

REPORT NUMBER 138-STF-10-007

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

NISSAN MOTOR COMPANY
2010 NISSAN CUBE
FOUR-DOOR MPV
NHTSA NO. CA5203

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



June 3, 2010

FINAL REPORT

PREPARED FOR

**U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
NVS-220
OFFICE OF VEHICLE SAFETY COMPLIANCE
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SECTION 1

INTRODUCTION

1.1 PURPOSE OF COMPLIANCE TEST

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

1.2 TEST VEHICLE

The test vehicle was a 2010 Nissan Cube four-door MPV. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: JN8AZ2KR6AT151088

B. NHTSA Number: CA5203

C. Manufacturer: Nissan Motor Company

D. Manufacture Date: 10/2009

1.3 TEST DATE

The test vehicle was tested during the time period May 12 through May 19, 2010.

SECTION 2

TEST PROCEDURE AND SUMMARY OF RESULTS

2.1 TEST PROCEDURE

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

Subsequent events included weighing the vehicle to establish the Unloaded Vehicle Weight (UVW) and the distribution of weight on the front and rear axles and each wheel position. The vehicle was loaded to its Lightly Loaded Vehicle Weight (LLVW) for three tire deflation scenarios. This LLVW included the weights of driver, one passenger, and test equipment. The vehicle was loaded to its Unloaded Vehicle Weight plus Vehicle Capacity Weight (VCW) for three additional tire deflation scenarios. The VCW included the weights of driver, one passenger, test equipment, ballast in the rear seat, and ballast in the rear cargo area. The vehicle is required to be loaded to its maximum capacity without exceeding either the Vehicle Capacity Weight or Gross Vehicle Weight Rating (GVWR). For determination of the telltale warning activation pressure, the recommended cold inflation pressure was identified from the vehicle placard.

The vehicle was instrumented with a Racelogic VBOX III 100 Hz GPS Data Logger and brake pedal trigger. The VBOX uses GPS to measure vehicle speed, time, and distance. Test data were recorded to a compact flash card. During the test, a stopwatch was used to determine the approximate "cumulative driving time" during each test phase. Cumulative driving time does not include time during the brake application or when the vehicle speed was below 50 km/h or above 100 km/h. Upon completion of a tire deflation scenario, graphs were generated by VBOX software showing vehicle speed versus time during the test procedures. The graphs furnish a second by second analysis of each calibration and low inflation pressure detection phase (as appropriate). The cumulative driving time was calculated by post-processing the VBOX graph data, and is reported in Section 3 (Test Data) as 'Total Driving Time'.

The tire deflation test scenario consisted of four phases:

1. Calibration phase: Tires were set at vehicle placard cold inflation pressure and the vehicle was driven for at least twenty minutes of cumulative driving time between 50 and 100 km/h.

2. Detection phase: Immediately after calibration phase, the selected tire(s) were deflated to seven kPa (one psi) below the Telltale Warning Activation Pressure. After one minute, the inflation pressure(s) of only deflated tire(s) were rechecked and adjusted if necessary. The vehicle was started and driven 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 Nissan Cube. 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 wiring harness from the tire pressure receiver module.

2.2 SUMMARY OF RESULTS

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

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

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

- D. Left rear
- E. Left front and right front
- F. Left rear and right front

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

One malfunction detection scenario was performed on the test vehicle at LLVW:

- G. Spare tire without TPMS sensor was applied to right front wheel position.

One malfunction detection scenario was performed on the test vehicle at UVW + VCW:

- H. Tire Pressure Receiver module was disconnected.

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: May 12 – May 19, 2010 LAB: U.S. DOT San Angelo Test Facility

VIN: JN8AZ2KR6AT151088 VEHICLE NHTSA NUMBER: CA5203

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: May 12, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203 VIN: JN8AZ2KR6AT151088

CERTIFICATION LABEL BUILD DATE: 10/2009 ENGINE: 1.8 liter, 4 cylinder

MY/MAKE/MODEL/BODY STYLE: 2010 Nissan Cube four-door MPV

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 113 km (70 mi)

VEHICLE ALIGNMENT AND WHEEL BALANCING:

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

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

TPMS IDENTIFICATION:

TPMS MAKE/MODEL: Sensor: Schrader Electronics; ECU: Calsonic Kansei Corp.;
tuner: ALPS Electric Company

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	P195/60R15	230 kPa (33 psi)	Vehicle placard
Rear	P195/60R15	230 kPa (33 psi)	Vehicle placard



Front and Rear Axles

Tire Size and Load Index / Speed Rating: P195/60R15 87H

Manufacturer/Tire Name: Toyo A20

Sidewall Max Load Rating: 540 kg (1,190 lbs)

Max Inflation Pressure: 350 kPa (51 psi)

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

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

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>230 kPa</u> x .75 = <u>172.5</u> kPa	<u>230 kPa</u> x .75 = <u>172.5</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>350</u> kPa (51 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>350</u> kPa (51 psi) <u>140</u> kPa (20 psi)
(C) Telltale Warning Activation Pressure is the higher of Part (A) or (B)	<u>172.5</u> kPa (25 psi)	<u>172.5</u> kPa (25 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	<u>165.5</u> kPa (24 psi)	<u>165.5</u> kPa (24 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: May 12, 2010

APPROVED BY: Kenneth H. Yates

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

TEST DATE: May 12, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

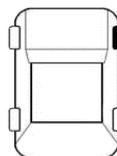
TPMS Low Tire Pressure Warning Telltale

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

YES () NO (fail)

TPMS Low Tire Pressure Warning Telltale Location: Between "3" and "4" in tachometer display

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: May 13, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

Time: Start: 8:32 am End: 11:10 am

Ambient Temperature: Start: 21.2°C (70.2°F) End: 20.4°C (68.7°F)

Trip Odometer Reading: Start: 112.7 km (70 mi)

Fuel Level: Start: Full

Weather Conditions: Partly cloudy, light breeze

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Pre-test cold measurements after ambient soak: Inflation Pressure	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	24.2°C (75.6°F)	24.2°C (75.6°F)	23.8°C (74.8°F)	23.8°C (74.8°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

Ratings are not expressed in metric units on certification label. Therefore, metric units shown below are conversions from English units shown on certification label.

GVWR: 1,750 kg (3,858 lbs)

GAWR (front): 900 kg (1,984 lbs)

GAWR (rear): 860 kg (1,896 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight: 390 kg (860 lbs)

Measured Unloaded Vehicle Weight:

LF	<u>387 kg (853 lbs)</u>	LR	<u>262 kg (577 lbs)</u>
RF	<u>376 kg (829 lbs)</u>	RR	<u>262 kg (578 lbs)</u>
Front		Rear	
Axle	<u>763 kg (1,682 lbs)</u>	Axle	<u>524 kg (1,155 lbs)</u>
Total Vehicle <u>1,287 kg (2,837 lbs)</u>			

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

LF	<u>433 kg (955 lbs)</u>	LR	<u>305 kg (672 lbs)</u>
RF	<u>423 kg (933 lbs)</u>	RR	<u>306 kg (674 lbs)</u>
Front		Rear	
Axle	<u>856 kg (1,888 lbs) (≤ GAWR)</u>	Axle	<u>611 kg (1,346 lbs) (≤ GAWR)</u>
Total Vehicle <u>1,467 kg (3,234 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 (397 lbs) of driver, passenger, and test equipment.

RECORDED BY: Todd P. Groghan

DATE: May 13, 2010

APPROVED BY: Kenneth H. Yates

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

SCENARIO A – Right Rear Tire Deflation at LLVW

TEST DATE: May 14, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

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>20.1°C (68.2°F)</u> Vehicle cool down period: <u>overnight</u>				
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	21.2°C (70.2°F)	21.0°C (69.8°F)	21.2°C (70.2°F)	21.2°C (70.2°F)
San Angelo Test Facility Shop Floor Temp	22.4°C (72.3°F)	22.6°C (72.7°F)	22.6°C (72.7°F)	22.6°C (72.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 12:49:53 UTC End: 13:15:21 UTC
 Trip Odometer Reading: Start: 142.7 km (88.7 mi) End: 175.1 km (108.8 mi)
 Ambient Temperature: Start: 20.1°C (68.2°F) End: 21.0°C (69.8°F)
 Roadway Temperature: Start: 23.4°C (74.1°F) End: 23.0°C (73.4°F)

Driving in first direction:

Goodfellow Air Force
 Starting point: Base (GAFB) north gate Direction: see chart, page 59
10:17 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 59
10:19 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 100.0 km/h (62.1 mph)

Total Driving Time: 20:37 minutes (VBox time)

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

SCENARIO A – Right Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	245.3 kPa (35.6 psi)	243.0 kPa (35.2 psi)	242.8 kPa (35.2 psi)	245.6 kPa (35.6 psi)
Tire Sidewall Temp	32.4°C (90.3°F)	28.2°C (82.8°F)	28.6°C (83.5°F)	33.2°C (91.8°F)
San Angelo Test Facility Shop Floor Temp	22.6°C (72.7°F)	22.4°C (72.3°F)	22.6°C (72.7°F)	22.8°C (73.0°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 ()LR (X)RR ()RF Inflation Pressure			165.5 kPa (24.0 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 1.42 minutes (stopwatch time – non-cumulative)

0.6 km (0.4 mi) distance

Driving above 50 km/h was not necessary.

