REPORT NUMBER 138-STF-08-004

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

TOYOTA MOTOR CORPORATION
2008 SCION XD
FIVE-DOOR PASSENGER CAR
NHTSA NO. C85107

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

August 26, 2008

**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<br>Compliance tests were conducted on the subject 2008 Toyota Scion xD five-door passenger car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-138-03 for the determination of FMVSS 138 compliance. Test failures identified were as follows: NONE. | | |
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# SECTION 1

# INTRODUCTION

## 1.1 PURPOSE OF COMPLIANCE TEST

A 2008 Toyota Scion xD five-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 2008 Toyota Scion xD five-door passenger car. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: JTKKU10468J015848

B. NHTSA Number: C85107

C Manufacturer: Toyota Motor Corporation

D. Manufacture Date: 11/2007

## 1.3 TEST DATE

The test vehicle was tested during the time period July 21, 2008, through August 1, 2008.

SECTION 2

TEST PROCEDURE AND SUMMARY OF RESULTS

## 2.1 TEST PROCEDURE

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

Subsequent events included weighing the vehicle to establish the Unloaded Vehicle Weight (UVW) and the distribution of weight on the front and rear axles and each wheel position. The vehicle was loaded to its Lightly Loaded Vehicle Weight (LLVW) for four tire deflation scenarios. This LLVW included the weights of driver, one passenger, and test equipment. The vehicle was loaded to its Gross Vehicle Weight Rating (GVWR) for four additional tire deflation scenarios. The vehicle is required to be loaded to its maximum capacity without exceeding either the Vehicle Capacity Weight (VCW) or Gross Vehicle Weight Rating (GVWR). The VCW was within 2.3 kilograms of the GVWR lower limit, at which the test was run. The Gross Vehicle Weight included the weights of driver, one passenger, test equipment, ballast in the rear seat, and ballast in the internal cargo area. 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 detection test phase. There was no driving time necessary for telltale illumination in the detection phases of the Scion, and no graphs were created for those phases. The cumulative driving time for each calibration phase 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 is normally started and driven between 50 and 100 km/h to verify telltale illumination, but in this phase the Scion telltale illuminated without driving the vehicle.
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. In this phase, the normal driving sequence was not necessary because the Scion telltale extinguished without driving the vehicle.

A malfunction detection scenario was performed with the vehicle loaded to its LLVW. A malfunction was simulated by removing the ECU fuse from the fuse block. In this instance, the Scion malfunction telltale sequence functioned without the normal driving procedure.

## 2.2 SUMMARY OF RESULTS

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

A. Left front
B. Right rear
C. Left rear, right rear
D. Left front, left rear, right rear, right front

Four tire deflation scenarios were performed on the test vehicle at GVWR:

E. Left rear
F. Right front
G. Left front, left rear
H. Left front, left rear, right rear, right front

The Scion was equipped with a reset button that stores the cold tire inflation pressure used with the TPMS system. Initially the manufacture-recommended preset cold tire inflation pressure is stored. During this test, the reset button did not require activation because the factory set tire air pressure for TPMS was not required to be changed.

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

One malfunction detection scenario was performed on the test vehicle at LLVW. The vehicle's combination malfunction telltale indicated a malfunction per the standard's requirements.

SECTION 3

TEST DATA

## FMVSS No. 138 – TEST DATA SUMMARY

TEST DATES: July 21 – August 1, 2008 LAB: U. S. DOT San Angelo Test Facility

VIN: JTKKU10468J015848 VEHICLE NHTSA NUMBER: C85107

CERTIFICATION LABEL BUILD DATE: 11/2007

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

**REMARKS:** None

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

TEST DATE: July 21 - 23, 2008 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107 VIN: JTKKU10468J015848

CERTIFICATION LABEL BUILD DATE: 11/2007 ENGINE: 1.8 liter 4 cylinder

MY/MAKE/MODEL/BODY STYLE: 2008 Toyota Scion xD five-door passenger car

**TIRE CONDITIONING:**

( X ) Tires used more than 100 km. Actual odometer reading : 109.4 km (68 mi)

( ) Other – describe reason and procedure applied:

**VEHICLE ALIGNMENT AND WHEEL BALANCING:**

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

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

**TPMS IDENTIFICATION:**

TPMS SENSOR MAKE/MODEL: Sensors: Pacific Industries (part #42607-33011); ECU: Denso Corporation; Antenna & Receiver: Denso Corporation

Source: Manufacturer supplied information sheet

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

**TPMS MALFUNCTION INDICATOR TYPE**:

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

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

Source: Manufacturer supplied information

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

Describe reset control location and function: Located below and left of steering wheel – function is to create a set pressure for TPMS system to monitor.

**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 | 195/60R16 | 230 kPa (33 psi) | Vehicle placard |
| Rear | 195/60R16 | 230 kPa (33 psi) | Vehicle placard |
| Spare | T135/70D16 | 420 kPa (60 psi) | Vehicle placard |

**INSTALLED TIRE DATA (Use diagrams as reference):**

Diagram - Passenger Car Tire Labeling

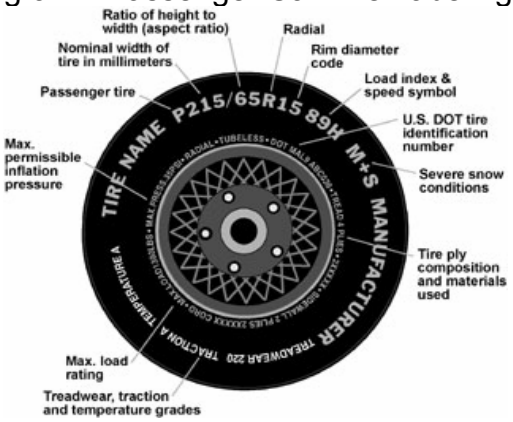
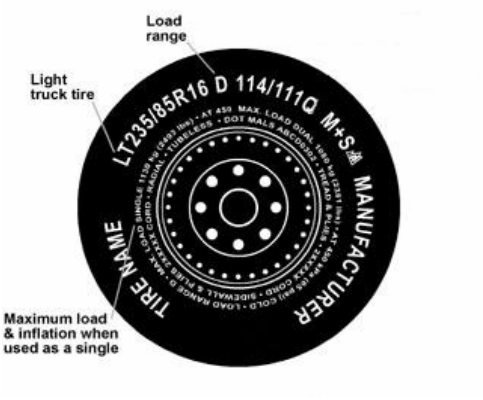



Diagram - Other Markings on Light Trucks




**Front and Rear Axles**

Tire Size and Load Index / Speed Rating: 195/60R16 89H

Manufacturer/Tire Name: Bridgestone Turanza EL 400

Sidewall Max Load Rating: 580 kg (1,279 lbs)

Max Inflation Pressure: 300 kPa (44 psi)

Sidewall Construction (number of plies and ply material): 1 ply polyester

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

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

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

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

| **Worksheet for Determining FMVSS No. 138 Telltale Warning Activation Pressure for Tires Installed on Vehicle** | | |
|---|---|---|
| **Part** | **Front Axle** | **Rear Axle** |
| **(A)** Recommended Inflation Pressure x .75 | 230 kPa x .75 = 172.5 kPa | 230 kPa x .75 = 172.5 kPa |
| **(B)** Information from FMVSS 138 Table 1 below, Tire types are:<br><br>Inflation pressure<br><br>Minimum activation pressures from Table 1 | ( X ) P-metric-Standard load<br>( ) P-metric-Extra Load<br>Load Range ( ) C, ( ) D, or ( ) E<br><br>( X ) Maximum or ( ) Rated<br>300 kPa (44 psi)<br><br>140 kPa (20 psi) | ( X ) P-metric-Standard load<br>( ) P-metric-Extra Load<br>Load Range ( ) C, ( ) D, or ( ) E<br><br>( X ) Maximum or ( ) Rated<br>300 kPa (44 psi)<br><br>140 kPa (20 psi) |
| **(C)** Telltale Warning Activation Pressure is the higher of Part (A) or (B) | 172.5 kPa (25.0 psi) | 172.5 kPa (25.0 psi) |
| **(D)** Pressure at which to deflate tire(s) = (C) – 7 kPa | 165.5 kPa (24.0 psi) | 165.5 kPa (24.0 psi) |

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

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

REMARKS: None

RECORDED BY: Jack R. Stewart DATE: July 23, 2008

APPROVED BY: Kenneth H. Yates

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

TEST DATE: July 23, 2008 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

**TPMS Low Tire Pressure Warning Telltale**

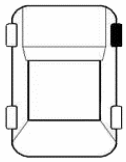
TPMS Low Tire Pressure Warning Telltale Location: Left side of instrument panel, slightly above the fuel gauge

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

( X )YES ( )NO (fail)

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 TELLTALE AND MALFUNCTION INDICATION, IF COMBINED

Ignition locking system position when telltale illuminates:

| | | | |
|---|---|---|---|
| ☐ | OFF/LOCK | ☐ | Between OFF/LOCK and ON/RUN |
| ☐ | ON/RUN | ☒ | Between OFF/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

**TEST RESULTS**

**Low Tire Pressure Warning Telltale (PASS/FAIL)** **PASS**

**REMARKS:** None

RECORDED BY: Jack R. Stewart DATE: July 23, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 1 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

TEST DATE: July 24, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 7:50 am | End: | 8:20 am |
| Ambient Temperature: | Start: | 24.8°C (76.6°F) | End: | 26.0°C (78.8°F) |
| Odometer Reading: | Start: | 109 km (68.0 mi) | | |
| Fuel Level: | Start: | Full | | |
| Weather Conditions: | | Partly cloudy and calm | | |

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

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

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| Pre-test cold measurements after ambient soak: Inflation Pressure | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |
| Tire Sidewall Temp | 26.9°C (80.5°F) | 26.7°C (80.0°F) | 26.9°C (80.5°F) | 26.9°C (80.5°F) |

**DATA SHEET 3 (Sheet 2 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**VEHICLE WEIGHT:**

**Vehicle Ratings from Certification Label:**

GVWR: 1,635 kg (3,605 lbs)

GAWR (front): 896 kg (1,975 lbs)

GAWR (rear): 826 kg (1,820 lbs)

**Vehicle Capacity Weight:**

Vehicle Capacity Weight 383 kg (845 lbs)

**Measured Unloaded Vehicle Weight:**

| | | | |
|---|---|---|---|
| LF | 368 kg (811 lbs) | LR | 238 kg (524 lbs) |
| RF | 354 kg (781 lbs) | RR | 240 kg (530 lbs) |
| Front Axle | 722 kg (1,592 lbs) | Rear Axle | 478 kg (1,054 lbs) |

Total Vehicle 1,200 kg (2,646 lbs)

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

| | | | | | |
|---|---|---|---|---|---|
| LF | 419 kg (924 lbs) | | LR | 287 kg (633 lbs) | |
| RF | 409 kg (902 lbs) | | RR | 291 kg (642 lbs) | |
| Front Axle | 828 kg (1,826 lbs) | ( ≤ GAWR) | Rear Axle | 578 kg (1,275 lbs) | ( ≤ GAWR) |

Total Vehicle 1,406 kg (3,101 lbs) (not greater than GVWR)

Note: For scenarios A, B, C, D, and I, this total vehicle weight measures the vehicle loaded to Lightly Loaded Vehicle Weight (LLVW), 206 kg (455 lbs) of driver, passenger, and test equipment.

