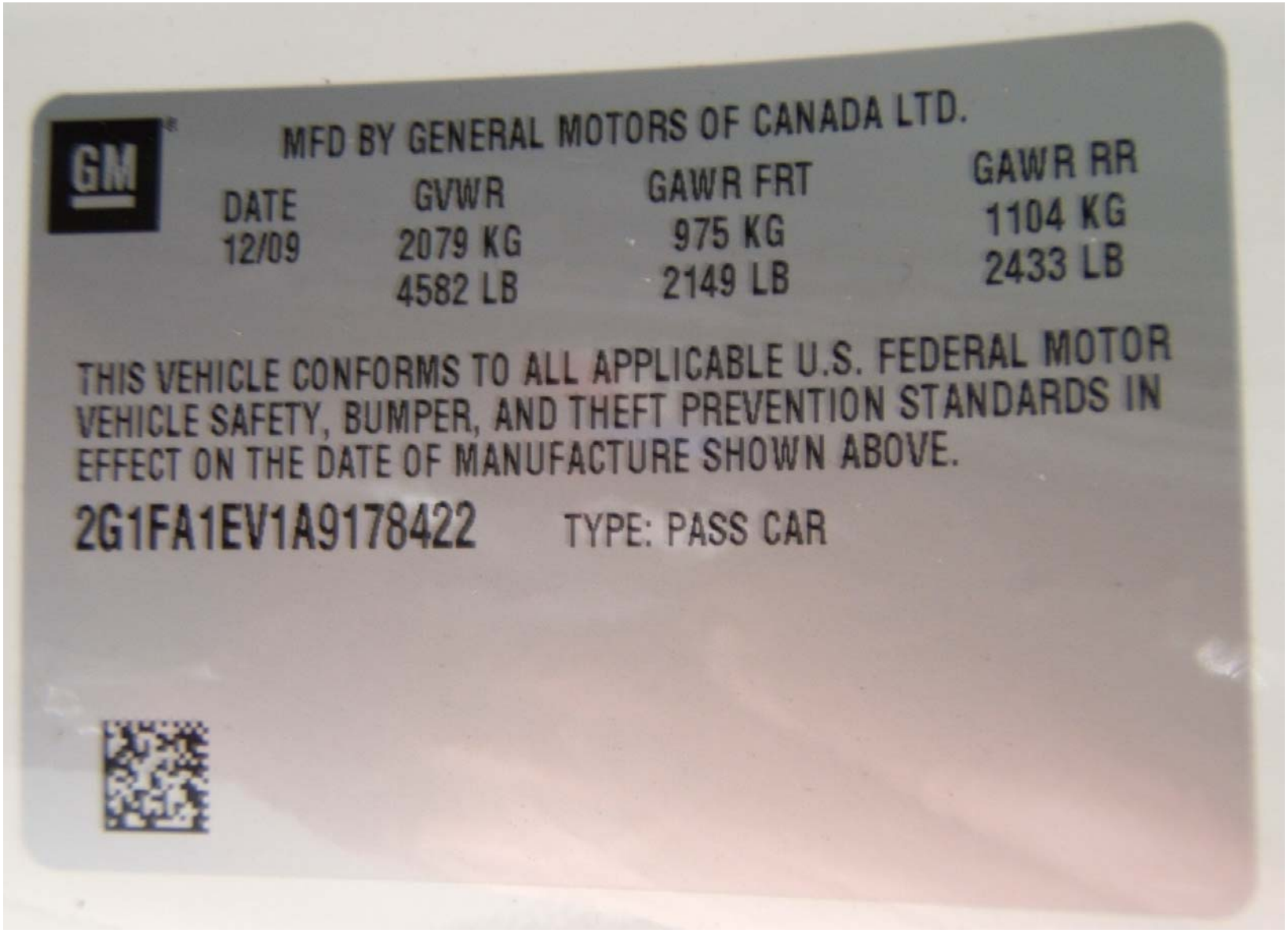
EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO	CAL. DATE	NEXT CAL. DATE
STOPWATCH	CHAMPION SPORTS TIMER	910 R	N/A	N/A
VBOX RECORDING DEVICE	RACELOGIC VBOX III	SERIAL # 030209	2/3/2010	2/3/2011
AMBIENT TEMPERATURE GAUGE	FLUKE 179 DIGITAL THERMOMETER	SERIAL # 84740316	2/24/2010	2/24/2011
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	RAYTEK ST20	SERIAL 2065640101-0014	8/19/2009	8/19/2010
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

SECTION 5

PHOTOGRAPHS

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO.138

FIGURE 5.1
¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE



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NHTSA NO. CA0106
FMVSS NO.138

FIGURE 5.2
VEHICLE CERTIFICATION LABEL

2010 CHEVROLET CAMARO
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FMVSS NO. 138

FIGURE 5.3
VEHICLE PLACARD

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.4
TIRE SHOWING BRAND

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.5
TIRE SHOWING MODEL

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.6
TIRE SHOWING SIZE AND LOAD INDEX / SPEED RATING

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.7
TIRE SHOWING DOT SERIAL NUMBER

