

REPORT NUMBER 138-STF-10-004

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

MAZDA MOTOR CORPORATION
2010 MAZDA 6
FOUR-DOOR PASSENGER CAR
NHTSA NO. CA5402

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



MAY 20, 2010

FINAL REPORT

PREPARED FOR

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ENFORCEMENT
NVS-220
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1200 NEW JERSEY AVENUE, SE
WASHINGTON, D.C. 20590

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Prepared By: Doris Beebe

Approved By: Kenneth H. Gata

Accepted By: John Linnert

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SECTION 1
INTRODUCTION

1.1 PURPOSE OF COMPLIANCE TEST

A 2010 Mazda 6 four-door passenger car was tested to determine if the vehicle was in compliance with the requirements of FMVSS 138. All tests were conducted in accordance with NHTSA/Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure TP-138-03 dated July 12, 2007.

1.2 TEST VEHICLE

The test vehicle was a 2010 Mazda 6 four-door passenger car. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: 1YVHZ8BH3A5M11305

B. NHTSA Number: CA5402

C. Manufacturer: Mazda Motor Corporation

D. Manufacture Date: 10/2009

1.3 TEST DATE

The test vehicle was tested during the time period April 27 through May 6, 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 Mazda 6. 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 the ABS unit wiring harness connector.

2.2 SUMMARY OF RESULTS

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

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

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

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

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. The wiring harness connector was disconnected from the under-hood ABS unit.

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 27 – May 6, 2010 LAB: U.S. DOT San Angelo Test Facility

VIN: 1YVHZ8BH3A5M11305 VEHICLE NHTSA NUMBER: CA5402

CERTIFICATION LABEL BUILD DATE: 10/2009

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

VEHICLE NHTSA NUMBER: CA5402 VIN: 1YVHZ8BH3A5M11305

CERTIFICATION LABEL BUILD DATE: 10/2009 ENGINE: 2.5 liter, 4 cylinder

MY/MAKE/MODEL/BODY STYLE: 2010 Mazda 6 four-door passenger car

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 192 km (119 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: Continental Automotive; receiver: no independent ECU unit – system uses keyless receiver and control module.

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:

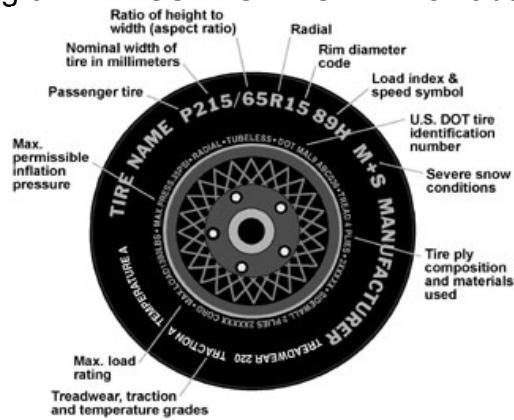
() None () Dedicated Telltale (X) Combination low tire pressure/malfunction telltale

**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	P205/65R16	220 kPa (32 psi)	Vehicle placard
Rear	P205/65R16	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: P205/65R16 94H

Manufacturer/Tire Name: Michelin Energy MXV4 S8

Sidewall Max Load Rating: 670 kg (1,477 lbs)

Max Inflation Pressure: 300 kPa (44 psi)

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

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

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

Are all installed tires the same as designated by the vehicle manufacturer on the vehicle placard? 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	<u>220 kPa</u> x .75 = <u>165</u> kPa	<u>220 kPa</u> x .75 = <u>165</u> 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 <u>300</u> kPa (44 psi) <u>140</u> kPa (20 psi)	(X) P-metric-Standard load () P-metric-Extra Load Load Range () C, () D, or () E (X) Maximum or () Rated <u>300</u> kPa (44 psi) <u>140</u> kPa (20 psi)
(C) Telltale Warning Activation Pressure is the higher of Part (A) or (B)	<u>165</u> kPa (24 psi)	<u>165</u> kPa (24 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	<u>158</u> kPa (23 psi)	<u>158</u> 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 27, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: April 27, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

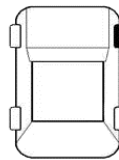
TPMS Low Tire Pressure Warning Telltale

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: In center of tachometer in instrument cluster

Identify Telltale Symbol Used (check box above figure).



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 3 (Sheet 1 of 22)
TPMS OPERATIONAL PERFORMANCE

TEST DATE: April 27, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

Time: Start: 10:32 am End: 12:31 pm
 Ambient Temperature: Start: 19.5°C (67.1°F) End: 21.5°C (70.7°F)
 Odometer Reading: Start: 192 km (119 mi)
 Fuel Level: Start: Full
 Weather Conditions: Sunny, 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	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	20.8°C (69.4°F)	20.8°C (69.4°F)	21.0°C (69.8°F)	21.4°C (70.5°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 1,969 kg (4,340 lbs)

GAWR (front): 1,037 kg (2,286 lbs)

GAWR (rear): 935 kg (2,062 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight : 385 kg (850 lbs)

Measured Unloaded Vehicle Weight:

LF	<u>441 kg (973 lbs)</u>	LR	<u>293 kg (645 lbs)</u>
RF	<u>436 kg (961 lbs)</u>	RR	<u>303 kg (668 lbs)</u>
Front		Rear	
Axle	<u>877 kg (1,934 lbs)</u>	Axle	<u>596 kg (1,313 lbs)</u>
Total Vehicle <u>1,473 kg (3,247 lbs)</u>			

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

LF	<u>489 kg (1,077 lbs)</u>	LR	<u>338 kg (744 lbs)</u>
RF	<u>482 kg (1,063 lbs)</u>	RR	<u>344 kg (759 lbs)</u>
Front		Rear	
Axle	<u>971 kg (2,140 lbs) (≤ GAWR)</u>	Axle	<u>682 kg (1,503 lbs) (≤ GAWR)</u>
Total Vehicle <u>1,653 kg (3,643 lbs) (not greater than GVWR)</u>			

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 27, 2010

APPROVED BY: Kenneth H. Yates

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

SCENARIO A – Left Rear Tire Deflation at LLVW

TEST DATE: April 28, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

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: <u>14.5°C (58.1°F)</u> Vehicle cool down period: <u>overnight</u>				
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	15.2°C (59.4°F)	15.2°C (59.4°F)	15.4°C (59.7°F)	15.4°C (59.7°F)
San Angelo Test Facility Shop Floor Temp	17.2°C (63.0°F)	17.4°C (63.3°F)	17.4°C (63.3°F)	17.6°C (63.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 13:46:21 UTC End: 14:11:46 UTC
 Trip Odometer Reading: Start: 0.6 km (0.4 mi) End: 32.2 km (20.0 mi)
 Ambient Temperature: Start: 14.5°C (58.1°F) End: 16.4°C (61.5°F)
 Roadway Temperature: Start: 17.6°C (63.7°F) End: 19.6°C (67.3°F)

Driving in first direction:

Goodfellow Air Force
 Starting point: Base (GAFB) north gate Direction: see chart, page 60
10:09 minutes (stopwatch time) 15.6 km (9.7 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 60
10:25 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Max speed: 100.4 km/h (62.4 mph)

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

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

SCENARIO A – Left Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	241.9 kPa (35.1 psi)	239.1 kPa (34.7 psi)	239.7 kPa (34.8 psi)	241.5 kPa (35.0 psi)
Tire Sidewall Temp	32.2°C (90.0°F)	28.4°C (83.1°F)	25.8°C (78.4°F)	27.4°C (81.3°F)
San Angelo Test Facility Shop Floor Temp	16.8°C (62.2°F)	16.6°C (61.9°F)	17.2°C (63.0°F)	16.8°C (62.2°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: ()LF (X)LR ()RR ()RF Inflation Pressure		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 5 of 22)
TPMS OPERATIONAL PERFORMANCE**

SCENARIO A – Left Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>19.3°C (66.7°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	229.2 kPa (33.2 psi)	151.0 kPa (21.9 psi)	226.6 kPa (32.9 psi)	229.4 kPa (33.3 psi)
Tire Sidewall Temp	22.2°C (72.0°F)	20.6°C (69.1°F)	20.8°C (69.4°F)	23.0°C (73.4°F)
San Angelo Test Facility Shop Floor Temp	18.4°C (65.1°F)	18.2°C (64.8°F)	18.6°C (65.5°F)	18.6°C (65.5°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?

