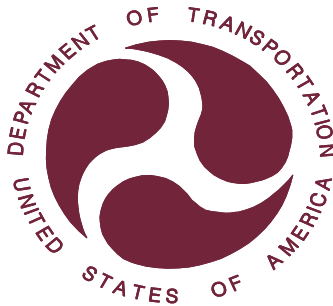


REPORT NUMBER 138-STF-07-001

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

KIA MOTORS CORPORATION
2007 HYUNDAI ENTOURAGE
FOUR-DOOR MPV
NHTSA NO. C70504

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



November 7, 2007

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
NVS-220
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 NEW JERSEY AVENUE, SE
WASHINGTON, D.C. 20590

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SECTION 1
INTRODUCTION

1.1 PURPOSE OF COMPLIANCE TEST

A 2007 Hyundai Entourage 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 2007 Hyundai Entourage four-door MPV. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: KNDMC233776011787

B. NHTSA Number: C70504

C. Manufacturer: Kia Motors Corporation

D. Manufacture Date: 02/2006

1.3 TEST DATE

The test vehicle was tested during the time period July 23 through August 21, 2007.

SECTION 2

TEST PROCEDURE AND SUMMARY OF RESULTS

2.1 TEST PROCEDURE

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

Subsequent events included weighing the vehicle to establish the Unloaded Vehicle Weight (UVW) and the distribution of weight on the front and rear axles and each wheel position. The vehicle was loaded to its Lightly Loaded Vehicle Weight (LLVW) for four tire deflation scenarios. This LLVW included the weights of driver, one passenger, and test equipment. The vehicle was loaded to its Vehicle Capacity Weight (VCW) for four tire deflation scenarios. The Vehicle Capacity Weight included the weights of driver, one passenger, equipment, ballast in the mid and rear seats, and ballast in the internal cargo area. For determination of the telltale warning activation pressure, the recommended cold inflation pressure was identified from the vehicle placard.

The vehicle was instrumented with a Racelogic VBOX III 100 Hz GPS Data Logger and brake pedal trigger. The VBOX uses GPS to measure vehicle speed, time, and distance. Test data were recorded to a compact flash card. During the test, a stopwatch was used to determine the approximate "cumulative driving time" during each test phase. Cumulative driving time does not include time during the brake application or when the vehicle speed was below 50 km/h or above 100 km/h. Upon completion of a tire deflation test, graph(s) were generated by VBOX software showing vehicle speed versus time during the test procedure calibration phase and detection phase. The graphs furnish a second-by-second analysis of each test phase. The cumulative driving time for each test 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 consisted of four parts:

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 50-100 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. Vehicle was started and low tire pressure telltale illuminated without driving.
3. Cool down phase: Vehicle was parked in the San Angelo Test Facility (SATF) open bay. Tires were allowed to cool down for one hour, or until all tires excluding deflated tire(s) were within seven kPa (one psi) of vehicle placard cold inflation pressure. 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 driven when necessary (Scenario G) until the telltale extinguished. Other scenarios extinguished without driving.

An indicant malfunction detection scenario was performed with the vehicle loaded to its LLVW. A malfunction was simulated by placing the compact spare tire (with no TPMS sensor) on the left front wheel position. The vehicle was driven until telltale illumination was attained.

2.2 SUMMARY OF RESULTS

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

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

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

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

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

One indicant malfunction detection scenario was performed on the test vehicle at LLVW. The vehicle's dedicated malfunction telltale indicated a malfunction per the standard's requirements effective September 1, 2007.

SECTION 3
TEST DATA

FMVSS No. 138 – TEST DATA SUMMARY

TEST DATES: July 23 through August 21, 2007 LAB: U. S. DOT San Angelo Test Facility (SATF)

VIN: KNDMC233776011787 VEHICLE NHTSA NUMBER: C70504

CERTIFICATION LABEL BUILD DATE: 02/2006

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	INDICANT 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: July 23, 2007 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504 VIN: KNDMC233776011787

CERTIFICATION LABEL BUILD DATE: 02/2006 ENGINE: V-6 3800

MY/MAKE/MODEL/BODY STYLE: 2007 Hyundai Entourage four-door MPV

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 175 km (109 mi)

VEHICLE ALIGNMENT AND WHEEL BALANCING:

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

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

TPMS IDENTIFICATION:

TPMS SENSOR MAKE/MODEL: Lear Corporation, #52933-4D000, High Line

Source: Information supplied by Hyundai

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

TPMS MALFUNCTION INDICATOR TYPE:

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

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

Source: Information supplied by Hyundai

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

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

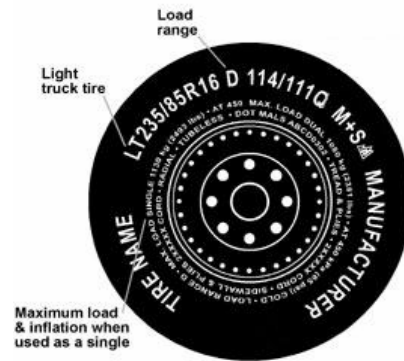
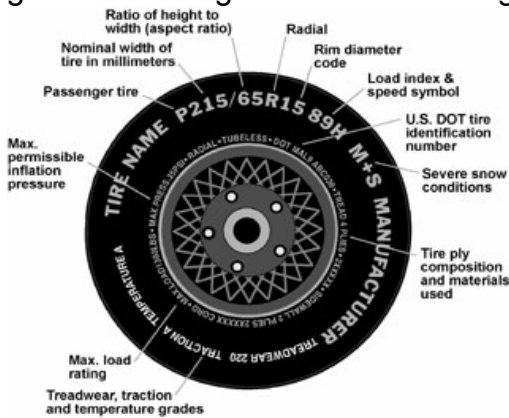
DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING AND OWNER'S MANUAL:

Axle	Tire Size	Recommended Cold Inflation Pressure	Source
Front	225/70R16	240 kPa (35 psi)	Vehicle placard
Rear	225/70R16	240 kPa (35 psi)	Vehicle placard
Spare	T135/90R17	420 kPa (60 psi)	Vehicle placard

INSTALLED TIRE DATA (Use diagrams as reference):

Diagram - Passenger Car Tire Labeling

Diagram - Other Markings on Light Trucks



Front and Rear Axles

Tire Size (ex. P225/65R15 89H): 225/70R16 102T

Manufacturer/Tire Name: Kumho Solus KH16

Sidewall Max Load Rating: 850 kg (1,874 lbs)

Max Inflation Pressure: 300 kPa (44 psi)

Sidewall Construction (number of plies and ply material): 2 plies polyester

Tread Construction (number of plies and ply material): 5 plies - 2 polyester, 2 steel, 1 nylon

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

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

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

Worksheet for Determining FMVSS No. 138 Telltale Warning Activation Pressure for Tires Installed on Vehicle		
Part	Front Axle	Rear Axle
(A) Recommended Inflation Pressure x .75	<u>240</u> kPa x .75 = <u>180.0</u> kPa	<u>240</u> kPa x .75 = <u>180.0</u> kPa
(B) Information from FMVSS 138 Table 1 below, Tire types are: Inflation pressure Minimum activation pressures from Table 1	(<input checked="" type="checkbox"/>) P-metric-Standard load (<input type="checkbox"/>) P-metric-Extra Load Load Range (<input type="checkbox"/>) C, (<input type="checkbox"/>) D, or (<input type="checkbox"/>) E (<input checked="" type="checkbox"/>) Maximum or (<input type="checkbox"/>) Rated <u>300</u> kPa (44 psi) <u>140</u> kPa (20 psi)	(<input checked="" type="checkbox"/>) P-metric-Standard load (<input type="checkbox"/>) P-metric-Extra Load Load Range (<input type="checkbox"/>) C, (<input type="checkbox"/>) D, or (<input type="checkbox"/>) E (<input checked="" type="checkbox"/>) Maximum or (<input type="checkbox"/>) 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>180.0</u> kPa (26.1 psi)	<u>180.0</u> kPa (26.1 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	<u>173.0</u> kPa (25.1 psi)	<u>173.0</u> kPa (25.1 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: Robert N. Gregg

DATE: July 23, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: July 23, 2007 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

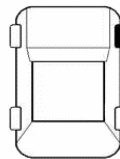
TPMS Low Tire Pressure Warning Telltale

TPMS Low Tire Pressure Warning Telltale Location: Lower right side of instrument cluster

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

(X)YES ()NO (fail)

Identify Telltale Symbol Used (check box above figure).



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 (X) Dedicated stand-alone () Combined with low tire pressure telltale

TPMS Dedicated Malfunction Telltale Location: Central right side of instrument cluster

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

(X)YES ()NO (fail)

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

Identify Telltale Symbol Used: (X) "TPMS" () OTHER (fail)

Note any words or additional symbols used.

None

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

Check Telltale Lamp Functions:

LOW TIRE PRESSURE TELLTALE

Identify position of ignition locking system when telltale illuminates.

OFF/LOCK Between OFF/LOCK and ON/RUN

ON/RUN Between OFF/RUN and START

Is the telltale yellow in color? (X)YES ()NO (fail)

Time telltale remains illuminated 3.13 seconds.

DEDICATED MALFUNCTION TELLTALE

Identify position of ignition locking system when telltale illuminates.

OFF/LOCK Between OFF/LOCK and ON/RUN

ON/RUN Between OFF/RUN and START

Is the telltale yellow in color? (X)YES ()NO (fail)

Time telltale remains illuminated 3.12 seconds.