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

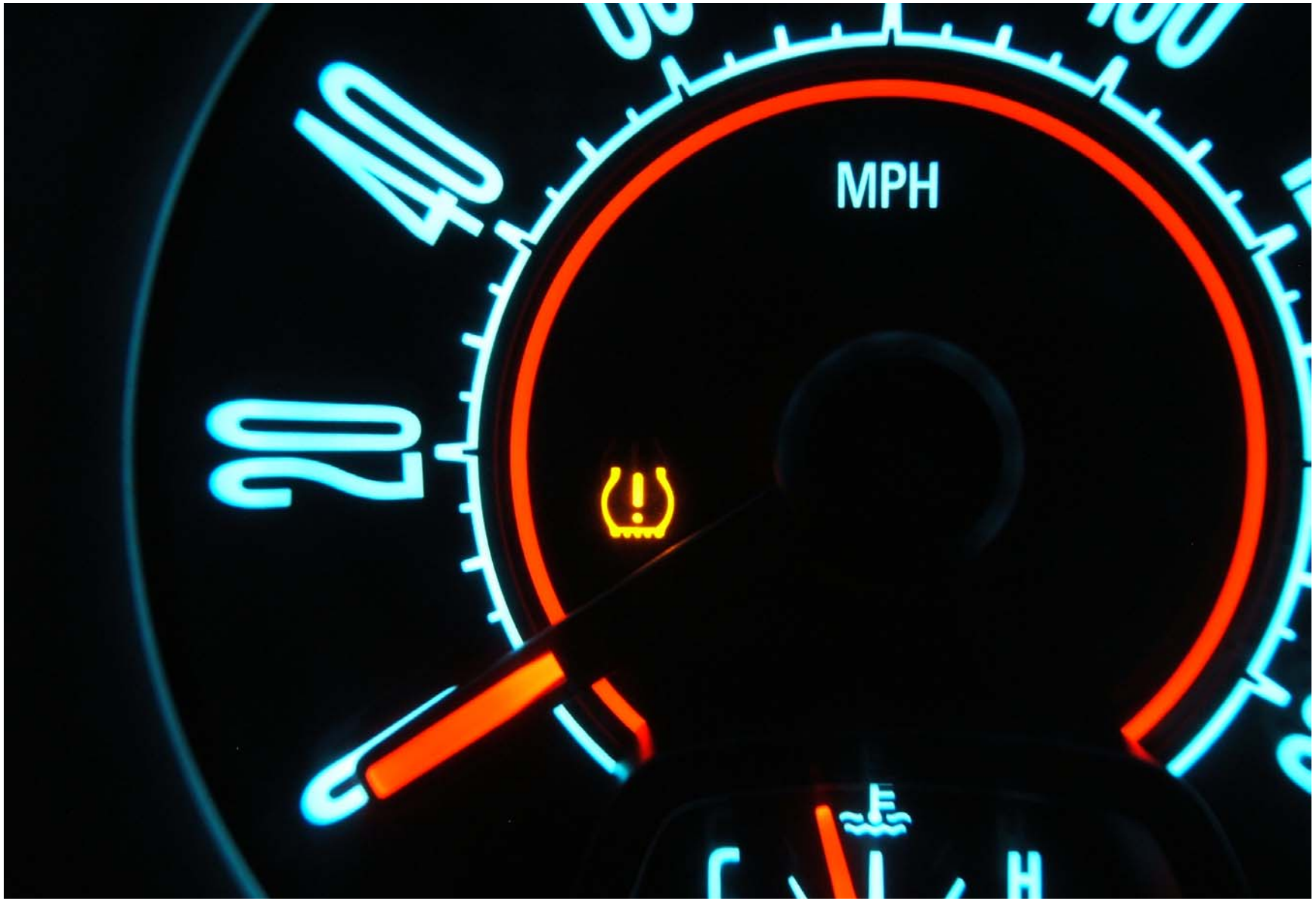
FIGURE 5.8
TIRE SHOWING MAX LOAD RATING
AND MAX COLD INFLATION PRESSURE

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.9
TIRE SHOWING SIDEWALL / TREAD CONSTRUCTION

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.10
RIM SHOWING TPMS SENSOR AND RIM
CONTOUR FOR FULL WIDTH OF CROSS SECTION



2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.11
DISPLAY SHOWING COMBINATION LOW TIRE PRESSURE /TPMS MALFUNCTION WARNING TELLTALE

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO 138

FIGURE 5.12
DRIVER INFORMATION CENTER
SHOWING LOW TIRE PRESSURE WARNING

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO 138

FIGURE 5.13
DRIVER INFORMATION CENTER
SHOWING TPMS MALFUNCTION WARNING

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO 138

FIGURE 5.14
TEST INSTRUMENTATION INSTALLED IN VEHICLE

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.15
VEHICLE REAR SEAT BALLAST FOR LLVW LOAD

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.16
VEHICLE REAR SEAT BALLAST FOR UVW + VCW LOAD

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.17
VEHICLE CARGO AREA BALLAST FOR UVW + VCW LOAD

2010 CHEVROLET CAMARO
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.18
VEHICLE ON WEIGHT SCALES

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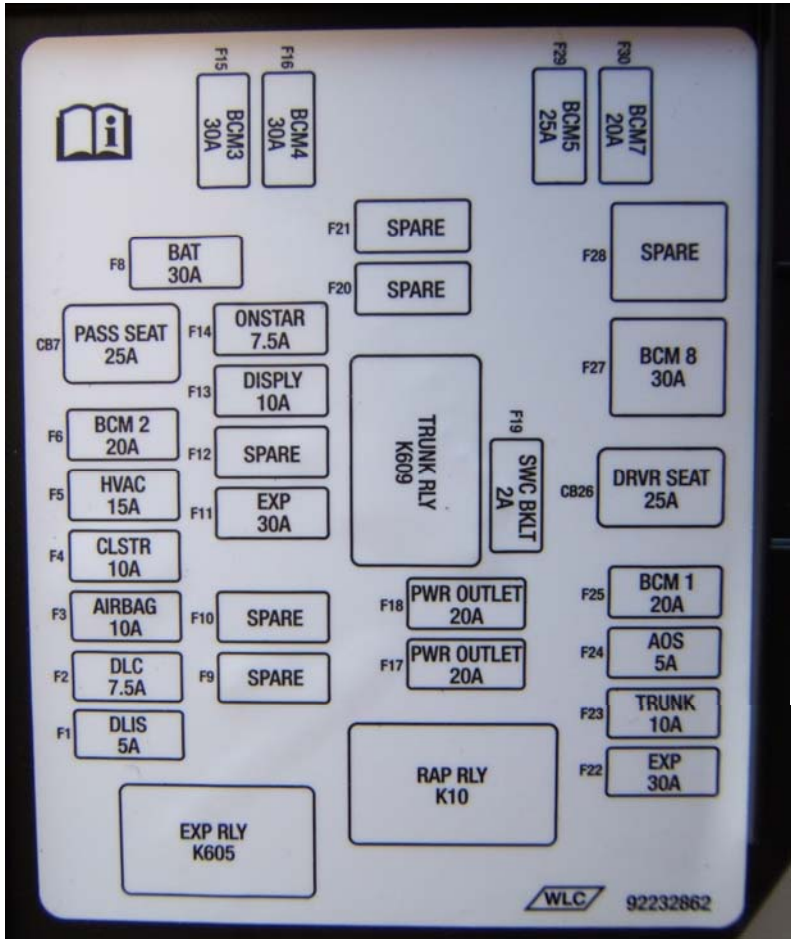
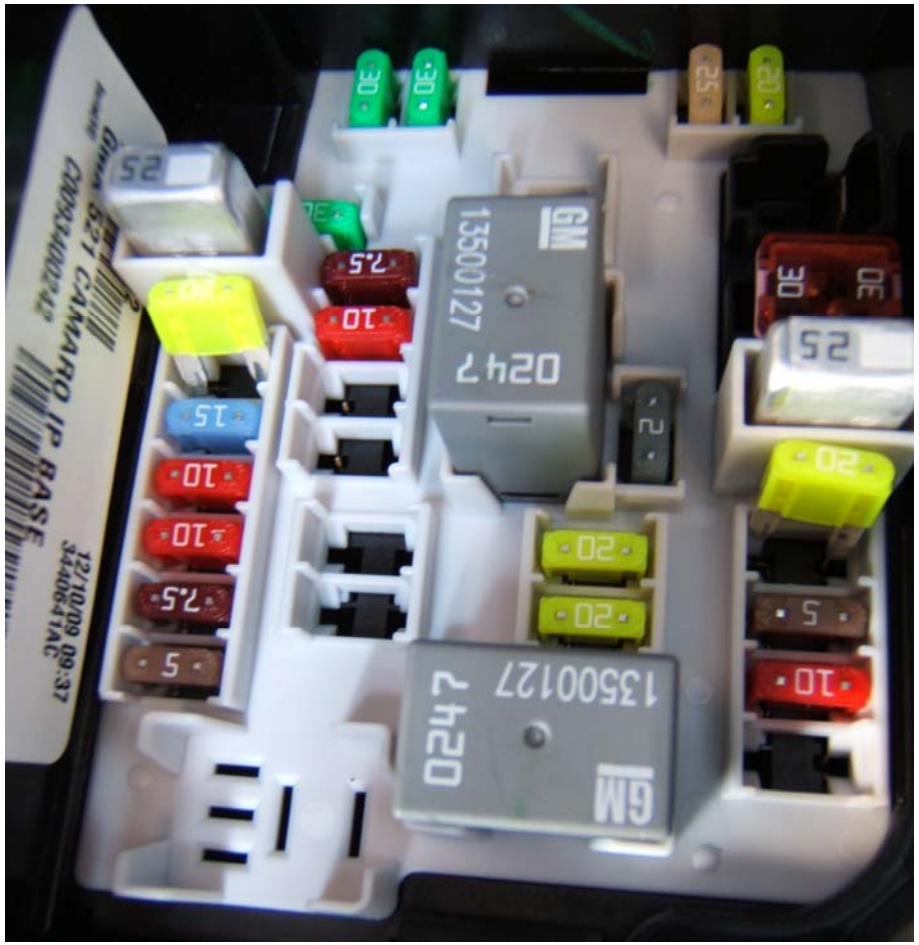
NHTSA NO. CA0106
FMVSS NO. 138

