REPORT NUMBER 138-STF-10-003

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

TOYOTA MOTOR MANUFACTURING
2010 TOYOTA VENZA
FOUR-DOOR MPV
NHTSA NO. CA5105

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

MAY 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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16. Abstract Compliance tests were conducted on the subject 2010 Toyota Venza four-door MPV 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 Toyota Venza four-door MPV 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 Toyota Venza four-door MPV. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: 4T3ZA3BB2AU021370

B. NHTSA Number: CA5105

C Manufacturer: Toyota Motor Manufacturing

D. Manufacture Date: 11/2009

1.3 TEST DATE

The test vehicle was tested during the time period April 21 through April 27, 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 Toyota Venza. 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 disconnecting power to the TPMS ECU.

2.2 SUMMARY OF RESULTS

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

A. Left front
B. Left rear 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 left 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. Power was disconnected from TPMS warning ECU.

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: April 21 – April 27, 2010 LAB: U.S. DOT San Angelo Test Facility

VIN: 4T3ZA3BB2AU021370 VEHICLE NHTSA NUMBER: CA5105

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: April 21, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105 VIN: 4T3ZA3BB2AU021370

CERTIFICATION LABEL BUILD DATE: 11/2009 ENGINE: 2.7 liter, 4 cylinder

MY/MAKE/MODEL/BODY STYLE: 2010 Toyota Venza four-door MPV

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 103 km (64 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: Pacific Manufacturing Ohio, Inc.; receiver: Denso Corp.

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

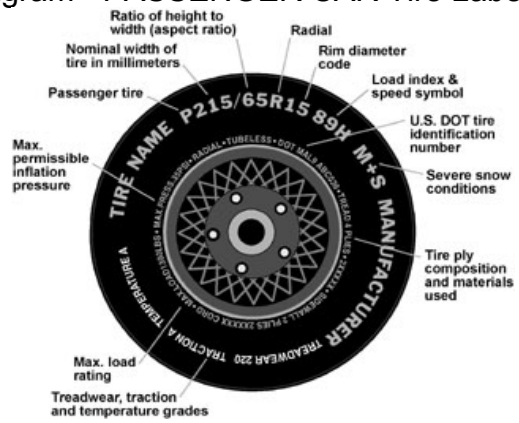
DATA SHEET 1 (Sheet 2 of 3)
TEST PREPARATION INFORMATION

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

Axle	Tire Size	Recommended Cold Inflation Pressure	Source
Front	P245/55R19	220 kPa (32 psi)	Vehicle placard
Rear	P245/55R19	220 kPa (32 psi)	Vehicle placard

INSTALLED TIRE DATA

Diagram - PASSENGER CAR Tire Labeling



Front and Rear Axles

Tire Size and Load Index / Speed Rating: P245/55R19 103S

Manufacturer/Tire Name: Bridgestone Dueler H/L 400

Sidewall Max Load Rating: 875 kg (1,929 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	220 kPa x .75 = 165 kPa	220 kPa x .75 = 165 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)	165 kPa (24 psi)	165 kPa (24 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	158 kPa (23 psi)	158 kPa (23 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: April 21, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: April 21, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

TPMS Low Tire Pressure Warning Telltale

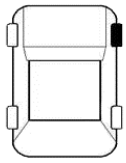
Telltale is mounted inside the occupant compartment in front of and in clear view of the driver?

(X)YES ( )NO (fail)

TPMS Low Tire Pressure Warning Telltale Location: Top center of instrument panel in driver information center

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: April 21, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: April 22, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

Time:	Start:	7:15 am	End:	8:16 am
Ambient Temperature:	Start:	19.6°C (67.3°F)	End:	19.6°C (67.3°F)
Trip Odometer Reading:	Start:	101.5 km (63.1 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): 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	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	20.6°C (69.1°F)	20.4°C (68.7°F)	20.4°C (68.7°F)	20.4°C (68.7°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,245 kg (4,960 lbs)

GAWR (front): 1,400 kg (3,090 lbs)

GAWR (rear): 1,230 kg (2,715 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight (per load carrying capacity modification label) 367 kg (809 lbs)

Measured Unloaded Vehicle Weight:

LF	494 kg (1,088 lbs)	LR	371 kg (818 lbs)
RF	480 kg (1,059 lbs)	RR	361 kg (796 lbs)
Front Axle	974 kg (2,147 lbs)	Rear Axle	732 kg (1,614 lbs)

Total Vehicle 1,706 kg (3,761 lbs)

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

LF	541 kg (1,192 lbs)	LR	415 kg (915 lbs)
RF	526 kg (1,159 lbs)	RR	404 kg (891 lbs)
Front Axle	1,067 kg (2,351 lbs) (≤ GAWR)	Rear Axle	819 kg (1,806 lbs) (≤ GAWR)

Total Vehicle 1,886 kg (4,157 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), 180 kg (396 lbs) of driver, passenger, ballast, and test equipment.

RECORDED BY: Todd P. Groghan DATE: April 22, 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: April 22, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

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: 20.5°C (68.9°F) Vehicle cool down period: overnight				
Inflation Pressure	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	20.4°C (68.7°F)	20.4°C (68.7°F)	20.6°C (69.1°F)	20.4°C (68.7°F)
San Angelo Test Facility Shop Floor Temp	19.6°C (67.3°F)	19.8°C (67.6°F)	19.8°C (67.6°F)	19.6°C (67.3°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	14:48:33 UTC	End:	15:14:09 UTC
Trip Odometer Reading:	Start:	101.5 km (63.1 mi)	End:	133.3 km (82.8 mi)
Ambient Temperature:	Start:	20.5°C (68.9°F)	End:	20.6°C (69.1°F)
Roadway Temperature:	Start:	22.2°C (72.0°F)	End:	22.6°C (72.7°F)

Driving in first direction:

Starting point: Goodfellow Air Force Base (GAFB) north gate Direction: see chart, page 61

10:14 minutes (stopwatch time) 15.6 km (9.7 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 61

10:08 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 98.9 km/h (61.5 mph)

Total Driving Time: 20:21 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	235.3 kPa (34.1 psi)	232.6 kPa (33.7 psi)	233.4 kPa (33.9 psi)	235.8 kPa (34.2 psi)
Tire Sidewall Temp	29.8°C (85.6°F)	27.4°C (81.3°F)	27.4°C (81.3°F)	29.4°C (84.9°F)
San Angelo Test Facility Shop Floor Temp	19.8°C (67.6°F)	19.8°C (67.6°F)	19.8°C (67.6°F)	19.8°C (67.6°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 ( )RR ( )RF Inflation Pressure	158.0 kPa (22.9 psi)			

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated in 16 seconds. 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: 22.3°C (72.1°F)	Vehicle cool down period: 69 minutes			
Inflation Pressure	152.3 kPa (22.1 psi)	223.6 kPa (32.4 psi)	223.9 kPa (32.5 psi)	226.3 kPa (32.8 psi)
Tire Sidewall Temp	24.4°C (75.9°F)	23.8°C (74.8°F)	24.2°C (75.6°F)	25.2°C (77.4°F)
San Angelo Test Facility Shop Floor Temp	20.6°C (69.1°F)	21.2°C (70.2°F)	21.8°C (71.2°F)	20.8°C (69.4°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:	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 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 tire was deflated at LLVW.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: April 22, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: April 22, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

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: 22.3°C (72.1°F) Vehicle cool down period: 82 minutes				
Inflation Pressure	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	24.2°C (75.6°F)	23.6°C (74.5°F)	23.8°C (74.8°F)	25.2°C (77.4°F)
San Angelo Test Facility Shop Floor Temp	20.6°C (69.1°F)	21.2°C (70.2°F)	21.2°C (70.2°F)	20.8°C (69.4°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	16:52:13 UTC	End:	17:16:56 UTC
Trip Odometer Reading:	Start:	134.7 km (83.7 mi)	End:	166.2 km (103.3 mi)
Ambient Temperature:	Start:	22.3°C (72.1°F)	End:	23.2°C (73.8°F)
Roadway Temperature:	Start:	27.2°C (81.0°F)	End:	27.8°C (82.0°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 62

10:11 minutes (stopwatch time) 15.4 km (9.6 mi) distance

Driving in opposite direction:

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

10:22 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 99.8 km/h (62.0 mph)

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

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

SCENARIO B – Left Rear and 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	232.8 kPa (33.8 psi)	232.2 kPa (33.7 psi)	232.2 kPa (33.7 psi)	233.5 kPa (33.9 psi)
Tire Sidewall Temp	33.2°C (91.8°F)	30.4°C (86.7°F)	30.4°C (86.7°F)	32.4°C (90.3°F)
San Angelo Test Facility Shop Floor Temp	21.2°C (70.2°F)	21.4°C (70.5°F)	21.6°C (70.9°F)	21.4°C (70.5°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 (X)LR (X)RR ( )RF Inflation Pressure		158.0 kPa (22.9 psi)	158.0 kPa (22.9 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated in 6 seconds. 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 Rear and 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: 25.1°C (77.2°F)	Vehicle cool down period: 61 minutes			
Inflation Pressure	222.9 kPa (32.3 psi)	152.3 kPa (22.1 psi)	152.6 kPa (22.1 psi)	224.3 kPa (32.5 psi)
Tire Sidewall Temp	26.8°C (80.2°F)	25.8°C (78.4°F)	26.6°C (79.9°F)	28.0°C (82.4°F)
San Angelo Test Facility Shop Floor Temp	21.6°C (70.9°F)	21.8°C (71.2°F)	22.2°C (72.0°F)	21.6°C (70.9°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:	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)

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

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

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: April 22, 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: April 23, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

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: 22.9°C (73.2°F) Vehicle cool down period: 60 minutes				
Inflation Pressure	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	25.6°C (78.1°F)	24.4°C (75.9°F)	25.0°C (77.0°F)	24.4°C (75.9°F)
San Angelo Test Facility Shop Floor Temp	21.8°C (71.2°F)	21.6°C (70.9°F)	21.8°C (71.2°F)	21.2°C (70.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	17:37:51 UTC	End:	18:02:27 UTC
Trip Odometer Reading:	Start:	393.0 km (244.2 mi)	End:	424.5 km (263.8 mi)
Ambient Temperature:	Start:	22.9°C (73.2°F)	End:	22.9°C (73.2°F)
Roadway Temperature:	Start:	40.2°C (104.4°F)	End:	42.6°C (108.7°F)

Driving in first direction:

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

10:10 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

10:26 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Max speed: 100.0 km/h (62.1 mph)

Total Driving Time: 20:36 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	234.2 kPa (34.0 psi)	234.4 kPa (34.0 psi)	233.3 kPa (33.8 psi)	235.4 kPa (34.1 psi)
Tire Sidewall Temp	35.8°C (96.4°F)	33.6°C (92.5°F)	32.6°C (90.7°F)	34.4°C (93.9°F)
San Angelo Test Facility Shop Floor Temp	22.2°C (72.0°F)	22.6°C (72.7°F)	22.6°C (72.7°F)	22.6°C (72.7°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR (X)RR (X)RF Inflation Pressure	158.0 kPa (22.9 psi)	158.0 kPa (22.9 psi)	158.0 kPa (22.9 psi)	158.0 kPa (22.9 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated in 8 seconds. 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: 24.5°C (76.1°F)	Vehicle cool down period: 60 minutes			
Inflation Pressure	151.9 kPa (22.0 psi)	152.3 kPa (22.1 psi)	152.5 kPa (22.1 psi)	152.3 kPa (22.1 psi)
Tire Sidewall Temp	27.6°C (81.7°F)	26.6°C (79.9°F)	26.6°C (79.9°F)	28.4°C (83.1°F)
San Angelo Test Facility Shop Floor Temp	21.8°C (71.2°F)	22.4°C (72.3°F)	22.6°C (72.7°F)	22.0°C (71.6°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:	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 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: April 23, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: April 26, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

Time: Start: 7:45 am End: 9:55 am

Ambient Temperature: Start: 18.4°C (65.1°F) End: 22.5°C (72.5°F)

Trip Odometer Reading: Start: 426 km (264.7 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): 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	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	18.2°C (64.8°F)	18.2°C (64.8°F)	18.2°C (64.8°F)	18.2°C (64.8°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,245 kg (4,960 lbs)

GAWR (front): 1,400 kg (3,090 lbs)

GAWR (rear): 1,230 kg (2,715 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight (per load carrying capacity modification label) 367 kg (809 lbs)

Measured Unloaded Vehicle Weight:

LF	495 kg (1,091 lbs)	LR	371 kg (817 lbs)
RF	478 kg (1,055 lbs)	RR	362 kg (798 lbs)
Front Axle	973 kg (2,146 lbs)	Rear Axle	733 kg (1,615 lbs)

Total Vehicle 1,706 kg (3,761 lbs)

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

LF	554 kg (1,221 lbs)	LR	496 kg (1,093 lbs)
RF	538 kg (1,186 lbs)	RR	485 kg (1,070 lbs)
Front Axle	1,092 kg (2,407 lbs) (≤ GAWR)	Rear Axle	981 kg (2,163 lbs) (≤ GAWR)

Total Vehicle 2,073 kg (4,570 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), 367 kg (809 lbs) of driver, passenger, test equipment, and ballast.

RECORDED BY: Todd P. Groghan DATE: April 26, 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: April 26, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

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: 23.1°C (73.6°F) Vehicle cool down period: overnight				
Inflation Pressure	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	21.8°C (71.2°F)	21.8°C (71.2°F)	21.8°C (71.2°F)	21.6°C (70.9°F)
San Angelo Test Facility Shop Floor Temp	20.6°C (69.1°F)	21.4°C (70.5°F)	20.8°C (69.4°F)	20.4°C (68.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	15:02:37 UTC	End:	15:27:11 UTC
Trip Odometer Reading:	Start:	426.6 km (265.1 mi)	End:	458.2 km (284.7 mi)
Ambient Temperature:	Start:	23.1°C (73.6°F)	End:	24.0°C (75.2°F)
Roadway Temperature:	Start:	27.8°C (82.0°F)	End:	30.0°C (86.0°F)

Driving in first direction:

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

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

Driving in opposite direction:

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

10:28 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Max speed: 97.7 km/h (60.7 mph)

Total Driving Time: 20:37 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	240.8 kPa (34.9 psi)	240.2 kPa (34.8 psi)	240.5 kPa (34.9 psi)	240.6 kPa (34.9 psi)
Tire Sidewall Temp	35.4°C (95.7°F)	33.6°C (92.5°F)	33.6°C (92.5°F)	34.4°C (93.9°F)
San Angelo Test Facility Shop Floor Temp	20.4°C (68.7°F)	20.4°C (68.7°F)	20.4°C (68.7°F)	20.6°C (69.1°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			158.0 kPa (22.9 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated in 9 seconds. 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: 27.0°C (80.6°F)	Vehicle cool down period: 60 minutes			
Inflation Pressure	229.4 kPa (33.3 psi)	228.3 kPa (33.1 psi)	150.7 kPa (21.9 psi)	230.0 kPa (33.4 psi)
Tire Sidewall Temp	27.8°C (82.0°F)	26.6°C (79.9°F)	27.0°C (80.6°F)	28.6°C (83.5°F)
San Angelo Test Facility Shop Floor Temp	21.6°C (70.9°F)	22.0°C (71.6°F)	22.2°C (72.0°F)	21.8°C (71.2°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:	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 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: April 26, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: April 26, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

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: 27.0°C (80.6°F) Vehicle cool down period: 65 minutes				
Inflation Pressure	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	27.8°C (82.0°F)	26.8°C (80.2°F)	26.8°C (80.2°F)	27.8°C (82.0°F)
San Angelo Test Facility Shop Floor Temp	21.6°C (70.9°F)	22.2°C (72.0°F)	22.2°C (72.0°F)	21.8°C (71.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	16:54:18 UTC	End:	17:19:18 UTC
Trip Odometer Reading:	Start:	459.6 km (285.6 mi)	End:	491.2 km (305.2 mi)
Ambient Temperature:	Start:	27.0°C (80.6°F)	End:	27.9°C (82.2°F)
Roadway Temperature:	Start:	38.8°C (101.8°F)	End:	41.2°C (106.2°F)

Driving in first direction:

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

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

Driving in opposite direction:

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

10:29 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Max speed: 99.5 km/h (61.8 mph)