Starter Interlocks:

Does vehicle have any starter, transmission or other interlocks that affect operation of the telltale lamp check function? ()YES (X)NO

TEST RESULTS

Low Tire Pressure Warning Telltale (PASS/FAIL)

PASS

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: July 23, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: July 26, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

Time: Start: 12:10 pm End: 12:58 pm

Ambient Temperature: Start: 26.4°C (79.5°F) End: 27.8°C (82.0°F)

Odometer Reading: Start: 175 km (109 mi)

Fuel Level: Start: Full

Weather Conditions: Partly cloudy

Time vehicle has remained with engine off and tires shielded from direct sunlight:
 (1 hour minimum): 3 hours (inside the SATF open bay)

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Pre-test cold measurements after ambient soak: Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.2 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	26.2°C (79.2°F)	27.4°C (81.3°F)	28.4°C (83.1°F)	26.8°C (80.2°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,675 kg (5,898 lbs)

GAWR (front): 1,360 kg (2,998 lbs)

GAWR (rear): 1,390 kg (3,064 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 525 kg (1,157 lbs)

Measured Unloaded Vehicle Weight:

LF	<u>622.5 kg (1,372.4 lbs)</u>	LR	<u>437.5 kg (964.5 lbs)</u>
RF	<u>581.0 kg (1,280.9 lbs)</u>	RR	<u>436.0 kg (961.2 lbs)</u>
Front		Rear	
Axle	<u>1,203.5 kg (2,653.3 lbs)</u>	Axle	<u>873.5 kg (1,925.7 lbs)</u>
Total Vehicle		<u>2,077.0 kg (4,579.0 lbs)</u>	

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

LF	<u>676.5 kg (1,491.4 lbs)</u>	LR	<u>473.0 kg (1,042.8 lbs)</u>
RF	<u>637.0 kg (1,404.3 lbs)</u>	RR	<u>476.5 kg (1,050.5 lbs)</u>
Front		Rear	
Axle	<u>1,313.5 kg (2,895.7 lbs) (≤ GAWR)</u>	Axle	<u>949.5 kg (2,093.3 lbs) (≤ GAWR)</u>
Total Vehicle		<u>2,263.0 kg (4,989.0 lbs) (not greater than GVWR)</u>	

Note: For scenarios A, B, C, D, and I, this total vehicle weight measures the vehicle loaded to lightly loaded vehicle weight (LLVW), 186 kg (410 lbs) of driver, passenger, and equipment.

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

SCENARIO A - Left Front Tire Deflation at LLVW

TEST DATE: July 26, 2007 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>20.7°C (69.3°F)</u> Vehicle cool down period: <u>overnight</u>				
Inflation Pressure	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	23.8°C (74.8°F)	23.6°C (74.5°F)	23.8°C (74.8°F)	24.2°C (75.6°F)
San Angelo Test Facility Shop Floor Temp	25.2°C (77.4°F)	25.0°C (77.0°F)	25.2°C (77.4°F)	25.4°C (77.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:

(VBox time – see Section 6 test plots)

Time: Start: 12:15:13 UTC End: 12:39:48 UTC
 Odometer Reading: Start: 205.8 km (127.9 mi) End: 233.2 km (144.9 mi)
 Ambient Temperature: Start: 20.7°C (69.3°F) End: 21.6°C (70.9°F)
 Roadway Temperature: Start: 24.8°C (76.6°F) End: 26.0°C (78.8°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:46 minutes (stopwatch time) 13.5 km (8.4 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:38 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Max speed: 82.06 km/hr (50.99 mph)

Total Driving Time: 21:29 minutes (VBox time)

**DATA SHEET 3 (Sheet 4 of 28)
TPMS OPERATIONAL PERFORMANCE**

SCENARIO A - Left Front Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	259.2 kPa (37.6 psi)	255.7 kPa (37.1 psi)	255.2 kPa (37.0 psi)	256.2 kPa (37.2 psi)
Tire Sidewall Temp	34.8°C (94.6°F)	30.2°C (86.4°F)	30.4°C (86.7°F)	33.2°C (91.8°F)
San Angelo Test Facility Shop Floor Temp	26.6°C (79.9°F)	25.8°C (78.4°F)	26.4°C (79.5°F)	26.4°C (79.5°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: (X)LF ()LR ()RR ()RF Inflation Pressure	173.0 kPa (25.1 psi)			

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

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

Time to illuminate:

Illumination in three seconds. Driving was not required.

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

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

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?
(X)YES ()NO

Tire locations verified: (X)LF ()LR ()RR ()RF

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

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

SCENARIO A - Left Front Tire Deflation at LLVW

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>22.3°C (72.1°F)</u> Vehicle cool down period: <u>50</u> minutes				
Inflation Pressure	166.7 kPa (24.2 psi)	244.6 kPa (35.5 psi)	245.3 kPa (35.6 psi)	246.0 kPa (35.7 psi)
Tire Sidewall Temp	25.4°C (77.7°F)	25.0°C (77.0°F)	25.6°C (78.1°F)	26.0°C (78.8°F)
San Angelo Test Facility Shop Floor Temp	24.8°C (76.6°F)	25.0°C (77.0°F)	25.2°C (77.4°F)	25.6°C (78.1°F)

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

TELLTALE EXTINGUISHMENT:

RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)

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

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Left front tire was deflated at LLVW.

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: July 26, 2007

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 6 of 28)
TPMS OPERATIONAL PERFORMANCE
SCENARIO B – Right Rear Tire Deflation at LLVW

TEST DATE: July 26, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>22.3°C (72.1°F)</u> Vehicle cool down period: <u>65</u> minutes				
Inflation Pressure	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)
Tire Sidewall Temp	26.0°C (78.8°F)	24.8°C (76.6°F)	25.8°C (78.4°F)	26.2°C (79.2°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)	25.4°C (77.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(VBox time – see Section 6 test plots)

Time: Start: 14:10:26 UTC End: 14:34:31 UTC
Odometer Reading: Start: 234.5 km (145.7 mi) End: 262.0 km (162.8 mi)
Ambient Temperature: Start: 22.3°C (72.1°F) End: 22.9°C (73.2°F)
Roadway Temperature: Start: 27.6°C (81.7°F) End: 29.2°C (84.6°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:32 minutes (stopwatch time) 13.7 km (8.5 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:40 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Max speed: 84.90 km/hr (52.75 mph)

Total Driving Time: 21:13 minutes (VBox time)

**DATA SHEET 3 (Sheet 7 of 28)
 TPMS OPERATIONAL PERFORMANCE
 SCENARIO B – Right Rear Tire Deflation at LLVW**

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	254.0 kPa (36.8 psi)	254.6 kPa (36.9 psi)	252.3 kPa (36.6 psi)	253.3 kPa (36.7 psi)
Tire Sidewall Temp	34.4°C (93.9°F)	30.9°C (87.6°F)	29.4°C (84.9°F)	32.0°C (89.6°F)
San Angelo Test Facility Shop Floor Temp	25.4°C (77.7°F)	25.4°C (77.7°F)	25.6°C (78.1°F)	25.2°C (77.4°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: ()LF ()LR (X)RR ()RF Inflation Pressure			173.0 kPa (25.1 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

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

Time to illuminate:

Illumination in 40 seconds. Driving was not required.

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

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

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?
 (X)YES ()NO

Tire locations verified: ()LF ()LR (X)RR ()RF

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

DATA SHEET 3 (Sheet 8 of 28)
TPMS OPERATIONAL PERFORMANCE
SCENARIO B – Right Rear Tire Deflation at LLVW

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>24.2°C (75.6°F)</u> Vehicle cool down period: <u>63</u> minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.3 kPa (34.9 psi)	164.8 kPa (23.9 psi)	240.7 kPa (34.9 psi)
Tire Sidewall Temp	26.6°C (79.9°F)	26.4°C (79.5°F)	26.8°C (80.2°F)	27.0°C (80.6°F)
San Angelo Test Facility Shop Floor Temp	25.8°C (78.4°F)	25.8°C (78.4°F)	25.8°C (78.4°F)	26.0°C (78.8°F)

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

TELLTALE EXTINGUISHMENT:
RE-ADJUSTED TIRE INFLATION PRESSURES:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:				
	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)

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

TEST RESULTS

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

PASS

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: July 26, 2007

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: July 26, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>24.7°C (76.5°F)</u> Vehicle cool down period: <u>75</u> minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	26.5°C (79.7°F)	26.4°C (79.5°F)	27.2°C (81.0°F)	26.6°C (79.9°F)
San Angelo Test Facility Shop Floor Temp	26.0°C (78.8°F)	26.0°C (78.8°F)	26.4°C (79.5°F)	26.0°C (78.8°F)

SYSTEM CALIBRATION/LEARNING PHASE:

(VBox time – see Section 6 test plots)

Time: Start: 16:27:32 UTC End: 16:51:19 UTC
 Odometer Reading: Start: 263.9 km (164.0 mi) End: 291.3 km (181.0 mi)
 Ambient Temperature: Start: 24.7°C (76.5°F) End: 25.0°C (77.0°F)
 Roadway Temperature: Start: 33.4°C (92.1°F) End: 34.4°C (93.9°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:28 minutes (stopwatch time) 13.5 km (8.4 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:38 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Max speed: 83.95 km/hr (52.16 mph)

Total Driving Time: 21:06 minutes (VBox time)

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

SCENARIO C – Left 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	256.7 kPa (37.2 psi)	250.4 kPa (36.3 psi)	253.0 kPa (36.7 psi)	254.9 kPa (37.0 psi)
Tire Sidewall Temp	39.6°C (103.3°F)	35.0°C (95.0°F)	35.8°C (96.4°F)	38.8°C (101.8°F)
San Angelo Test Facility Shop Floor Temp	27.4°C (81.3°F)	27.6°C (81.7°F)	27.6°C (81.7°F)	27.2°C (81.0°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: ()LF (X)LR ()RR (X)RF Inflation Pressure		173.0 kPa (25.1 psi)		173.0 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

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

Time to Illuminate:

illumination in 3.12 seconds. Driving was not required.