FIGURE 5.19
MALFUNCTION DETECTION TEST 1 -
SPARE INSTALLED ON RIGHT FRONT





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NHTSA NO. CA0106
FMVSS NO. 138

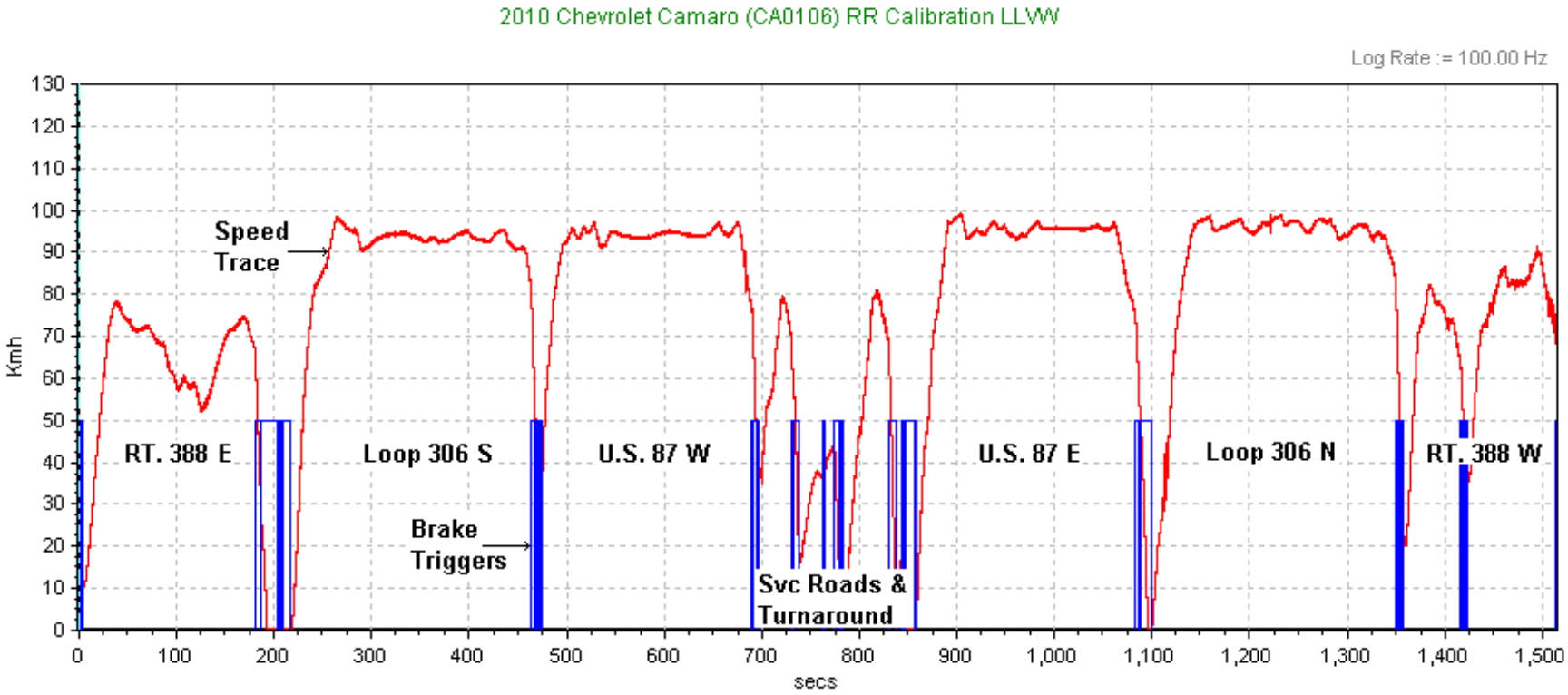
FIGURE 5.20
MALFUNCTION DETECTION TEST 2 -
FUSE CHART (left) AND TPMS FUSES REMOVED (right)

SECTION 6

TEST PLOTS

Scenario A: Right Rear Tire at LLVW
Test Date: 3/11/10
Data File Time: 25:16 minutes
Cumulative Driving Time: 20:34 minutes
Start Point: GAFB North Gate