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 NO

Starting point: San Angelo Test Facility shop

1:20 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Left rear tire was deflated at LLVW.

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: April 28, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: April 28, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

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: <u>22.2°C (72.0°F)</u> Vehicle cool down period: <u>62</u> 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	22.8°C (73.0°F)	22.4°C (72.3°F)	22.4°C (72.3°F)	22.8°C (73.0°F)
San Angelo Test Facility Shop Floor Temp	19.6°C (67.3°F)	19.6°C (67.3°F)	19.8°C (67.6°F)	19.6°C (67.3°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 16:42:59 UTC End: 17:08:26 UTC
 Trip Odometer Reading: Start: 0.6 km (0.4 mi) End: 32.3 km (20.1 mi)
 Ambient Temperature: Start: 22.2°C (72.0°F) End: 23.5°C (74.3°F)
 Roadway Temperature: Start: 35.4°C (95.7°F) End: 36.2°C (97.2°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 61
10:11 minutes (stopwatch time) 15.8 km (9.8 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 61
10:36 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Max speed: 99.8 km/h (62.0 mph)

Total Driving Time: 20:46 minutes (VBox time)

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	240.1 kPa (34.8 psi)	238.7 kPa (34.6 psi)	239.9 kPa (34.8 psi)	240.3 kPa (34.9 psi)
Tire Sidewall Temp	39.0°C (102.2°F)	35.4°C (95.7°F)	34.2°C (93.6°F)	35.8°C (96.4°F)
San Angelo Test Facility Shop Floor Temp	19.6°C (67.3°F)	19.6°C (67.3°F)	19.6°C (67.3°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: ()LF ()LR (X)RR (X)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 35 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 – Right Rear, Right Front Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>25.4°C (77.7°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	225.6 kPa (32.7 psi)	224.8 kPa (32.6 psi)	148.4 kPa (21.5 psi)	149.6 kPa (21.7 psi)
Tire Sidewall Temp	27.6°C (81.7°F)	26.2°C (79.2°F)	26.4°C (79.5°F)	29.2°C (84.6°F)
San Angelo Test Facility Shop Floor Temp	21.4°C (70.5°F)	21.4°C (70.5°F)	21.6°C (70.9°F)	21.4°C (70.5°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?

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 NO

Starting point: San Angelo Test Facility shop

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

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Right rear and right front tires were deflated at LLVW.

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: April 28, 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 29, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

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: <u>18.3°C (64.9°F)</u> Vehicle cool down period: <u>overnight</u> 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	18.4°C (65.1°F)	18.6°C (65.5°F)	18.6°C (65.5°F)	18.8°C (65.8°F)
San Angelo Test Facility Shop Floor Temp	19.8°C (67.6°F)	19.6°C (67.3°F)	19.8°C (67.6°F)	19.8°C (67.6°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 13:15:21 UTC End: 13:39:50 UTC
Trip Odometer Reading: Start: 60.2 km (37.4 mi) End: 91.9 km (57.1 mi)
Ambient Temperature: Start: 18.3°C (64.9°F) End: 18.3°C (64.9°F)
Roadway Temperature: Start: 18.8°C (65.8°F) End: 20.2°C (68.4°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 62
10:15 minutes (stopwatch time) 15.6 km (9.7 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 62
10:26 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 101.6 km/h (63.1 mph)

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

DATA SHEET 3 (Sheet 10 of 22)
TPMS OPERATIONAL PERFORMANCE
SCENARIO C – Left Front, Left Rear, Right Rear,
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	238.0 kPa (34.5 psi)	235.8 kPa (34.2 psi)	237.1 kPa (34.4 psi)	237.6 kPa (34.5 psi)
Tire Sidewall Temp	31.8°C (89.2°F)	28.2°C (82.8°F)	28.2°C (82.8°F)	29.8°C (85.6°F)
San Angelo Test Facility Shop Floor Temp	19.4°C (66.9°F)	19.8°C (67.6°F)	19.8°C (67.6°F)	20.0°C (68.0°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR (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 14 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: <u>21.3°C (70.3°F)</u> Vehicle cool down period: <u>77</u> minutes				
Inflation Pressure	150.3 kPa (21.8 psi)	151.5 kPa (22.0 psi)	151.2 kPa (21.9 psi)	151.7 kPa (22.0 psi)
Tire Sidewall Temp	22.6°C (72.7°F)	22.0°C (71.6°F)	22.2°C (72.0°F)	23.6°C (74.5°F)
San Angelo Test Facility Shop Floor Temp	21.0°C (69.8°F)	21.0°C (69.8°F)	20.8°C (69.4°F)	21.2°C (70.2°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?
 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 NO

Starting point: San Angelo Test Facility shop

1:02 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Left front, left rear, right rear, and right front tires were deflated at LLVW.

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: April 29, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: April 30, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

Time: Start: 6:55 am End: 8:58 am

Ambient Temperature: Start: 21.7°C (71.1°F) End: 21.7°C (71.1°F)

Odometer Reading: Start: 319 km (198 mi)

Fuel Level: Start: Full

Weather Conditions: Sunny

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	22.4°C (72.3°F)	22.2°C (72.0°F)	22.4°C (72.3°F)	22.2°C (72.0°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 1,969 kg (4,340 lbs)

GAWR (front): 1,037 kg (2,286 lbs)

GAWR (rear): 935 kg (2,062 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 385 kg (850 lbs)

Measured Unloaded Vehicle Weight:

LF	<u>456 kg (1,005 lbs)</u>	LR	<u>280 kg (618 lbs)</u>
RF	<u>421 kg (928 lbs)</u>	RR	<u>316 kg (697 lbs)</u>
Front		Rear	
Axle	<u>877 kg (1,933 lbs)</u>	Axle	<u>596 kg (1,315 lbs)</u>
Total Vehicle <u>1,473 kg (3,248 lbs)</u>			

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

LF	<u>503 kg (1,109 lbs)</u>	LR	<u>427 kg (942 lbs)</u>
RF	<u>494 kg (1,090 lbs)</u>	RR	<u>434 kg (957 lbs)</u>
Front		Rear	
Axle	<u>997 kg (2,199 lbs)</u> (≤ GAWR)	Axle	<u>861 kg (1,899 lbs)</u> (≤ GAWR)
Total Vehicle <u>1,858 kg (4,098 lbs)</u> (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), 385 kg (850 lbs) of driver, passenger, test equipment, and ballast.