TEST RESULTS

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

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ()NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ()NO (fail)

**DATA SHEET 3 (Sheet 5 of 22)
TPMS OPERATIONAL PERFORMANCE**

SCENARIO A – Right Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>23.0°C (73.4°F)</u> Vehicle cool down period: <u>62</u> minutes				
Inflation Pressure	234.7 kPa (34.0 psi)	234.1 kPa (34.0 psi)	160.0 kPa (23.2 psi)	235.0 kPa (34.1 psi)
Tire Sidewall Temp	27.0°C (80.6°F)	25.6°C (78.1°F)	25.2°C (77.4°F)	26.8°C (80.2°F)
San Angelo Test Facility Shop Floor Temp	23.6°C (74.5°F)	23.4°C (74.1°F)	23.6°C (74.5°F)	23.4°C (74.1°F)

After the cool down period of a minimum of one hour, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?

(X)YES ()NO (fail)

TELLTALE EXTINGUISHMENT:

RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After illumination verification: Re-adjusted Inflation Pressure:				
	230.0 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? (X)YES ()NO

Starting point: San Angelo Test Facility shop

1:59 minutes (stopwatch time – non-cumulative) 0.6 km (0.4 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Right rear tire was deflated at LLVW.

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: May 14, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: May 14, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

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>25.0°C (77.0°F)</u> Vehicle cool down period: <u>62</u> 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	27.6°C (81.7°F)	26.4°C (79.5°F)	26.6°C (79.9°F)	27.4°C (81.3°F)
San Angelo Test Facility Shop Floor Temp	24.2°C (75.6°F)	24.0°C (75.2°F)	24.0°C (75.2°F)	24.0°C (75.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 16:01:22 UTC End: 16:26:39 UTC
 Trip Odometer Reading: Start: 179.1 km (111.3 mi) End: 211.5 km (131.4 mi)
 Ambient Temperature: Start: 25.0°C (77.0°F) End: 26.0°C (78.8°F)
 Roadway Temperature: Start: 30.4°C (86.7°F) End: 33.6°C (92.5°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 60
10:20 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 60
10:24 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 99.1 km/h (61.6 mph)

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

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

SCENARIO B – 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	248.1 kPa (36.0 psi)	247.3 kPa (35.9 psi)	247.7 kPa (35.9 psi)	248.0 kPa (36.0 psi)
Tire Sidewall Temp	41.2°C (106.2°F)	38.0°C (100.4°F)	37.2°C (99.0°F)	40.2°C (104.4°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)	24.0°C (75.2°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 (X)RR (X)RF Inflation Pressure		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

Illumination at 1:44 minutes (stopwatch time – non-cumulative)

0.3 km (0.2 mi) distance

Driving above 50 km/h was not necessary.

TEST RESULTS

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

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?
(X)YES ()NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?
(X)YES ()NO (fail)

**DATA SHEET 3 (Sheet 8 of 22)
TPMS OPERATIONAL PERFORMANCE**

SCENARIO B – 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>29.1°C (84.4°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	235.6 kPa (34.2 psi)	158.1 kPa (22.9 psi)	158.0 kPa (22.9 psi)	158.7 kPa (23.0 psi)
Tire Sidewall Temp	32.8°C (91.0°F)	30.2°C (86.4°F)	30.6°C (87.1°F)	32.4°C (90.3°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)	25.2°C (77.4°F)

After the cool down period of a minimum of one hour, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?

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:	230.0 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 NO

Starting point: San Angelo Test Facility shop

1:35 minutes (stopwatch time – non-cumulative)

0.5 km (0.3 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

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

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: May 14, 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: May 17, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

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>19.9°C (67.8°F)</u> Vehicle cool down period: <u>overnight</u> 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	20.4°C (68.7°F)	20.4°C (68.7°F)	20.4°C (68.7°F)	20.4°C (68.7°F)
San Angelo Test Facility Shop Floor Temp	20.8°C (69.4°F)	21.8°C (71.2°F)	22.2°C (72.0°F)	21.8°C (71.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 13:18:44 UTC End: 13:43:55 UTC
Trip Odometer Reading: Start: 214.8 km (133.5 mi) End: 247.2 km (153.6 mi)
Ambient Temperature: Start: 19.9°C (67.8°F) End: 20.8°C (69.4°F)
Roadway Temperature: Start: 21.0°C (69.8°F) End: 26.2°C (79.2°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 61
10:12 minutes (stopwatch time) 15.9 km (9.9 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 61
10:25 minutes (stopwatch time) 16.4 km (10.2 mi) distance

Max speed: 105.5 km/h (65.6 mph)

Total Driving Time: 20:37 minutes (VBox time)

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>24.7°C (76.5°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	159.4 kPa (23.1 psi)	160.3 kPa (23.2 psi)	160.0 kPa (23.2 psi)	160.4 kPa (23.3 psi)
Tire Sidewall Temp	27.8°C (82.0°F)	26.4°C (79.5°F)	25.8°C (78.4°F)	27.8°C (82.0°F)
San Angelo Test Facility Shop Floor Temp	22.8°C (73.0°F)	23.2°C (73.8°F)	23.2°C (73.8°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:	230.0 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 NO

Starting point: San Angelo Test Facility shop

1:37 minutes (stopwatch time – non-cumulative) 0.5 km (0.3 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: May 17, 2010

APPROVED BY: Kenneth H. Yates

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

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

VEHICLE NHTSA NUMBER: CA5203

Time: Start: 11:55 am End: 1:35 pm

Ambient Temperature: Start: 29.7°C (85.5°F) End: 30.7°C (87.3°F)

Trip Odometer Reading: Start: 275 km (171 mi)

Fuel Level: Start: Full

Weather Conditions: Sunny, calm

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Pre-test cold measurements after ambient soak: Inflation Pressure	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	31.8°C (89.2°F)	31.8°C (89.2°F)	31.6°C (88.9°F)	31.6°C (88.9°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

Ratings are not expressed in metric units on certification label. Therefore, metric units shown below are conversions from English units shown on certification label.

GVWR: 1,750 kg (3,858 lbs)

GAWR (front): 900 kg (1,984 lbs)

GAWR (rear): 860 kg (1,896 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight: 390 kg (860 lbs)

Measured Unloaded Vehicle Weight:

LF	<u>387 kg (853 lbs)</u>	LR	<u>262 kg (578 lbs)</u>
RF	<u>377 kg (830 lbs)</u>	RR	<u>261 kg (576 lbs)</u>
Front		Rear	
Axle	<u>764 kg (1,683 lbs)</u>	Axle	<u>523 kg (1,154 lbs)</u>
Total Vehicle <u>1,287 kg (2,837 lbs)</u>			

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

LF	<u>442 kg (974 lbs)</u>	LR	<u>400 kg (881lbs)</u>
RF	<u>435 kg (959 lbs)</u>	RR	<u>400 kg (883 lbs)</u>
Front		Rear	
Axle	<u>877 kg (1,933 lbs)</u> (≤ GAWR)	Axle	<u>800 kg (1,764 lbs)</u> (≤ GAWR)
Total Vehicle <u>1,677 kg (3,697 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), 390 kg (860 lbs) of driver, passenger, test equipment, and ballast.

RECORDED BY: Todd P. Groghan

DATE: May 17, 2010

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 14 of 22)
TPMS OPERATIONAL PERFORMANCE
SCENARIO D – Left Rear Tire Deflation at UVW + VCW

TEST DATE: May 18, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

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>18.4°C (65.1°F)</u> Vehicle cool down period: <u>overnight</u>				
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	19.6°C (67.3°F)	19.2°C (66.6°F)	19.2°C (66.6°F)	19.4°C (66.9°F)
San Angelo Test Facility Shop Floor Temp	20.4°C (68.7°F)	20.8°C (69.4°F)	21.0°C (69.8°F)	21.2°C (70.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 12:56:03 UTC End: 13:20:56 UTC
Trip Odometer Reading: Start: 308.4 km (191.6 mi) End: 340.7 km (211.7 mi)
Ambient Temperature: Start: 18.4°C (65.1°F) End: 18.4°C (65.1°F)
Roadway Temperature: Start: 19.0°C (66.2°F) End: 19.6°C (67.3°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 62
10:12 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 62
10:22 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 98.7 km/h (61.3 mph)

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

DATA SHEET 3 (Sheet 15 of 22)
TPMS OPERATIONAL PERFORMANCE
SCENARIO D – Left Rear Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	246.6 kPa (35.8 psi)	247.3 kPa (35.9 psi)	247.7 kPa (35.9 psi)	246.5 kPa (35.8 psi)
Tire Sidewall Temp	30.2°C (86.4°F)	28.4°C (83.1°F)	29.0°C (84.2°F)	30.6°C (87.1°F)
San Angelo Test Facility Shop Floor Temp	21.2°C (70.2°F)	20.2°C (68.4°F)	21.2°C (70.2°F)	21.4°C (70.5°F)

SYSTEM DETECTION PHASE:

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

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

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 1:43 minutes (stopwatch time – non-cumulative)

0.6 km (0.4 mi) distance

Driving above 50 km/h was not necessary.