**DATA SHEET 3 (Sheet 3 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO A - Left Front Tire Deflation at LLVW**

TEST DATE: July 24, 2008 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 2 of 28) for Test Weight.

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

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period:<br>Ambient Temperature: 27.2°C (81.0°F) Vehicle cool down period: overnight | | | | |
| Inflation Pressure | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) |
| Tire Sidewall Temp | 28.0°C (82.4°F) | 28.2°C (82.8°F) | 28.6°C (83.5°F) | 28.4°C (83.1°F) |
| San Angelo Test Facility Shop Floor Temp | 29.0°C (84.2°F) | 29.2°C (84.6°F) | 29.2°C (84.6°F) | 28.8°C (83.8°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 15:26:52 UTC | End: | 15:51:18 UTC |
| Odometer Reading*: | Start: | 109.4 km (68 mi) | End: | 141.6 km (88 mi) |
| Ambient Temperature: | Start: | 27.4°C (81.3°F) | End: | 28.4°C (83.1°F) |
| Roadway Temperature: | Start: | 36.2°C (97.2°F) | End: | 39.4°C (102.9°F) |

* For this scenario only, the regular odometer was used. In all later scenarios, the trip odometer with increments in tenths of a mile was used.

Driving in first direction:

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

10:13 minutes (stopwatch time) 16.1 km (10 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 mi) distance

**Max speed: 99.0 km/h (61.5 mph)**

**Total Driving Time: 20:39 minutes (VBox time)**

**DATA SHEET 3 (Sheet 4 of 28)**
**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 | 250.6 kPa (36.3 psi) | 247.1 kPa (35.8 psi) | 248.8 kPa (36.1 psi) | 251.8 kPa (36.5 psi) |
| Tire Sidewall Temp | 41.2°C (106.2°F) | 37.2°C (99.0°F) | 37.4°C (99.3°F) | 40.2°C (104.4°F) |
| San Angelo Test Facility Shop Floor Temp | 29.4°C (84.9°F) | 29.8°C (85.6°F) | 29.4°C (84.9°F) | 29.6°C (85.3°F) |

**SYSTEM DETECTION PHASE:**

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

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

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

**Did the telltale illuminate?** ( X )YES ( )NO

Time to Illumination:

Illumination in 3.7 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 5 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO A - Left Front Tire Deflation at LLVW**

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)

**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: 31.0°C (87.8°F) Vehicle cool down period: 63 minutes | | | | |
| Inflation Pressure | 158.1 kPa (22.9 psi) | 236.2 kPa (34.3 psi) | 236.2 kPa (34.3 psi) | 238.5 kPa (34.6 psi) |
| Tire Sidewall Temp | 31.8°C (89.2°F) | 31.6°C (88.9°F) | 31.8°C (89.2°F) | 31.8°C (89.2°F) |
| San Angelo Test Facility Shop Floor Temp | 30.0°C (86.0°F) | 30.4°C (86.7°F) | 30.4°C (86.7°F) | 30.4°C (86.7°F) |

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

**TELLTALE EXTINGUISHMENT:**

**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |

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

**TEST RESULTS**

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

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: July 24, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 6 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO B – Right Rear Tire Deflation at LLVW**

TEST DATE: July 24, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 2 of 28) for Test Weight.

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

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 32.2°C (90.0°F) Vehicle cool down period: 61 minutes | | | | |
| Inflation Pressure | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |
| Tire Sidewall Temp | 31.8°C (89.2°F) | 32.0°C (89.6°F) | 31.8°C (89.2°F) | 31.6°C (88.9°F) |
| San Angelo Test Facility Shop Floor Temp | 30.4°C (86.7°F) | 30.6°C (87.1°F) | 30.8°C (87.4°F) | 30.6°C (87.1°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 18:27:49 UTC | End: | 18:52:23 UTC |
| Odometer Reading*: | Start: | 123.3 km (76.6 mi) | End: | 155.6 km (96.3 mi) |
| Ambient Temperature: | Start: | 31.9°C (89.4°F) | End: | 32.4°C (90.3°F) |
| Roadway Temperature: | Start: | 45.0°C (113.0°F) | End: | 46.2°C (115.2°F) |

* For Scenario A only, the regular odometer was used. In Scenario B and all later scenarios, the trip odometer with increments in tenths of a mile was used.

Driving in first direction:

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

10:17 minutes (stopwatch time) 15.8 km (9.8 mi) distance

Driving in opposite direction:

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

10:18 minutes (stopwatch time) 15.9 km (9.9 mi) distance

**Max speed: 98.9 km/h (61.5 mph)**

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

**DATA SHEET 3 (Sheet 7 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO B – 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 | 248.5 kPa (36.0 psi) | 246.3 kPa (35.7 psi) | 247.5 kPa (35.9 psi) | 250.0 kPa (36.3 psi) |
| Tire Sidewall Temp | 44.4°C (111.9°F) | 41.2°C (106.2°F) | 41.6°C (106.9°F) | 44.8°C (112.6°F) |
| San Angelo Test Facility Shop Floor Temp | 30.6°C (87.1°F) | 31.0°C (87.8°F) | 31.4°C (88.5°F) | 30.8°C (87.4°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: ( )LF ( )LR ( X )RR ( )RF Inflation Pressure | | | 165.5 kPa (24.0 psi) | |

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

**Did the telltale illuminate?** ( X )YES ( )NO

Time to Illumination:

Illumination in 9.5 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 8 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO B – Right Rear Tire Deflation at LLVW**

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)

**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: 33.1°C (91.6°F) Vehicle cool down period: 60 minutes | | | | |
| Inflation Pressure | 233.9 kPa (33.9 psi) | 233.5 kPa (33.9 psi) | 156.3 kPa (22.7 psi) | 235.7 kPa (34.2 psi) |
| Tire Sidewall Temp | 33.8°C (92.8°F) | 33.8°C (92.8°F) | 33.8°C (92.8°F) | 33.6°C (92.5°F) |
| San Angelo Test Facility Shop Floor Temp | 31.4°C (88.5°F) | 31.8°C (89.2°F) | 31.8°C (89.2°F) | 31.4°C (88.5°F) |

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

**TELLTALE EXTINGUISHMENT:**
**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) |

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

**TEST RESULTS**

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

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: July 24, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 9 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO C – Left Rear and Right Rear Tire Deflation at LLVW**

TEST DATE: July 28, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 2 of 28) for Test Weight.

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

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 36.6°C (97.9°F) Vehicle cool down period: overnight | | | | |
| Inflation Pressure | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |
| Tire Sidewall Temp | 34.0°C (93.2°F) | 34.0°C (93.2°F) | 33.6°C (92.5°F) | 33.4°C (92.1°F) |
| San Angelo Test Facility Shop Floor Temp | 31.4°C (88.5°F) | 31.4°C (88.5°F) | 31.4°C (88.5°F) | 30.8°C (87.4°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 17:50:08 UTC | End: | 18:15:02 UTC |
| Odometer Reading: | Start: | 157.4 km (97.8 mi) | End: | 172.8 km (117.4 mi) |
| Ambient Temperature: | Start: | 36.7°C (98.1°F) | End: | 37.7°C (99.9°F) |
| Roadway Temperature: | Start: | 50.2°C (122.4°F) | End: | 52.6°C (126.7°F) |

Driving in first direction:

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

10:15 minutes (stopwatch time) 15.4 km (9.6 mi) distance

Driving in opposite direction:

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

10:24 minutes (stopwatch time) 16.1 km (10.0 mi) distance

**Max speed: 97.4 km/h (60.5 mph)**

**Total Driving Time: 20:39 minutes (VBox time)**

**DATA SHEET 3 (Sheet 10 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO C – 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 | 255.3 kPa (37.0 psi) | 250.3 kPa (36.3 psi) | 254.3 kPa (36.9 psi) | 255.8 kPa (37.1 psi) |
| Tire Sidewall Temp | 48.6°C (119.5°F) | 45.4°C (113.7°F) | 45.6°C (114.1°F) | 47.2°C (117.0°F) |
| San Angelo Test Facility Shop Floor Temp | 32.6°C (90.7°F) | 32.6°C (90.7°F) | 32.4°C (90.3°F) | 32.2°C (90.0°F) |

**SYSTEM DETECTION PHASE:**

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

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

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

**Did the telltale illuminate?** ( X )YES ( )NO

Time to Illumination:

Illumination in 7.3 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 11 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO C – Left Rear and Right Rear Tire Deflation at LLVW**

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)

**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: 38.6°C (101.5°F) Vehicle cool down period: 61 minutes | | | | |
| Inflation Pressure | 239.3 kPa (34.7 psi) | 157.6 kPa (22.9 psi) | 155.9 kPa (22.6 psi) | 240.4 kPa (34.9 psi) |
| Tire Sidewall Temp | 37.8°C (100.0°F) | 38.0°C (100.4°F) | 38.0°C (100.4°F) | 37.8°C (100.0°F) |
| San Angelo Test Facility Shop Floor Temp | 33.6°C (92.5°F) | 33.6°C (92.5°F) | 33.6°C (92.5°F) | 33.8°C (92.8°F) |

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

**TELLTALE EXTINGUISHMENT:**
**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |

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

**TEST RESULTS**

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

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: July 28, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 12 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

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

TEST DATE: July 29, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 2 of 28) for Test Weight.