RECORDED BY: Todd P. Groghan

DATE: April 30, 2010

APPROVED BY: Kenneth H. Yates

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

SCENARIO D – Right Front Tire Deflation at UVW + VCW

TEST DATE: April 30, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

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: <u>20.8°C (69.4°F)</u> Vehicle cool down period: <u>overnight</u>				
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)	21.6°C (70.9°F)	21.6°C (70.9°F)	21.4°C (70.5°F)
San Angelo Test Facility Shop Floor Temp	22.4°C (72.3°F)	22.6°C (72.7°F)	22.8°C (73.0°F)	21.8°C (71.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 14:22:39 UTC End: 14:47:32 UTC
 Trip Odometer Reading: Start: 94.3 km (58.6 mi) End: 126.0 km (78.3 mi)
 Ambient Temperature: Start: 20.8°C (69.4°F) End: 21.8°C (71.2°F)
 Roadway Temperature: Start: 26.8°C (80.2°F) End: 28.4°C (83.1°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
10:28 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 99.8 km/h (62.0 mph)

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

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

SCENARIO D – Right Front Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	239.1 kPa (34.7 psi)	239.1 kPa (34.7 psi)	239.4 kPa (34.7 psi)	239.6 kPa (34.8 psi)
Tire Sidewall Temp	39.0°C (102.2°F)	36.8°C (98.2°F)	34.4°C (93.9°F)	35.0°C (95.0°F)
San Angelo Test Facility Shop Floor Temp	22.4°C (72.3°F)	22.6°C (72.7°F)	22.2°C (72.0°F)	22.4°C (72.3°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				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 16 of 22)
TPMS OPERATIONAL PERFORMANCE**

SCENARIO D – Right Front Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>24.4°C (75.9°F)</u> Vehicle cool down period: <u>74</u> minutes				
Inflation Pressure	226.7 kPa (32.9 psi)	224.8 kPa (32.6 psi)	225.1 kPa (32.6 psi)	150.4 kPa (21.8 psi)
Tire Sidewall Temp	29.4°C (84.9°F)	27.2°C (81.0°F)	26.2°C (79.2°F)	28.0°C (82.4°F)
San Angelo Test Facility Shop Floor Temp	23.6°C (74.5°F)	23.6°C (74.5°F)	23.4°C (74.1°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?

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 NO

Starting point: San Angelo Test Facility shop

0:53 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Right front tire was deflated at UVW + VCW.

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: April 30, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: April 30, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

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: <u>25.4°C (77.7°F)</u> Vehicle cool down period: <u>97</u> 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	27.2°C (81.0°F)	25.8°C (78.4°F)	25.8°C (78.4°F)	26.8°C (80.2°F)
San Angelo Test Facility Shop Floor Temp	24.0°C (75.2°F)	24.2°C (75.6°F)	24.0°C (75.2°F)	23.8°C (74.8°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 18:08:58 UTC End: 18:34:02 UTC
 Trip Odometer Reading: Start: 127.8 km (79.4 mi) End: 159.5 km (99.1 mi)
 Ambient Temperature: Start: 25.4°C (77.7°F) End: 26.3°C (79.3°F)
 Roadway Temperature: Start: 45.2°C (113.4°F) End: 46.0°C (114.8°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 64
10:09 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
10:25 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 104.8 km/h (65.1 mph)

Total Driving Time: 20:32 minutes (VBox time)

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

SCENARIO E – Left Rear, 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	238.9 kPa (34.6 psi)	241.0 kPa (35.0 psi)	242.7 kPa (35.2 psi)	239.6 kPa (34.8 psi)
Tire Sidewall Temp	42.6°C (108.7°F)	40.4°C (104.7°F)	41.0°C (105.8°F)	41.2°C (106.2°F)
San Angelo Test Facility Shop Floor Temp	24.8°C (76.6°F)	24.8°C (76.6°F)	25.0°C (77.0°F)	24.6°C (76.3°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 (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 37 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 Rear, 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: <u>26.4°C (79.5°F)</u> Vehicle cool down period: <u>61</u> minutes				
Inflation Pressure	224.2 kPa (32.5 psi)	148.2 kPa (21.5 psi)	147.0 kPa (21.3 psi)	225.1 kPa (32.6 psi)
Tire Sidewall Temp	31.6°C (88.9°F)	30.8°C (87.4°F)	29.0°C (84.2°F)	30.8°C (87.4°F)
San Angelo Test Facility Shop Floor Temp	25.2°C (77.4°F)	25.2°C (77.4°F)	25.4°C (77.7°F)	24.8°C (76.6°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?

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 NO

Starting point: San Angelo Test Facility shop

0:43 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

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

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: April 30, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: May 3, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

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: <u>15.6°C (60.1°F)</u> Vehicle cool down period: <u>overnight</u> 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	17.0°C (62.6°F)	17.0°C (62.6°F)	16.8°C (62.2°F)	17.2°C (63.0°F)
San Angelo Test Facility Shop Floor Temp	18.6°C (65.5°F)	18.6°C (65.5°F)	18.6°C (65.5°F)	18.8°C (65.8°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 13:20:58 UTC End: 13:45:50 UTC
 Trip Odometer Reading: Start: 161.7 km (100.5 mi) End: 193.4 km (120.2 mi)
 Ambient Temperature: Start: 15.6°C (60.1°F) End: 16.6°C (61.9°F)
 Roadway Temperature: Start: 19.4°C (66.9°F) End: 17.6°C (63.7°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 65
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 65
10:22 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Max speed: 98.9 km/h (61.5 mph)

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

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	237.0 kPa (34.4 psi)	237.5 kPa (34.4 psi)	238.9 kPa (34.6 psi)	237.7 kPa (34.5 psi)
Tire Sidewall Temp	27.4°C (81.3°F)	25.6°C (78.1°F)	26.2°C (79.2°F)	27.2°C (81.0°F)
San Angelo Test Facility Shop Floor Temp	17.4°C (63.3°F)	17.6°C (63.7°F)	17.6°C (63.7°F)	17.6°C (63.7°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 ()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 13 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 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: <u>16.6°C (61.9°F)</u> Vehicle cool down period: <u>61</u> minutes				
Inflation Pressure	149.6 kPa (21.7 psi)	149.5 kPa (21.7 psi)	148.2 kPa (21.5 psi)	225.4 kPa (32.7 psi)
Tire Sidewall Temp	21.4°C (70.5°F)	20.4°C (68.7°F)	18.8°C (65.8°F)	21.2°C (70.2°F)
San Angelo Test Facility Shop Floor Temp	19.2°C (66.6°F)	19.4°C (66.9°F)	19.2°C (66.6°F)	19.2°C (66.6°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?