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

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

SCENARIO E – Left Front, Left 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	237.4 kPa (34.4 psi)	237.9 kPa (34.5 psi)	236.8 kPa (34.3 psi)	236.5 kPa (34.3 psi)
Tire Sidewall Temp	41.8°C (107.2°F)	40.2°C (104.4°F)	37.8°C (100.0°F)	38.2°C (100.8°F)
San Angelo Test Facility Shop Floor Temp	23.2°C (73.8°F)	23.0°C (73.4°F)	23.2°C (73.8°F)	23.0°C (73.4°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 (X)LR ( )RR ( )RF Inflation Pressure	158.0 kPa (22.9 psi)	158.0 kPa (22.9 psi)		

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated in 18 seconds. 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, Left 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: 29.0°C (84.2°F)	Vehicle cool down period: 61 minutes			
Inflation Pressure	150.0 kPa (21.8 psi)	150.0 kPa (21.8 psi)	223.4 kPa (32.4 psi)	224.6 kPa (32.6 psi)
Tire Sidewall Temp	31.6°C (88.9°F)	30.0°C (86.0°F)	29.6°C (85.3°F)	30.2°C (86.4°F)
San Angelo Test Facility Shop Floor Temp	23.2°C (73.8°F)	23.6°C (74.5°F)	23.6°C (74.5°F)	23.2°C (73.8°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:	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 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 left rear tires were deflated at UVW + VCW.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: April 26, 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 27, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

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: 10.0°C (50.0°F) Vehicle cool down period: overnight				
Inflation Pressure	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)
Tire Sidewall Temp	13.0°C (55.4°F)	12.8°C (55.0°F)	12.6°C (54.7°F)	12.6°C (54.7°F)
San Angelo Test Facility Shop Floor Temp	16.6°C (61.9°F)	16.4°C (61.5°F)	16.2°C (61.2°F)	16.4°C (61.5°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time:	Start:	13:13:56 UTC	End:	13:38:25 UTC
Trip Odometer Reading:	Start:	492.8 km (306.2 mi)	End:	524.3 km (325.8 mi)
Ambient Temperature:	Start:	10.0°C (50.0°F)	End:	11.9°C (53.4°F)
Roadway Temperature:	Start:	13.6°C (56.5°F)	End:	13.4°C (56.1°F)

Driving in first direction:

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

10:12 minutes (stopwatch time) 15.6 km (9.7 mi) distance

Driving in opposite direction:

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

10:23 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Max speed: 98.7 km/h (61.3 mph)

Total Driving Time: 20:36 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	234.6 kPa (34.0 psi)	235.2 kPa (34.1 psi)	235.9 kPa (34.2 psi)	235.4 kPa (34.1 psi)
Tire Sidewall Temp	22.8°C (73.0°F)	21.4°C (70.5°F)	20.2°C (68.4°F)	21.8°C (71.2°F)
San Angelo Test Facility Shop Floor Temp	15.2°C (59.4°F)	15.2°C (59.4°F)	15.0°C (59.0°F)	15.4°C (59.7°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR ( )RR (X)RF Inflation Pressure	158.0 kPa (22.9 psi)	158.0 kPa (22.9 psi)		158.0 kPa (22.9 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Telltale illuminated in 7 seconds. 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: 15.6°C (60.1°F)	Vehicle cool down period: 60 minutes			
Inflation Pressure	154.2 kPa (22.4 psi)	153.2 kPa (22.2 psi)	226.9 kPa (32.9 psi)	154.5 kPa (22.4 psi)
Tire Sidewall Temp	18.4°C (65.1°F)	17.4°C (63.3°F)	17.4°C (63.3°F)	19.0°C (66.2°F)
San Angelo Test Facility Shop Floor Temp	16.8°C (62.2°F)	16.8°C (62.2°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:	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 psi)	220.0 kPa (31.9 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 27, 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: April 23, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

Time:	Start:	14:14:48 UTC	End:	14:35:10 UTC
Trip Odometer Reading:	Start:	278.6 km (173.1 mi)	End:	302.9 km (188.2 mi)
Ambient Temperature:	Start:	17.4°C (63.3°F)	End:	18.6°C (65.5°F)
Roadway Temperature:	Start:	19.6°C (67.3°F)	End:	20.4°C (68.7°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 5.17)

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 67

24.3 km (15.1 mi) distance

Max speed: 99.5 km/h (61.8 mph)
Total Driving Time: 15:58 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 3 seconds

Time telltale remains flashing 64 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**

Spare without TPMS sensor was applied to right front at LLVW.

REMARKS: Replacing the right front tire with the spare will not produce a malfunction if the original right front tire/wheel assembly is stowed inside vehicle.

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

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 3 of 4)
Scenario H – Malfunction Detection Test –
Power Disconnected from TPMS Warning ECU

TEST DATE: April 26, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5105

Time:	Start:	2:07 pm	End:	2:49 pm
Odometer Reading:	Start:	492.1 km (305.8 mi)	End:	492.1 km (305.8 mi)
Ambient Temperature:	Start:	28.0°C (82.4°F)	End:	28.0°C (82.4°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: Power was disconnected from the TPMS warning ECU. (See Figure 5.18)

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 –
Power Disconnected from TPMS Warning ECU

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	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? ( )YES (X)NO

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

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

Power was disconnected from TPMS warning ECU.

REMARKS: None

RECORDED BY: Todd P. Groghan DATE: April 26, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: April 21, 2010 LAB: San Angelo Test Facility VEHICLE NHTSA NO: CA5105

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?

- ☑ Significance of the low tire pressure warning telltale illuminating
- ☑ A description of corrective action to be undertaken
- ☑ 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: April 21, 2010

APPROVED BY: Kenneth H. Yates

SECTION 4

TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

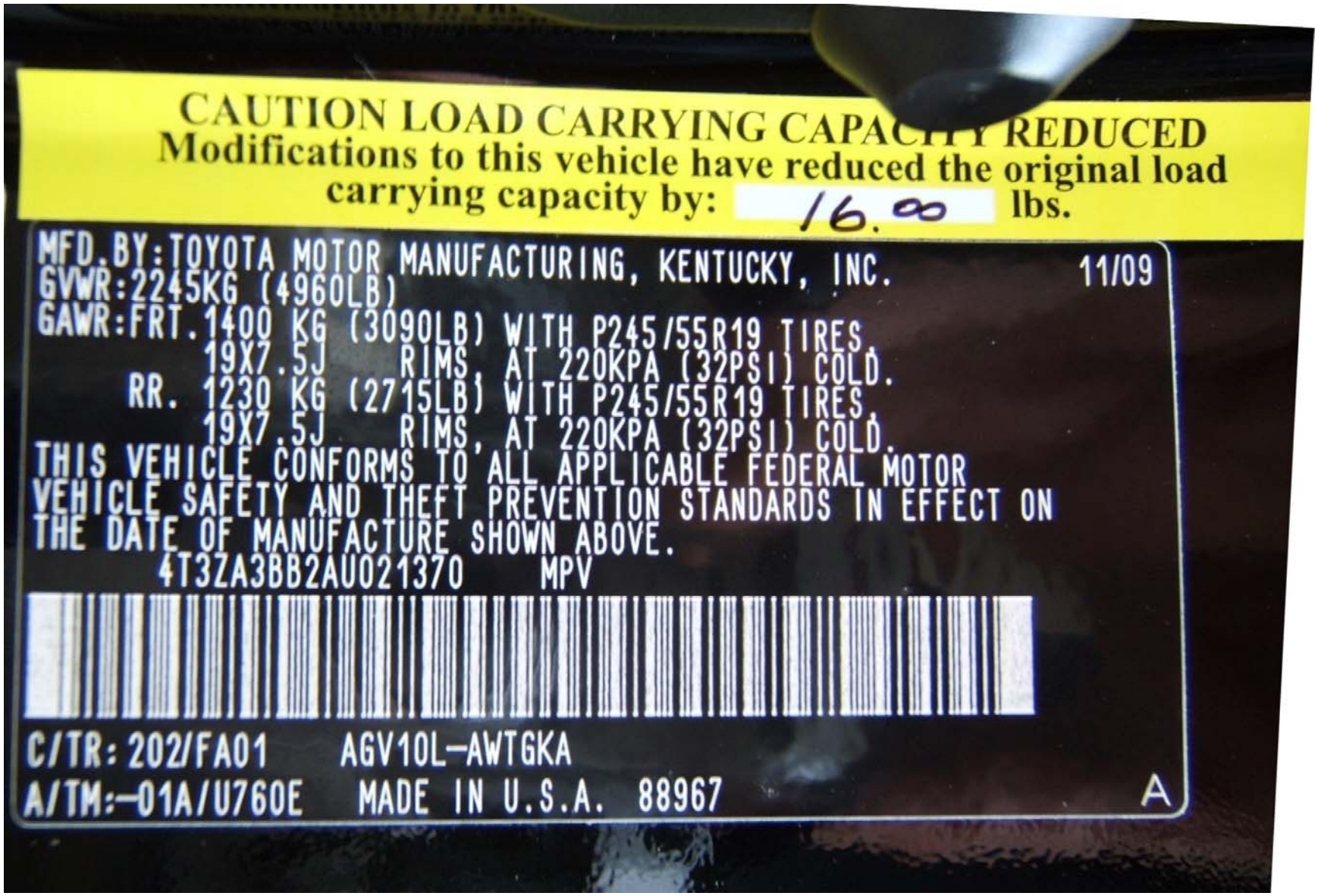
EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO	CAL. DATE	NEXT CAL. DATE
STOPWATCH	CHAMPION SPORTS TIMER	910 R	N/A	N/A
VBOX RECORDING DEVICE	RACELOGIC VBOX III	SERIAL # 030209	2/3/2010	2/3/2011
AMBIENT TEMPERATURE GAUGE	FLUKE 179 DIGITAL THERMOMETER	SERIAL # 84740316	2/24/2010	2/24/2011
LASER TEMPERATURE GAUGE (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
PLATFORM SCALE (BALLAST)	HOWE RICHARDSON	MODEL # 6401 SERIAL # 0181-5509-26	7/28/2009	7/28/2010