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

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 27.3°C (81.1°F) Vehicle cool down period: overnight | | | | |
| Inflation Pressure | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |
| Tire Sidewall Temp | 28.4°C (83.1°F) | 28.4°C (83.1°F) | 28.4°C (83.1°F) | 28.4°C (83.1°F) |
| San Angelo Test Facility Shop Floor Temp | 29.6°C (85.3°F) | 29.4°C (84.9°F) | 29.6°C (85.3°F) | 29.4°C (84.9°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 13:52:47 UTC | End: | 14:17:56 UTC |
| Odometer Reading: | Start: | 190.1 km (118.1 mi) | End: | 221.1 km (137.4 mi) |
| Ambient Temperature: | Start: | 27.2°C (81.0°F) | End: | 28.1°C (82.6°F) |
| Roadway Temperature: | Start: | 30.8°C (87.4°F) | End: | 33.8°C (92.8°F) |

Driving in first direction:

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

10:15 minutes (stopwatch time) 15.3 km (9.5 mi) distance

Driving in opposite direction:

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

10:22 minutes (stopwatch time) 15.8 km (9.8 mi) distance

**Max speed: 98.6 km/h (61.3 mph)**

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

**DATA SHEET 3 (Sheet 13 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO D – 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 | 250.0 kPa (36.3 psi) | 245.1 kPa (35.5 psi) | 247.7 kPa (35.9 psi) | 250.0 kPa (36.3 psi) |
| Tire Sidewall Temp | 40.8°C (105.4°F) | 36.6°C (97.9°F) | 36.2°C (97.2°F) | 39.2°C (102.6°F) |
| San Angelo Test Facility Shop Floor Temp | 30.0°C (86.0°F) | 29.8°C (85.6°F) | 29.8°C (85.6°F) | 29.8°C (85.6°F) |

**SYSTEM DETECTION PHASE:**

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

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

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

**Did the telltale illuminate?** ( X )YES ( )NO

Time to Illumination:

Illumination in 5.4 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 14 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

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

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)

**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: 30.0°C (86.0°F) Vehicle cool down period: 62 minutes | | | | |
| Inflation Pressure | 156.6 kPa (22.7 psi) | 160.3 kPa (23.2 psi) | 158.3 kPa (23.0 psi) | 158.0 kPa (22.9 psi) |
| Tire Sidewall Temp | 31.4°C (88.5°F) | 31.2°C (88.2°F) | 31.2°C (88.2°F) | 30.8°C (87.4°F) |
| San Angelo Test Facility Shop Floor Temp | 30.4°C (86.7°F) | 30.4°C (86.7°F) | 30.4°C (86.7°F) | 30.4°C (86.7°F) |

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

**TELLTALE EXTINGUISHMENT:**
**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |

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

**TEST RESULTS**

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

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: July 29, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 15 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

TEST DATE: July 30, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 12:54 pm | End: | 12:16 pm |
| Ambient Temperature: | Start: | 33.8°C (92.8°F) | End: | 34.6°C (94.3°F) |
| Odometer Reading: | Start: | 271.5 km (168.7 mi) | | |
| Fuel Level: | Start: | Full | | |
| Weather Conditions: | | Partly cloudy | | |

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

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

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| Pre-test cold measurements after ambient soak: Inflation Pressure | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) |
| Tire Sidewall Temp | 35.4°C (95.7°F) | 36.0°C (96.8°F) | 36.0°C (96.8°F) | 35.6°C (96.1°F) |

**DATA SHEET 3 (Sheet 16 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**VEHICLE WEIGHT:**

**Vehicle Ratings from Certification Label:**

GVWR: 1,635 kg (3,605 lbs)

GAWR (front): 896 kg (1,975 lbs)

GAWR (rear): 826 kg (1,820 lbs)

**Vehicle Capacity Weight:**

Vehicle Capacity Weight 383 kg (845 lbs)

**Measured Unloaded Vehicle Weight:**

| | | | |
|---|---|---|---|
| LF | 368 kg (811 lbs) | LR | 238 kg (524 lbs) |
| RF | 354 kg (781 lbs) | RR | 240 kg (530 lbs) |
| Front Axle | 722 kg (1,592 lbs) | Rear Axle | 478 kg (1,054 lbs) |

Total Vehicle 1,200 kg (2,646 lbs)

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

| | | | | | |
|---|---|---|---|---|---|
| LF | 428 kg (943 lbs) | | LR | 368 kg (811 lbs) | |
| RF | 422 kg (930 lbs) | | RR | 368 kg (812 lbs) | |
| Front Axle | 850 kg (1,873 lbs) | ( ≤ GAWR) | Rear Axle | 736 kg (1,623 lbs) | ( ≤ GAWR) |

Total Vehicle 1,586 kg (3,496 lbs) (not greater than GVWR)

Note: For scenarios E, F, G, and H, this Total Vehicle Weight measures the vehicle loaded to Gross Vehicle Weight Rating (GVWR), 386 kg (850 lbs) of driver, passenger, test equipment, and ballast. In order to achieve this load, the VCW was exceeded by five pounds.

**DATA SHEET 3 (Sheet 17 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO E – Left Rear Tire Deflation at GVWR**

TEST DATE: July 31, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 16 of 28) 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 vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 26.7°C (80.1°F) Vehicle cool down period: overnight | | | | |
| Inflation Pressure | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |
| Tire Sidewall Temp | 27.4°C (81.3°F) | 27.4°C (81.3°F) | 27.4°C (81.3°F) | 27.4°C (81.3°F) |
| San Angelo Test Facility Shop Floor Temp | 29.0°C (84.2°F) | 28.8°C (83.8°F) | 29.0°C (84.2°F) | 28.8°C (83.8°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 14:09:58 UTC | End: | 14:34:23 UTC |
| Odometer Reading: | Start: | 274.6 km (170.6 mi) | End: | 305.9 km (190.1 mi) |
| Ambient Temperature: | Start: | 26.7°C (80.1°F) | End: | 28.1°C (82.6°F) |
| Roadway Temperature: | Start: | 33.6°C (92.5°F) | End: | 36.8°C (98.2°F) |

Driving in first direction:

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

10:12 minutes (stopwatch time) 15.4 km (9.6 mi) distance

Driving in opposite direction:

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

10:22 minutes (stopwatch time) 15.9 km (9.9 mi) distance

**Max speed: 99.8 km/h (62.0 mph)**

**Total Driving Time: 20:31 minutes (VBox time)**

**DATA SHEET 3 (Sheet 18 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO E – Left Rear Tire Deflation at GVWR**

**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 | 253.8 kPa (36.8 psi) | 251.2 kPa (36.4 psi) | 254.1 kPa (36.9 psi) | 254.1 kPa (36.9 psi) |
| Tire Sidewall Temp | 42.4°C (108.3°F) | 40.2°C (104.4°F) | 39.4°C (102.9°F) | 40.0°C (104.0°F) |
| San Angelo Test Facility Shop Floor Temp | 29.4°C (84.9°F) | 29.6°C (85.3°F) | 29.8°C (85.6°F) | 29.4°C (84.9°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: ( )LF ( X )LR ( )RR ( )RF Inflation Pressure | | 165.5 kPa (24.0 psi) | | |

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

Time to Illumination:

Illumination in 19.0 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 19 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO E – Left Rear Tire Deflation at GVWR**

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)

**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: 31.0°C (66.6°F) Vehicle cool down period: 61 minutes | | | | |
| Inflation Pressure | 241.4 kPa (35.0 psi) | 157.4 kPa (22.8 psi) | 238.2 kPa (34.5 psi) | 241.1 kPa (35.0 psi) |
| Tire Sidewall Temp | 31.8°C (89.2°F) | 31.6°C (88.9°F) | 31.6°C (88.9°F) | 31.8°C (89.2°F) |
| San Angelo Test Facility Shop Floor Temp | 30.2°C (86.4°F) | 29.8°C (85.6°F) | 29.8°C (85.6°F) | 29.8°C (85.6°F) |

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

**TELLTALE EXTINGUISHMENT:**
**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |

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

**TEST RESULTS**

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

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: July 31, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 20 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO F – Right Front Tire Deflation at GVWR**

TEST DATE: July 31, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 16 of 28) 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 vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period:<br>Ambient Temperature: 34.7°C (94.5°F) Vehicle cool down period: 114 minutes | | | | |
| Inflation Pressure | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) |
| Tire Sidewall Temp | 34.2°C (93.6°F) | 34.4°C (93.9°F) | 33.6°C (92.5°F) | 33.6°C (92.5°F) |
| San Angelo Test Facility Shop Floor Temp | 31.8°C (89.2°F) | 32.0°C (89.6°F) | 31.8°C (89.2°F) | 31.8°C (89.2°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 17:56:42 UTC | End: | 18:21:32 UTC |
| Odometer Reading: | Start: | 307.4 km (191.0 mi) | End: | 338.4 km (210.3 mi) |
| Ambient Temperature: | Start: | 35.2°C (95.4°F) | End: | 35.5°C (95.9°F) |
| Roadway Temperature: | Start: | 53.4°C (128.1°F) | End: | 54.2°C (129.6°F) |

Driving in first direction:

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

10:10 minutes (stopwatch time) 15.3 km (9.5 mi) distance

Driving in opposite direction:

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

10:23 minutes (stopwatch time) 15.8 km (9.8 mi) distance

**Max speed: 97.8 km/h (60.8 mph)**

**Total Driving Time: 20:36 minutes (VBox time)**

**DATA SHEET 3 (Sheet 21 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO F – Right Front Tire Deflation at GVWR**

**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 | 253.8 kPa (36.8 psi) | 252.4 kPa (36.6 psi) | 256.7 kPa (37.2 psi) | 255.1 kPa (37.0 psi) |
| Tire Sidewall Temp | 48.8°C (119.8°F) | 45.2°C (113.4°F) | 47.4°C (117.3°F) | 47.4°C (117.3°F) |
| San Angelo Test Facility Shop Floor Temp | 32.4°C (90.3°F) | 32.6°C (90.7°F) | 32.4°C (90.3°F) | 32.4°C (90.3°F) |

**SYSTEM DETECTION PHASE:**

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

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

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

**Did the telltale illuminate?** ( X )YES ( )NO

Time to Illumination:

Illumination in 8.3 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 22 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO F – Right Front Tire Deflation at GVWR**

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)

**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: 36.6°C (97.9°F) Vehicle cool down period: 60 minutes | | | | |
| Inflation Pressure | 239.4 kPa (34.7 psi) | 237.8 kPa (34.5 psi) | 238.8 kPa (34.6 psi) | 156.0 kPa (22.6 psi) |
| Tire Sidewall Temp | 37.2°C (99.0°F) | 37.6°C (99.7°F) | 37.2°C (99.0°F) | 37.0°C (98.6°F) |
| San Angelo Test Facility Shop Floor Temp | 33.2°C (91.8°F) | 33.6°C (92.5°F) | 33.6°C (92.5°F) | 33.2°C (91.8°F) |

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

**TELLTALE EXTINGUISHMENT:**
**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) |

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 GVWR.