TEST RESULTS

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

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?
 (X)YES ()NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?
 (X)YES ()NO (fail)

**DATA SHEET 3 (Sheet 16 of 22)
TPMS OPERATIONAL PERFORMANCE**

SCENARIO D – Left Rear Tire Deflation at UVW + VCW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>19.4°C (66.9°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	236.2 kPa (34.3 psi)	158.7 kPa (23.0 psi)	235.1 kPa (34.1 psi)	236.4 kPa (34.3 psi)
Tire Sidewall Temp	25.2°C (77.4°F)	24.2°C (75.6°F)	23.8°C (74.8°F)	25.6°C (78.1°F)
San Angelo Test Facility Shop Floor Temp	20.4°C (68.7°F)	20.8°C (69.4°F)	21.6°C (70.9°F)	22.2°C (72.0°F)

After the cool down period of a minimum of one hour, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?

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:	230.0 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 NO

Starting point: San Angelo Test Facility shop

1:36 minutes (stopwatch time – non-cumulative)

0.3 km (0.2 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Left rear tire was deflated at UVW + VCW.

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: May 18, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: May 18, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

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>21.4°C (70.5°F)</u> Vehicle cool down period: <u>60</u> 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	24.0°C (75.2°F)	23.4°C (74.1°F)	23.8°C (74.8°F)	23.8°C (74.8°F)
San Angelo Test Facility Shop Floor Temp	21.6°C (70.9°F)	22.2°C (72.0°F)	22.6°C (72.7°F)	22.4°C (72.3°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 15:57:35 UTC End: 16:22:05 UTC
 Trip Odometer Reading: Start: 344.6 km (214.1 mi) End: 376.9 km (234.2 mi)
 Ambient Temperature: Start: 21.4°C (70.5°F) End: 22.3°C (72.1°F)
 Roadway Temperature: Start: 36.8°C (98.2°F) End: 39.6°C (103.3°F)

Driving in first direction:

Starting point: GAFB north gate Direction: see chart, page 63
10:15 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Driving in opposite direction:

Starting point: US 87 crossover overpass Direction: see chart, page 63
10:23 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 99.7 km/h (62.0 mph)

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

**DATA SHEET 3 (Sheet 19 of 22)
TPMS OPERATIONAL PERFORMANCE**

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>25.3°C (77.5°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	156.7 kPa (22.7 psi)	238.2 kPa (34.5 psi)	235.6 kPa (34.2 psi)	157.8 kPa (22.9 psi)
Tire Sidewall Temp	30.2°C (86.4°F)	29.8°C (85.6°F)	28.4°C (83.1°F)	30.2°C (86.4°F)
San Angelo Test Facility Shop Floor Temp	23.4°C (74.1°F)	22.8°C (73.0°F)	23.2°C (73.8°F)	23.4°C (74.1°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:	230.0 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 NO

Starting point: San Angelo Test Facility shop

1:43 minutes (stopwatch time – non-cumulative)

0.6 km (0.4 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

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

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: May 18, 2010

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: May 19, 2010 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

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>22.1°C (71.8°F)</u> Vehicle cool down period: <u>overnight</u>				
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	22.6°C (72.7°F)	22.6°C (72.7°F)	22.8°C (73.0°F)	22.6°C (72.7°F)
San Angelo Test Facility Shop Floor Temp	22.6°C (72.7°F)	22.8°C (73.0°F)	22.8°C (73.0°F)	22.8°C (73.0°F)

SYSTEM CALIBRATION/LEARNING PHASE:

Time: Start: 13:10:14 UTC End: 13:36:11 UTC
 Trip Odometer Reading: Start: 380.6 km (236.5 mi) End: 413.0 km (256.6 mi)
 Ambient Temperature: Start: 22.1°C (71.8°F) End: 22.1°C (71.8°F)
 Roadway Temperature: Start: 23.4°C (74.1°F) End: 25.8°C (78.4°F)

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

10:14 minutes (stopwatch time) 16.1 km (10.0 mi) distance

Driving in opposite direction:

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

10:31 minutes (stopwatch time) 16.3 km (10.1 mi) distance

Max speed: 99.6 km/h (61.9 mph)

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

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	248.1 kPa (36.0 psi)	248.7 kPa (36.1 psi)	247.8 kPa (35.9 psi)	247.0 kPa (35.8 psi)
Tire Sidewall Temp	32.8°C (91.0°F)	32.4°C (90.3°F)	32.2°C (90.0°F)	33.4°C (92.1°F)
San Angelo Test Facility Shop Floor Temp	23.6°C (74.5°F)	23.8°C (74.8°F)	24.0°C (75.2°F)	23.8°C (74.8°F)

SYSTEM DETECTION PHASE:

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

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

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Illumination at 1:35 minutes (stopwatch time – non-cumulative)

0.3 km (0.2 mi) distance

Driving above 50 km/h was not necessary.

TEST RESULTS

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

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ()NO (fail)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position? (X)YES ()NO (fail)

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>25.0°C (77.0°F)</u> Vehicle cool down period: <u>70</u> minutes				
Inflation Pressure	235.6 kPa (34.2 psi)	156.8 kPa (22.7 psi)	233.9 kPa (33.9 psi)	158.8 kPa (23.0 psi)
Tire Sidewall Temp	27.2°C (81.0°F)	26.2°C (79.2°F)	26.6°C (79.9°F)	27.6°C (81.7°F)
San Angelo Test Facility Shop Floor Temp	24.4°C (75.9°F)	24.4°C (75.9°F)	24.4°C (75.9°F)	24.6°C (76.3°F)

After the cool down period of a minimum of one hour, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?

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:	230.0 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 NO

Starting point: San Angelo Test Facility shop

1:24 minutes (stopwatch time – non-cumulative) 0.3 km (0.2 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

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

REMARKS: None

RECORDED BY: Todd P. Groghan

DATE: May 19, 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: May 17, 2010

LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

Time:	Start:	<u>15:42:54 UTC</u>	End:	<u>15:57:03 UTC</u>
Trip Odometer Reading:	Start:	<u>251.4 km (156.2 mi)</u>	End:	<u>266.8 km (165.8 mi)</u>
Ambient Temperature:	Start:	<u>25.7°C (78.3°F)</u>	End:	<u>25.7°C (78.3°F)</u>
Roadway Temperature:	Start:	<u>38.4°C (101.1°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: () 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: Spare tire without TPMS sensor was
applied to right front at LLVW. (See Figure 5.15)

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 65

15.4 km (9.6 mi) distance

Max speed: 97.6 km/h (60.6 mph)

Total Driving Time: 9:52 minutes (VBox time)

COMBINATION MALFUNCTION TELLTALE ILLUMINATES (FLASHING AND ILLUMINATION SEQUENCE) WITHIN 20 MINUTES:

() 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 2 seconds

Time telltale remains flashing 60 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

 1:27 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: May 17, 2010

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 3 of 4)
Scenario H – Malfunction Detection Test –
Tire Pressure Receiver Module Disconnected

TEST DATE: May 17, 2010

LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: CA5203

Time:	Start: <u>19:10:05 UTC</u>	End: <u>19:23:21 UTC</u>
Odometer Reading:	Start: <u>276.8 km (172.0 mi)</u>	End: <u>291.5 km (181.1 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>50.8°C (123.4°F)</u>	End: <u>50.8°C (123.4°F)</u>
Fuel Level:	Start: <u>Full</u>	

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: Wiring harness was disconnected from the tire pressure receiver module. (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

14.6 km (9.1 mi) distance

Max speed: 98.8 km/h (61.4 mph)

Total Driving Time: 9:12 minutes (VBox time)

COMBINATION MALFUNCTION TELLTALE ILLUMINATES (FLASHING AND ILLUMINATION SEQUENCE) WITHIN 20 MINUTES:

(X)YES ()NO

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

TEST
DATE: May 12, 2010

LAB: San Angelo Test Facility

VEHICLE
NHTSA NO: CA5203

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: May 12, 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
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	MINITEMP MT6	SERIAL # MAGR000042598	4/6/2010	4/6/2011

SECTION 5
PHOTOGRAPHS



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO.138

FIGURE 5.1
¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE



2010 NISSAN CUBE
 NHTSA NO. CA5203
 FMVSS NO.138

FIGURE 5.2
 VEHICLE CERTIFICATION LABEL



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 FMVSS NO. 138

FIGURE 5.3
 VEHICLE PLACARD



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.4
TIRE SHOWING BRAND AND MODEL



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.5
TIRE SHOWING SIZE AND LOAD INDEX / SPEED RATING



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NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.6
TIRE SHOWING DOT SERIAL NUMBER



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NHTSA NO. CA5203
FMVSS NO. 138

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



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.8
TIRE SHOWING SIDEWALL / TREAD CONSTRUCTION



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

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



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

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



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO 138

FIGURE 5.11
TEST INSTRUMENTATION INSTALLED IN VEHICLE



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.12
VEHICLE REAR SEAT BALLAST FOR UVW + VCW LOAD



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.13
VEHICLE CARGO AREA BALLAST FOR UVW + VCW LOAD



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.14
VEHICLE ON WEIGHT SCALES