SECTION 5

PHOTOGRAPHS

2010 TOYOTA VENZA
NHTSA NO. CA5105
FMVSS NO.138

FIGURE 5.1
¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE



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NHTSA NO. CA5105
FMVSS NO.138

FIGURE 5.2
VEHICLE CERTIFICATION LABEL AND LOAD CARRYING CAPACITY MODIFICATION LABEL

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FIGURE 5.3
VEHICLE PLACARD

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FIGURE 5.4
TIRE SHOWING BRAND

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FIGURE 5.5
TIRE SHOWING MODEL

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FIGURE 5.6
TIRE SHOWING SIZE AND LOAD INDEX / SPEED RATING

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NHTSA NO. CA5105
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FIGURE 5.7
TIRE SHOWING DOT SERIAL NUMBER

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

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NHTSA NO. CA5105
FMVSS NO. 138

FIGURE 5.9
TIRE SHOWING SIDEWALL / TREAD CONSTRUCTION

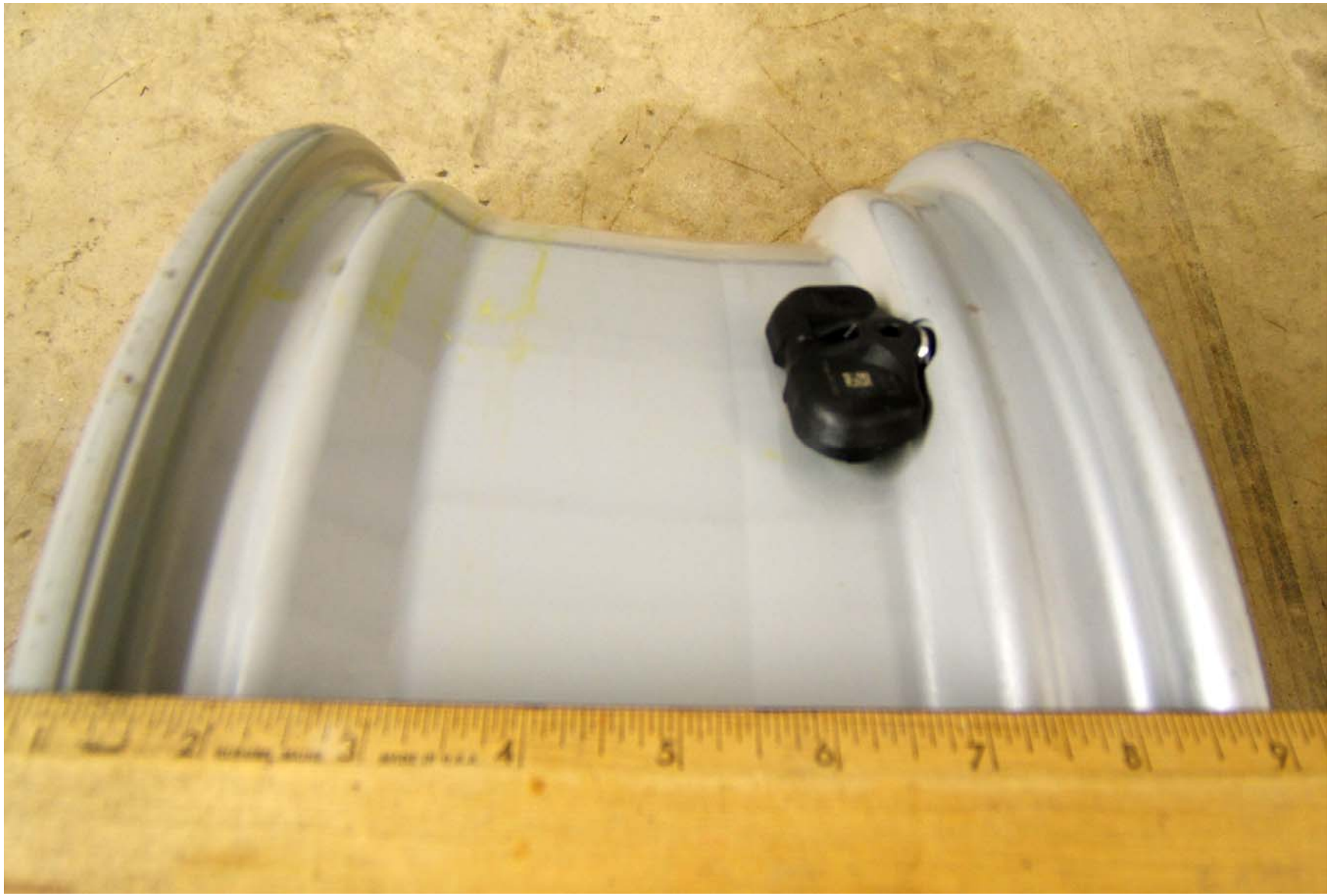

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FIGURE 5.10
RIM SHOWING TPMS SENSOR AND RIM
CONTOUR FOR FULL WIDTH OF CROSS SECTION

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NHTSA NO. CA5105
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FIGURE 5.11
DISPLAY SHOWING COMBINATION LOW TIRE
PRESSURE / TPMS MALFUNCTION WARNING TELLTALE

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NHTSA NO. CA5105
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FIGURE 5.12
TEST INSTRUMENTATION INSTALLED IN VEHICLE

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NHTSA NO. CA5105
FMVSS NO. 138

FIGURE 5.13
VEHICLE REAR SEAT BALLAST FOR LLVW LOAD

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FMVSS NO. 138

FIGURE 5.14
VEHICLE REAR SEAT BALLAST FOR UVW + VCW LOAD

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NHTSA NO. CA5105
FMVSS NO. 138