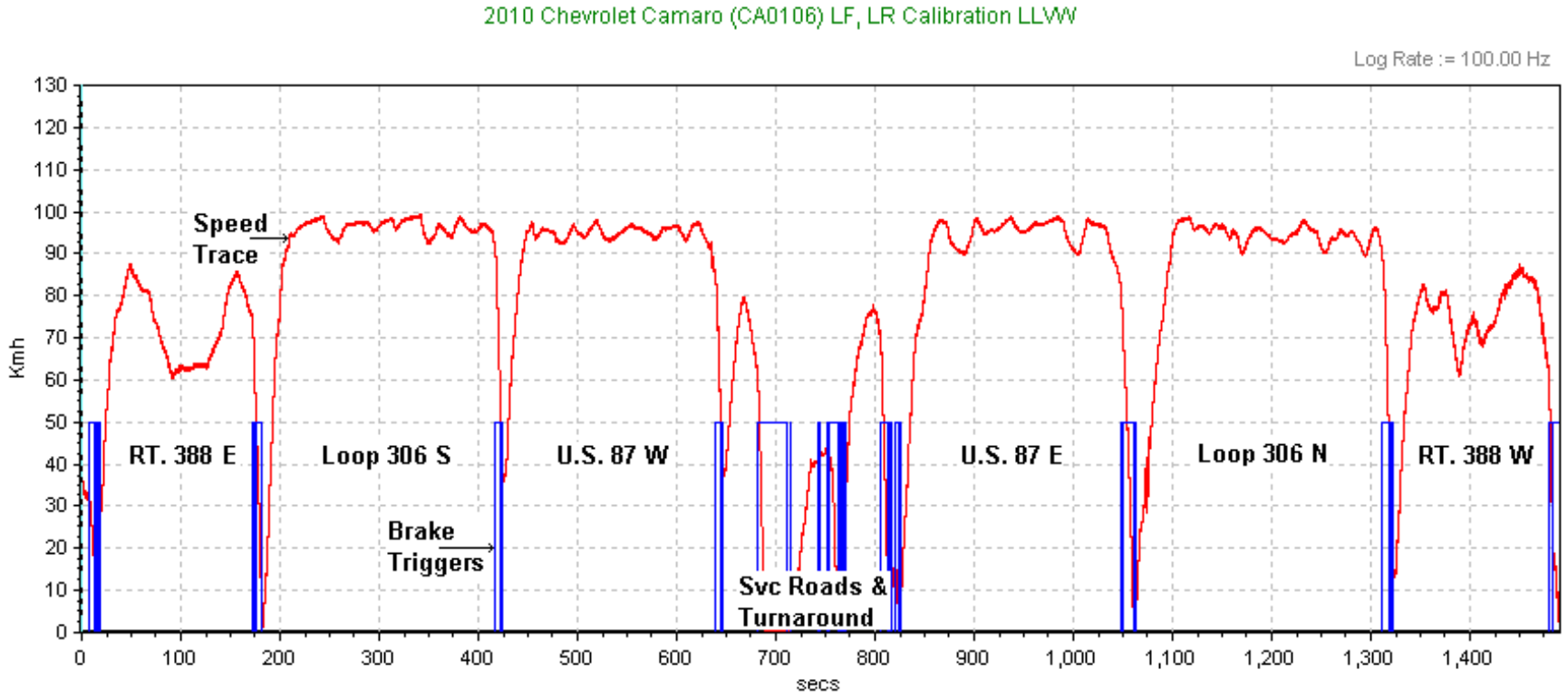
Calibration Phase:



RR Detection Phase: Telltale illumination in 1:45 minutes. Driving above 50 km/h (31 mph) was not necessary.

Scenario B:	Left Front, Left Rear Tires at LLVW
Test Date:	3/11/10
Data File Time:	24:51 minutes
Cumulative Driving Time:	20:32 minutes
Start Point:	GAFB North Gate

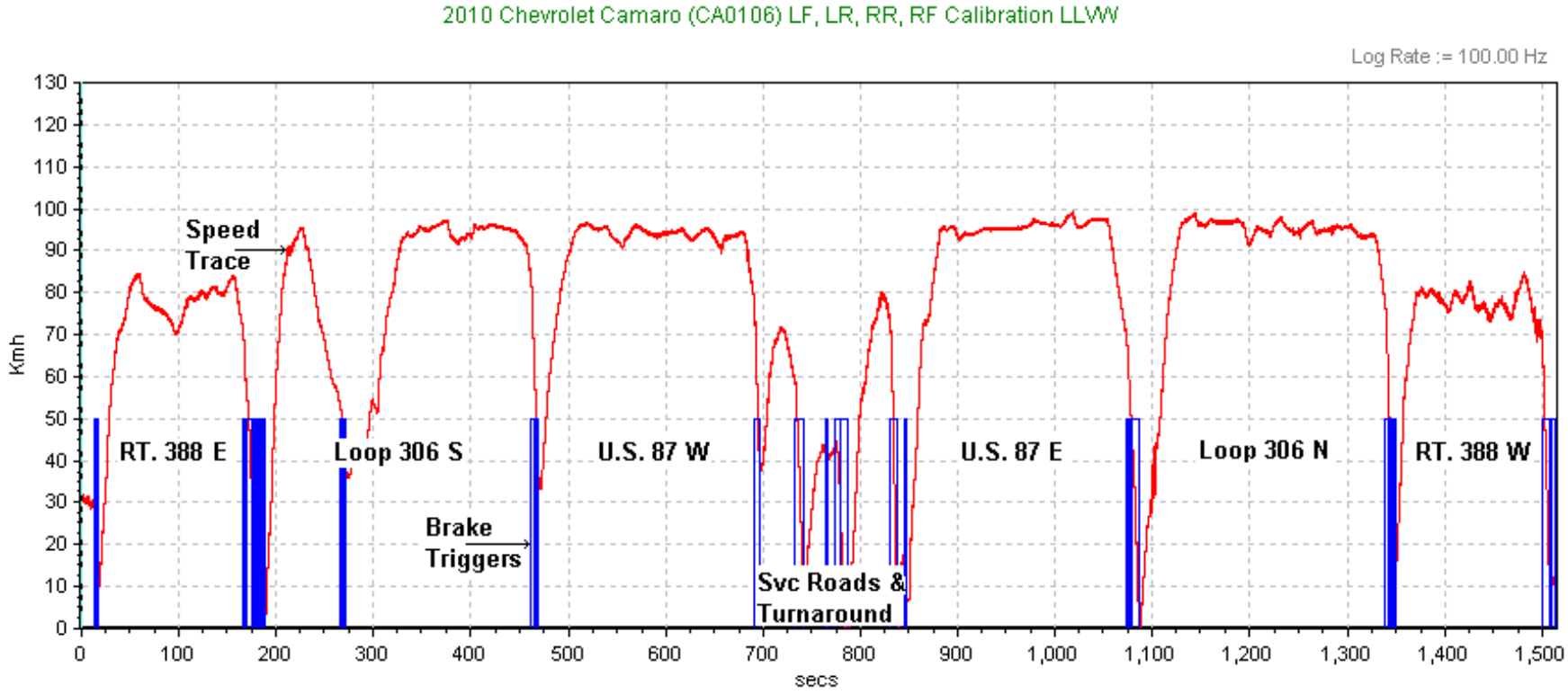
Calibration Phase:



LF, LR Detection Phase: Telltale illumination at lamp check. Driving above 50 km/h (31 mph) was not necessary.