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 NO

Starting point: San Angelo Test Facility shop

0:45 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

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

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: May 3, 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 28, 2010

LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

Time:	Start:	<u>18:48:16 UTC</u>	End:	<u>19:00:35 UTC</u>
Trip Odometer Reading:	Start:	<u>34.6 km (21.5 mi)</u>	End:	<u>49.4 km (30.7 mi)</u>
Ambient Temperature:	Start:	<u>25.6°C (78.1°F)</u>	End:	<u>25.6°C (78.1°F)</u>
Roadway Temperature:	Start:	<u>43.2°C (109.8°F)</u>	End:	<u>41.2°C (106.2°F)</u>
Fuel Level:	Start:	<u>Full</u>		

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 5.16)

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 66

14.8 km (9.2 mi) distance

Max speed: 99.9 km/h (62.1 mph)

Total Driving Time: 9:08 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? YES NO (fail)

Time it takes before telltale starts flashing 3 seconds

Time telltale remains flashing 76 seconds

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

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

Extinguishment Phase:

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

Starting point: San Angelo Test Facility shop

 2:15 minutes (stopwatch time – non-cumulative) 0.2 km (0.1 mi) distance

COMBINATION MALFUNCTION TELLTALE EXTINGUISHED: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (FAIL)

TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL) PASS

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

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: April 28, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: May 6, 2010

LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5402

Time:	Start: <u>1:07 pm</u>	End: <u>1:32 pm</u>
Odometer Reading:	Start: <u>195.1 km (121.2 mi)</u>	End: <u>195.1 km (121.2 mi)</u>
Ambient Temperature:	Start: <u>30.7°C (87.3°F)</u>	End: <u>30.7°C (87.3°F)</u>
Roadway Temperature:	Start: <u>NA</u>	End: <u>NA</u>
Fuel Level:	Start: <u>Full</u>	

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

TPMS MALFUNCTION TELLTALE:

() Dedicated stand-alone () Combination low tire pressure warning/malfunction telltale

METHOD OF MALFUNCTION SIMULATION:

Describe method of malfunction simulation: Wiring harness connector was disconnected from under-hood ABS unit. (See Figure 5.17)

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:

() YES () NO

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

TEST
DATE: April 27, 2010

LAB: San Angelo Test Facility

VEHICLE
NHTSA NO: CA5402

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:

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 N/A

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

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

The above statement in the English language is provided verbatim in owner's manual:

YES NO 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:

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 27, 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 MAZDA 6
NHTSA NO. CA5402
FMVSS NO.138

FIGURE 5.1
¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE

MFD. BY AUTO ALLIANCE INTERNATIONAL, INC.
FOR **MAZDA MOTOR CORPORATION**
MADE IN U.S.A.

DATE: 10/09

GVWR: 4340LB/1969KG

FRONT GAWR: 2286LB/1037KG

REAR GAWR: 2062LB/935KG

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR
VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS
IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: 1YVHZ8BH3A5M11305

TYPE: Passenger Car



EXT PNT:	36	Y			RC:		DSO:
WB	BRK	INT TR	TP/PS	R	AXLE	TR	SPR
				ZFP			▽F85B-1520472-AB

2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO.138

FIGURE 5.2
VEHICLE CERTIFICATION LABEL



2010 MAZDA 6
 NHTSA NO. CA5402
 FMVSS NO. 138

FIGURE 5.3
 VEHICLE PLACARD



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.4
TIRE SHOWING BRAND



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.5
TIRE SHOWING MODEL, SIZE,
AND LOAD INDEX / SPEED RATING



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.6
TIRE SHOWING DOT SERIAL NUMBER



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.7
TIRE SHOWING MAX LOAD RATING
AND MAX COLD INFLATION PRESSURE



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.8
TIRE SHOWING SIDEWALL / TREAD CONSTRUCTION



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.9
RIM SHOWING TPMS SENSOR AND RIM
CONTOUR FOR FULL WIDTH OF CROSS SECTION



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.10
DISPLAY SHOWING COMBINATION LOW TIRE
PRESSURE WARNING/TPMS MALFUNCTION WARNING TELLTALE



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO 138

FIGURE 5.11
TEST INSTRUMENTATION INSTALLED IN VEHICLE



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.12
VEHICLE REAR SEAT BALLAST FOR LLVW LOAD



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.13
VEHICLE REAR SEAT BALLAST FOR UVW + VCW LOAD



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.14
VEHICLE CARGO AREA BALLAST FOR UVW + VCW LOAD



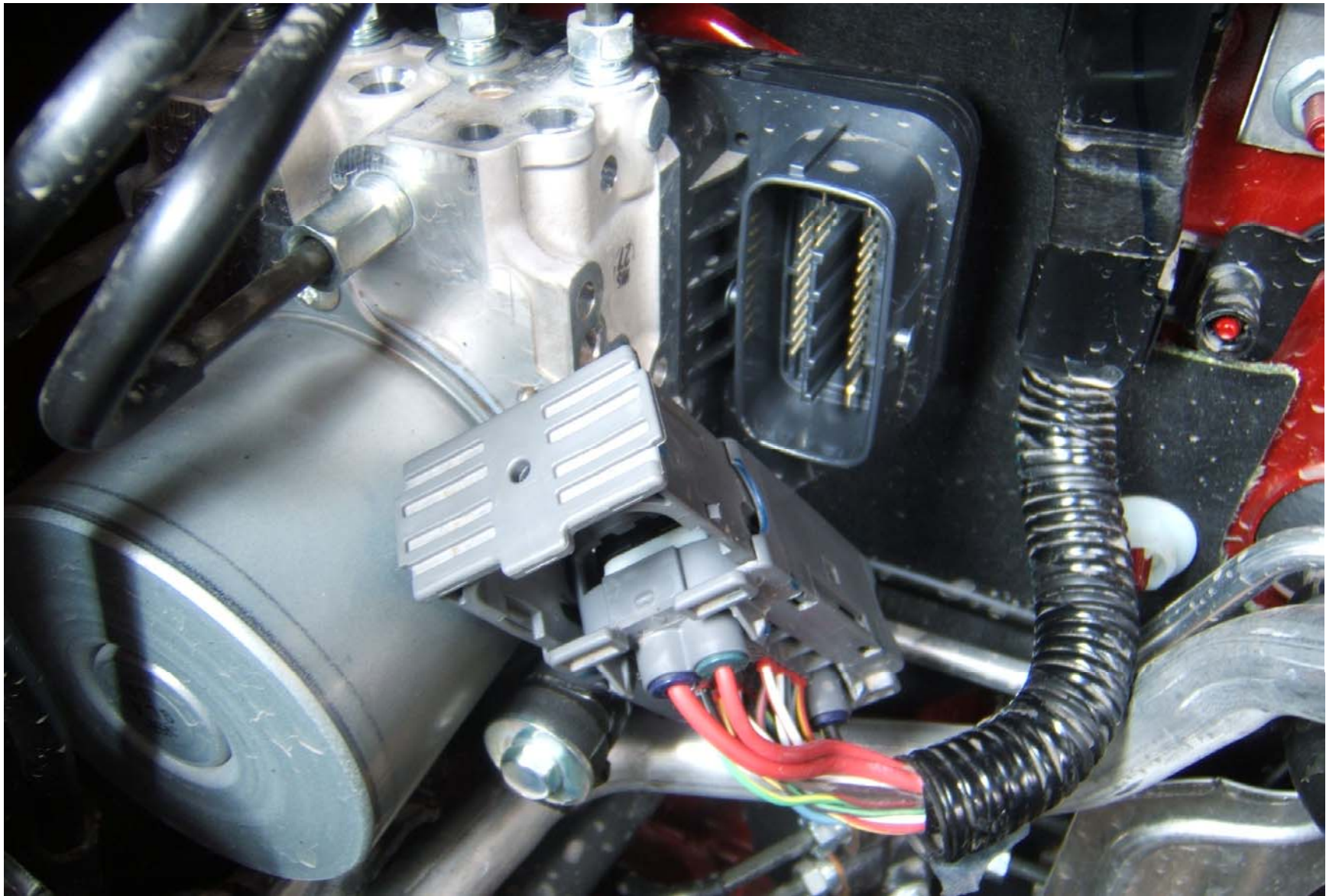
2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.15
VEHICLE ON WEIGHT SCALES



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.16
SPARE INSTALLED ON RIGHT FRONT