FIGURE 5.15
VEHICLE CARGO AREA BALLAST FOR UVW + VCW LOAD

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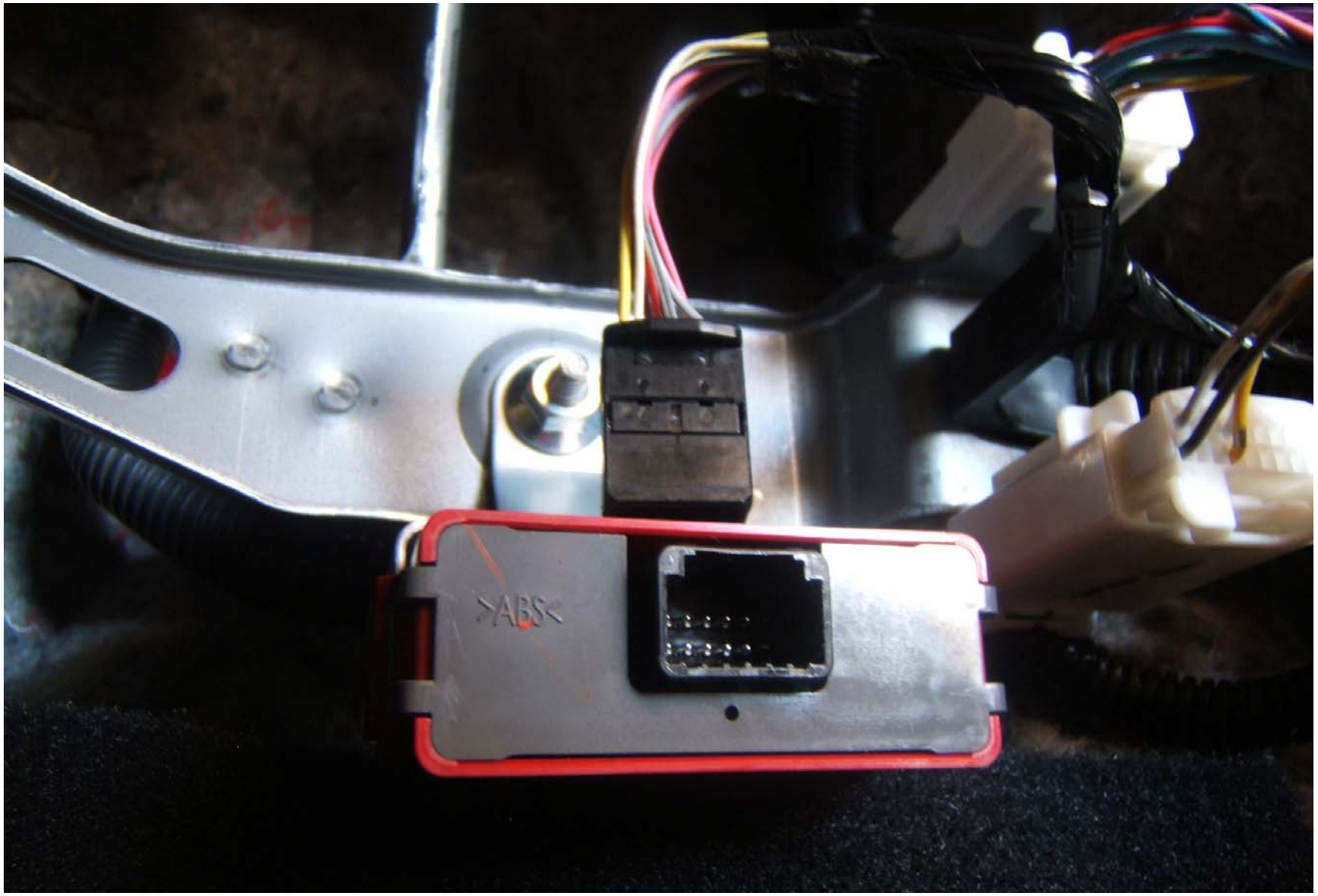
NHTSA NO. CA5105
FMVSS NO. 138

FIGURE 5.16
VEHICLE ON WEIGHT SCALES

2010 TOYOTA VENZA
NHTSA NO. CA5105
FMVSS NO. 138

FIGURE 5.17
SPARE INSTALLED ON RIGHT FRONT



2010 TOYOTA VENZA
NHTSA NO. CA5105
FMVSS NO. 138

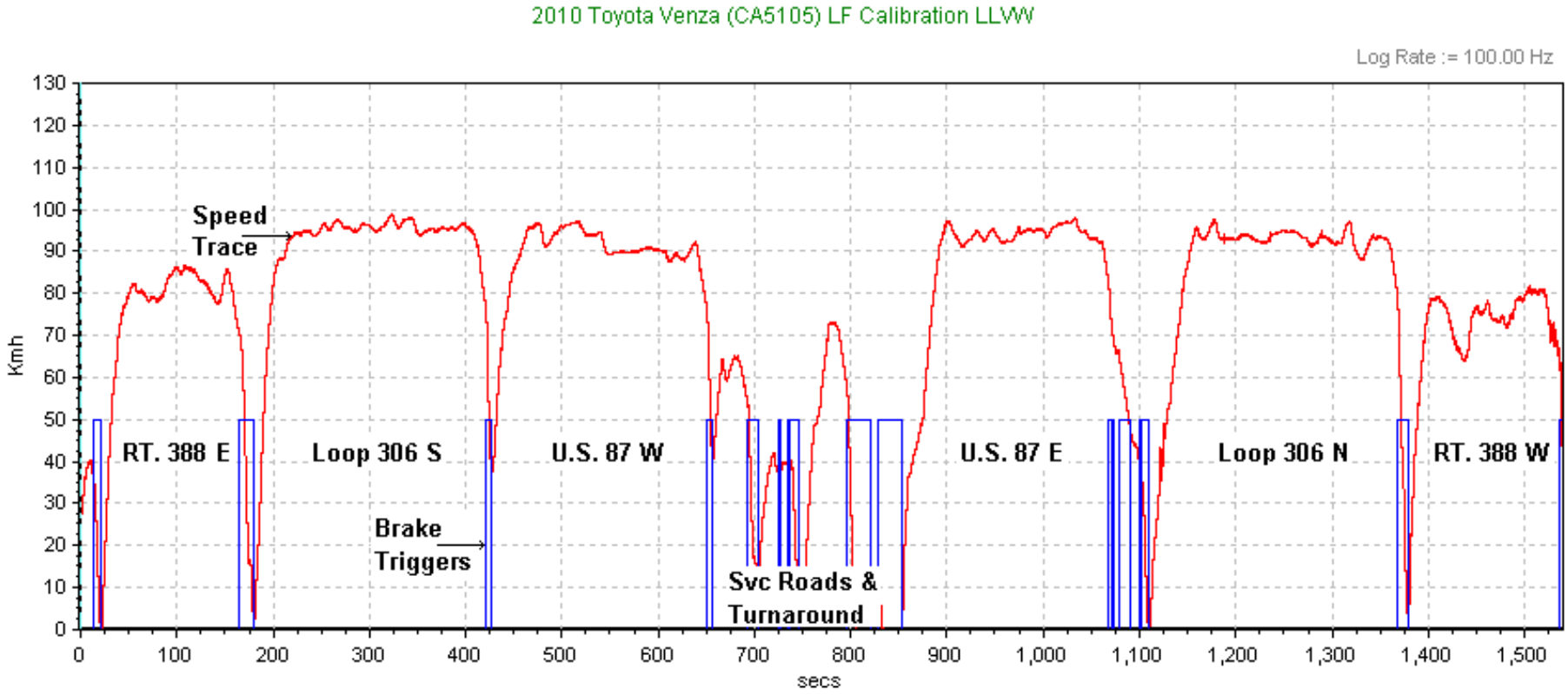
FIGURE 5.18
POWER DISCONNECTED FROM TPMS WARNING ECU

SECTION 6

TEST PLOTS

Scenario A:	Left Front Tire at LLVW
Test Date:	4/22/10
Data File Time:	25:41 minutes
Cumulative Driving Time:	20:21minutes
Start Point:	GAFB North Gate