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: July 31, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 23 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO G – Left Front, Left Rear Tire Deflation at GVWR**

TEST DATE: August 1, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 16 of 28) 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 vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 26.6°C (79.9°F) Vehicle cool down period: overnight | | | | |
| Inflation Pressure | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.0 kPa (33.4 psi) |
| Tire Sidewall Temp | 28.8°C (83.8°F) | 28.6°C (83.5°F) | 29.0°C (84.2°F) | 29.2°C (84.6°F) |
| San Angelo Test Facility Shop Floor Temp | 29.6°C (85.3°F) | 29.6°C (65.8°F) | 29.6°C (85.3°F) | 29.6°C (85.3°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 13:28:46 UTC | End: | 13:53:47 UTC |
| Odometer Reading: | Start: | 340.4 km (211.5 mi) | End: | 371.6 km (230.9 mi) |
| Ambient Temperature: | Start: | 27.2°C (81.0°F) | End: | 28.1°C (82.6°F) |
| Roadway Temperature: | Start: | 30.8°C (87.4°F) | End: | 33.8°C (92.8°F) |

Driving in first direction:

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

10:12 minutes (stopwatch time) 15.4 km (9.6 mi) distance

Driving in opposite direction:

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

10:22 minutes (stopwatch time) 15.8 km (9.8 mi) distance

**Max speed: 97.8 km/h (60.8 mph)**

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

**DATA SHEET 3 (Sheet 24 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO G – Left Front, Left Rear Tire Deflation at GVWR**

**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 | 248.4 kPa (36.0 psi) | 247.1 kPa (35.8 psi) | 250.1 kPa (36.3 psi) | 248.3 kPa (36.0 psi) |
| Tire Sidewall Temp | 42.6°C (108.7°F) | 39.2°C (102.6°F) | 38.8°C (101.8°F) | 40.2°C (104.4°F) |
| San Angelo Test Facility Shop Floor Temp | 30.6°C (87.1°F) | 30.6°C (87.1°F) | 30.6°C (87.1°F) | 30.6°C (87.1°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: ( X )LF ( X )LR ( )RR ( )RF Inflation Pressure | 165.5 kPa (24.0 psi) | 165.5 kPa (24.0 psi) | | |

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

**Did the telltale illuminate?** ( X )YES ( )NO

Time to Illumination:

Illumination in 9.3 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 25 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO G – Left Front, Left Rear Tire Deflation at GVWR**

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)

**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: 29.9°C (85.8°F) Vehicle cool down period: 62 minutes | | | | |
| Inflation Pressure | 158.4 kPa (23.0 psi) | 157.7 kPa (22.9 psi) | 234.5 kPa (34.0 psi) | 235.8 kPa (34.2 psi) |
| Tire Sidewall Temp | 31.6°C (88.9°F) | 30.8°C (87.4°F) | 31.2°C (88.2°F) | 31.4°C (88.5°F) |
| San Angelo Test Facility Shop Floor Temp | 30.6°C (87.1°F) | 30.4°C (86.7°F) | 30.6°C (87.1°F) | 30.6°C (87.1°F) |

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

**TELLTALE EXTINGUISHMENT:**
**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |

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

**TEST RESULTS**

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

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: August 1, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 3 (Sheet 26 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO H – Left Front, Left Rear, Right Rear, and Right Front Tire Deflation at GVWR**

TEST DATE: August 1, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

Note: See Data Sheet 3 (Sheet 16 of 28) 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 vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: 31.7°C (89.1°F) Vehicle cool down period: 62 minutes | | | | |
| Inflation Pressure | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.0 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |
| Tire Sidewall Temp | 31.8°C (89.2°F) | 31.6°C (88.9°F) | 31.4°C (88.5°F) | 31.4°C (88.5°F) |
| San Angelo Test Facility Shop Floor Temp | 30.8°C (87.4°F) | 30.6°C (87.1°F) | 30.8°C (87.4°F) | 30.8°C (87.4°F) |

**SYSTEM CALIBRATION/LEARNING PHASE:**

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 16:30:41 UTC | End: | 16:55:39 UTC |
| Odometer Reading: | Start: | 373.0 km (231.8 mi) | End: | 404.1 km (251.1 mi) |
| Ambient Temperature: | Start: | 31.7°C (89.1°F) | End: | 32.9°C (91.2°F) |
| Roadway Temperature: | Start: | 46.2°C (115.2°F) | End: | 49.4°C (120.9°F) |

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 69

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 69

10:25 minutes (stopwatch time) 15.6 km (9.7 mi) distance

**Max speed: 100.6 km/h (62.5 mph)**

**Total Driving Time: 20:36 minutes (VBox time)**

**DATA SHEET 3 (Sheet 27 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO H – Left Front, Left Rear, Right Rear, and Right Front Tire Deflation at GVWR**

**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 | 252.1 kPa (36.6 psi) | 251.6 kPa (36.5 psi) | 254.9 kPa (37.0 psi) | 253.3 kPa (36.7 psi) |
| Tire Sidewall Temp | 50.0°C (122.0°F) | 45.2°C (113.4°F) | 45.6°C (114.1°F) | 46.8°C (116.2°F) |
| San Angelo Test Facility Shop Floor Temp | 32.6°C (90.7°F) | 32.4°C (90.3°F) | 32.2°C (90.0°F) | 32.4°C (90.3°F) |

**SYSTEM DETECTION PHASE:**

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

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

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop

**Did the telltale illuminate? ( X )YES ( )NO**

Time to Illumination:

Illumination in 5.7 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?
( )YES ( X )NO

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)

**DATA SHEET 3 (Sheet 28 of 28)**
**TPMS OPERATIONAL PERFORMANCE**

**SCENARIO H – Left Front, Left Rear, Right Rear, and Right Front Tire Deflation at GVWR**

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)

**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: 35.9°C (96.6°F) Vehicle cool down period: 60 minutes | | | | |
| Inflation Pressure | 156.0 kPa (22.6 psi) | 156.8 kPa (22.7 psi) | 155.1 kPa (22.5 psi) | 156.3 kPa (22.7 psi) |
| Tire Sidewall Temp | 35.8°C (96.4°F) | 36.4°C (97.5°F) | 35.8°C (96.4°F) | 36.0°C (96.8°F) |
| San Angelo Test Facility Shop Floor Temp | 32.8°C (91.0°F) | 33.2°C (91.8°F) | 33.0°C (91.4°F) | 32.8°C (91.0°F) |

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

**TELLTALE EXTINGUISHMENT:**
**RE-ADJUSTED TIRE INFLATION PRESSURES:**

| Execution Procedure | LF Tire | LR Tire | RR Tire | RF Tire |
|---|---|---|---|---|
| After cool down period: Re-adjusted Inflation Pressure: | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) | 230.1 kPa (33.4 psi) |

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

**TEST RESULTS**

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

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: August 1, 2008

APPROVED BY: Kenneth H. Yates

**DATA SHEET 4 (Sheet 1 of 2)**
**SCENARIO I – Malfunction Detection Test at LLVW**

TEST DATE: February 28, 2008 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C85107

| | | | | |
|---|---|---|---|---|
| Time: | Start: | 11:00 am | End: | 11:02 am |
| Odometer Reading: | Start: | 156.8 km (97.4 mi) | End: | 156.8 km (97.4 mi) |
| Ambient Temperature: | Start: | 32.7°C (90.9°F) | | |
| Fuel Level: | Start: | Full | | |

Note: See Data Sheet 3 (Sheet 2 of 28) 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: ECU-1G fuse (42 under dash fuse box) was removed to disable TPMS ECU. This also affects ABS, power steering, & electric fan.

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

***Combination Malfunction Telltale***

**Did the telltale illuminate? ( X )YES ( )NO**

Time to Illumination:

Telltale illuminated immediately. Driving was not required.

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

**DATA SHEET 4 (Sheet 2 of 2)**
**SCENARIO I – Malfunction Detection Test at LLVW**

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 | 61 | seconds |
| Time telltale remains illuminated (Verified for a minimum of 60 seconds) | 120+ | 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. Does the malfunction telltale extinguish after the engine is started? ( X ) YES ( )NO

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

**TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL)** **PASS**
ECU-1G fuse was removed to disable TPMS ECU.

**REMARKS**: None

RECORDED BY: Jack R. Stewart DATE: July 28, 2008

APPROVED BY: Kenneth H. Yates

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

TEST DATE: July 21, 2008 LAB: San Angelo Test Facility VEHICLE NHTSA NO: C85107

**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/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: Jack R. Stewart DATE: July 21, 2008

APPROVED BY: Kenneth H. Yates

## SECTION 4

## TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

TABLE 1 - INSTRUMENTATION AND EQUIPMENT INFORMATION LIST

| EQUIPMENT | DESCRIPTION | MODEL/ SERIAL NO | CAL. DATE | NEXT CAL. DATE |
|---|---|---|---|---|
| STOPWATCH | WESTCLOX QUARTZ STOPWATCH | NONE | N/A | N/A |
| VBOX RECORDING DEVICE | RACELOGIC VBOX III | SERIAL #030209 | 3/20/2008 | 3/20/2009 |
| AMBIENT TEMPERATURE GAUGE | FLUKE 50D K/J THERMOMETER | SERIAL #80840101 | 3/10/2008 | 3/10/2009 |
| LASER TEMPERATURE GAUGE (TIRES AND GROUND) | RAYNGER ST20 PRO NON-CONTACT INFRARED THERMOMETER | SERIAL #2065640101-0014 | 8/14/2007 | 8/14/2008 |
| AIR PRESSURE GAUGE | ASHCROFT GENERAL PURPOSE DIGITAL GAUGE | MODEL #D1005PS 02L 100 PSI SERIAL #20017398-01 | 12/11/2007 | 12/11/2008 |
| FLOOR SCALES (VEHICLE) | INTERCOMP SW DELUXE SCALES | PART #100156 SERIAL #27032382 | 8/14/2007 | 8/14/2008 |
| PLATFORM SCALE (BALLAST) | HOWE RICHARDSON | MODEL #6401 SERIAL #0181-5509-26 | 8/14/2007 | 8/14/2008 |