2010 MAZDA 6
NHTSA NO. CA5402
FMVSS NO. 138

FIGURE 5.17
REMOVAL OF WIRING HARNESS
CONNECTOR FROM UNDER-HOOD ABS UNIT

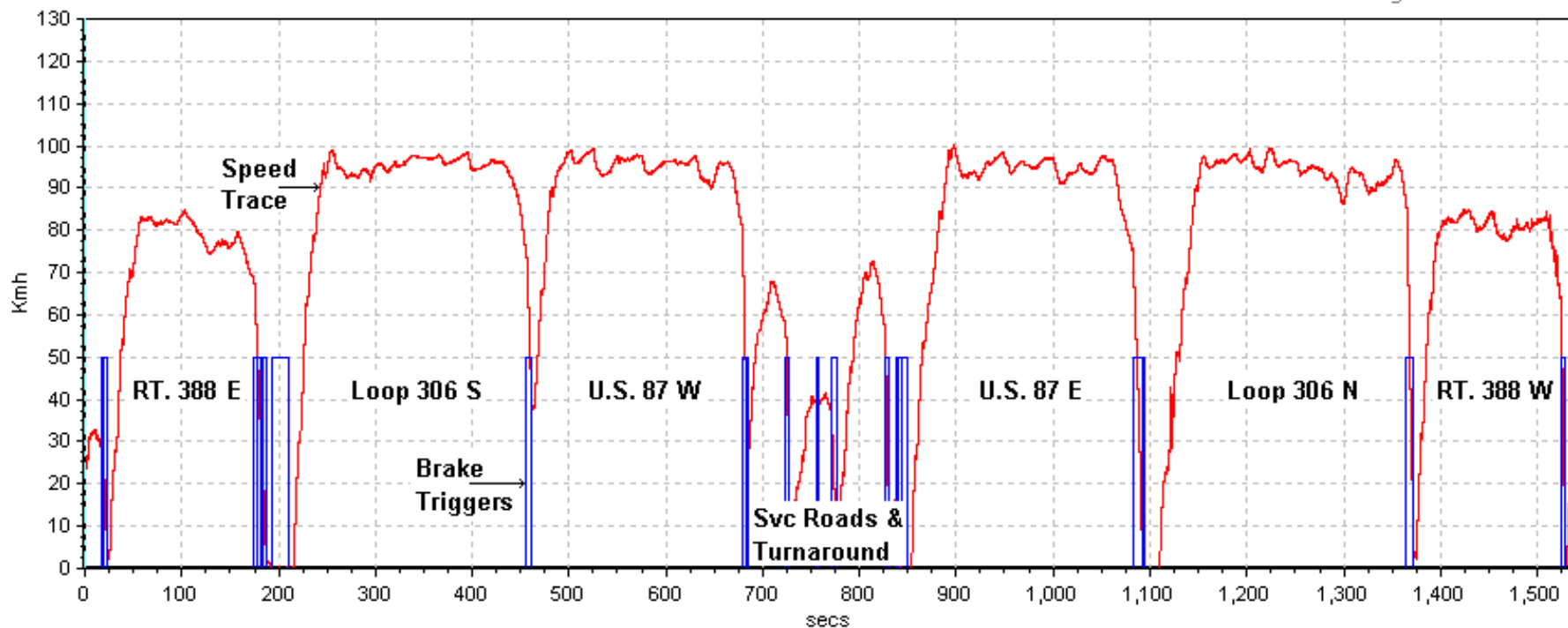
SECTION 6
TEST PLOTS

Scenario A: Left Rear Tire at LLVW
Test Date: 4/28/10
Data File Time: 25:40 minutes
Cumulative Driving Time: 20:35 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Mazda 6 (CA5402) LR Calibration LLVW

Log Rate := 100.00 Hz



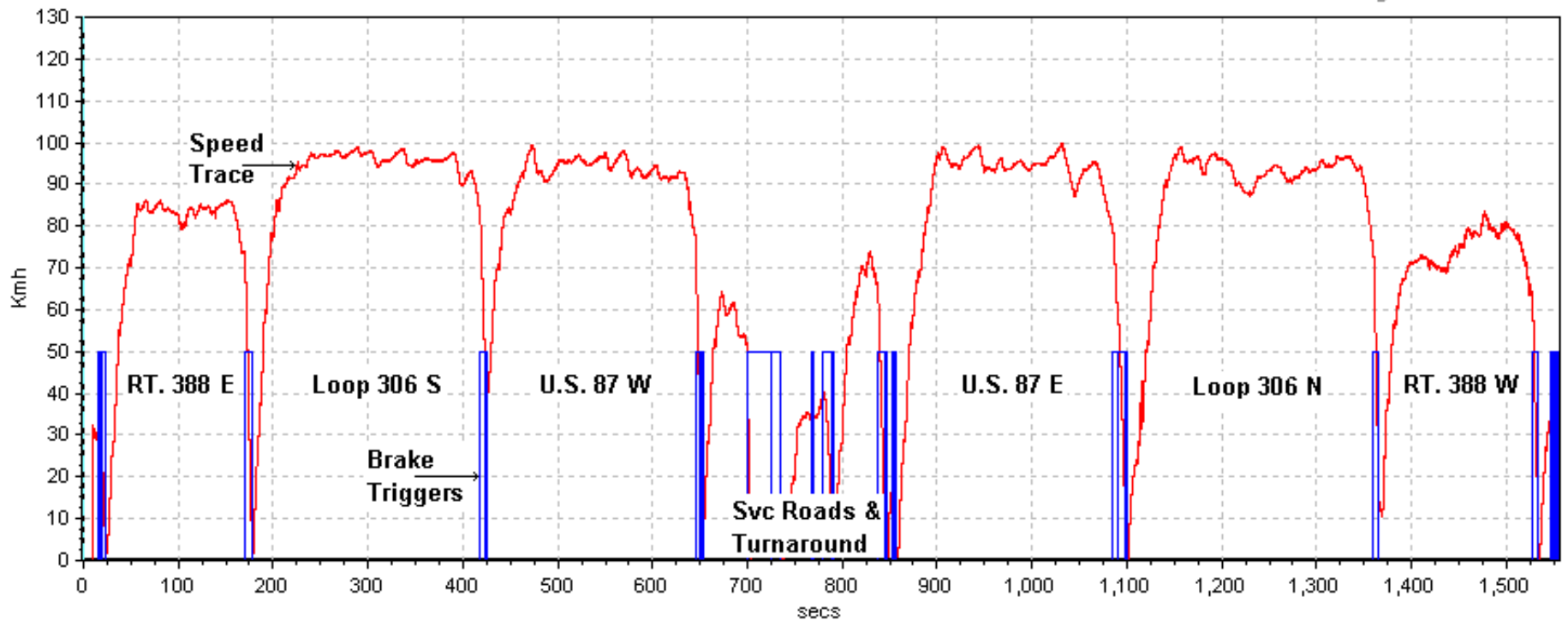
LR Detection Phase: Telltale illuminated in 6 seconds. Driving was not necessary.