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

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

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?
(X)YES ()NO

Tire locations verified: ()LF (X)LR ()RR (X)RF

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

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

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>26.0°C (78.8°F)</u> Vehicle cool down period: <u>72</u> minutes				
Inflation Pressure	241.6 kPa (35.0 psi)	164.8 kPa (23.9 psi)	240.9 kPa (34.9 psi)	166.0 kPa (24.1 psi)
Tire Sidewall Temp	29.0°C (84.2°F)	29.0°C (84.2°F)	29.4°C (84.9°F)	29.0°C (84.2°F)
San Angelo Test Facility Shop Floor Temp	27.6°C (81.7°F)	27.6°C (81.7°F)	27.2°C (81.0°F)	27.4°C (81.3°F)

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:				
	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)

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

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Left rear and right front tires were deflated at LLVW.

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: July 26, 2007

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: August 15, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>34.0°C (93.2°F)</u> Vehicle cool down period: <u>90</u> minutes				
Inflation Pressure	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)
Tire Sidewall Temp	36.6°C (97.9°F)	37.2°C (99.0°F)	36.8°C (98.2°F)	35.6°C (96.1°F)
San Angelo Test Facility Shop Floor Temp	33.6°C (92.5°F)	35.0°C (95.0°F)	35.4°C (95.7°F)	33.4°C (92.1°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(VBox time – see Section 6 test plots)

Time: Start: 18:19:16 UTC End: 18:43:20 UTC
 Odometer Reading: Start: 956.6 km (594.4 mi) End: 984.0 km (611.4 mi)
 Ambient Temperature: Start: 34.0°C (93.2°F) End: 35.1°C (95.2°F)
 Roadway Temperature: Start: 53.6°C (128.5°F) End: 55.2°C (131.4°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:26 minutes (stopwatch time) 13.5 km (8.4 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:39 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Max speed: 83.80 km/hr (52.07 mph)

Total Driving Time: 21:13 minutes (VBox time)

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Immediately, after vehicle is stopped, engine off: Inflation Pressure	260.4 kPa (37.8 psi)	259.3 kPa (37.6 psi)	260.7 kPa (37.8 psi)	261.5 kPa (37.9 psi)
Tire Sidewall Temp	50.8°C (123.4°F)	45.4°C (113.7°F)	48.4°C (119.1°F)	51.2°C (124.2°F)
San Angelo Test Facility Shop Floor Temp	34.0°C (93.2°F)	34.8°C (94.6°F)	34.8°C (94.6°F)	34.2°C (93.6°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR (X)RR (X)RF Inflation Pressure	173.1 kPa (25.1 psi)	173.0 kPa (25.1 psi)	173.0 kPa (25.1 psi)	173.0 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

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

Time to Illuminate:

illumination in 5.5 seconds. Driving was not required.

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

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

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?
(X)YES ()NO

Tire locations verified: (X)LF (X)LR (X)RR (X)RF

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

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

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>39.2°C (102.6°F)</u> Vehicle cool down period: <u>69</u> minutes				
Inflation Pressure	158.1 kPa (22.9 psi)	164.9 kPa (23.9 psi)	162.8 kPa (23.6 psi)	162.6 kPa (23.6 psi)
Tire Sidewall Temp	36.8°C (98.2°F)	38.2°C (100.8°F)	38.2°C (100.8°F)	40.6°C (105.1°F)
San Angelo Test Facility Shop Floor Temp	36.4°C (97.5°F)	36.8°C (98.2°F)	37.0°C (98.6°F)	37.8°C (100.0°F)

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:				
	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)

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

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

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

REMARKS: The first attempt at Scenario D was aborted after 16.9 miles due to valve stem damage. A trip to a Hyundai dealer for a replacement valve stem/sensor unit added 217.6 miles. Then the left rear tire was replaced due to a damaged bead and a sidewall bubble. Breaking in a new tire required an additional 97.2 miles.

RECORDED BY: Robert N. Gregg

DATE: August 15, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: August 16, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

Time: Start: 8:16 am End: 11:06 am

Ambient Temperature: Start: 26.4°C (79.5°F) End: 30.1°C (86.2°F)

Odometer Reading: Start: 984.9 km (612.0 mi)

Fuel Level: Start: Full

Weather Conditions: Overcast

Time vehicle has remained with engine off and tires shielded from direct sunlight:
 (1 hour minimum): overnight (inside the SATF open bay)

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Pre-test cold measurements after ambient soak: Inflation Pressure	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)
Tire Sidewall Temp	29.2°C (84.6°F)	28.2°C (82.8°F)	28.8°C (83.8°F)	29.4°C (84.9°F)

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

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 2,675 kg (5,898 lbs)

GAWR (front): 1,360 kg (2,998 lbs)

GAWR (rear): 1,390 kg (3,064 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 525 kg (1,157 lbs)

Measured Unloaded Vehicle Weight:

LF	<u>624.0 kg (1,376 lbs)</u>	LR	<u>434.0 kg (957 lbs)</u>
RF	<u>575.5 kg (1,269 lbs)</u>	RR	<u>439.5 kg (969 lbs)</u>
Front		Rear	
Axle	<u>1,199.5 kg (2,645 lbs)</u>	Axle	<u>874.5 kg (1,926 lbs)</u>
Total Vehicle		<u>2,074 kg (4,571 lbs)</u>	

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

LF	<u>696 kg (1,535 lbs)</u>	LR	<u>615 kg (1,355 lbs)</u>
RF	<u>655 kg (1,445 lbs)</u>	RR	<u>634 kg (1,398 lbs)</u>
Front		Rear	
Axle	<u>1,351 kg (2,980 lbs) (≤ GAWR)</u>	Axle	<u>1,249 kg (2,753 lbs) (≤ GAWR)</u>
Total Vehicle		<u>2,600 kg (5,733 lbs) (not greater than GVWR)</u>	

Note: For scenarios E, F, G, and H, this Total Vehicle Weight measures the vehicle loaded to vehicle capacity weight (VCW), 526 kg (1,160 lbs) of driver, passenger, equipment, and ballast.

DATA SHEET 3 (Sheet 17 of 28)
TPMS OPERATIONAL PERFORMANCE
SCENARIO E – Left Rear Tire Deflation at VCW

TEST DATE: August 16, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

Note: See Data Sheet 3 (Sheet 16 of 28) for Test Weight.

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>30.5°C (86.9°F)</u> Vehicle cool down period: <u>80</u> minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	31.6°C (88.9°F)	33.8°C (92.8°F)	35.2°C (95.4°F)	32.8°C (91.0°F)
San Angelo Test Facility Shop Floor Temp	31.6°C (88.9°F)	33.0°C (91.4°F)	33.8°C (92.8°F)	31.8°C (89.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(VBox time – see Section 6 test plots)

Time: Start: 17:33:23 UTC End: 17:57:17 UTC
Odometer Reading: Start: 987.0 km (613.3 mi) End: 1,014.4 km (630.3 mi)
Ambient Temperature: Start: 30.5°C (86.9°F) End: 30.4°C (86.7°F)
Roadway Temperature: Start: 41.4°C (106.5°F) End: 40.8°C (105.4°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:22 minutes (stopwatch time) 13.5 km (8.4 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:34 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Max speed: 84.43 km/hr (52.46 mph)

Total Driving Time: 20:58 minutes (VBox time)

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

SCENARIO E – Left Rear Tire Deflation at 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	259.3 kPa (37.6 psi)	259.5 kPa (37.6 psi)	259.7 kPa (37.7 psi)	258.9 kPa (37.6 psi)
Tire Sidewall Temp	41.2°C (106.2°F)	40.6°C (105.1°F)	42.0°C (107.6°F)	38.8°C (101.8°F)
San Angelo Test Facility Shop Floor Temp	31.6°C (88.9°F)	31.8°C (89.2°F)	32.2°C (90.0°F)	32.4°C (90.3°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: ()LF (X)LR ()RR ()RF Inflation Pressure		173.0 kPa (25.1 psi)		

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Did the telltale illuminate? YES NO

Time to Illuminate:

illumination in 2.8 seconds. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (fail)

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

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?
 YES NO

Tire locations verified: () LF LR () RR () RF

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?
 YES NO (fail)

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

SCENARIO E – Left Rear Tire Deflation at VCW

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>31.2°C (88.2°F)</u> Vehicle cool down period: <u>62</u> minutes				
Inflation Pressure	241.4 kPa (35.0 psi)	162.7 kPa (23.6 psi)	242.1 kPa (35.1 psi)	243.3 kPa (35.3 psi)
Tire Sidewall Temp	33.6°C (92.5°F)	34.2°C (93.6°F)	33.8°C (92.8°F)	33.4°C (92.1°F)
San Angelo Test Facility Shop Floor Temp	32.4°C (90.3°F)	32.8°C (91.0°F)	32.8°C (91.0°F)	32.4°C (90.3°F)

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)

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

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Left rear tire was deflated at VCW.

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 16, 2007

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 20 of 28)
TPMS OPERATIONAL PERFORMANCE
SCENARIO F – Right Front Tire Deflation at VCW

TEST DATE: August 16, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

Note: See Data Sheet 3 (Sheet 16 of 28) for Test Weight.

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>31.2°C (88.2°F)</u> Vehicle cool down period: <u>75</u> minutes				
Inflation Pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	33.2°C (91.8°F)	34.4°C (93.9°F)	34.4°C (93.9°F)	33.2°C (91.8°F)
San Angelo Test Facility Shop Floor Temp	32.0°C (89.6°F)	32.8°C (91.0°F)	33.2°C (91.8°F)	32.4°C (90.3°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(VBox time – see Section 6 test plots)

Time: Start: 19:42:25 UTC End: 20:06:29 UTC
Odometer Reading: Start: 1016.3 km (631.5 mi) End: 1,043.7 km (648.5 mi)
Ambient Temperature: Start: 31.2°C (88.2°F) End: 31.5°C (88.7°F)
Roadway Temperature: Start: 40.6°C (105.1°F) End: 41.0°C (105.8°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:19 minutes (stopwatch time) 13.7 km (8.5 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:42 minutes (stopwatch time) 13.7 km (8.5 mi) distance

Max speed: 83.30 km/hr (51.76 mph)

Total Driving Time: 21:00 minutes (VBox time)

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

SCENARIO F – Right Front Tire Deflation at 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	256.7 kPa (37.2 psi)	257.1 kPa (37.3 psi)	258.1 kPa (37.4 psi)	256.9 kPa (37.3 psi)
Tire Sidewall Temp	38.4°C (101.1°F)	42.8°C (109.0°F)	42.8°C (109.0°F)	42.0°C (107.6°F)
San Angelo Test Facility Shop Floor Temp	32.4°C (90.3°F)	33.0°C (91.4°F)	33.0°C (91.4°F)	33.0°C (91.4°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: ()LF ()LR ()RR (X)RF Inflation Pressure				173.0 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

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

Time to Illuminate:

illumination in 6.3 seconds. Driving was not required.