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

FIGURE 5.15
SPARE INSTALLED ON RIGHT FRONT



2010 NISSAN CUBE
NHTSA NO. CA5203
FMVSS NO. 138

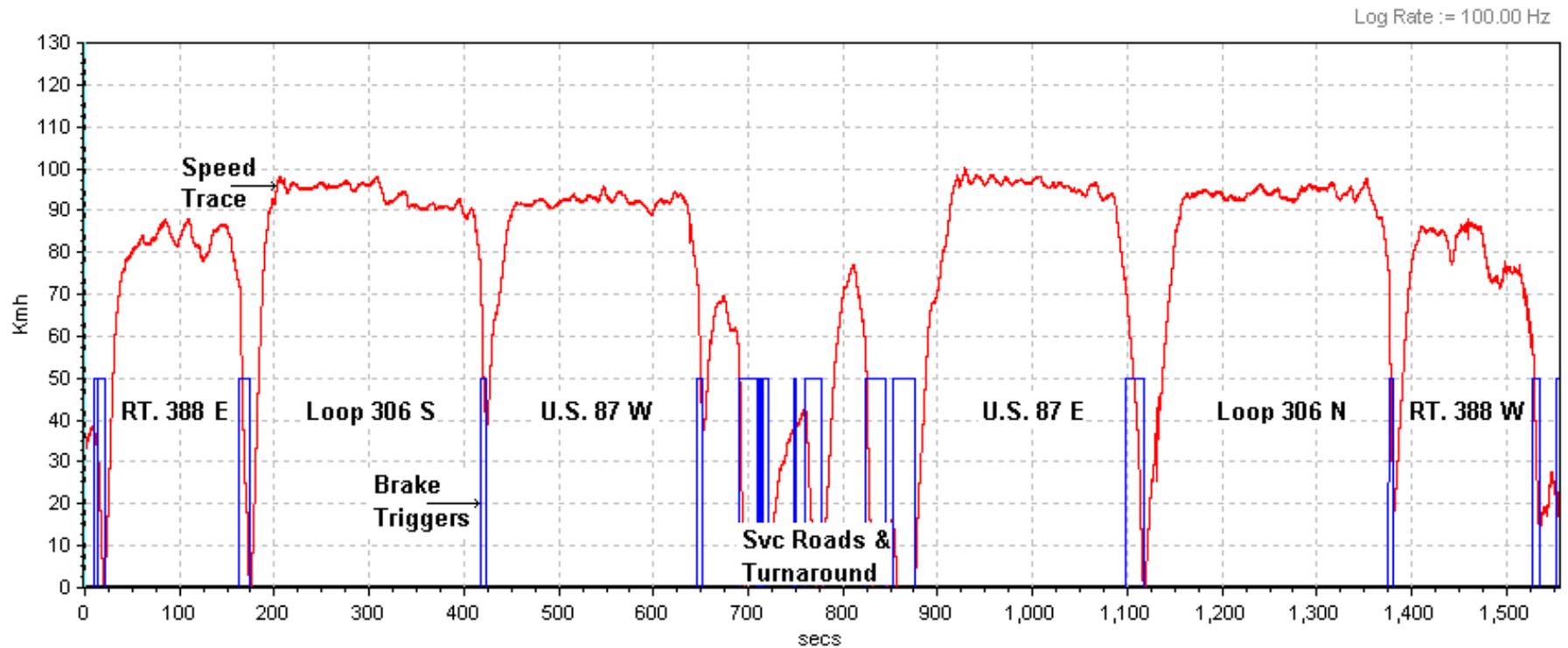
FIGURE 5.16
TIRE PRESSURE RECEIVER MODULE
DISCONNECTED

SECTION 6
TEST PLOTS

Scenario A: Right Rear Tire at LLVW
Test Date: 5/14/10
Data File Time: 25:56 minutes
Cumulative Driving Time: 20:37minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Nissan Cube (CA5203) RR Calibration LLVW

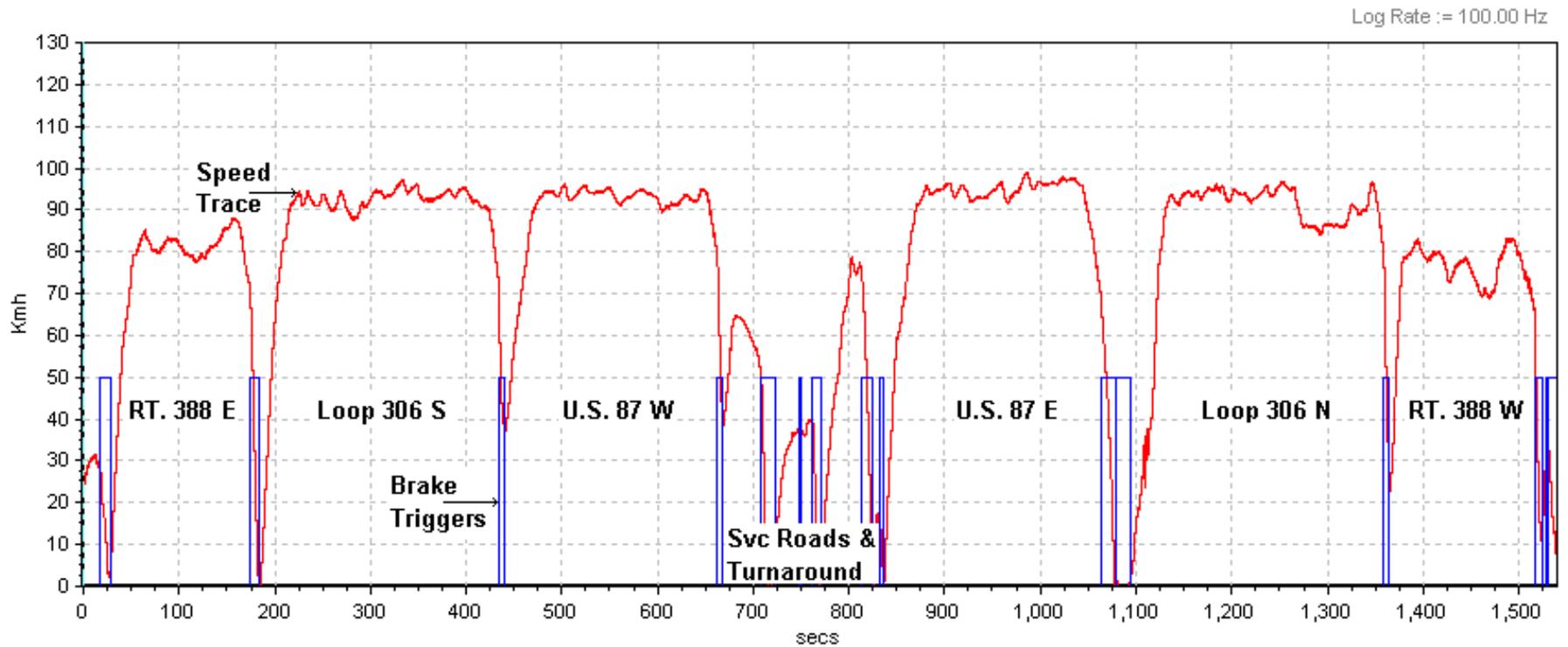


RR Detection Phase: Telltale illuminated 1:42 minutes after lamp check. Driving above 50 km/h was not necessary.

Scenario B: Left Rear, Right Rear, Right Front Tires at LLVW
 Test Date: 5/14/10
 Data File Time: 25:40 minutes
 Cumulative Driving Time: 20:46 minutes
 Start Point: GAFB north gate

Calibration Phase:

2010 Nissan Cube (CA5203) LR, RR, RF Calibration LLVW



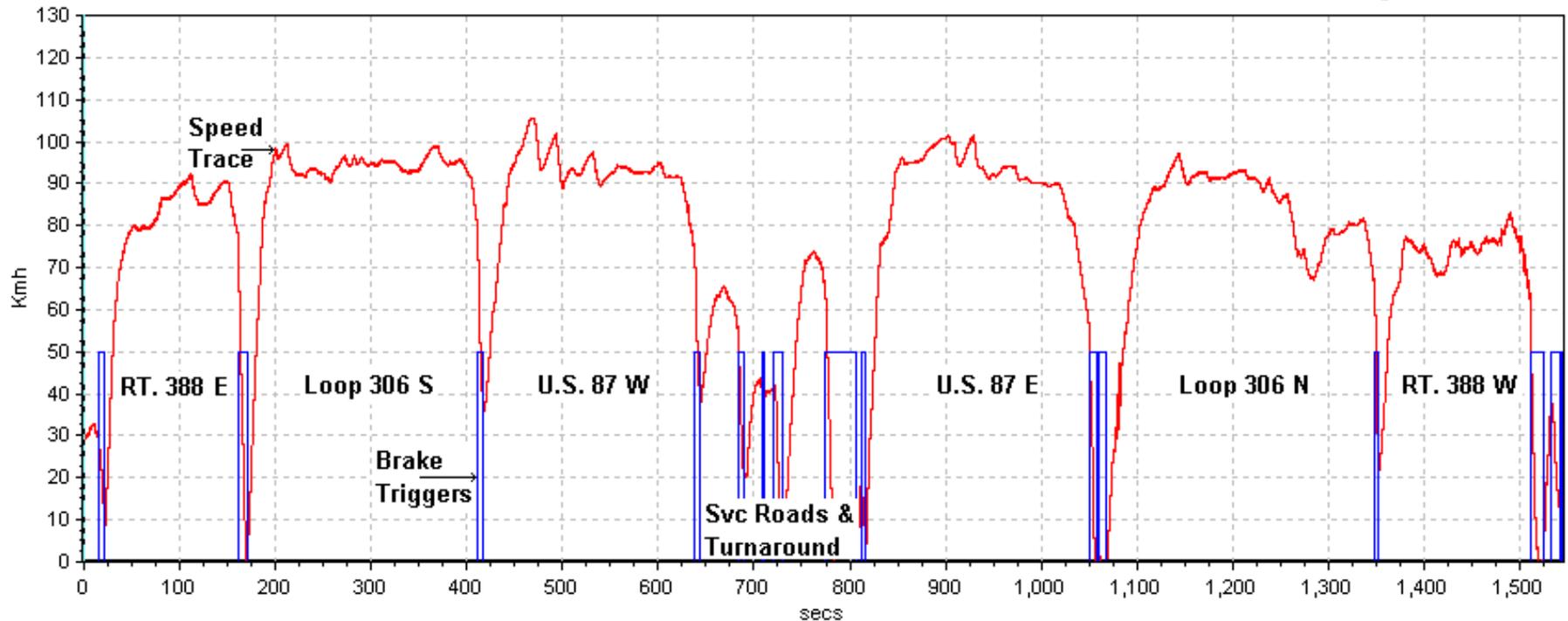
LR, RR, RF Detection Phase: Telltale illuminated 1:44 minutes after lamp check. Driving above 50 km/h was not necessary.