Scenario B: Right Rear, Right Front Tires at LLVW
Test Date: 4/28/10
Data File Time: 25:56 minutes
Cumulative Driving Time: 20:46 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Mazda 6 (CA5402) RR, RF Calibration LLVW

Log Rate := 100.00 Hz

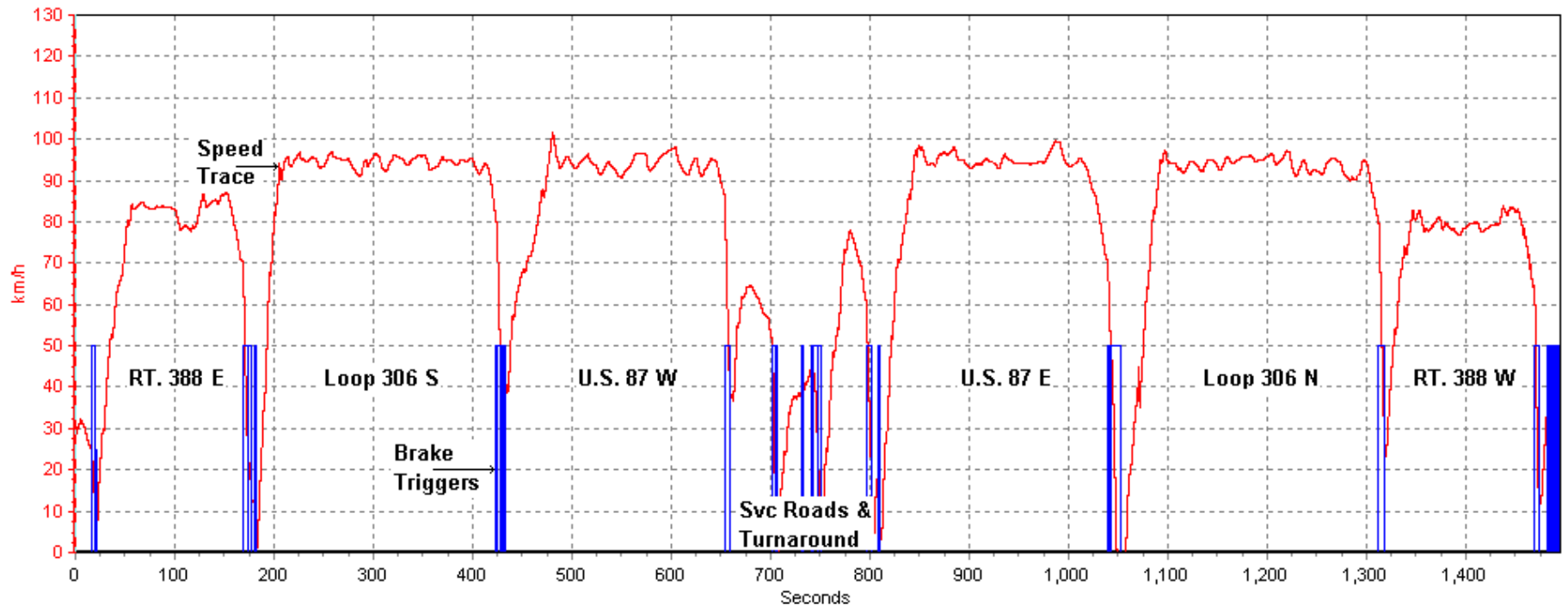


RR, RF Detection Phase: Telltale illuminated in 35 seconds. Driving was not necessary.

Scenario C: Left Front, Left Rear, Right Rear, Right Front Tires at LLVW
Test Date: 4/29/10
Data File Time: 24:55 minutes
Cumulative Driving Time: 20:43 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Mazda 6 (CA5402) LF, LR, RR, RF Calibration LLVW

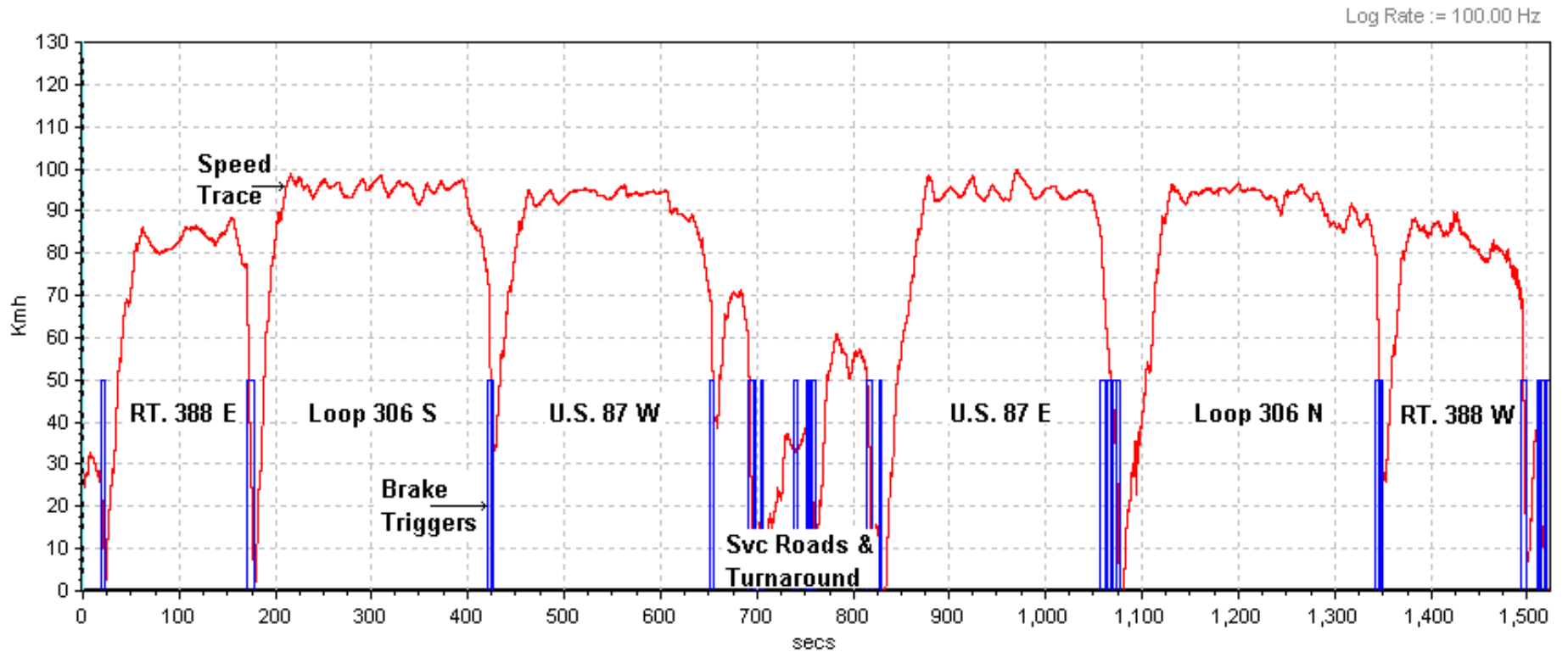


LF, LR, RR, RF Detection Phase: Telltale illuminated in 14 seconds. Driving was not necessary.