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

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

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?
(X)YES ()NO

Tire locations verified: ()LF ()LR ()RR (X)RF

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

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

SCENARIO F – Right Front Tire Deflation at VCW

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>31.1°C (88.0°F)</u> Vehicle cool down period: <u>50</u> minutes				
Inflation Pressure	242.4 kPa (35.2 psi)	242.7 kPa (35.2 psi)	243.3 kPa (35.3 psi)	163.8 kPa (23.8 psi)
Tire Sidewall Temp	34.2°C (93.6°F)	36.4°C (97.5°F)	35.0°C (95.0°F)	32.8°C (91.0°F)
San Angelo Test Facility Shop Floor Temp	32.4°C (90.3°F)	33.2°C (91.8°F)	33.4°C (92.1°F)	32.6°C (90.7°F)

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)

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

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Right front tire was deflated at VCW.

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 16, 2007

APPROVED BY: Kenneth H. Yates

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

SCENARIO G – Left Rear, Right Rear Tire Deflation at VCW

TEST DATE: August 20, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

Note: See Data Sheet 3 (Sheet 16 of 28) for Test Weight.

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>23.5°C (74.3°F)</u> Vehicle cool down period: <u>overnight</u>				
Inflation Pressure	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)
Tire Sidewall Temp	26.4°C (79.5°F)	26.8°C (80.2°F)	27.0°C (80.6°F)	26.0°C (78.8°F)
San Angelo Test Facility Shop Floor Temp	26.4°C (79.5°F)	28.2°C (82.8°F)	28.6°C (83.5°F)	26.2°C (79.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(VBox time – see Section 6 test plots)

Time: Start: 12:41:26 UTC End: 13:05:50 UTC
Odometer Reading: Start: 1,045.3 km (649.5 mi) End: 1,043.7 km (666.6 mi)
Ambient Temperature: Start: 23.5°C (74.3°F) End: 23.9°C (75.0°F)
Roadway Temperature: Start: 25.4°C (77.7°F) End: 25.4°C (77.7°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:20 minutes (stopwatch time) 13.7 km (8.5 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:33 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Max speed: 83.70 km/hr (52.01 mph)

Total Driving Time: 20:54 minutes (VBox time)

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

SCENARIO G – Left Rear, Right Rear Tire Deflation at 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	258.1 kPa (37.4 psi)	257.2 kPa (37.3 psi)	260.6 kPa (37.8 psi)	256.6 kPa (37.2 psi)
Tire Sidewall Temp	37.2°C (99.0°F)	34.8°C (94.6°F)	35.8°C (96.4°F)	35.4°C (95.7°F)
San Angelo Test Facility Shop Floor Temp	27.4°C (81.3°F)	29.0°C (84.2°F)	30.2°C (86.4°F)	27.6°C (81.7°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: ()LF (X)LR (X)RR ()RF Inflation Pressure		173.0 kPa (25.1 psi)	173.1 kPa (25.1 psi)	

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

Did the telltale illuminate? YES NO

Time to Illuminate:

illumination in 6.4 seconds. Driving was not required.

TELLTALE ILLUMINATES WITHIN 20 MINUTES: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (fail)

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

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?
 YES NO

Tire locations verified: () LF LR RR () RF

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?
 YES NO (fail)

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

SCENARIO G – Left Rear, Right Rear Tire Deflation at VCW

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>25.8°C (78.4°F)</u> Vehicle cool down period: <u>69</u> minutes				
Inflation Pressure	241.8 kPa (35.1 psi)	164.3 kPa (23.8 psi)	164.1 kPa (23.8 psi)	243.3 kPa (35.3 psi)
Tire Sidewall Temp	27.8°C (82.0°F)	28.6°C (83.5°F)	28.8°C (83.8°F)	27.4°C (81.3°F)
San Angelo Test Facility Shop Floor Temp	27.6°C (81.7°F)	28.6°C (83.5°F)	29.4°C (84.9°F)	27.2°C (81.0°F)

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:				
	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)

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

Driving direction:

Starting point: San Angelo Test Facility shop Direction: east

Time to Extinguish:

1:30 minutes (stopwatch time) 1.97 km (1.22 mi) distance

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

Left rear, right rear tires were deflated at VCW.

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 20, 2007

APPROVED BY: Kenneth H. Yates

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

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

TEST DATE: August 21, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70504

Note: See Data Sheet 3 (Sheet 16 of 28) for Test Weight.

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After loading vehicle to vehicle capacity weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>23.8°C (74.8°F)</u> Vehicle cool down period: <u>overnight</u>				
Inflation Pressure	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)
Tire Sidewall Temp	26.4°C (79.5°F)	26.4°C (79.5°F)	27.6°C (81.7°F)	26.4°C (79.5°F)
San Angelo Test Facility Shop Floor Temp	27.0°C (80.6°F)	27.2°C (81.0°F)	28.2°C (82.8°F)	27.6°C (81.7°F)

SYSTEM CALIBRATION/LEARNING PHASE:

(VBox time – see Section 6 test plots)

Time: Start: 13:29:52 UTC End: 13:53:46 UTC
 Odometer Reading: Start: 1,123.5 km (698.1 mi) End: 1,150.8 km (715.1 mi)
 Ambient Temperature: Start: 24.1°C (75.4°F) End: 24.6°C (76.3°F)
 Roadway Temperature: Start: 27.4°C (81.3°F) End: 30.2°C (86.4°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south
10:23 minutes (stopwatch time) 13.5 km (8.4 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north
10:28 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Max speed: 80.92 km/hr (50.28 mph)

Total Driving Time: 20:52 minutes (VBox time)

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

SCENARIO H – Left Front, Left Rear, Right Rear, and Right Front Tire Deflation at 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	260.9 kPa (37.8 psi)	261.8 kPa (38.0 psi)	262.6 kPa (38.1 psi)	259.2 kPa (37.6 psi)
Tire Sidewall Temp	37.6°C (99.7°F)	37.4°C (99.3°F)	38.0°C (100.4°F)	35.6°C (96.1°F)
San Angelo Test Facility Shop Floor Temp	29.2°C (84.6°F)	28.6°C (83.5°F)	29.4°C (84.9°F)	29.4°C (84.9°F)

SYSTEM DETECTION PHASE:

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Indicate Location of Tire(s) Deflated: (X)LF (X)LR (X)RR (X)RF Inflation Pressure	173.0 kPa (25.1 psi)	173.1 kPa (25.1 psi)	173.1 kPa (25.1 psi)	173.1 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop

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

Time to Illuminate:

Illumination in 9.8 seconds. Driving was not required.

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

Does the vehicle have a telltale that identifies which tire(s) is (are) under-inflated?

(X)YES ()NO

If Yes, does each tire in the symbol illuminate and stay illuminated when the tire it represents is under-inflated?

(X)YES ()NO

Tire locations verified: (X)LF (X)LR (X)RR (X)RF

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated when the ignition locking system is activated to the “On” or “Run” position?

(X)YES ()NO (fail)

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

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

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>26.4°C (79.5°F)</u> Vehicle cool down period: <u>67</u> minutes				
Inflation Pressure	166.2 kPa (24.1 psi)	165.2 kPa (24.0 psi)	164.7 kPa (23.9 psi)	166.7 kPa (24.2 psi)
Tire Sidewall Temp	29.2°C (84.6°F)	29.2°C (84.6°F)	29.6°C (85.3°F)	29.4°C (84.9°F)
San Angelo Test Facility Shop Floor Temp	28.4°C (83.1°F)	28.4°C (83.1°F)	29.2°C (84.6°F)	29.2°C (84.6°F)

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

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

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After cool down period: Re-adjusted Inflation Pressure:				
	240.1 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)

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

TEST RESULTS

TPMS Performance Test Results (PASS/FAIL)

PASS

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

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 21, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: August 21, 2007 LAB: SATF VEHICLE NHTSA NO: C70504

Time: Start: 18:19:11 UTC End: 18:23:01 UTC
Odometer Reading: Start: 1,152.3 km (716.0 mi) End: 1,153.9 km (717.0 mi)
Ambient Temperature: Start: 29.9°C (85.8°F)
Roadway Temperature: Start: 42.6°C (108.7°F)
Fuel Level: Start: Full

Note: See Data Sheet 3 (Sheet 2 of 28) 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: Compact spare tire assembly without
sensor was installed on left front wheel position.

MALFUNCTION TELLTALE ILLUMINATION

(after ignition locking system is activated to “On” (“Run”) position):

Dedicated Malfunction Telltale

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: east

Did the telltale illuminate? ()YES ()NO

32 seconds (stopwatch time) 1.3 km (0.8 mi) distance

Max speed: 78.3 km/hr (48.7 mph)

Total Driving Time: 0:32 minutes (VBox time)

After stopping the vehicle, does the telltale remain illuminated for at least 60 seconds (not flashing)?
()YES ()NO

<p>DEDICATED MALFUNCTION TELLTALE ILLUMINATES WITHIN 20 MINUTES: (<input checked="" type="checkbox"/>)YES (<input type="checkbox"/>)NO</p>
--

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

TEST

DATE: July 23, 2007 LAB: San Angelo Test Facility VEHICLE NHTSA NO: C70504

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)? YES NO

The following statement, in the English language, is provided verbatim in the Owner's Manual. 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

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/FAIL: PASS

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

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: FMVSS 138 malfunction performance requirements do not become effective until September 1, 2007.