Scenario C: Left Front, Left Rear, Right Rear, Right Front Tires at LLVW
 Test Date: 5/17/10
 Data File Time: 25:46minutes
 Cumulative Driving Time: 20:37 minutes
 Start Point: GAFB north gate

Calibration Phase:

2010 Nissan Cube (CA5203) LF, LR, RR, RF Calibration LLVW

Log Rate := 100.00 Hz

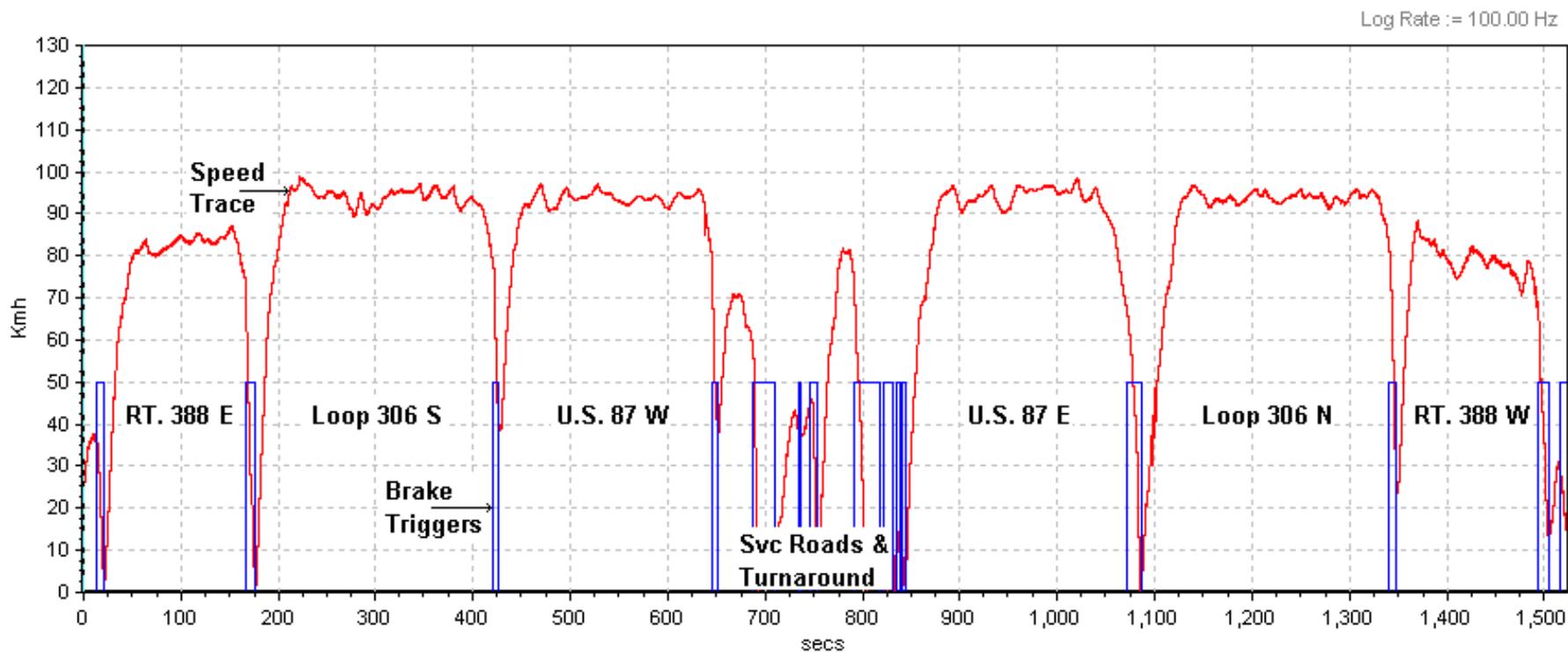


LF, LR, RR, RF Detection Phase: Telltale illuminated 1:42 minutes after lamp check. Driving above 50 km/h was not necessary.

Scenario D: Left Rear Tire at UVW + VCW
Test Date: 5/18/10
Data File Time: 25:24 minutes
Cumulative Driving Time: 20:34 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Nissan Cube (CA5203) LR Calibration UWW+VCW



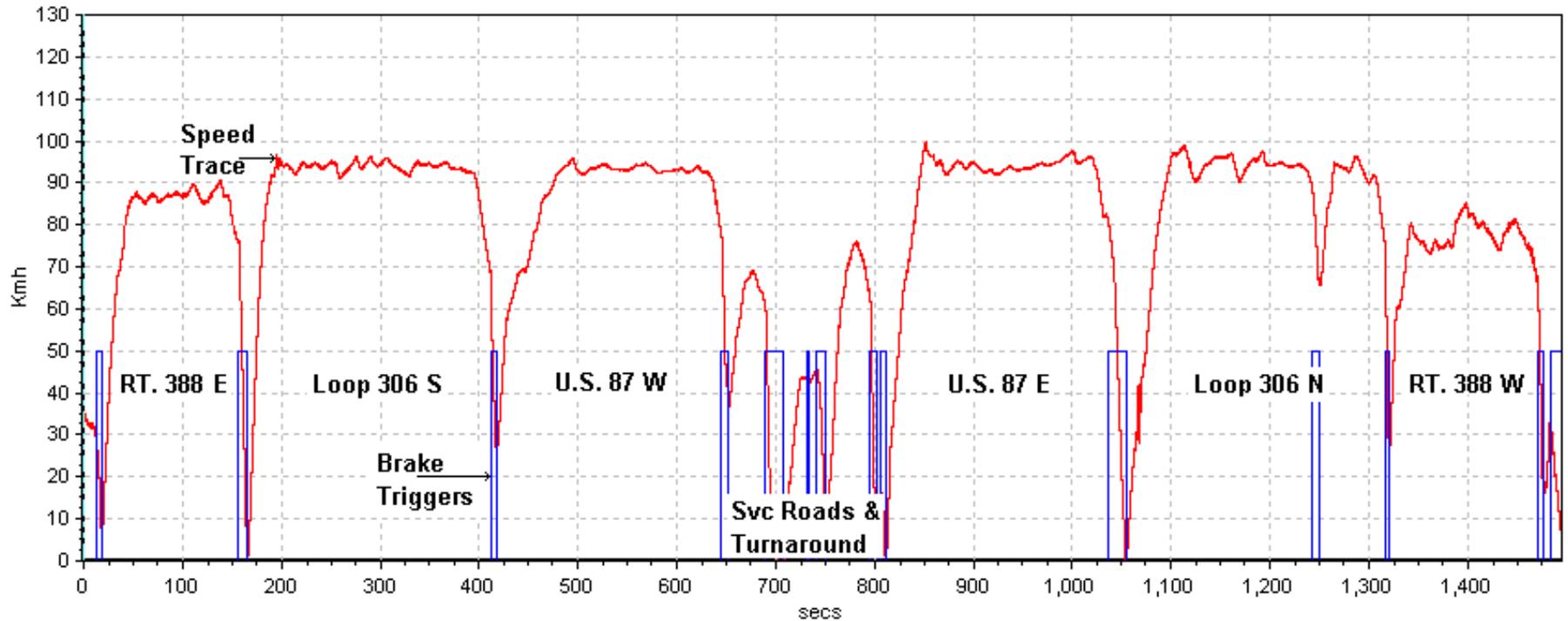
LR Detection Phase: Telltale illuminated 1:43 minutes after lamp check. Driving above 50 km/h was not necessary.