Scenario C:	Left Front, Left Rear, Right Rear, Right Front Tires at LLVW
Test Date:	3/12/10
Data File Time:	25:16 minutes
Cumulative Driving Time:	20:31 minutes
Start Point:	GAFB North Gate

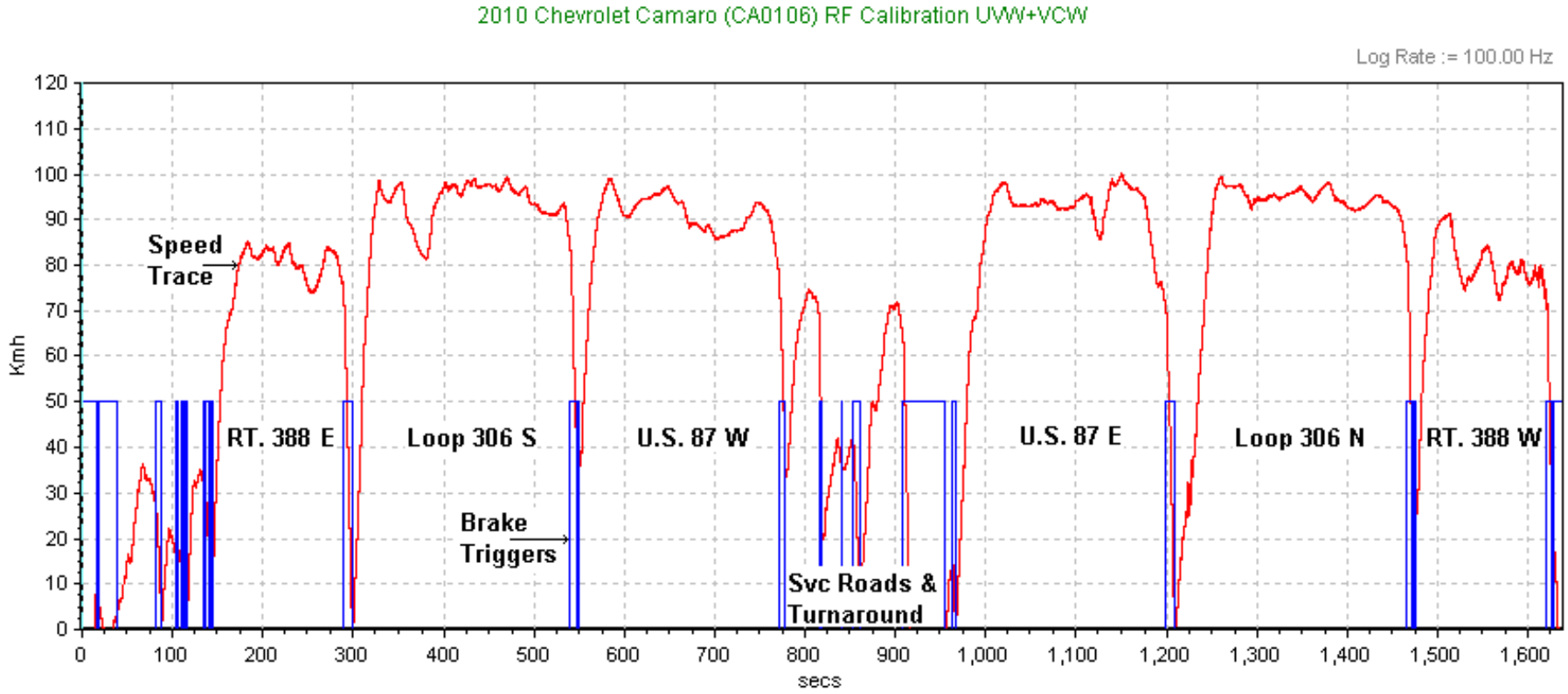
Calibration Phase:



LF, LR, RR, RF Detection Phase: Telltale illumination at lamp check. Driving above 50 km/h (31 mph) was not necessary.

Scenario D:	Right Front Tire at UVW + VCW
Test Date:	4/8/10
Data File Time:	27:18 minutes
Cumulative Driving Time:	20:30 minutes
Start Point:	GAFB North Gate

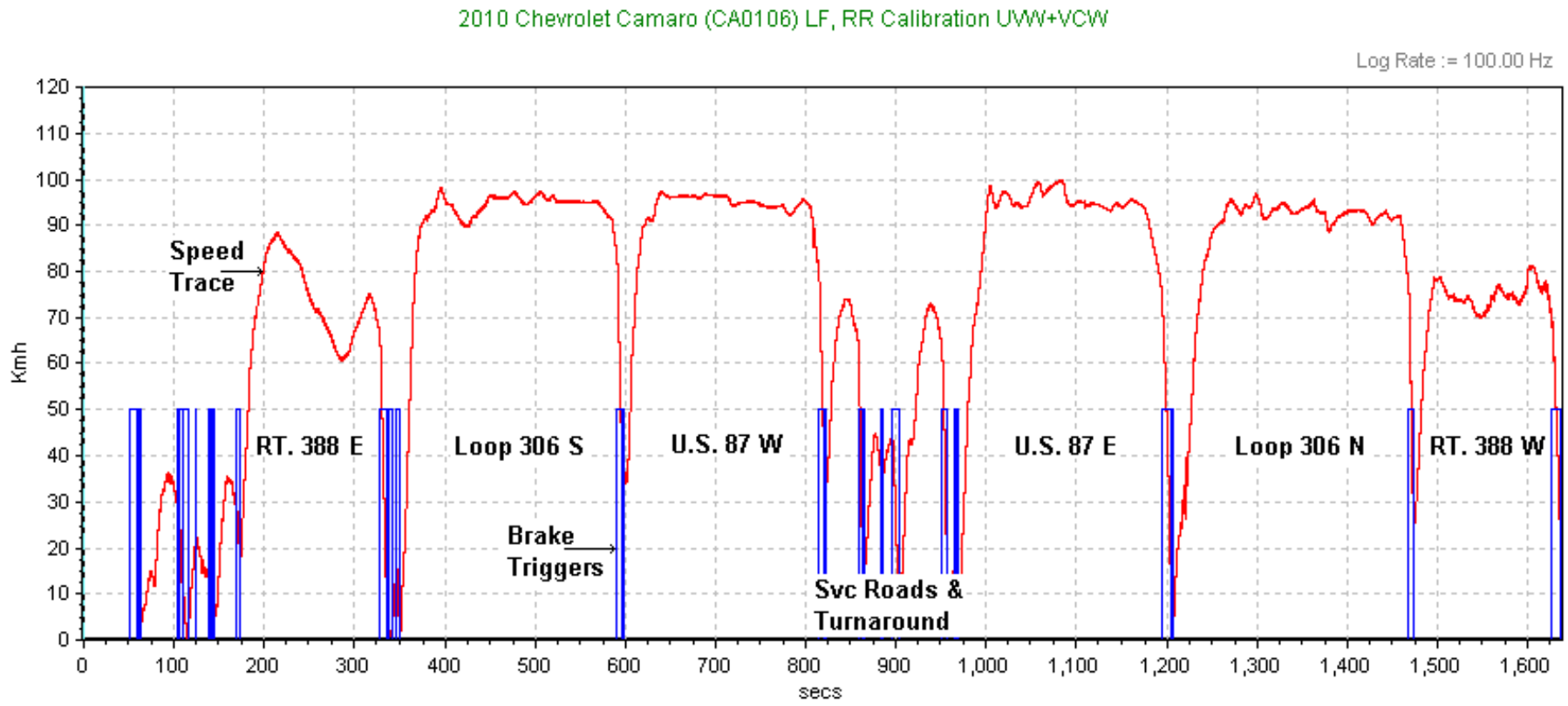
Calibration Phase:



RF Detection Phase: Telltale illumination six seconds after lamp check. Driving above 50 km/h (31 mph) was not necessary.

Scenario E:	Left Front, Right Rear Tires at UVW + VCW
Test Date:	4/8/10
Data File Time:	27:18 minutes
Cumulative Driving Time:	20:40 minutes
Start Point:	GAFB North Gate

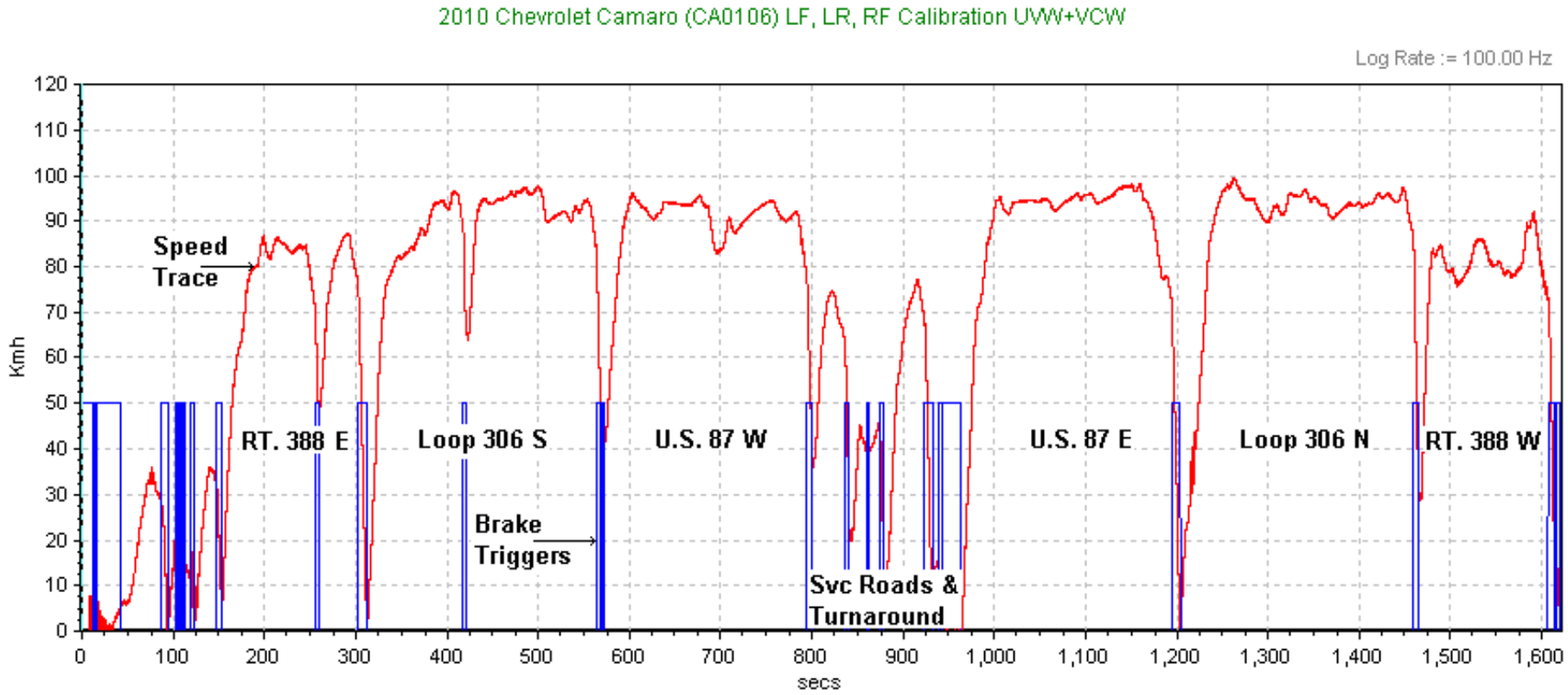
Calibration Phase:



LF, RR Detection Phase: Telltale illumination at 0.1 mile . Driving above 50 km/h (31 mph) was not necessary.

Scenario F:	Left Front, Left Rear, Right Front Tires at UVW + VCW
Test Date:	4/8/10
Data File Time:	27:02 minutes
Cumulative Driving Time:	20:34 minutes
Start Point:	GAFB North Gate