RECORDED BY: Robert N. Gregg

DATE: July 23, 2007

APPROVED BY: Kenneth H. Yates

SECTION 4
TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

TABLE 1 - INSTRUMENTATION AND EQUIPMENT INFORMATION LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO	CAL. DATE	NEXT CAL. DATE
STOPWATCH	WESTCLOX QUARTZ STOPWATCH	NONE	N/A	N/A
VBOX RECORDING DEVICE	RACELOGIC VBOX III	SERIAL #030209	2/28/2007	2/27/2008
AMBIENT TEMPERATURE GAUGE	FLUKE 50D K/J THERMOMETER	SERIAL #80840101	3/8/2007	3/8/2008
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	RAYNGER ST20 PRO NON- CONTACT INFRARED THERMOMETER	SERIAL #2065640101- 0014	8/10/2006 8/14/2007	8/10/2007 8/14/2008
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	RAYNGER MINITEMP MT6 NON-CONTACT INFRARED THERMOMETER*	SERIAL #MAGR00004259 8	4/11/2007	4/11/2008
AIR PRESSURE GAUGE	ASHCROFT GENERAL PURPOSE DIGITAL GAUGE	MODEL #D1005PS 02L 100 PSI SERIAL #20017398-01	12/20/2006	12/20/2007
FLOOR SCALES (VEHICLE)	INTERCOMP SW DELUXE SCALES	PART #100156 SERIAL #27032382	8/14/2007	8/14/2008
PLATFORM SCALE (BALLAST)	HOWE RICHARDSON	MODEL #6401 SERIAL #0181- 5509-26	8/14/2007	8/14/2008

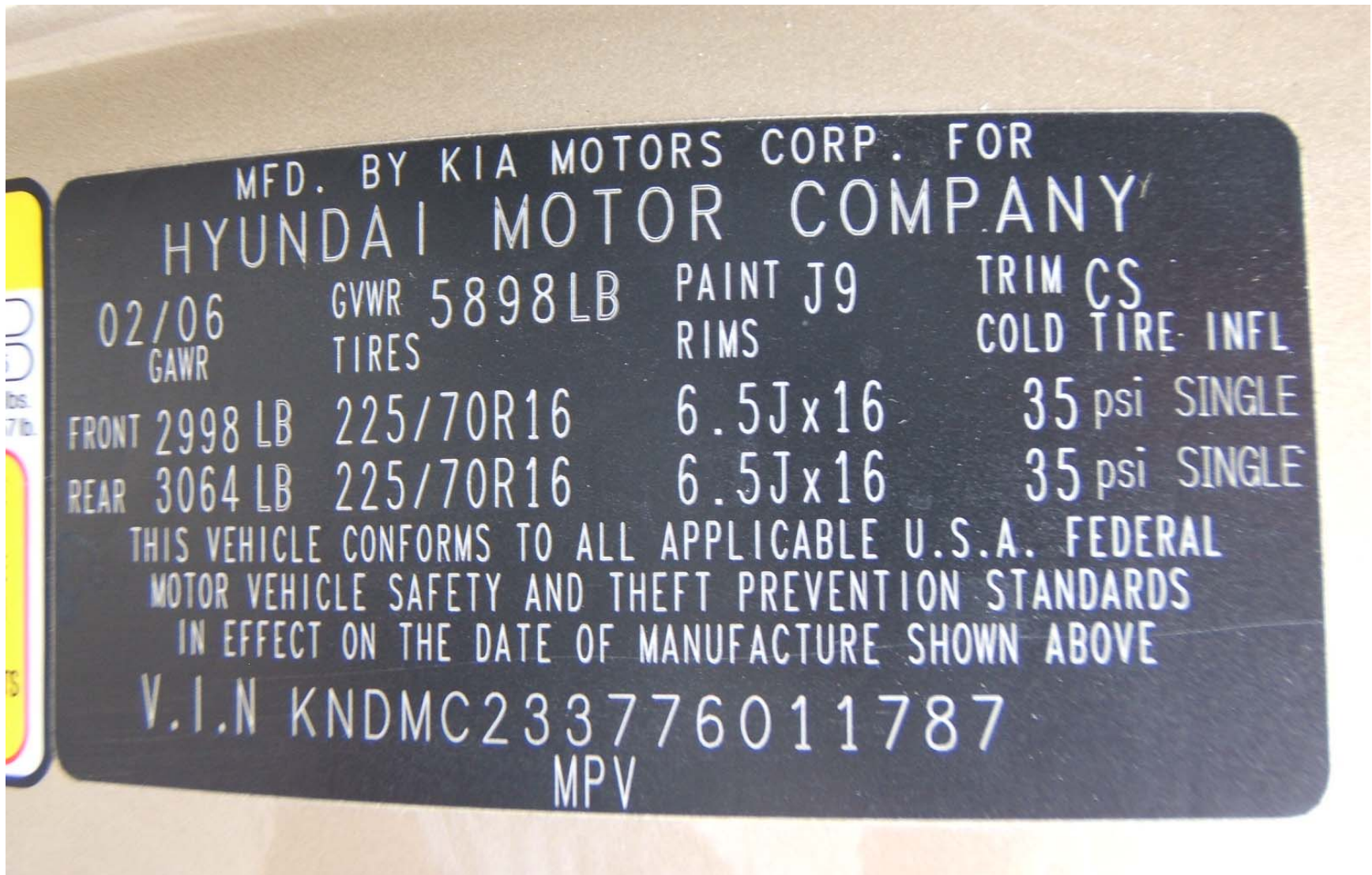
*The Raynger Minitemp MT 6 was used only while the Raynger ST20 was being calibrated.

SECTION 5
PHOTOGRAPHS



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FIGURE 5.1
3/4 FRONTAL VIEW FROM LEFT SIDE OF VEHICLE



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FIGURE 5.2
VEHICLE CERTIFICATION LABEL



TIRE AND LOADING INFORMATION PNEUS ET CHARGE-INFORMATION

SEATING CAPACITY TOTAL 7 FRONT 2 REAR 5

NOMBRE DE SIÈGES TOTAL 7 AVANT 2 ARRIÈRE 5

The combined weight of occupants and cargo should never exceed 525 kg or 1,157 lbs.
Le poids combiné des occupants et du chargement ne doit jamais excéder 525 kg ou 1,157 lb.

TIRE/ PNEU	SIZE/ DIMENSION	COLD TIRE PRESSURE/ PRESSION À FROID	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION	CONSULTER LE GUIDE DU PROPRIÉTAIRE POUR OBTENIR DES RENSEIGNEMENTS ADDITIONNELS
FRONT/ AVANT	225/70R16	240KPA , 35PSI		
REAR/ ARRIÈRE	225/70R16	240KPA , 35PSI		
SPARE/ SECOURS	T135/90R17	420kPa , 60psi		

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FIGURE 5.3
VEHICLE PLACARD



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FIGURE 5.4
TIRE SHOWING BRAND



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FIGURE 5.5
TIRE SHOWING MODEL



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



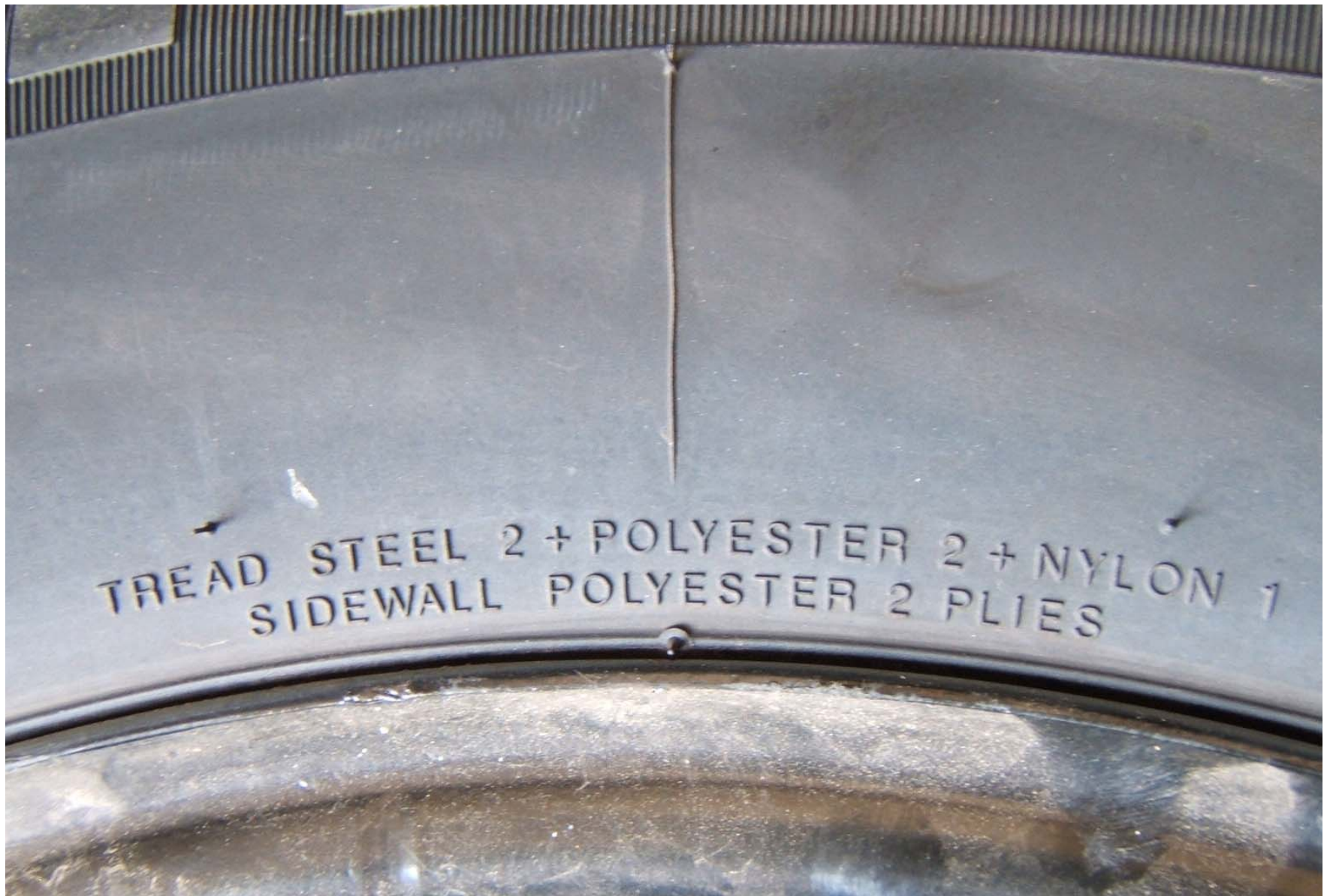
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FIGURE 5.7
TIRE SHOWING DOT SERIAL NUMBER