Scenario E: Left Front, Right Front Tires at UVW + VCW
Test Date: 5/18/10
Data File Time: 24:55 minutes
Cumulative Driving Time: 20:39 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Nissan Cube (CA5203) LF, RF Calibration UWW+VCW

Log Rate := 100.00 Hz



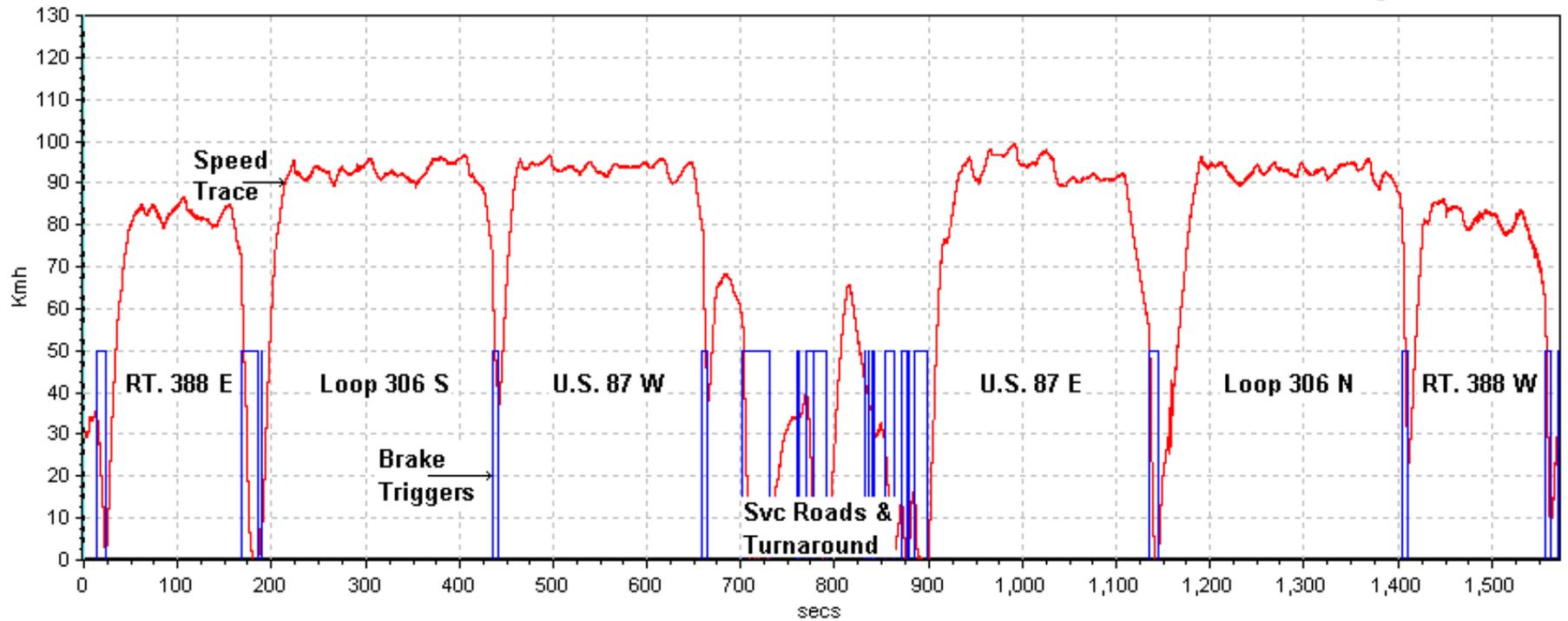
LF, RF Detection Phase: Telltale illuminated 1:25 minutes after lamp check. Driving above 50 km/h was not necessary.

Scenario F: Left Rear, Right Front Tires at UVW + VCW
Test Date: 5/19/10
Data File Time: 26:13 minutes
Cumulative Driving Time: 20:45 minutes
Start Point: GAFB north gate

Calibration Phase:

2010 Nissan Cube (CA5203) LR, RF Calibration UVW+VCW

Log Rate := 100.00 Hz

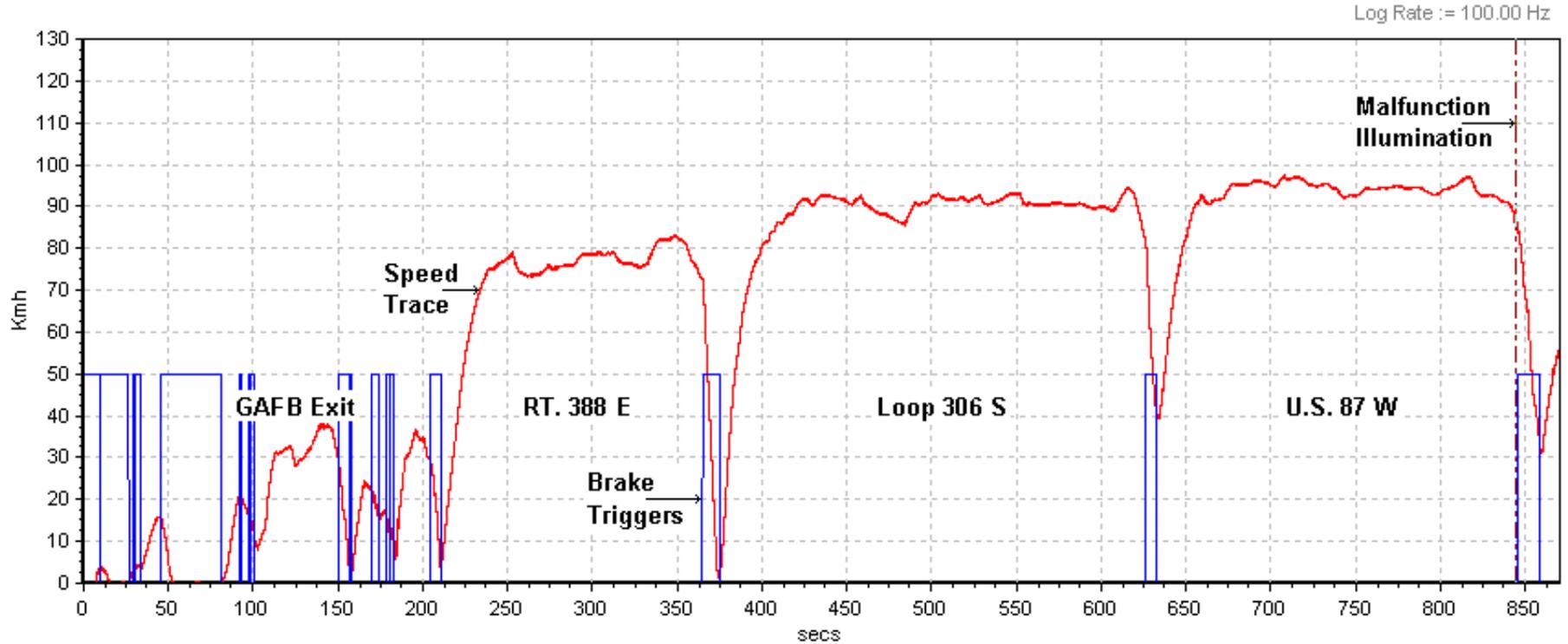


LR, RF Detection Phase: Telltale illuminated 1:35 minutes after lamp check. Driving above 50 km/h was not necessary.

Scenario G: Malfunction Detection Test at LLVW - Spare Installed on Right Front
Test Date: 5/17/10
Data File Time: 14:30 minutes
Cumulative Driving Time: 9:52 minutes
Start Point: San Angelo Test Facility shop

Malfunction Telltale Illumination:

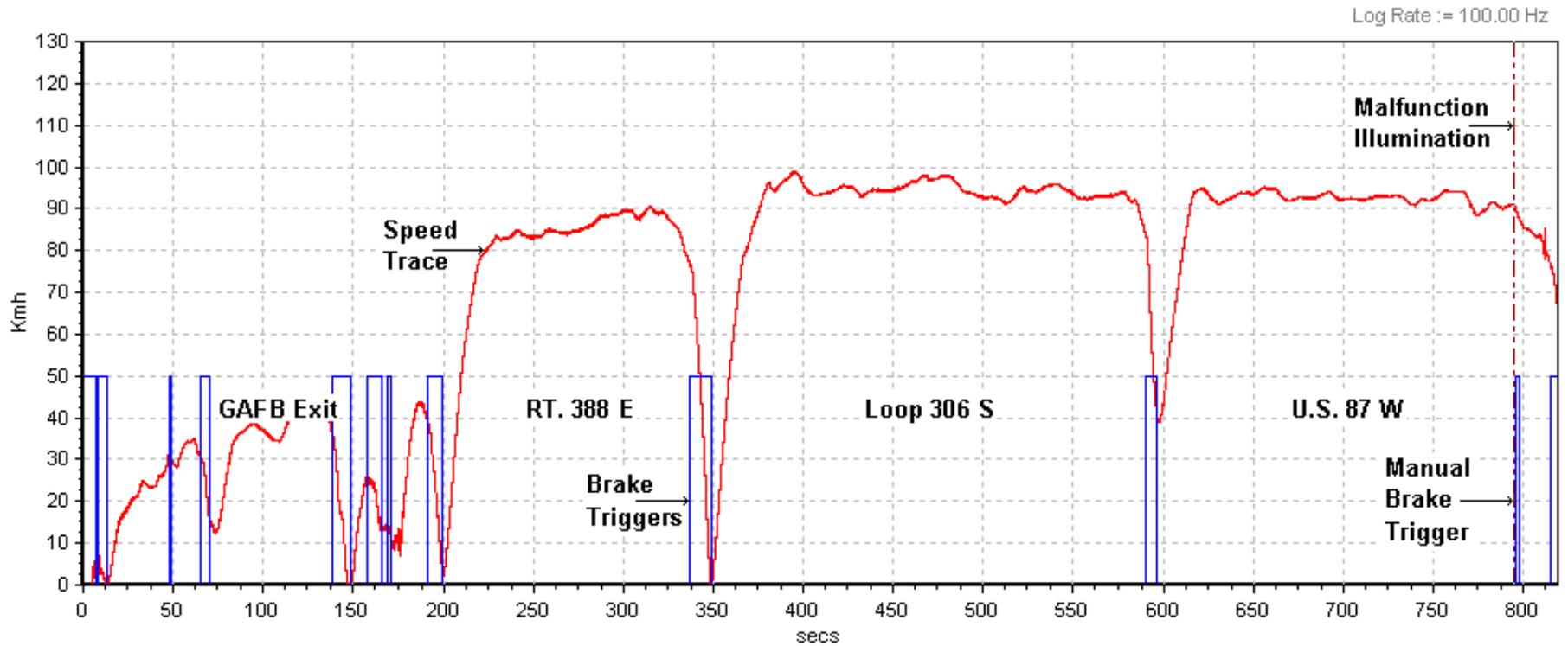
2010 Nissan Cube (CA5203) RF Spare Tire Malfunction Illumination LLVW