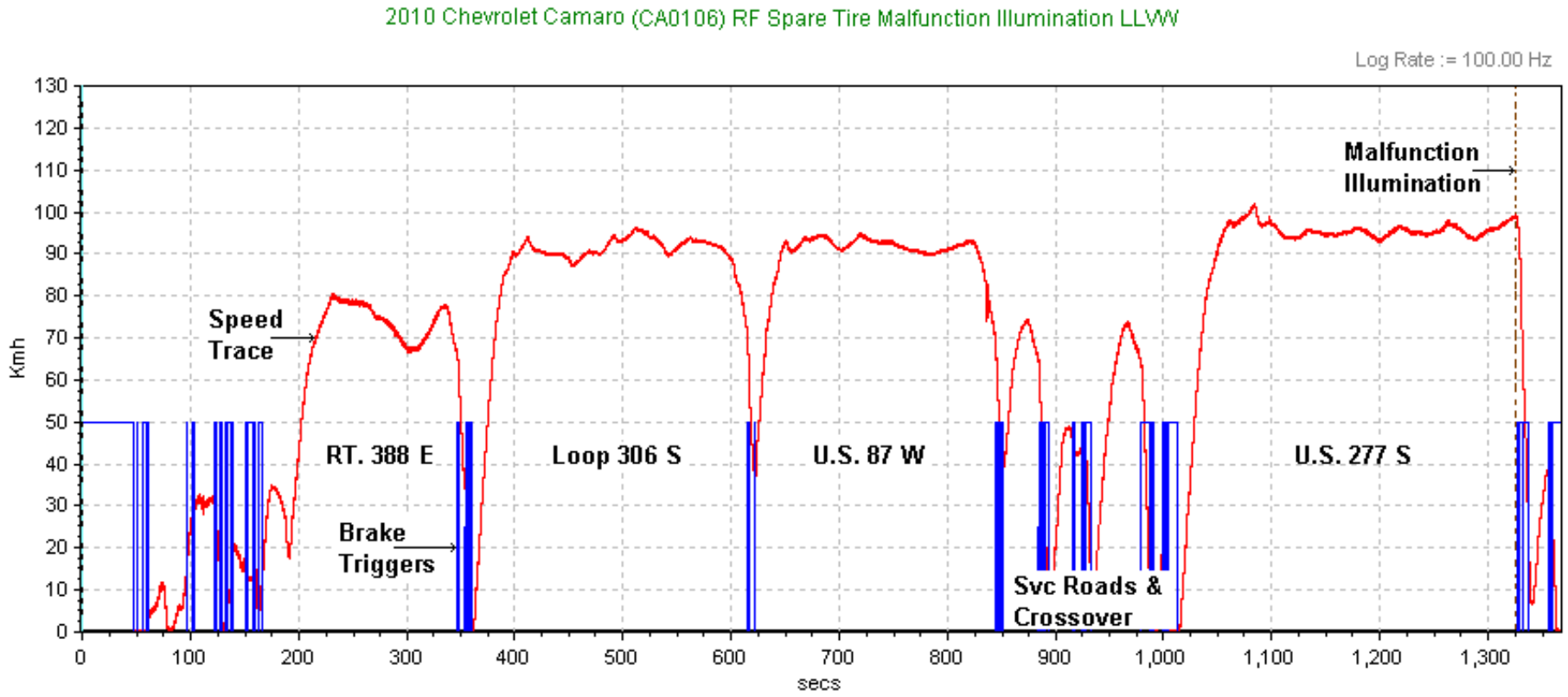
Calibration Phase:



LF, LR, RF Detection Phase: Telltale illumination after lamp check. Driving above 50 km/h (31 mph) was not necessary.

Scenario G: Malfunction Detection Test at LLVW
Test Date: 3/23/10
Data File Time: 22:49 minutes
Cumulative Driving Time: 16:00 minutes
Start Point: San Angelo Test Facility shop

Malfunction Telltale Illumination:



SECTION 7

OWNER'S MANUAL PAGES

See *Competitive Driving Mode on page 8-37*, *Traction Control System (TCS) on page 8-35* and *StabiliTrak System on page 8-36* for more information

Traction Control System (TCS) OFF/StabiliTrak® OFF Light

This light comes on when the StabiliTrak system is turned off . If the Traction Control System (TCS) is off, wheel spin is not limited. If the StabiliTrak system is off, the system does not assist in controlling the vehicle. Turn on the TCS and the StabiliTrak system and the warning light turns off.

For SS models, if this light is on, the vehicle is in Competitive Mode. A warning also appears in the DIC for StabiliTrak Competitive Mode. See *Ride Control System Messages on page 4-36* for more information.

See *Traction Control System (TCS) on page 8-35* and *StabiliTrak System on page 8-36* for more information

Tire Pressure Light

For vehicles with a tire pressure monitoring system, this light comes on briefly when the engine is started. It provides information about tire pressures and the Tire Pressure Monitoring System.

When the Light is On Steady

This indicates that one or more of the tires are significantly underinflated.

A tire pressure message in the Driver Information Center (DIC), can accompany the light. See *Tire Messages on page 4-37* for more information. Stop as soon as possible, and inflate the tires to the pressure value shown on the tire loading information label. See *Tire Pressure on page 9-55* for more information.

When the Light Flashes First and Then is On Steady

This indicates that there may be a problem with the Tire Pressure Monitor System. The light flashes for about a minute and stays on steady for the remainder of the ignition cycle. This sequence repeats with every ignition cycle. See *Tire Pressure Monitor Operation on page 9-58* for more information.

Engine Oil Pressure Light

⚠ WARNING

Do not keep driving if the oil pressure is low. The engine can become so hot that it catches fire. Someone could be burned. Check the oil as soon as possible and have the vehicle serviced.

Notice: **Lack of proper engine oil maintenance can damage the engine. The repairs would not be covered by the vehicle warranty. Always follow the maintenance schedule in this manual for changing engine oil.**

The oil pressure light should come on briefly as the engine is started. If it does not come on have the vehicle serviced by your dealer/retailer.

If the light comes on and stays on, it means that oil is not flowing through the engine properly. The vehicle could be low on oil and might have some other system problem. See your dealer/retailer.

Service Vehicle Messages

Service AC System

This message is displayed if there is a problem with the air conditioning system. Take the vehicle to your dealer/retailer for service.

Service Power Steering

This message is displayed if there is a problem with the power steering system. Take the vehicle to your dealer/retailer for service.

Service Vehicle Soon

This message is displayed if there is a problem with the vehicle. Take the vehicle to your dealer/retailer for service.

Tire Messages

Check XXX Tire Pressure

This message displays if the vehicle detects low pressure in one or more tires. The tire with the low pressure will be shown in the message. Check the tire pressures.

Service Tire Monitor System

This message displays if there is a problem with the Tire Pressure Monitor System (TPMS). See *Tire Pressure Monitor Operation on page 9-58* for more information.

Tire Learning Active

This message displays when the system is learning new tires. See *Tire Pressure Monitor Operation on page 9-58* for more information.

Tire Pressure System Reset

This message displays when resetting the TPMS. See *Tire Pressure Monitor Operation on page 9-58* for more information.

Transmission Messages

1 – 4 Shift

This message displays when you can only shift from 1 (First) to 4 (Fourth) instead of 1 (First) to 2 (Second). See *Manual Transmission on page 8-30* for more information.

Press Clutch To Start

This message displays when attempting to start a vehicle with a manual transmission without pressing on the clutch pedal.

Service Transmission

This message displays if there is a problem with the transmission. See your dealer/retailer.

Shift Denied

This message displays when attempting to use the automatic transmission manual mode to shift to too low of a gear. See *Manual Mode on page 8-29* for more information.

Tire Pressure Monitor System

The Tire Pressure Monitor System (TPMS) uses radio and sensor technology to check tire pressure levels. The TPMS sensors monitor the air pressure in your vehicle's tires and transmit tire pressure readings to a receiver located in the vehicle.

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.

See *Tire Pressure Monitor Operation on page 9-58* for additional information.

Federal Communications Commission (FCC) and Industry and Science Canada

See *Radio Frequency Statement on page 12-16* for information regarding Part 15 of the Federal Communications Commission (FCC) Rules and RSS-210/211 of Industry and Science Canada.