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



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FIGURE 5.9
TIRE SHOWING SIDEWALL/TREAD CONSTRUCTION



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FIGURE 5.10
RIM SHOWING VALVE STEM



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FIGURE 5.11
INSTRUMENT PANEL LAMP CHECK SHOWING LOW TIRE PRESSURE
WARNING TELLTALES AND DEDICATED MALFUNCTION TELLTALE



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FIGURE 5.12
INSTRUMENT PANEL SHOWING RIGHT
FRONT TIRE LOW TIRE PRESSURE WARNING



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FIGURE 5.13
TEST INSTRUMENTATION ON VEHICLE



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FIGURE 5.14
VEHICLE CENTER SEAT BALLAST
FOR VCW LOAD



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FIGURE 5.15
VEHICLE REAR SEAT BALLAST FOR
VCW LOAD



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FIGURE 5.16
REAR OF VEHICLE BALLASTED
FOR VCW LOAD



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FIGURE 5.17
VEHICLE ON WEIGHT SCALES



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FIGURE 5.18
SPARE INSTALLED ON LEFT FRONT POSITION
FOR MALFUNCTION DETECTION TEST



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FIGURE 5.19
INSTRUMENT PANEL SHOWING
DEDICATED MALFUNCTION TELLTALE

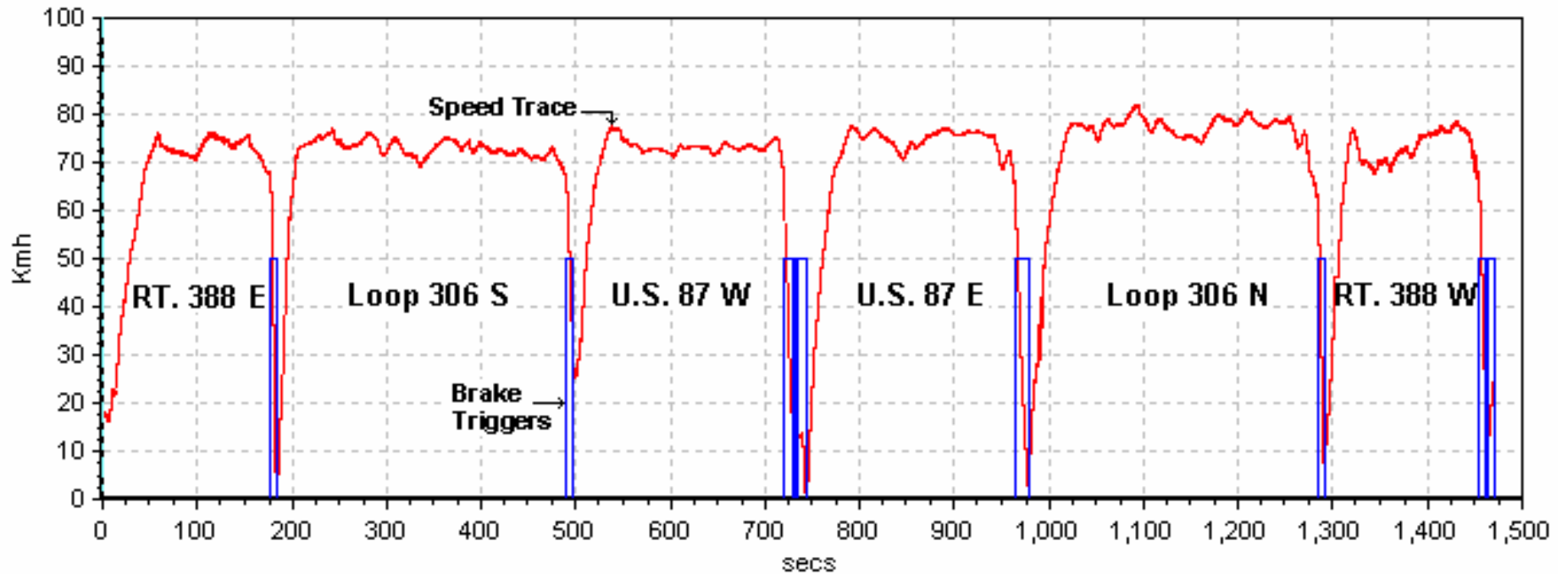
SECTION 6
TEST PLOTS

Scenario A: Left Front Tire
Test Date: 7/26/07
Data File Time: 24:35 minutes
Cumulative Driving Time: 21:29 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) LF Calibration / LLWW

Log Rate := 100.00 Hz

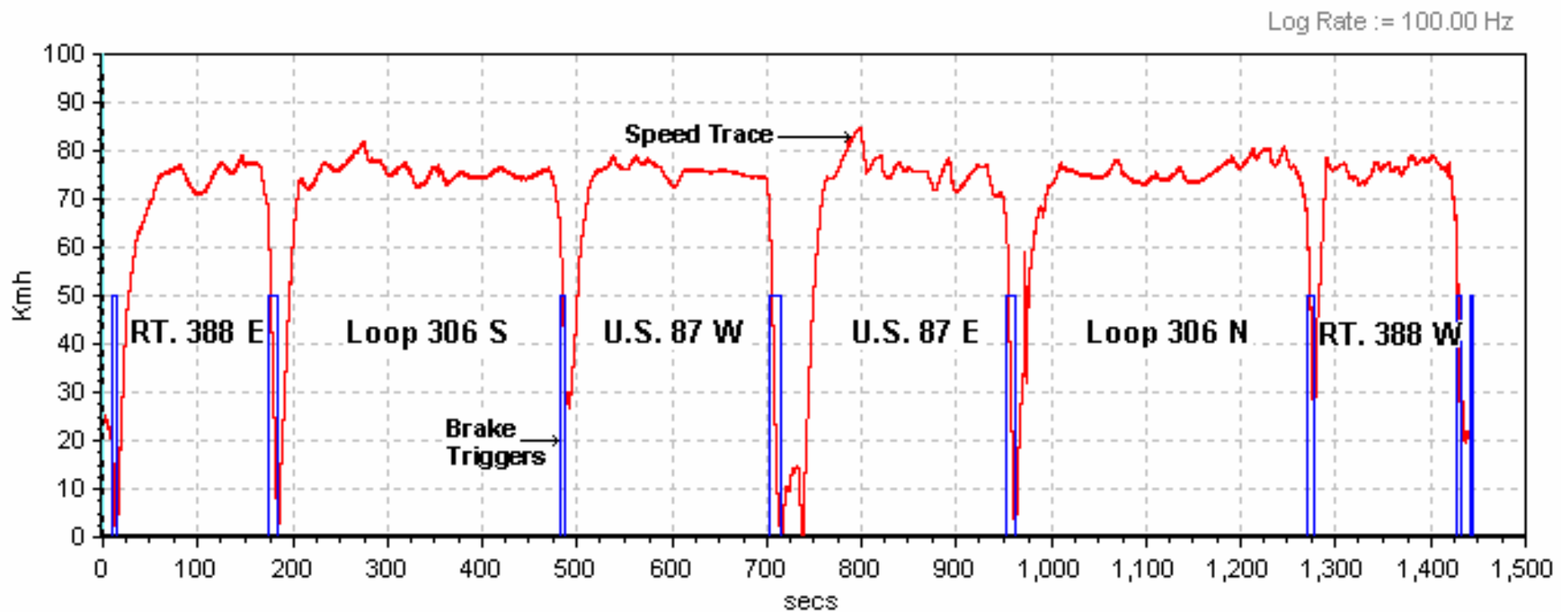


LF Detection Phase: Telltale illumination in 3 seconds. Driving was not required.