Scenario D: Right Front Tire at UVW + VCW
Test Date: 4/30/10
Data File Time: 25:24 minutes
Cumulative Driving Time: 20:38 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Mazda 6 (CA5402) RF Calibration UWW+VCW



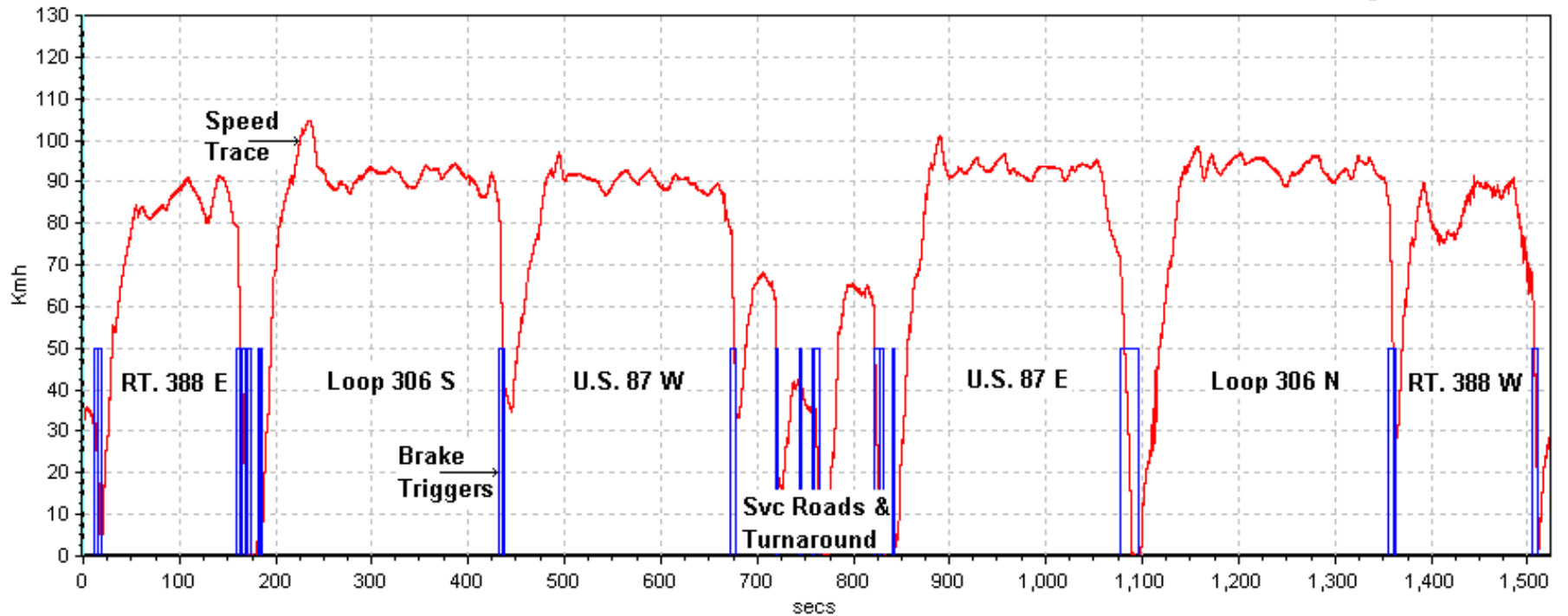
RF Detection Phase: Telltale illuminated in 7 seconds. Driving was not necessary.

Scenario E: Left Rear, Right Rear Tires at UVW + VCW
Test Date: 4/30/10
Data File Time: 25:24 minutes
Cumulative Driving Time: 20:32 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Mazda 6 (CA5402) LR, RR Calibration UVW+VCW

Log Rate := 100.00 Hz



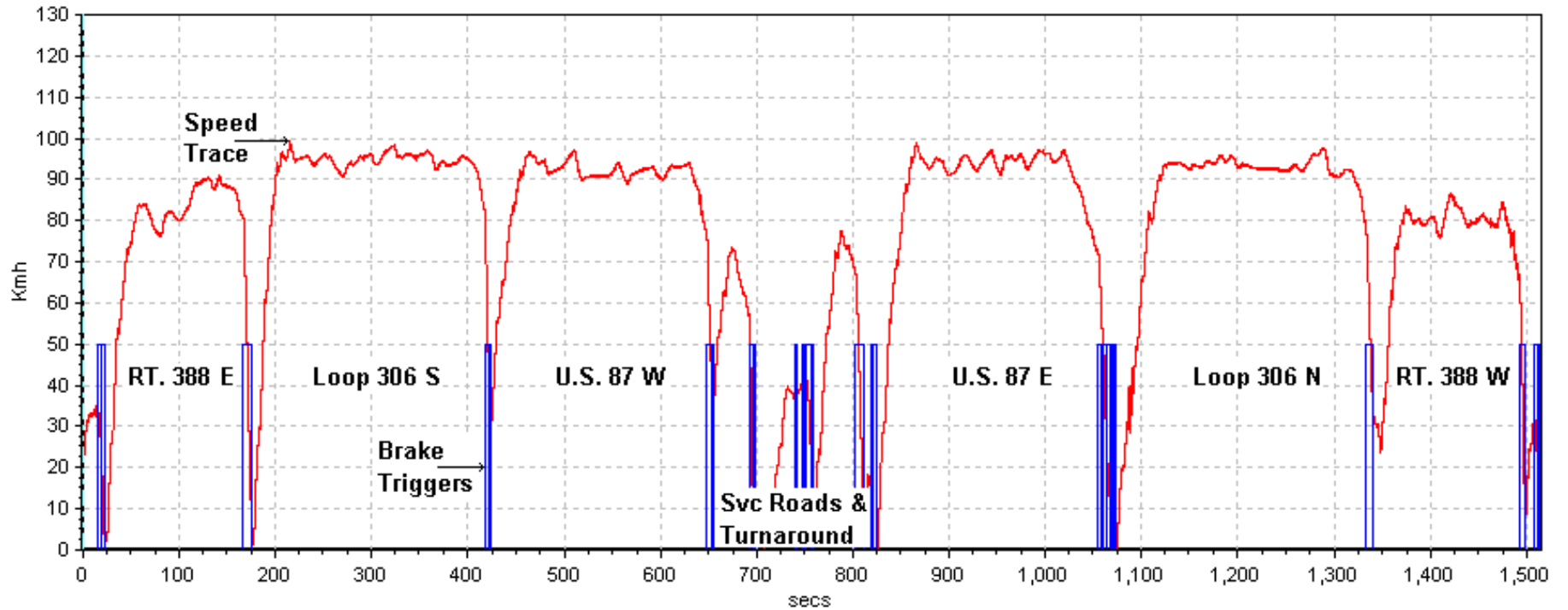
LR, RR Detection Phase: Telltale illuminated in 37 seconds. Driving was not necessary.

Scenario F: Left Front, Left Rear, Right Rear Tires at UVW + VCW
Test Date: 5/3/10
Data File Time: 25:16 minutes
Cumulative Driving Time: 20:35 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Mazda 6 (CA5402) LF, LR, RR Calibration UVW+VCW