Scenario H: Malfunction Detection Test - Tire Pressure Receiver Module Disconnected
Test Date: 5/17/10
Data File Time: 13:39 minutes
Cumulative Driving Time: 9:12 minutes
Start Point: San Angelo Test Facility shop

Malfunction Telltale Illumination:

2010 Nissan Cube (CA5203) Tire Pressure Receiver Disconnect Malfunction Illumination VCW



SECTION 7
OWNER'S MANUAL PAGES



Low tire pressure warning light

Your vehicle is equipped with a Tire Pressure Monitoring System (TPMS) that monitors the tire pressure of all tires except the spare.

The low tire pressure warning light warns of low tire pressure or indicates that the TPMS is not functioning properly.

After the ignition switch is placed in the ON position, this light illuminates for about 1 second and turns off.

Low tire pressure warning:

If the vehicle is being driven with low tire pressure, the warning light will illuminate.

When the low tire pressure warning light illuminates, you should stop and adjust the tire pressure to the recommended COLD tire pressure shown on the Tire and Loading Information label. The low tire pressure warning light does not automatically turn off when the tire pressure is adjusted. After the tire is inflated to the recommended pressure, the vehicle must be driven at speeds above 16 MPH (25 km/h) to activate the TPMS and turn off the low tire pressure warning light. Use a tire pressure gauge to check the tire pressure.

For additional information, see "TIRE PRESSURE MONITORING SYSTEM (TPMS)" in the

"5. Starting and driving" section and "TIRE PRESSURE MONITORING SYSTEM (TPMS)" in the "6. In case of emergency" section.

TPMS malfunction:

If the TPMS is not functioning properly, the low tire pressure warning light will flash for approximately 1 minute when the ignition switch is placed in the ON position. The light will remain on after 1 minute. Have the system checked by a NISSAN dealer.

For additional information, see "TIRE PRESSURE MONITORING SYSTEM (TPMS)" in the "5. Starting and driving" section.



WARNING

- If the light does not illuminate with the ignition switch placed in the ON position, have the vehicle checked by a NISSAN dealer as soon as possible.
- If the light illuminates while driving, avoid sudden steering maneuvers or abrupt braking, reduce vehicle speed, pull off the road to a safe location and stop the vehicle as soon as possible. Driving with under-inflated tires may permanently damage the tires and increase the

likelihood of tire failure. Serious vehicle damage could occur and may lead to an accident and could result in serious personal injury. Check the tire pressure for all four tires. Adjust the tire pressure to the recommended COLD tire pressure shown on the Tire and Loading Information label to turn the low tire pressure warning light OFF. If the light still illuminates while driving after adjusting the tire pressure, a tire may be flat. If you have a flat tire, replace it with a spare tire as soon as possible.

- When a spare tire is mounted or a wheel is replaced, the TPMS will not function and the low tire pressure warning light will flash for approximately 1 minute. The light will remain on after 1 minute. Contact your NISSAN dealer as soon as possible for tire replacement and/or system resetting.
- Replacing tires with those not originally specified by NISSAN could affect the proper operation of the TPMS.



CAUTION

- The TPMS is not a substitute for the regular tire pressure check. Be sure to check the tire pressure regularly.
- If the vehicle is being driven at speeds of less than 16 MPH (25 km/h), the TPMS may not operate correctly.
- Be sure to install the specified size of tires to the four wheels correctly.



Low washer fluid warning light (Canada only)

This light illuminates when the washer fluid is at a low level. Add washer fluid as necessary. (See "WINDOW WASHER FLUID" in the "8. Maintenance and do-it-yourself" section.)



P position selecting warning light (if so equipped)

The warning light blinks in red when the ignition switch is pushed to stop the engine with the selector lever in any position except the P (Park) position.

If this warning appears, move the selector lever

2-14 **Instruments and controls**

to the P (Park) position or push the ignition switch to the ON position.

An inside warning chime will also sound.

See "INTELLIGENT KEY SYSTEM" in the "3. Pre-driving checks and adjustments" section.



Seat belt warning light

The light and chime remind you to fasten seat belts. The light illuminates whenever the ignition switch is placed in the ON position, and will remain illuminated until the driver's seat belt is fastened. At the same time, the chime will sound for about 6 seconds unless the driver's seat belt is securely fastened.

The seat belt warning light for the front passenger will illuminate if the seat belt is not fastened when the front passenger's seat is occupied. For 5 seconds after the ignition switch is in the ON position, the system does not activate the warning light for the front passenger.

See "SEAT BELTS" in the "1. Safety — Seats, seat belts and supplemental restraint system" section for precautions on seat belt usage.



Supplemental air bag warning light

After turning the ignition switch to the ON position, the supplemental air bag warning light will illuminate. The supplemental air bag warning light will turn off after about 7 seconds if the supplemental front air bag and supplemental side air bag, curtain side-impact air bag systems and/or pretensioner seat belt are operational.

If any of the following conditions occur, the front air bag, side air bag, curtain air bag and pretensioner systems need servicing and your vehicle must be taken to your nearest NISSAN dealer.

- The supplemental air bag warning light remains on after approximately 7 seconds.
- The supplemental air bag warning light flashes intermittently.
- The supplemental air bag warning light does not illuminate at all.

Unless checked and repaired, the Supplemental Restraint Systems and/or the pretensioners may not function properly.

For additional information, see "SUPPLEMENTAL RESTRAINT SYSTEM" in the "1. Safety — Seats, seat belts and supplemental restraint system" section.



WARNING

- The exhaust gas and the exhaust system are very hot. Keep people, animals or flammable materials away from the exhaust system components.
- Do not stop or park the vehicle over flammable materials such as dry grass, waste paper or rags. They may ignite and cause a fire.



CAUTION

- Do not use leaded gasoline. Deposits from leaded gasoline will seriously reduce the three-way catalyst's ability to help reduce exhaust pollutants.
- Keep your engine tuned up. Malfunctions in the ignition, fuel injection, or electrical systems can cause overrich fuel flow into the three-way catalyst, causing it to overheat. Do not keep driving if the engine misfires, or if noticeable loss of performance or other unusual operating conditions are detected. Have the

vehicle inspected promptly by a NISSAN dealer.

- Avoid driving with an extremely low fuel level. Running out of fuel could cause the engine to misfire, damaging the three-way catalyst.
- Do not race the engine while warming it up.
- Do not push or tow your vehicle to start the engine.

TIRE PRESSURE MONITORING SYSTEM (TPMS)

Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label. (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should determine the proper tire inflation pressure for those tires.)

As an added safety feature, your vehicle has been equipped with a Tire Pressure Monitoring System (TPMS) that illuminates a low tire pressure telltale when one or more of your tires is significantly under-inflated. Accordingly, when the low tire pressure telltale illuminates, you should stop and check your tires as soon as

possible, and inflate them to the proper pressure. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.

Please note that the TPMS is not a substitute for proper tire maintenance, and it is the driver's responsibility to maintain correct tire pressure, even if under-inflation has not reached the level to trigger illumination of the TPMS low tire pressure telltale.

Your vehicle has also been equipped with a TPMS malfunction indicator to indicate when the system is not operating properly. The TPMS malfunction indicator is combined with the low tire pressure telltale. When the system detects a malfunction, the telltale will flash for approximately one minute and then remain continuously illuminated. This sequence will continue upon subsequent vehicle start-ups as long as the malfunction exists. When the malfunction indicator is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of replacement or alternate tires or wheels on the vehicle that prevent the TPMS from functioning properly. Always check the TPMS malfunction telltale after replacing one or more tires or wheels on your vehicle to ensure that the replacement or

Starting and driving 5-3

alternate tires and wheels allow the TPMS to continue to function properly.