Scenario B: Right Rear Tire
Test Date: 7/26/07
Data File Time: 24:05 minutes
Cumulative Driving Time: 21:13 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) RR Calibration / LLWW



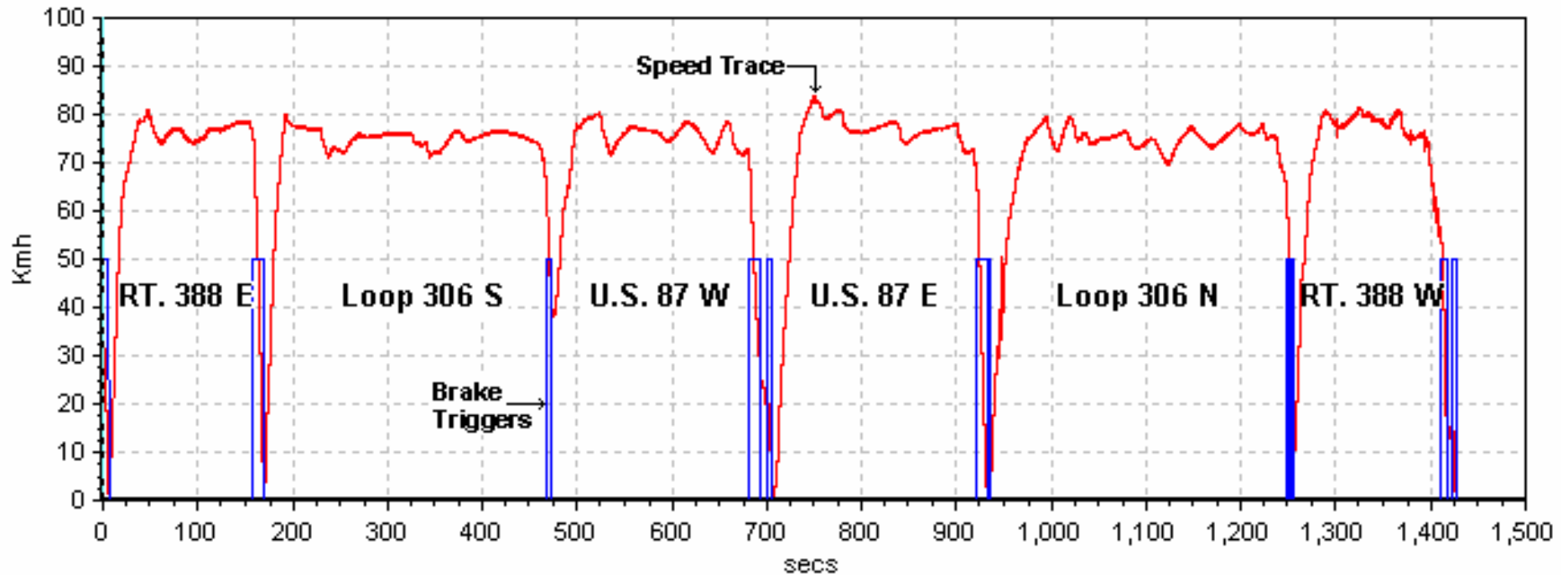
RR Detection Phase: Illumination in 40 seconds. Driving was not required.

Scenario C: Left Rear, Right Front Tires
Test Date: 7/26/07
Data File Time: 23:47 minutes
Cumulative Driving Time: 21:06 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) LR, RF Calibration / LLWW

Log Rate := 100.00 Hz

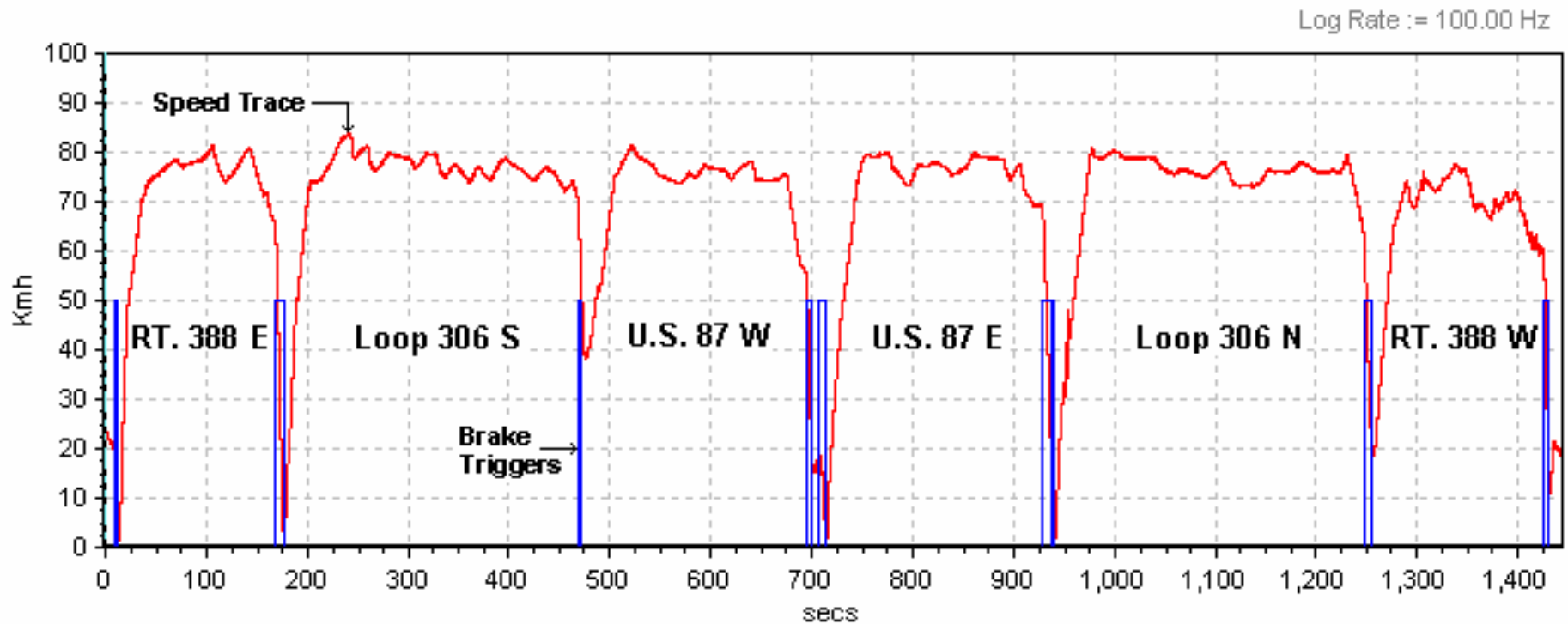


LR, RF Detection Phase: Illumination 3.12 seconds. Driving was not required.

Scenario D: Left Front, Left Rear, Right Rear, Right Front Tire
Test Date: 8/15/07
Data File Time: 24:04 minutes
Cumulative Driving Time: 21:13 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) LF, LR, RR, RF Calibration / LLWW

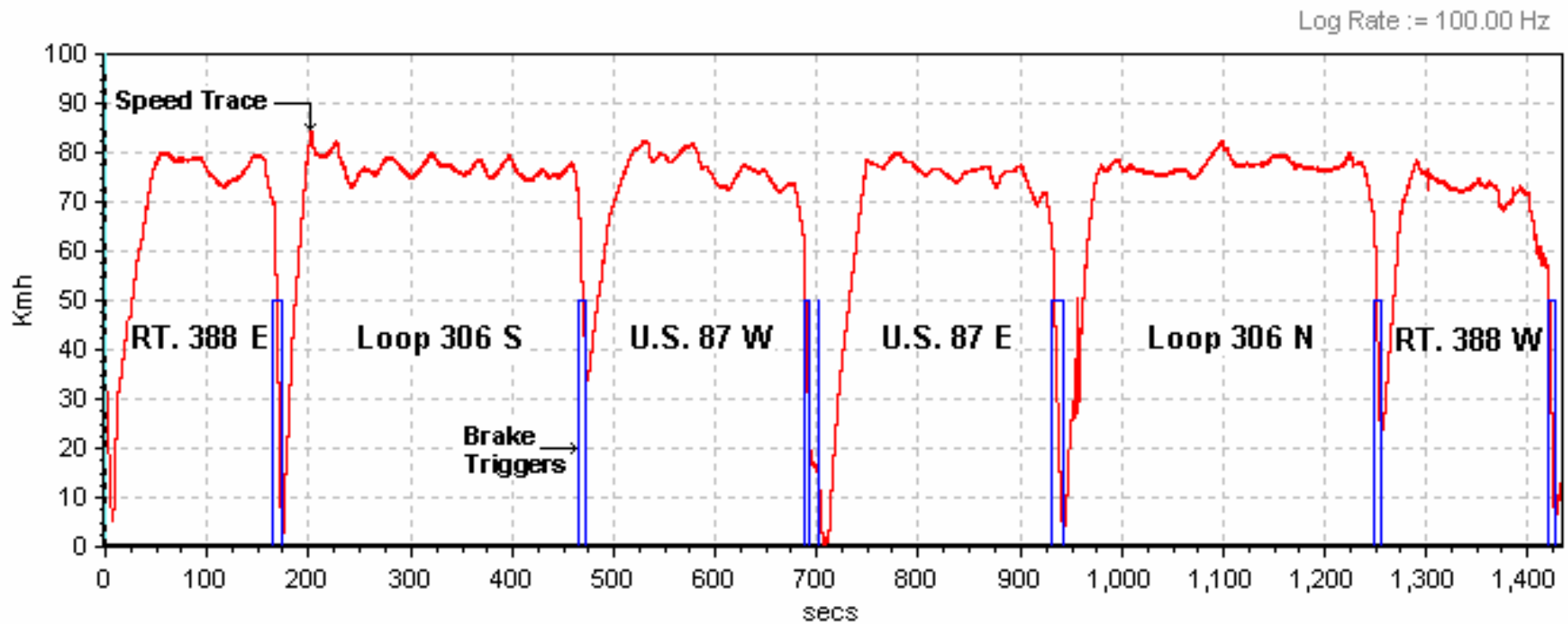


LF, LR, RR, RF Detection Phase: Illumination in 5.5 seconds. Driving was not required.