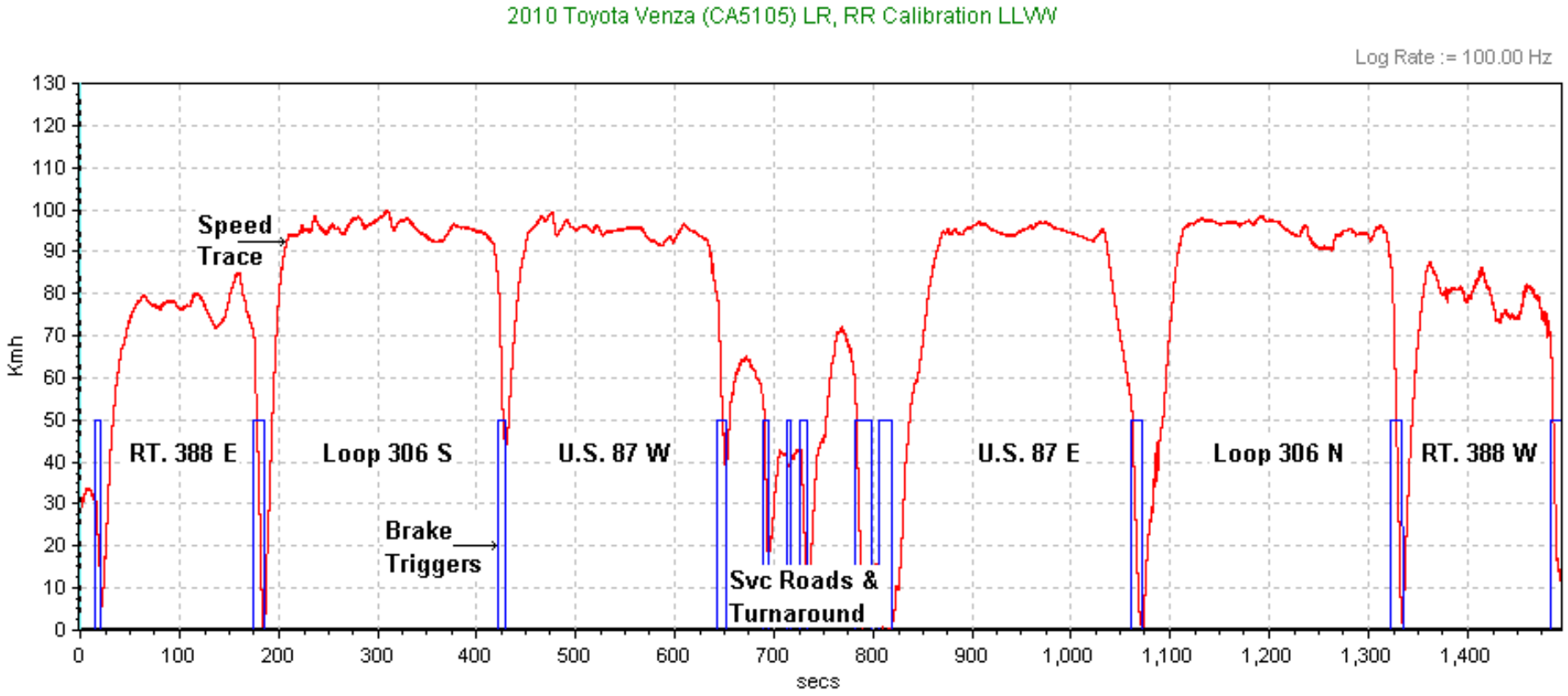
Calibration Phase:



LF Detection Phase: Telltale illuminated in 16 seconds. Driving was not necessary.

Scenario B:	Left Rear, Right Rear Tires at LLVW
Test Date:	4/22/10
Data File Time:	24:55 minutes
Cumulative Driving Time:	20:34 minutes
Start Point:	GAFB North Gate

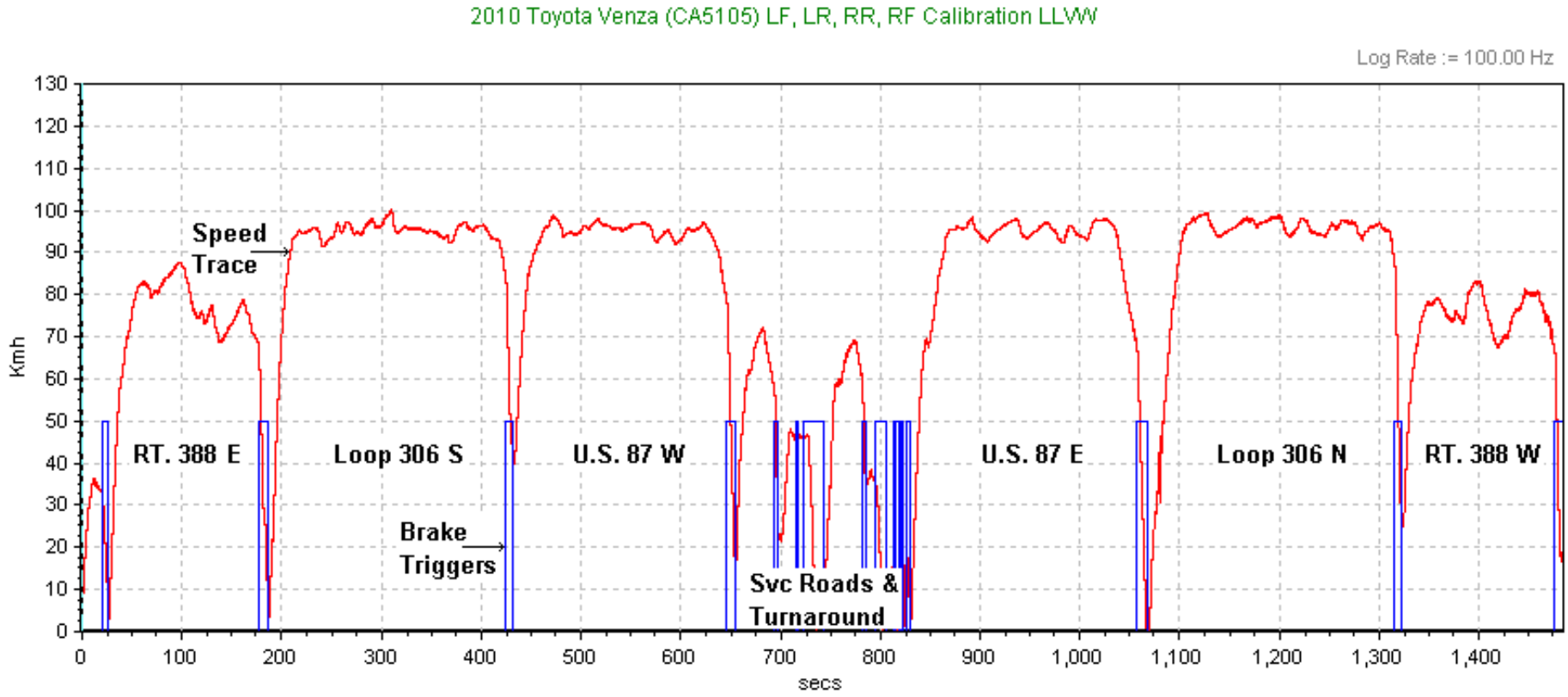
Calibration Phase:



LR, RR Detection Phase: Telltale illuminated in 6 seconds. Driving was not necessary.

Scenario C:	Left Front, Left Rear, Right Rear, Right Front Tires at LLVW
Test Date:	4/23/10
Data File Time:	24:45 minutes
Cumulative Driving Time:	20:36 minutes
Start Point:	GAFB North Gate