Additional information

- The TPMS does not monitor the tire pressure of the spare tire.
- The TPMS will activate only when the vehicle is driven at speeds above 16 MPH (25 km/h). Also, this system may not detect a sudden drop in tire pressure (for example a flat tire while driving).
- The low tire pressure warning light does not automatically turn off when the tire pressure is adjusted. After the tire is inflated to the recommended pressure, the vehicle must be driven at speeds above 16 MPH (25 km/h) to activate the TPMS and turn off the low tire pressure warning light. Use a tire pressure gauge to check the tire pressure.
- Tire pressure rises and falls depending on the heat caused by the vehicle's operation and the outside temperature. Low outside temperature can lower the temperature of the air inside the tire which can cause a lower tire inflation pressure. This may cause the low tire pressure warning light to illuminate. If the warning light illuminates in low ambient temperature, check the tire pressure for all four tires.

For additional information, see "Low tire pressure warning light" in the "2. Instruments and controls" section and "TIRE PRESSURE MONITORING SYSTEM (TPMS)" in the "6. In case of emergency" section.

sure warning light" in the "2. Instruments and controls" section and "TIRE PRESSURE MONITORING SYSTEM (TPMS)" in the "6. In case of emergency" section.



WARNING

- **If the low tire pressure warning light illuminates while driving, avoid sudden steering maneuvers or abrupt braking, reduce vehicle speed, pull off the road to a safe location and stop the vehicle as soon as possible. Driving with under-inflated tires may permanently damage the tires and increase the likelihood of tire failure. Serious vehicle damage could occur and may lead to an accident and could result in serious personal injury. Check the tire pressure for all four tires. Adjust the tire pressure to the recommended COLD tire pressure shown on the Tire and Loading Information label to turn the low tire pressure warning light OFF. If you have a flat tire, replace it with a spare tire as soon as possible. (See "FLAT TIRE" in the "6. In case of emergency" section for changing a flat tire.)**

- **When a spare tire is mounted or a wheel is replaced, the TPMS will not function and the low tire pressure warning light will flash for approximately 1 minute. The light will remain on after 1 minute. Contact your NISSAN dealer as soon as possible for tire replacement and/or system resetting.**
- **Replacing tires with those not originally specified by NISSAN could affect the proper operation of the TPMS.**
- **Do not inject any tire liquid or aerosol tire sealant into the tires, as this may cause a malfunction of the tire pressure sensors.**



CAUTION

- **The TPMS may not function properly when the wheels are equipped with tire chains or the wheels are buried in snow.**
- **Do not place metalized film or any metal parts (antenna, etc.) on the windows. This may cause poor reception of the signals from the tire**

pressure sensors, and the TPMS will not function properly.

Some devices and transmitters may temporarily interfere with the operation of the TPMS and cause the low tire pressure warning light to illuminate. Some examples are:

- Facilities or electric devices using similar radio frequencies are near the vehicle.
- If a transmitter set to similar frequencies is being used in or near the vehicle.
- If a computer (or similar equipment) or a DC/AC converter is being used in or near the vehicle.

FCC Notice:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules and RSS-210 of Industry Canada.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation of the device.

AVOIDING COLLISION AND ROLL-OVER



WARNING

Failure to operate this vehicle in a safe and prudent manner may result in loss of control or an accident.

Be alert and drive defensively at all times. Obey all traffic regulations. Avoid excessive speed, high speed cornering, or sudden steering maneuvers, because these driving practices could cause you to lose control of your vehicle. **As with any vehicle, a loss of control could result in a collision with other vehicles or objects, or cause the vehicle to rollover, particularly if the loss of control causes the vehicle to slide sideways.** Be attentive at all times, and avoid driving when tired. Never drive when under the influence of alcohol or drugs (including prescription or over-the-counter drugs which may cause drowsiness). Always wear your seat belt as outlined in the "SEAT BELTS" in the "1. Safety — Seats, seat belts and supplemental restraint system" section of this manual, and also instruct your passengers to do so.

Seat belts help reduce the risk of injury in collisions and rollovers. **In a rollover crash, an unbelted or improperly belted person is**

significantly more likely to be injured or killed than a person properly wearing a seat belt.

OFF-ROAD RECOVERY

While driving, the right side or left side wheels may unintentionally leave the road surface. If this occurs, maintain control of the vehicle by following the procedure below. Please note that this procedure is only a general guide. The vehicle must be driven as appropriate based on the conditions of the vehicle, road and traffic.

1. Remain calm and do not overreact.
2. Do not apply the brakes.
3. Maintain a firm grip on the steering wheel with both hands and try to hold a straight course.
4. When appropriate, slowly release the accelerator pedal to gradually slow the vehicle.
5. If there is nothing in the way, steer the vehicle to follow the road while the vehicle speed is reduced. Do not attempt to drive the vehicle back onto the road surface until vehicle speed is reduced.
6. When it is safe to do so, gradually turn the steering wheel until both tires return to the road surface. When all tires are on the road surface, steer the vehicle to stay in the

Starting and driving 5-5

FLAT TIRE

TIRE PRESSURE MONITORING SYSTEM (TPMS)

This vehicle is equipped with the Tire Pressure Monitoring System (TPMS). It monitors tire pressure of all tires except the spare. When the low tire pressure warning light is lit, one or more of your tires is significantly under-inflated. If the vehicle is being driven with low tire pressure, the TPMS will activate and warn you of it by the low tire pressure warning light. This system will activate only when the vehicle is driven at speeds above 16 MPH (25 km/h). For more details, see "WARNING/INDICATOR LIGHTS AND AUDIBLE REMINDERS" in the "2. Instruments and controls" section and "TIRE PRESSURE MONITORING SYSTEM (TPMS)" in the "5. Starting and driving" section.



WARNING

- If the low tire pressure warning light illuminates while driving, avoid sudden steering maneuvers or abrupt braking, reduce vehicle speed, pull off the road to a safe location and stop the vehicle as soon as possible. Driving with under-inflated tires may permanently damage the tires and increase the likelihood of tire failure. Serious vehicle damage

could occur and may lead to an accident and could result in serious personal injury. Check the tire pressure for all four tires. Adjust the tire pressure to the recommended COLD tire pressure shown on the Tire and Loading Information label to turn the low tire pressure warning light OFF. If you have a flat tire, replace it with a spare tire as soon as possible.

- When a spare tire is mounted or a wheel is replaced, the TPMS will not function and the low tire pressure warning light will flash for approximately 1 minute. The light will remain on after 1 minute. Contact your NISSAN dealer as soon as possible for tire replacement and/or system resetting.
- Replacing tires with those not originally specified by NISSAN could affect the proper operation of the TPMS.
- Do not inject any tire liquid or aerosol tire sealant into the tires, as this may cause a malfunction of the tire pressure sensors.

CHANGING A FLAT TIRE

If you have a flat tire, follow the instructions below.

Stopping the vehicle

1. Safely move the vehicle off the road and away from traffic.
2. Turn on the hazard warning flashers.
3. Park on a level surface and apply the parking brake.
4. **Continuously Variable Transmission (CVT) models:**
Move the selector lever to the P (Park) position.
Manual Transmission (MT) models:
Move the shift lever to the R (Reverse) position.
5. Turn off the engine.
6. Raise the hood to warn other traffic, and to signal professional road assistance personnel that you need assistance.
7. Have all passengers get out of the vehicle and stand in a safe place, away from traffic and clear of the vehicle.

wear indicators are visible, the tire(s) should be replaced.

- Tires degrade with age and use. Have tires, including the spare, over 6 years old checked by a qualified technician, because some tire damage may not be obvious. Replace the tires as necessary to prevent tire failure and possible personal injury.
- Improper service of the spare tire may result in serious personal injury. If it is necessary to repair the spare tire, contact a NISSAN dealer.
- For additional information regarding tires, refer to "Important Tire Safety Information" (US) or "Tire Safety Information" (Canada) in the Warranty Information Booklet.

Replacing wheels and tires

When replacing a tire, use the same size, tread design, speed rating and load carrying capacity as originally equipped. (See "SPECIFICATIONS" in the "9. Technical and consumer information" section for recommended types and sizes of tires and wheels.)

8-36 **Maintenance and do-it-yourself**



WARNING

- The use of tires other than those recommended or the mixed use of tires of different brands, construction (bias, bias-belted or radial), or tread patterns can adversely affect the ride, braking, handling, ground clearance, body-to-tire clearance, tire chain clearance, speedometer calibration, headlight aim and bumper height. Some of these effects may lead to accidents and could result in serious personal injury.
- If the wheels are changed for any reason, always replace with wheels which have the same off-set dimension. Wheels of a different off-set could cause premature tire wear, degrade vehicle handling characteristics and/or interference with the brake discs/drums. Such interference can lead to decreased braking efficiency and/or early brake pad/shoe wear. See "WHEELS AND TIRES" in the "9. Technical and consumer information" section of this manual for wheel off-set dimensions.

- When a spare tire is mounted or a wheel is replaced, the TPMS will not function and the low tire pressure warning light will flash for approximately 1 minute. The light will remain on after 1 minute. Contact your NISSAN dealer as soon as possible for tire replacement and/or system resetting.
- Replacing tires with those not originally specified by NISSAN could affect the proper operation of the TPMS.
- Do not install a damaged or deformed wheel or tire even if it has been repaired. Such wheels or tires could have structural damage and could fail without warning.
- The use of retread tire is not recommended.
- For additional information regarding tires, refer to "Important Tire Safety Information" (US) or "Tire Safety Information" (Canada) in the Warranty Information Booklet.