Tire Pressure Monitor Operation

This vehicle may have a Tire Pressure Monitor System (TPMS). The TPMS is designed to warn the driver when a low tire pressure condition exists. TPMS sensors are mounted onto each tire and wheel assembly, excluding the spare tire and wheel assembly, if the vehicle has one. The TPMS sensors monitor the air pressure in the vehicle's tires and transmits the tire pressure readings to a receiver located in the vehicle.

Using the Driver Information Center (DIC), the driver can also check tire pressure levels using the DIC. For additional information and details about the DIC operation and displays see *Tire Messages on page 4-37*.

When a low tire pressure condition is detected, the TPMS illuminates the low tire pressure warning light located on the instrument panel cluster.

A DIC warning message to check the pressure in a specific tire is also shown on the DIC display screen. The low tire pressure warning light and the DIC warning message come at each ignition cycle until the tires are inflated to the correct inflation pressure.

The low tire pressure warning light may come on in cool weather when the vehicle is first started, and then turn off as you start to drive. This could be an early indicator that the air pressure in the tire(s) are getting low and need to be inflated to the proper pressure.

The Tire and Loading Information label, attached to your vehicle, shows the size of your vehicle's original equipment tires and the correct inflation pressure for the tires when they are cold. See *Vehicle Load Limits on page 8-13*, for an example of the Tire and Loading Information label and its location on your vehicle. Also see *Tire Pressure on page 9-55*.

Your vehicle's TPMS can warn you about a low tire pressure condition but it does not replace normal tire maintenance. See *Tire Inspection on page 9-61*, *Tire Rotation on page 9-61* and *Tires on page 9-48*.

Notice: **Using non-approved tire sealants could damage the Tire Pressure Monitor System (TPMS) sensors. TPMS sensor damage caused by using an incorrect tire sealant is not covered by the vehicle warranty. Always use the GM approved tire sealant available through your dealer/ retailer.**

Factory-installed Tire Inflator Kits use a GM approved liquid tire sealant. Using non-approved tire sealants could damage the TPMS sensors. See *Tire Sealant and Compressor Kit on page 9-70* for information regarding the inflator kit materials and instructions.

TPMS Malfunction Light and Message

The TPMS will not function properly if one or more of the TPMS sensors are missing or inoperable. When the system detects a malfunction, the low tire warning light flashes for about one minute and then stays on for the remainder of the ignition cycle. A DIC warning message is also displayed. The low tire warning light and DIC warning message come on at each ignition cycle until the problem is corrected. Some of the conditions that can cause the malfunction light and DIC message to come on are:

- One of the road tires has been replaced with the spare tire, if the vehicle has one. The spare tire does not have a TPMS sensor. The DIC message should go off once you re-install the road tire containing the TPMS sensor.
- The TPMS sensor matching process was not done or not completed successfully after rotating the vehicle's tires. The DIC message should go off after successfully completing the sensor matching process. See "TPMS Sensor Matching Process" later in this section.
- One or more TPMS sensors are missing or damaged. The DIC message and the TPMS malfunction light should go off when the TPMS sensors are installed and the sensor matching process is performed successfully. See your dealer/ retailer for service.
- Replacement tires or wheels do not match your vehicle's original equipment tires or wheels. Tires and wheels other than those recommended for your vehicle could prevent the TPMS from functioning properly. See *Buying New Tires on page 9-63.*

- Operating electronic devices or being near facilities using radio wave frequencies similar to the TPMS could cause the TPMS sensors to malfunction.

If the TPMS is not functioning it cannot detect or signal a low tire condition. See your dealer/retailer for service if the TPMS malfunction light and DIC message comes on and stays on.

TPMS Sensor Matching Process

Each TPMS sensor has a unique identification code. Any time you replace one or more of the TPMS sensors or rotate your vehicle's tires, the identification codes need to be matched to the new tire/wheel position. The sensors are matched to the tire/wheel positions in the following order: driver side front tire, passenger side front tire, passenger side rear tire, and driver side rear tire using a TPMS diagnostic tool. See your dealer/retailer for service.

The TPMS sensors can also be matched to each tire/wheel position by increasing or decreasing the tire's air pressure. If increasing the tire's air pressure, do not exceed the maximum inflation pressure indicated on the tire's sidewall. To decrease the tire's air-pressure use the pointed end of the valve cap, a pencil-style air pressure gage, or a key.

You have two minutes to match the first tire/wheel position, and five minutes overall, to match all four tire/wheel positions. If it takes longer than two minutes, to match the first tire and wheel, or more than five minutes to match all four tire and wheel positions, the matching process stops and you need to start over.

The TPMS matching process is outlined below:

1. Set the parking brake.
2. Turn the ignition switch to ON/RUN with the engine off.
3. Go to the TPM vehicle information screen on the DIC. See *Driver Information Center (DIC) on page 4-28*. Press set to relearn the sensors. The horn sounds twice to signal the receiver is in relearn mode and Tire Learning Active message displays on the DIC screen.
4. Start with the driver side front tire.
5. Remove the valve cap from the valve stem. Activate the TPMS sensor by increasing or decreasing the tire's air pressure for 10 seconds, or until a horn chirp sounds. The horn chirp, which can take up to 30 seconds to sound, confirms that the TPMS sensor identification code has been matched to this tire position.
6. Proceed to the passenger side front tire, and repeat the procedure in Step 5.

7. Proceed to the passenger side rear tire, and repeat the procedure in Step 5.
8. Proceed to the driver side rear tire, and repeat the procedure in Step 5.
9. After hearing the confirming horn chirp, for the driver side rear tire, the horn sounds two more times to signal the tire learning mode is no longer active. Turn the ignition switch to LOCK/OFF.
10. Set all four tires to the recommended air pressure level as indicated on the tire and loading information label.
11. Put the valve caps back on the valve stems.

The tires air pressure will not appear on the screen until you start driving the vehicle.

Tire Inspection

We recommend that you regularly inspect your vehicle's tires, including the spare tire, if the vehicle has one, for signs of wear or damage. See *When It Is Time for New Tires on page 9-62* for more information.

Tire Rotation

Tire rotation is not recommended if the vehicle has different size tires on the front and rear wheels.

Different tire sizes should not be rotated front to rear. Each tire and wheel should only be used in its original front or rear position.

Tire rotation is recommended if the vehicle has the same size tires on all four wheel positions. These tires should be rotated every 5,000 to 8,000 miles (8 000 to 13 000 km). See *Scheduled Maintenance on page 10-2* .

The purpose of a regular tire rotation is to achieve a uniform wear for all tires on the vehicle. This will ensure that your vehicle continues to perform most like it did when the tires were new.

Any time you notice unusual wear, rotate the tires as soon as possible and check wheel alignment. Also check for damaged tires or wheels. See *When It Is Time for New Tires on page 9-62* and *Wheel Replacement on page 9-67* .