SECTION 5

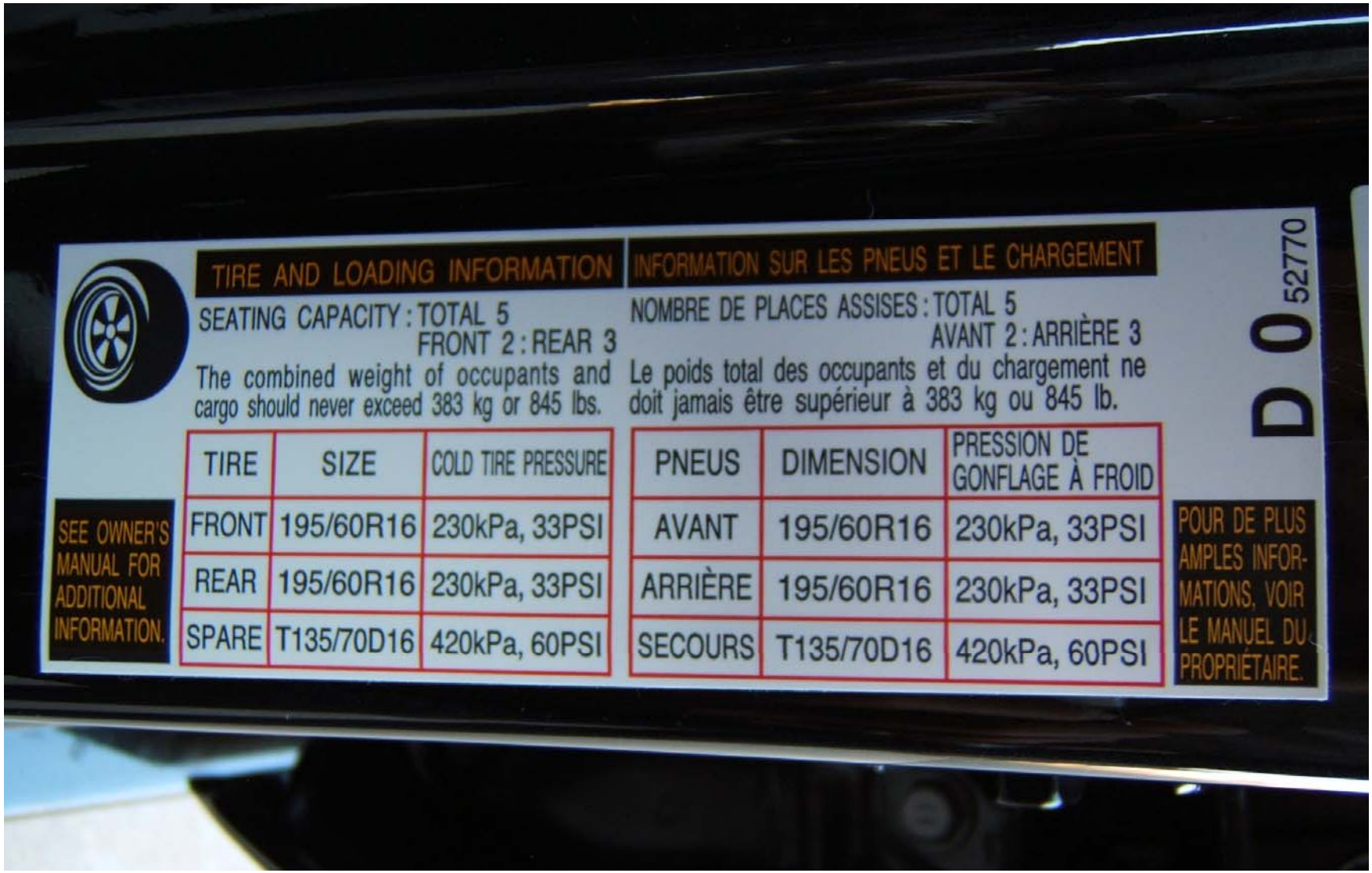
PHOTOGRAPHS


2008 SCION XD
NHTSA NO. C85107
FMVSS NO.138

FIGURE 5.1
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE


2008 SCION XD
NHTSA NO. C85107
FMVSS NO.138

FIGURE 5.2
VEHICLE CERTIFICATION LABEL




2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

FIGURE 5.3
VEHICLE PLACARD


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FIGURE 5.4
TIRE SHOWING BRAND


2008 SCION XD
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FMVSS NO. 138

FIGURE 5.5
TIRE SHOWING MODEL


2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

FIGURE 5.6
TIRE SHOWING SIZE, LOAD INDEX, AND SPEED RATING


2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

FIGURE 5.7
TIRE SHOWING DOT SERIAL NUMBER


2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

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


2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

FIGURE 5.9
TIRE SHOWING SIDEWALL / TREAD CONSTRUCTION

2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

FIGURE 5.10
RIM SHOWING VALVE STEM


2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

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


2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

FIGURE 5.12
RESET BUTTON


2008 SCION XD
NHTSA NO. C85107
FMVSS NO 138

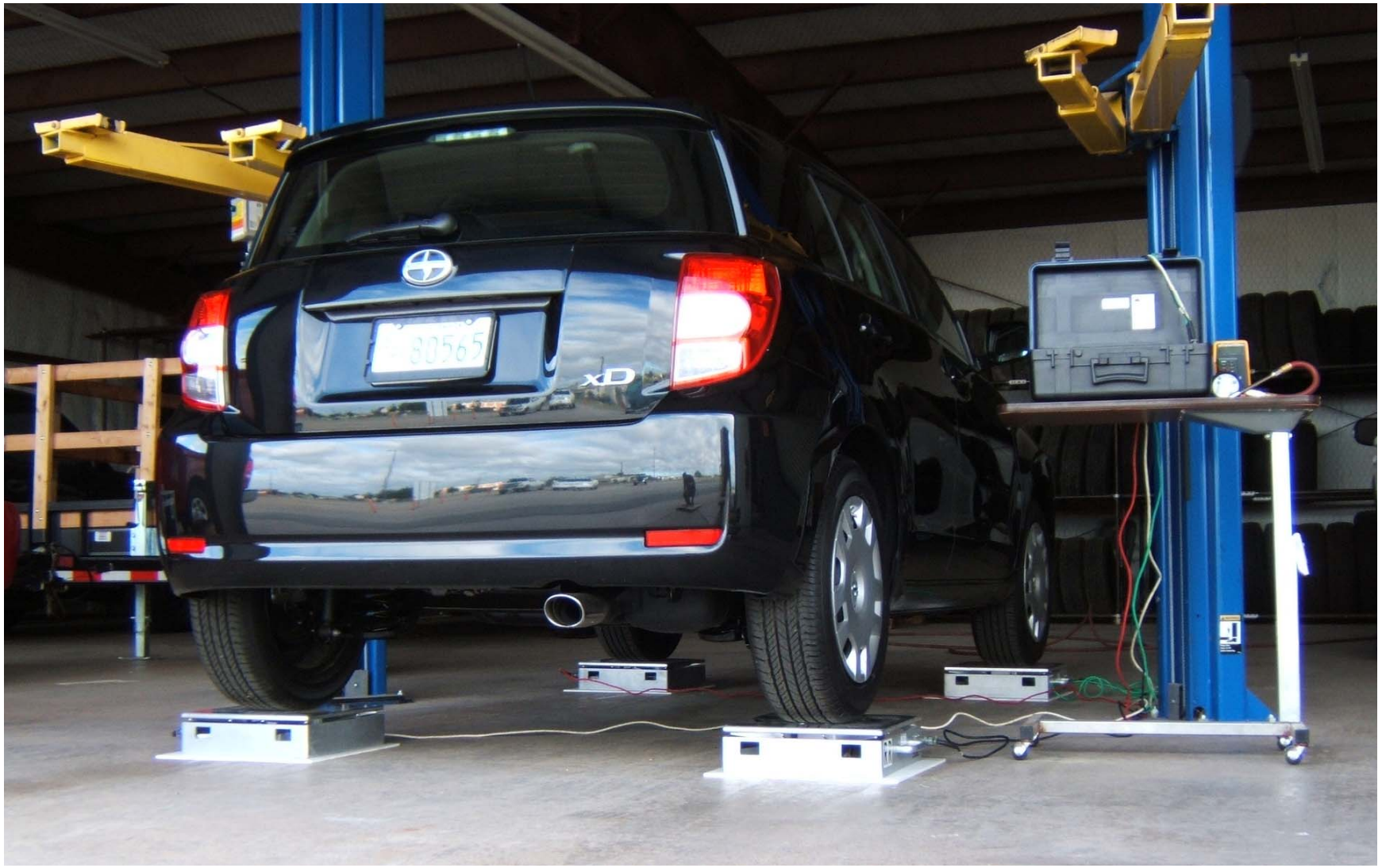
FIGURE 5.13
TEST INSTRUMENTATION ON VEHICLE