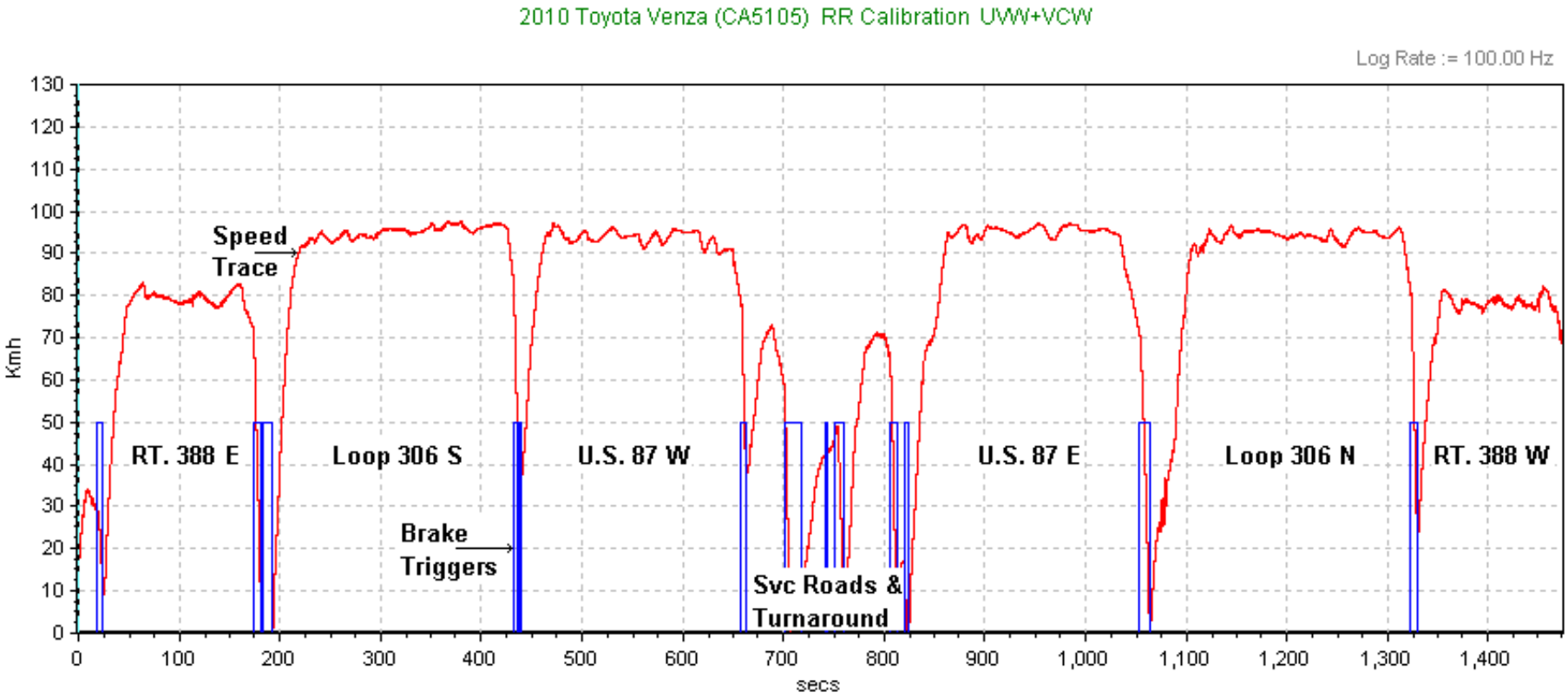
Calibration Phase:



LF, LR, RR, RF Detection Phase: Telltale illuminated in 8 seconds. Driving was not necessary.

Scenario D: Right Rear Tire at UVW + VCW
Test Date: 4/26/10
Data File Time: 24:35 minutes
Cumulative Driving Time: 20:37 minutes
Start Point: GAFB North Gate

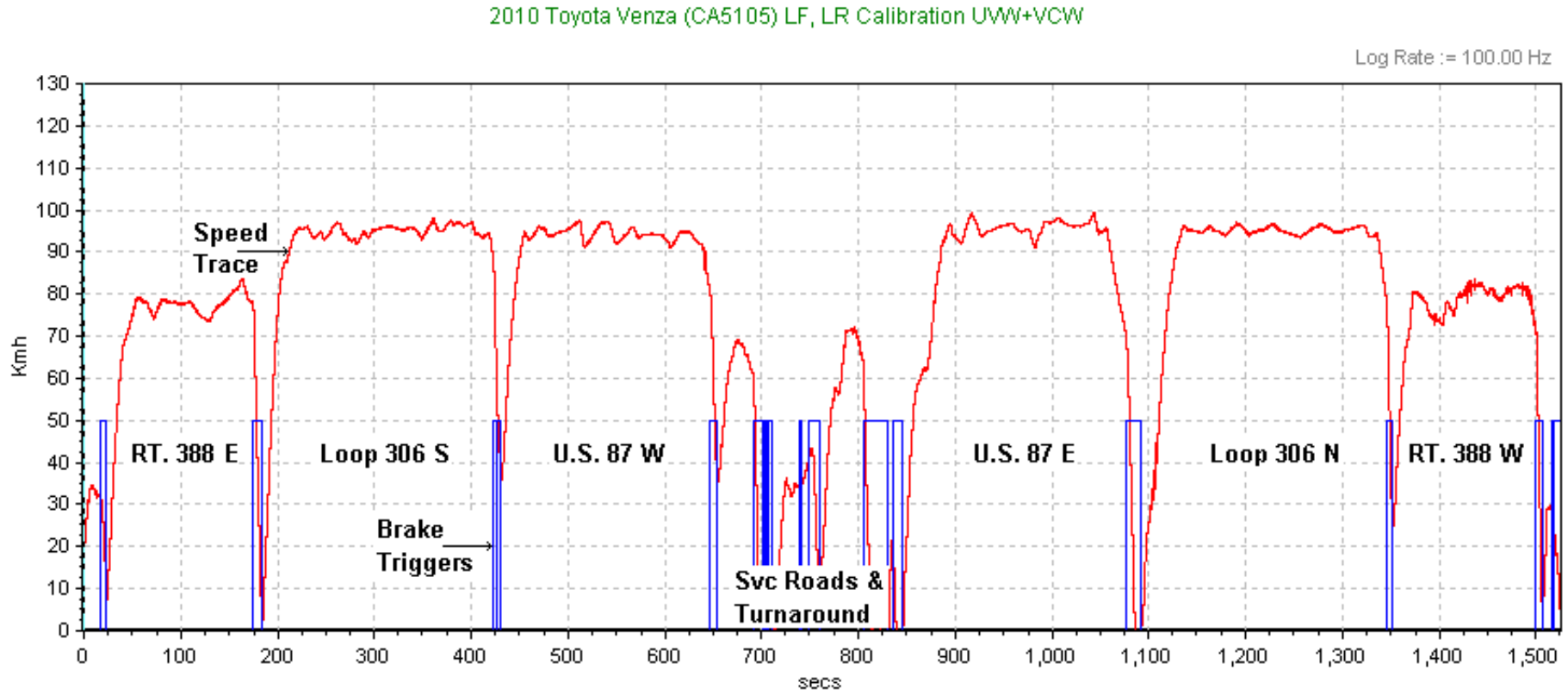
Calibration Phase:



RR Detection Phase: Telltale illuminated in 9 seconds. Driving was not necessary.

Scenario E:	Left Front, Left Rear Tires at UVW + VCW
Test Date:	4/26/10
Data File Time:	25:26 minutes
Cumulative Driving Time:	20:40 minutes
Start Point:	GAFB North Gate

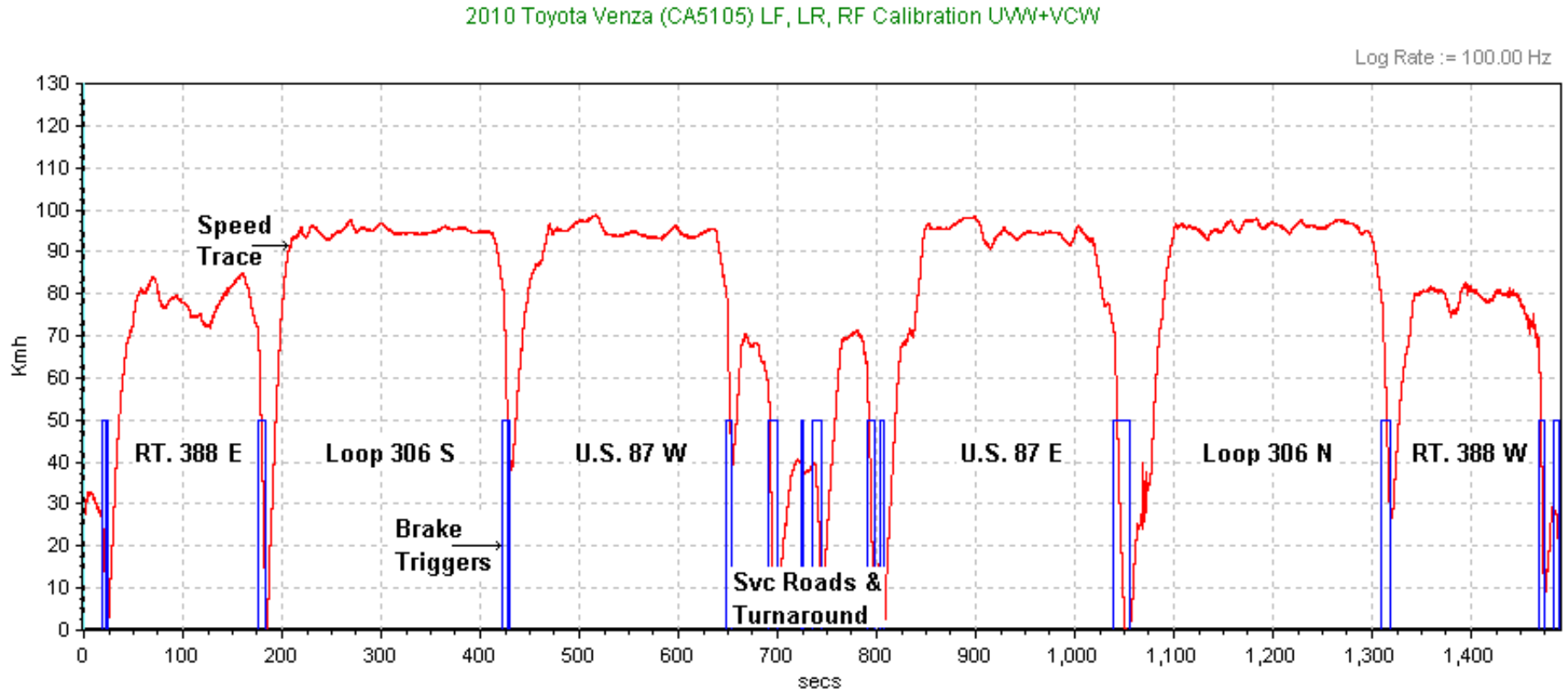
Calibration Phase:



LF, LR Detection Phase: Telltale illuminated in 18 seconds. Driving was not necessary.

Scenario F:	Left Front, Left Rear, Right Front Tires at UVW + VCW
Test Date:	4/27/10
Data File Time:	24:51 minutes
Cumulative Driving Time:	20:36 minutes
Start Point:	GAFB North Gate

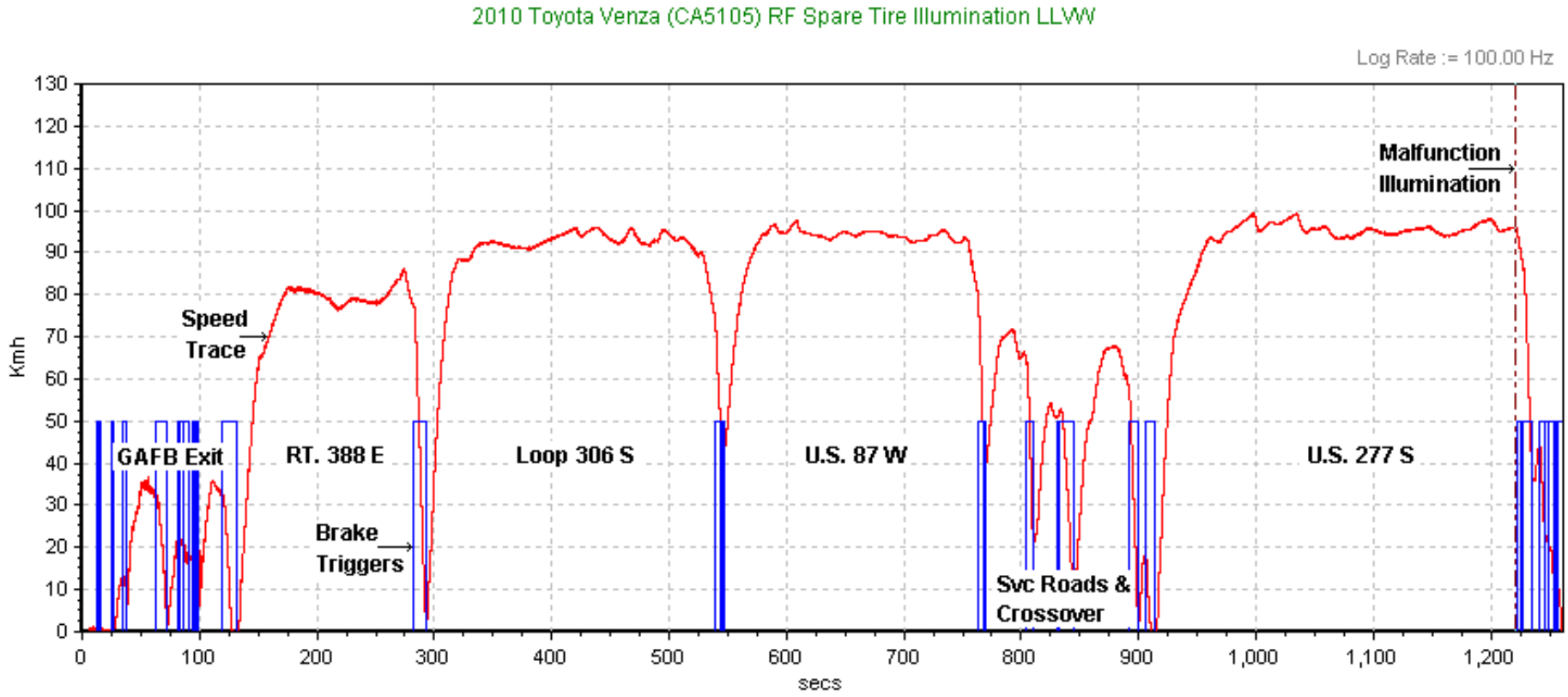
Calibration Phase:



LF, LR, RF Detection Phase: Telltale illuminated in 7 seconds. Driving was not necessary.

Scenario G:	Malfunction Detection Test at LLVW
Test Date:	4/23/10
Data File Time:	21:02 minutes
Cumulative Driving Time:	15:58 minutes
Start Point:	San Angelo Test Facility shop

Malfunction Telltale Illumination:



SECTION 7

OWNER'S MANUAL PAGES

Follow the correction procedures.

After taking the specified steps to correct the suspected problem, check that the warning light turns off.

Warning light	Warning light/Details	Correction procedure
	**Open door warning light (warning buzzer)*1** A door is not fully closed.	Check that all doors are closed.
	**Driver's seat belt reminder light (warning buzzer)*2** Warns the driver to fasten his/her seat belt.	Fasten the seat belt.
 (On the center display)	**Front passenger's seat belt reminder light (warning buzzer)*2** Warns the front passenger to fasten his/her seat belt.	Fasten the seat belt.
	**Tire pressure warning light**	
	When the light comes on: Low tire inflation pressure.	Adjust the tire inflation pressure.
	When the light comes on after blinking for 1 minute: Malfunction in the tire pressure warning system.	Have the system checked by your Toyota dealer.

Changing the engine oil (U.S.A. only)

Make sure to reset the oil change system. (→P. 491)

The tire pressure warning light may come on due to natural causes

The tire pressure warning light may come on due to natural causes such as natural air leaks or tire inflation pressure changes caused by temperature. In this case, adjusting the tire inflation pressure will turn off the warning light (after a few minutes).

When a tire is replaced with a spare tire

The compact spare tire is not equipped with the tire pressure warning valve and transmitter. If a tire goes flat, the tire pressure warning light will not turn off even though the flat tire is replaced with the spare tire. Replace the spare tire with the repaired tire and adjust the proper tire inflation pressure. The tire pressure warning light will turn off after a few minutes.

⚠ CAUTION

If a blowout or sudden air loss should occur

The tire pressure warning system may not activate immediately.

Maintenance of the tires

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 (tire and load information label). (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label [tire and load information 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-tire pressure warning system) that illuminates a low tire pressure telltale (tire pressure warning light) when one or more of your tires is significantly under-inflated. Accordingly, when the low tire pressure telltale (tire pressure warning light) 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 (tire pressure warning system) 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 (tire pressure warning light).

⚠ CAUTION

Your vehicle has also been equipped with a TPMS (tire pressure warning system) malfunction indicator to indicate when the system is not operating properly. The TPMS (tire pressure warning system) malfunction indicator is combined with the low tire pressure telltale (tire pressure warning light). 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 (tire pressure warning system) 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 (tire pressure warning system) from functioning properly. Always check the TPMS (tire pressure warning system) 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 (tire pressure warning system) to continue to function properly.

⚠ NOTICE

Precaution when installing a different tire

When a tire of a different specification or maker is installed, the tire pressure warning system may not operate properly.