Log Rate := 100.00 Hz

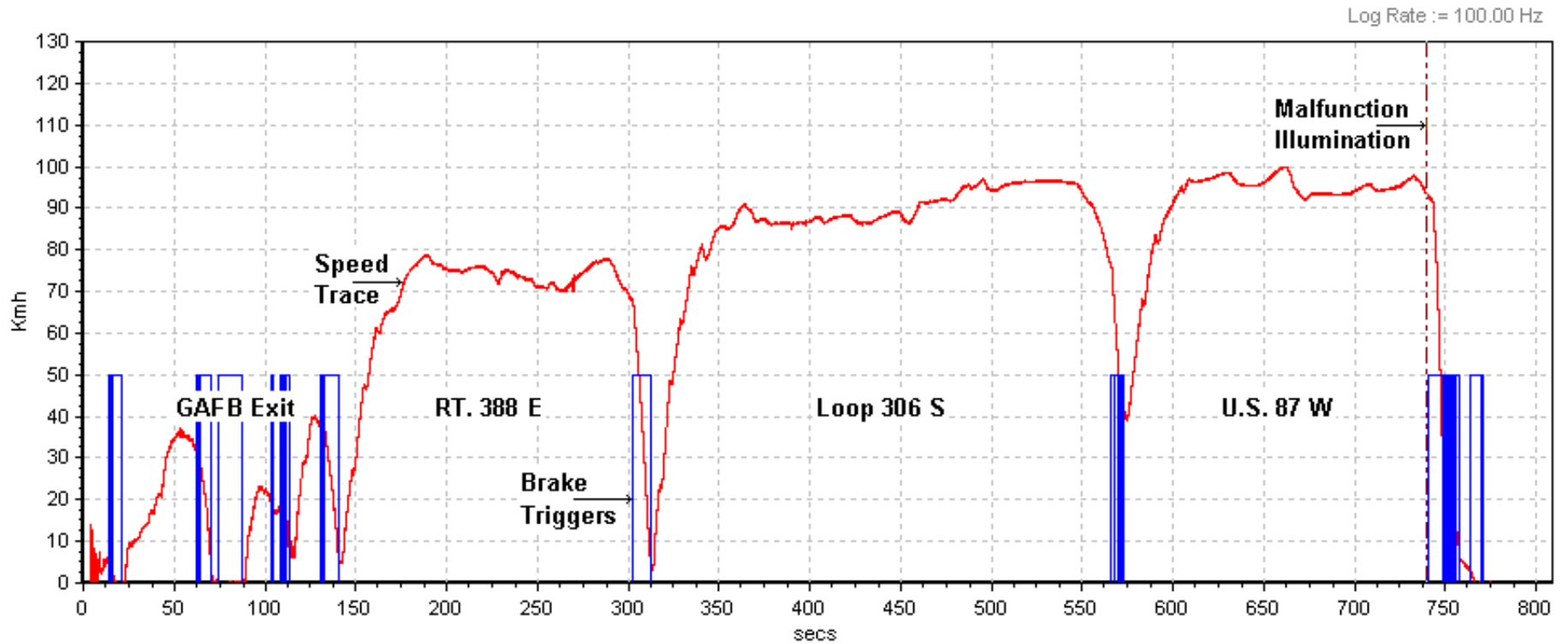


LF, LR, RR Detection Phase: Telltale illuminated in 13 seconds. Driving was not necessary.

Scenario G: Malfunction Detection Test at LLVW
Test Date: 4/28/10
Data File Time: 13:29 minutes
Cumulative Driving Time: 9:08 minutes
Start Point: San Angelo Test Facility shop

Malfunction Telltale Illumination:

2010 Mazda 6 (CA5402) RF Spare Tire Malfunction Illumination LLVW



SECTION 7
OWNER'S MANUAL PAGES

▼ **Tire Pressure Monitoring System
Warning Light**



This warning light illuminates for a few seconds when the ignition is switched ON.

Thereafter, the warning light illuminates and a beep is heard when tire pressure is too low in one or more tires, and flashes when there is a system malfunction.

⚠ WARNING

If the tire pressure monitoring system warning light illuminates or flashes, or the tire pressure warning beep sound is heard, decrease vehicle speed immediately and avoid sudden maneuvering and braking:

If the tire pressure monitoring system warning light illuminates or flashes, or the tire pressure warning beep sound is heard, it is dangerous to drive the vehicle at high speeds, or perform sudden maneuvering or braking. Vehicle drivability could worsen and result in an accident. To determine if you have a slow leak or a flat, pull over to a safe position where you can check the visual condition of the tire and determine if you have enough air to proceed to a place where air may be added and the system monitored again, an Authorized Mazda Dealer or a tire repair station.

Do not ignore the TPMS Warning Light: *Ignoring the TPMS warning light is dangerous, even if you know why it is illuminated. Have the problem taken care of as soon as possible before it develops into a more serious situation that could lead to tire failure and a dangerous accident.*

Warning light illuminates/Warning beep sounds

When the warning light illuminates, and the warning beep sound is heard (about 3 seconds), tire pressure is too low in one or more tires.

Starting and Driving

Adjust the tire pressure to the correct tire pressure. Refer to the specification charts (page 10-7).

CAUTION

When replacing/repairing the tires or wheels or both, have the work done by an Authorized Mazda Dealer, or the tire pressure sensors may be damaged.

NOTE

- Perform tire pressure adjustment when the tires are cold. Tire pressure will vary according to the tire temperature, therefore let the vehicle stand for 1 hour or only drive it 1.6 km (1 mile) or less before adjusting the tire pressures. When pressure is adjusted on hot tires to the cold inflation pressure, the TPMS warning light/beep may turn on after the tires cool and pressure drops below specification. Also, an illuminated TPMS warning light, resulting from the tire air pressure dropping due to cold ambient temperature, may turn off if the ambient temperature rises. In this case, it will also be necessary to adjust the tire air pressures. If the TPMS warning light illuminates due to a drop in tire air pressure, make sure to check and adjust the tire air pressures.
- After adjusting the tire air pressures, it may require some time for the TPMS warning light to turn off. If the TPMS warning light remains illuminated, drive the vehicle at a speed of at least 25 km/h (16 mph) for 10 minutes, and then verify that it turns off.
- Tires lose air naturally over time and the TPMS cannot tell if the tires are getting too soft over time or you have a flat. However, when you find one low tire in a set of four—that is an indication of trouble; you should have someone drive the vehicle slowly forward so you can inspect any low tire for cuts and any metal objects sticking through tread or sidewall. Put a few drops of water in the valve stem to see if it bubbles indicating a bad valve. Leaks need to be addressed by more than simply refilling the trouble tire as leaks are dangerous - take it to an Authorized Mazda Dealer which has all the equipment to fix tires, TPMS systems and order the best replacement tire for your vehicle.

If the warning light illuminates again even after the tire pressures are adjusted, there may be a tire puncture. Replace the punctured tire with the temporary spare tire (page 7-6).

NOTE

A tire pressure sensor is not installed to the temporary spare tire. The warning light will flash continuously while the temporary spare tire is being used.

Warning light flashes

When the warning light flashes, there may be a system malfunction. Consult an Authorized Mazda Dealer.

▼ System Error Activation

When the warning light flashes, there may be a system malfunction. Consult an Authorized Mazda Dealer. A system error activation may occur in the following cases:

- When there is equipment or a device near the vehicle using the same radio frequency as that of the tire pressure sensors.
- When using the following devices in the vehicle that may cause radio interference with the receiver unit.
 - A digital device such as a personal computer.
 - A current converter device such as a DC-AC converter.
- When excess snow or ice adheres to the vehicle, especially around the wheels.
- When the tire pressure sensor batteries are exhausted.
- When using a wheel with no tire pressure sensor installed.
- When using tires with steel wire reinforcement in the side walls.

▼ Tires and Wheels

⚠ CAUTION

When inspecting or adjusting the tire air pressures, do not apply excessive force to the stem part of the wheel unit. The stem part could be damaged.

Changing tires and wheels

The following procedure allows the TPMS to recognize a tire pressure sensor's unique ID signal code whenever tires or wheels are changed, such as changing to and from winter tires.

NOTE

Each tire pressure sensor has a unique ID signal code. The signal code must be registered with the TPMS before it can work. The easiest way to do it is to have an Authorized Mazda Dealer change your tire and complete ID signal code registration.

When having tires changed at an Authorized Mazda Dealer

Tire pressure sensor ID signal code registration is completed when an Authorized Mazda Dealer changes your vehicle's tires.

When changing tires yourself

If you or someone else changes tires, you or someone else can also undertake the steps for the TPMS to complete the ID signal code registration.

1. After tires have been changed, switch the ignition ON, then back to ACC or off (LOCK).
2. Wait for about 15 minutes.