FIGURE 5.14
VEHICLE REAR SEAT BALLAST
FOR GVWR LOAD

2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138


2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

FIGURE 5.15
REAR OF VEHICLE BALLAST FOR GVWR




2008 SCION XD
NHTSA NO. C85107
FMVSS NO. 138

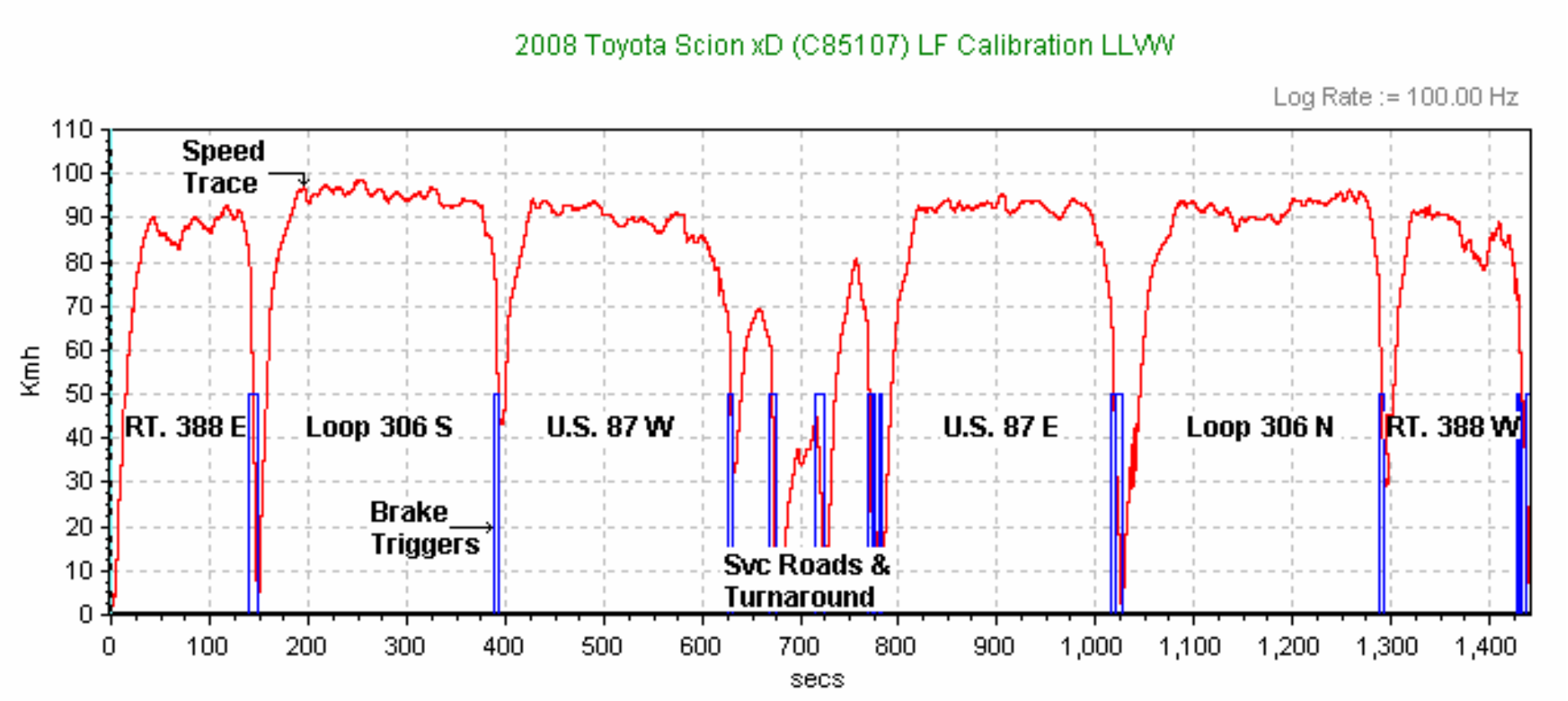
FIGURE 5.16
VEHICLE ON WEIGHT SCALES

SECTION 6

TEST PLOTS

| | |
|---|---|
| Scenario A: | Left Front Tire at LLVW |
| Test Date: | 7/24/08 |
| Data File Time: | 24:02 minutes |
| Cumulative Driving Time: | 20:39 minutes |
| Start Point: | GAFB North Gate |

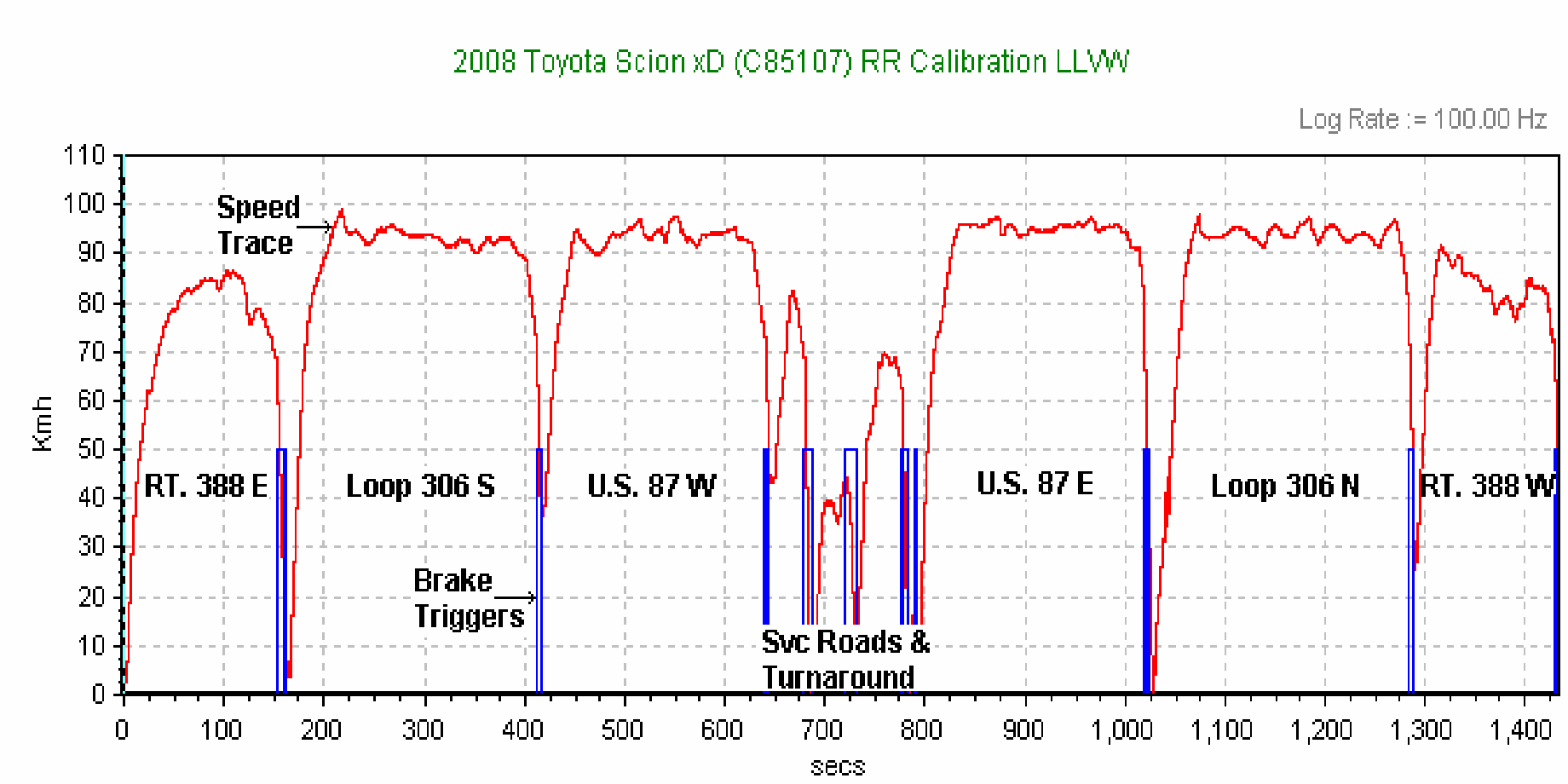
Calibration Phase:




LF Detection Phase: Telltale illumination in 3.7 seconds. Driving was not required.

| | |
|---|---|
| Scenario B: | Right Rear Tire at LLVW |
| Test Date: | 7/24/08 |
| Data File Time: | 23:54 minutes |
| Cumulative Driving Time: | 20:34 minutes |
| Start Point: | GAFB North Gate |

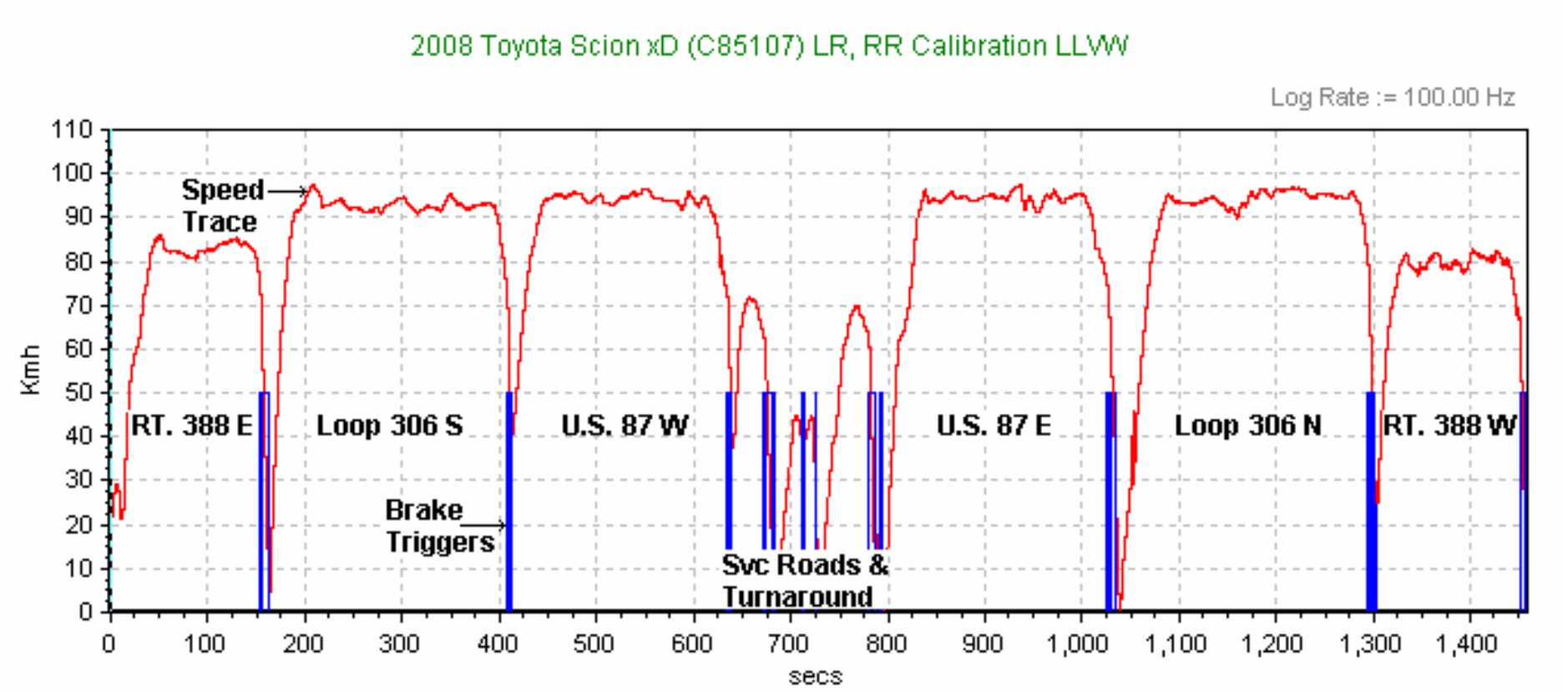
Calibration Phase:




RR Detection Phase: Telltale illumination in 9.5 seconds. Driving was not required.

Scenario C: Left Rear, Right Rear Tires at LLVW
Test Date: 7/28/08
Data File Time: 24:18 minutes
Cumulative Driving Time: 20:39 minutes
Start Point: GAFB North Gate

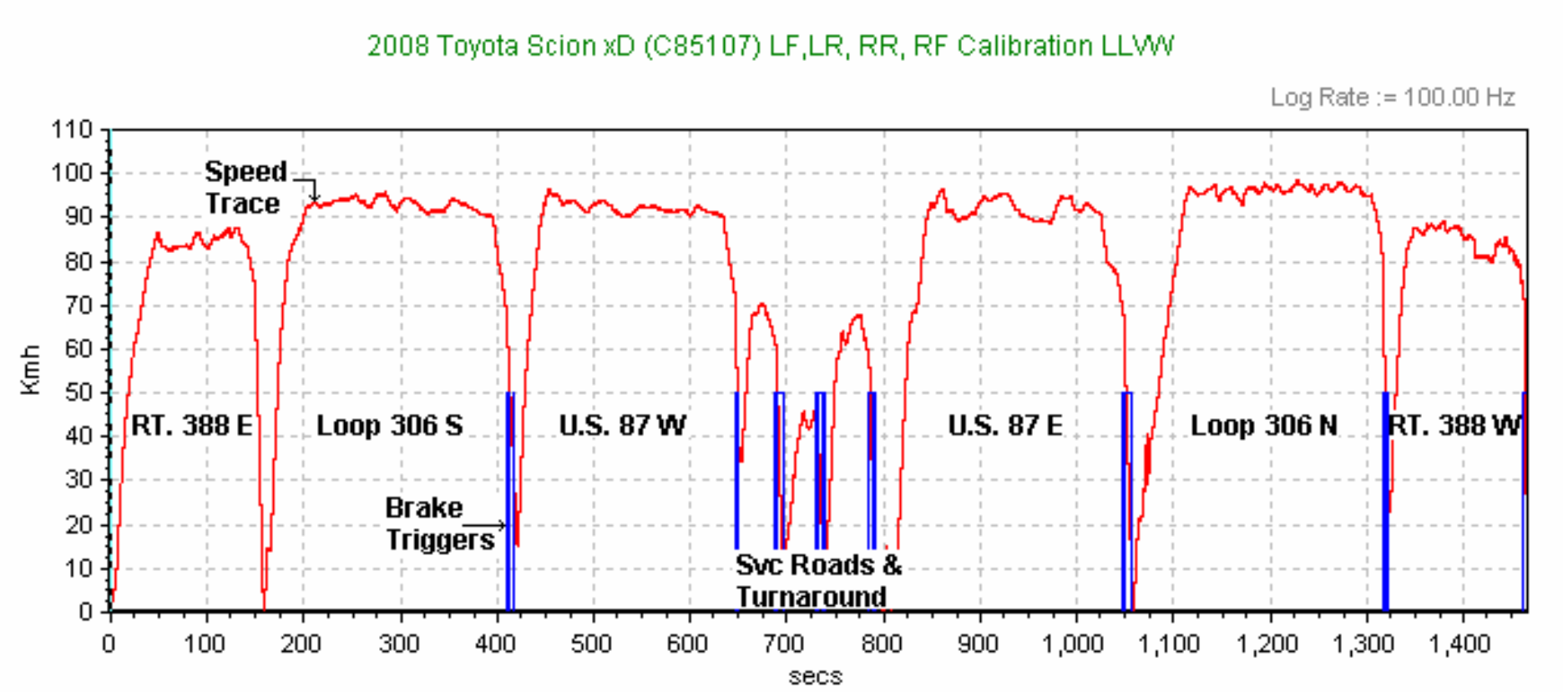
Calibration Phase:




LR, RR Detection Phase: Telltale illumination in 7.3 seconds. Driving was not required.

| | |
|---|---|
| Scenario D: | Left Front, Left Rear, Right Rear, Right Front Tire at LLVW |
| Test Date: | 7/29/08 |
| Data File Time: | 24:26 minutes |
| Cumulative Driving Time: | 20:43 minutes |
| Start Point: | GAFB North Gate |

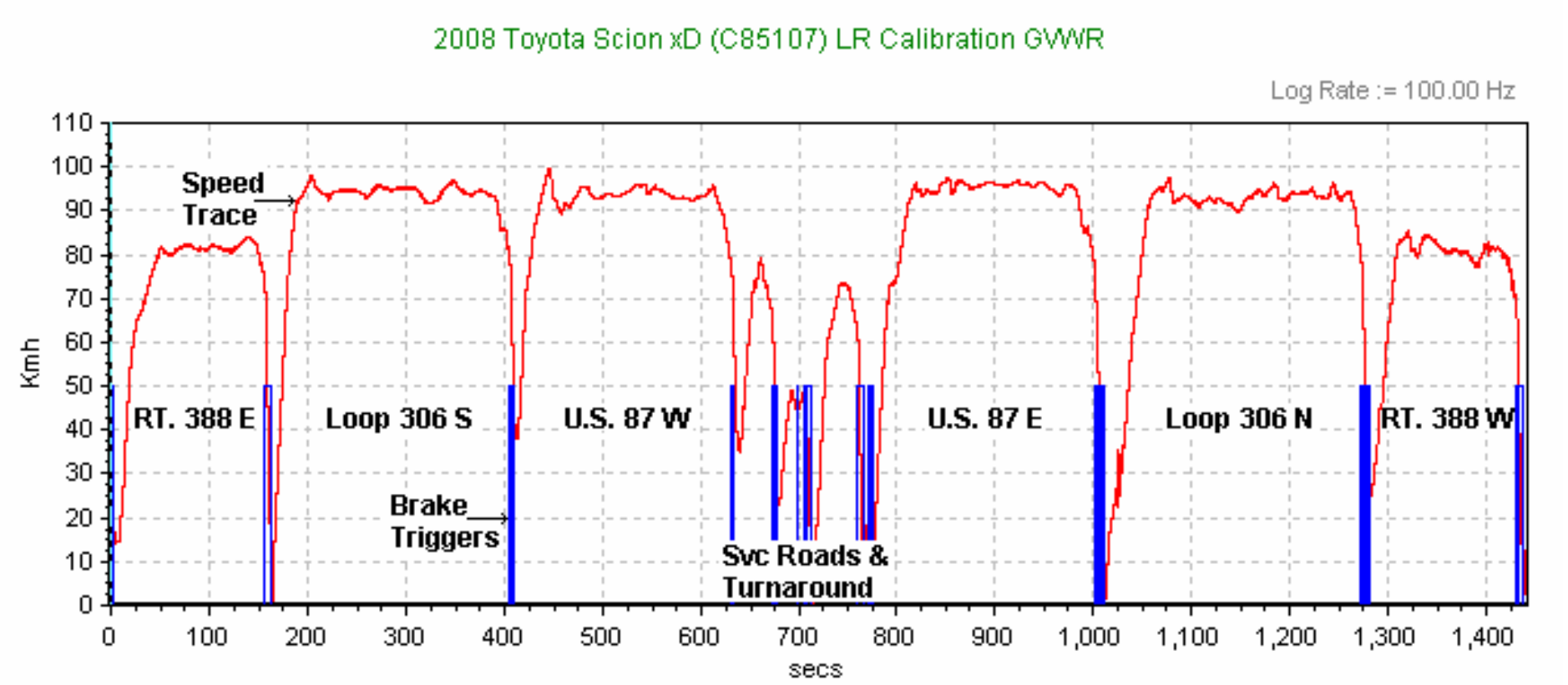
Calibration Phase:




LF, LR, RR, RF Detection Phase: Telltale illumination in 5.4 seconds. Driving was not required.

| | |
|---|---|
| Scenario E: | Left Rear Tire at GVWR |
| Test Date: | 7/31/08 |
| Data File Time: | 24:01 minutes |
| Cumulative Driving Time: | 20:31 minutes |
| Start Point: | GAFB North Gate |

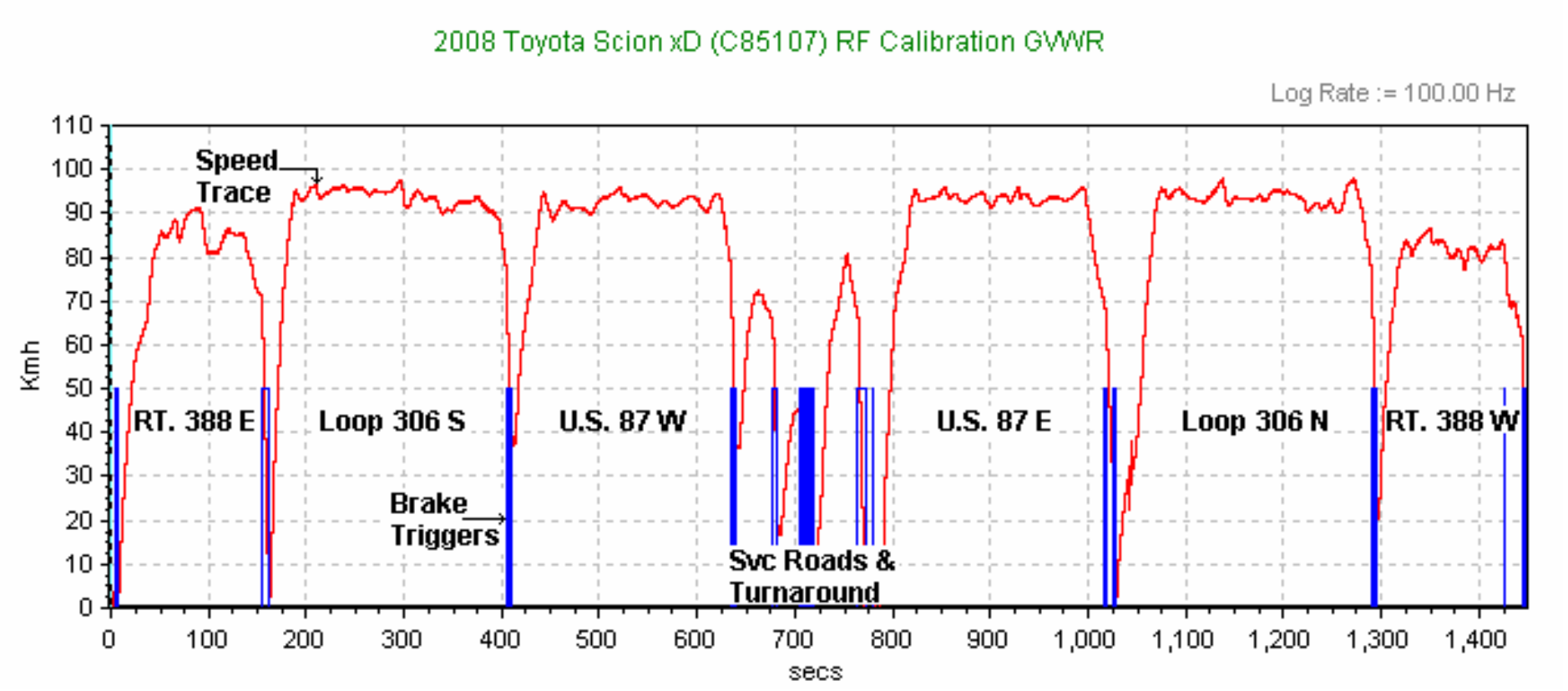
Calibration Phase:




LR Detection Phase: Telltale illumination in 19.0 seconds. Driving was not required.

| | |
|---|---|
| Scenario F: | Right Front Tire at GVWR |
| Test Date: | 7/31/08 |
| Data File Time: | 24:10 minutes |
| Cumulative Driving Time: | 20:36 minutes |
| Start Point: | GAFB North Gate |

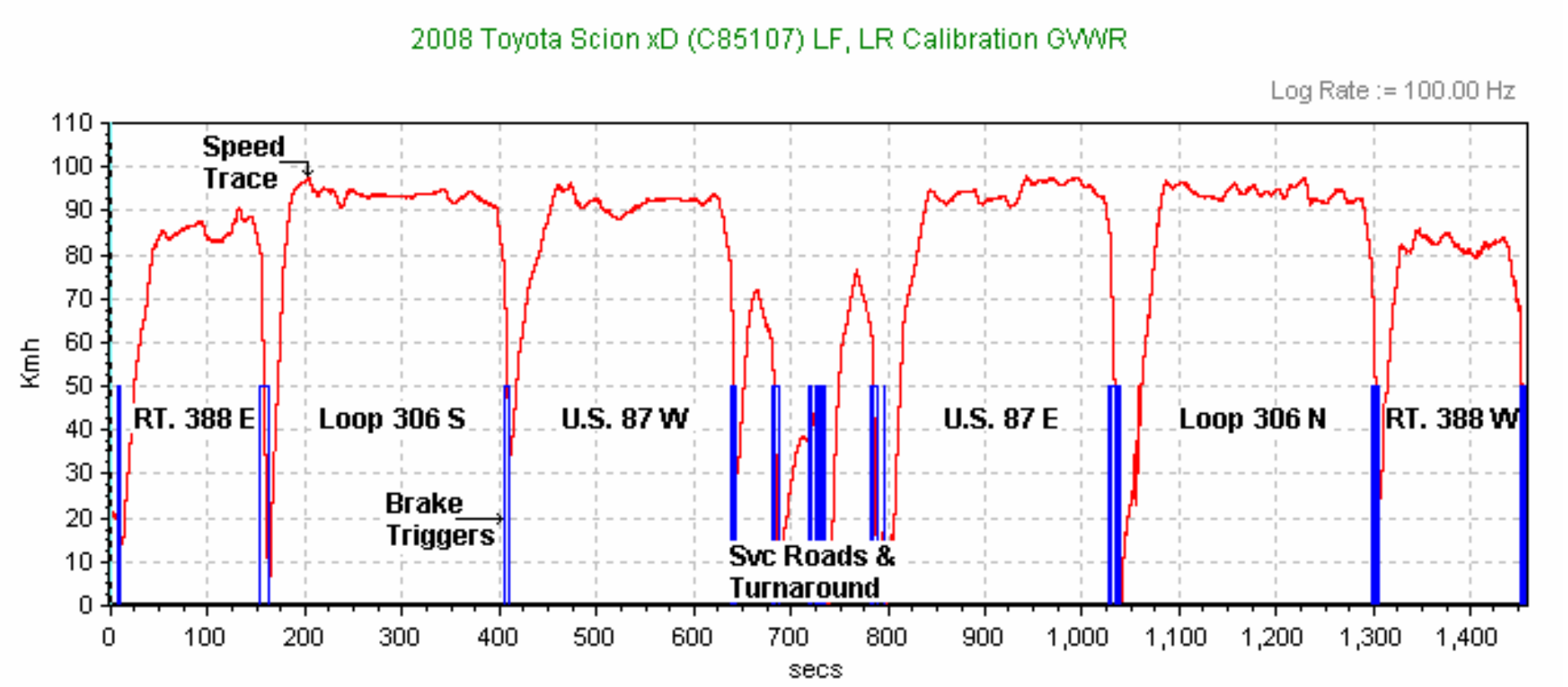
Calibration Phase:




RF Detection Phase: Telltale illumination in 8.3 seconds. Driving was not required

| | |
|---|---|
| Scenario G: | Left Front, Left Rear Tires at GVWR |
| Test Date: | 8/1/08 |
| Data File Time: | 24:18 minutes |
| Cumulative Driving Time: | 20:34 minutes |
| Start Point: | GAFB North Gate |

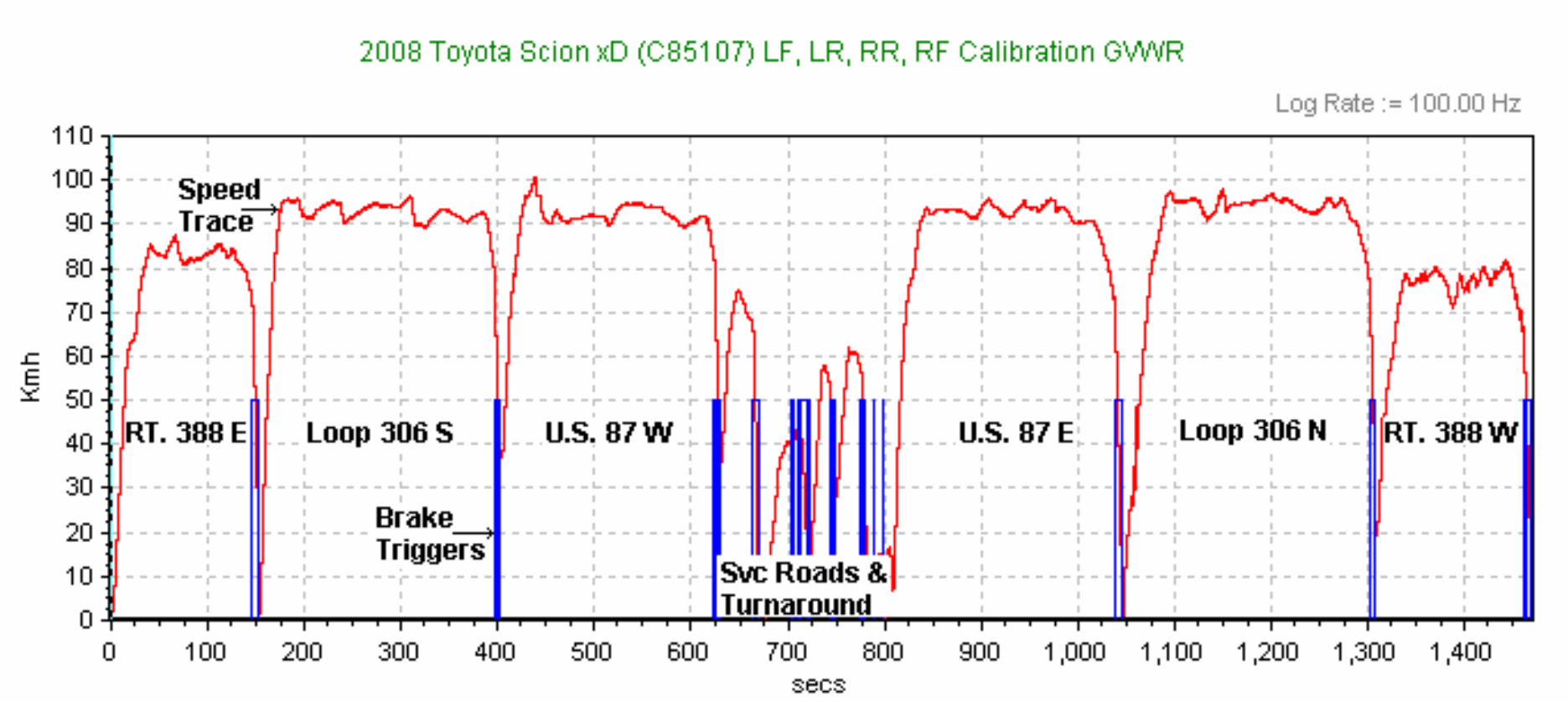
Calibration Phase:




LF, LR Detection Phase: Telltale illumination in 9.3 seconds. Driving was not required

| | |
|---|---|
| Scenario H: | Left Front, Left Rear, Right Rear, Right Front Tires at GVWR |
| Test Date: | 8/1/08 |
| Data File Time: | 24:31 minutes |
| Cumulative Driving Time: | 20:36 minutes |
| Start Point: | GAFB North Gate |

Calibration Phase:




LF, LR, RR, RF Detection Phase: Telltale illumination in 5.7 seconds. Driving was not required.