Scenario E: Left Rear Tire
Test Date: 8/16/07
Data File Time: 23:54 minutes
Cumulative Driving Time: 20:58 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) LR Calibration / VCW



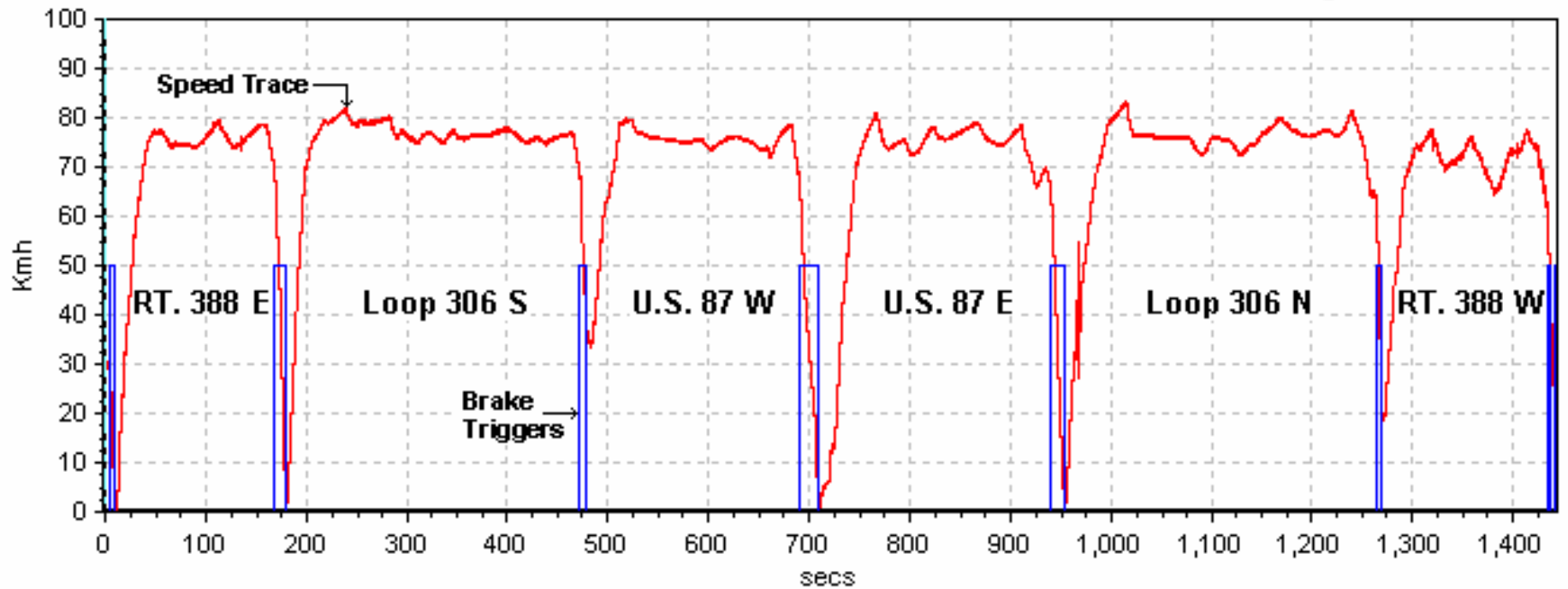
LR Detection Phase: Illumination in 2.8 seconds. Driving was not required.

Scenario F: Right Front Tire
Test Date: 8/16/07
Data File Time: 24:04 minutes
Cumulative Driving Time: 21.00 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) RF Calibration / VCW

Log Rate := 100.00 Hz



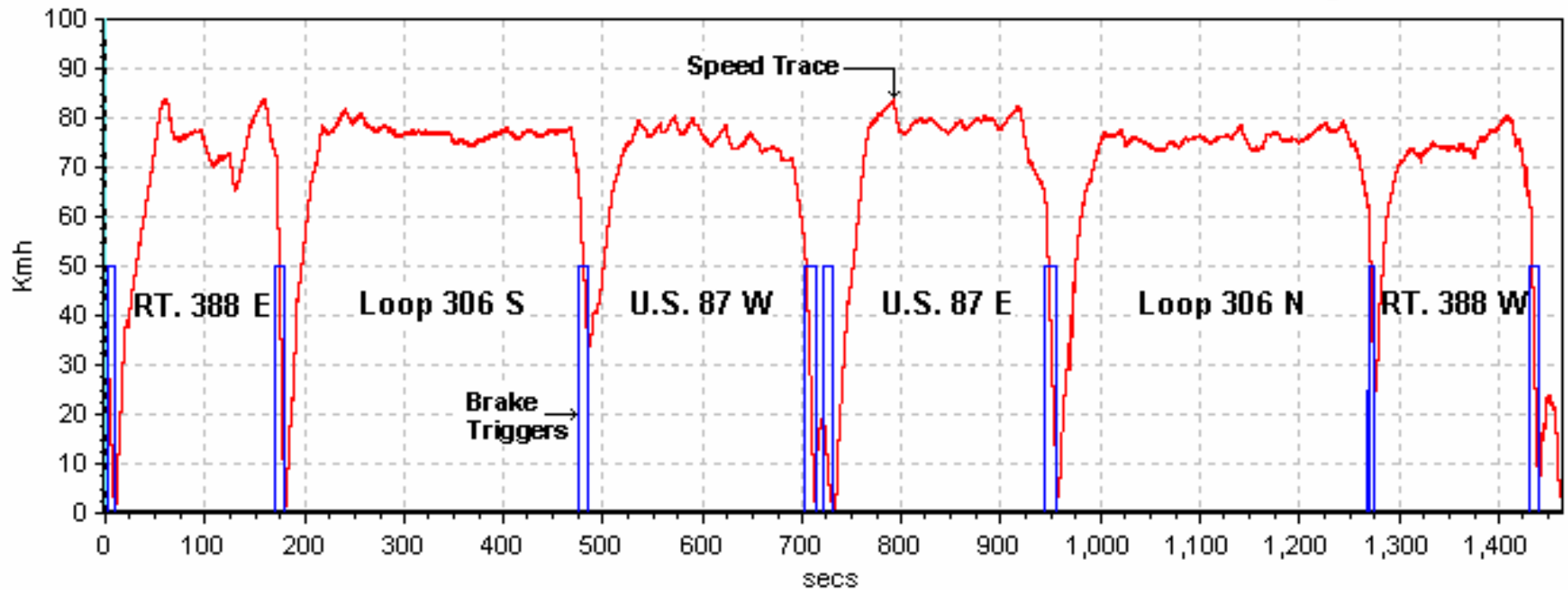
RF Detection Phase: Illumination in 6.3 seconds. Driving was not required.

Scenario G: Left Rear, Right Rear Tires
Test Date: 8/20/07
Data File Time: 24:24 minutes
Cumulative Driving Time: 20:54 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) LR, RR Calibration / VCW

Log Rate := 100.00 Hz

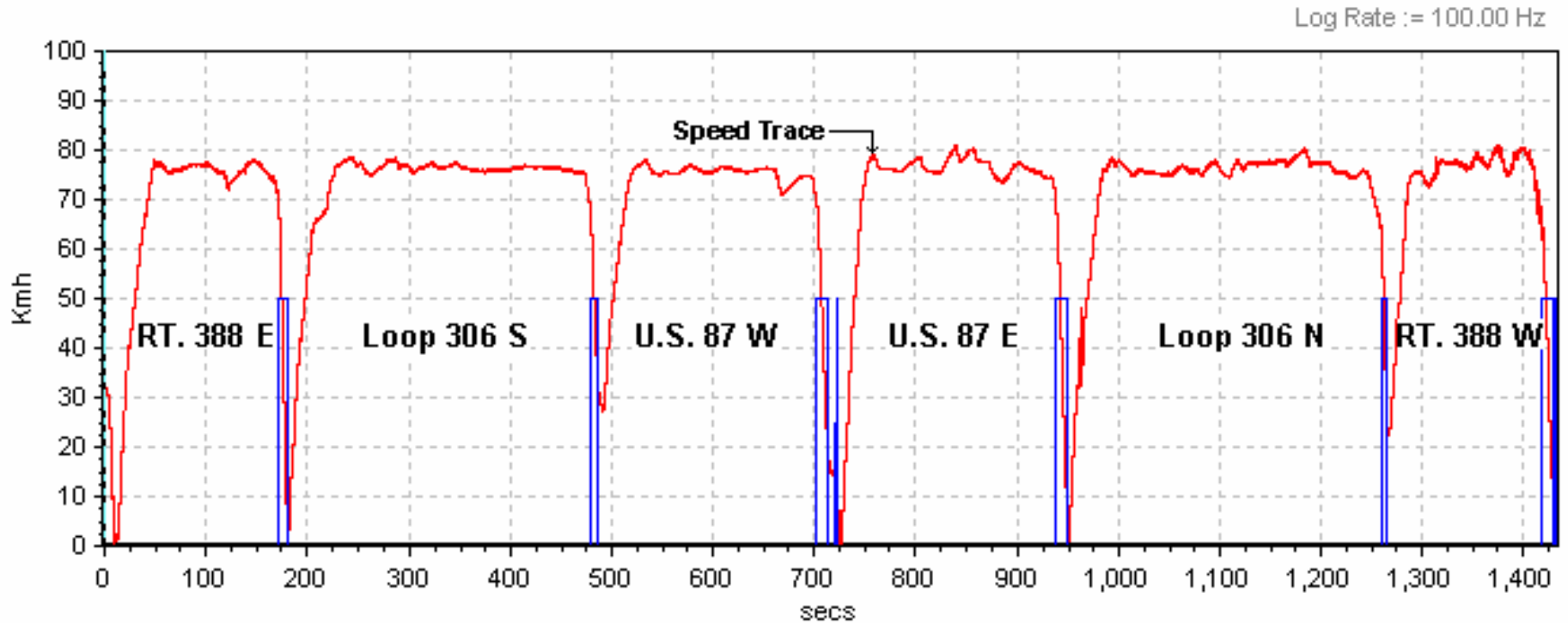


LR, RR Detection Phase: Illumination in 6.4 seconds. Driving was not required.

Scenario H: Left Front, Left Rear, Right Rear, Right Front Tires
Test Date: 8/21/07
Data File Time: 23:54 minutes
Cumulative Driving Time: 20:52 minutes
Start Point: GAFB North Gate

Calibration Phase:

2007 Hyundai Entourage (C70504) LF, LR, RR, RF Calibration / VCW



LF, LR, RR, RF Detection Phase: Illumination in 9.8 seconds. Driving was not required.

Scenario I: Compact Spare without Sensor Installed on Left Front Position at LLVW
Test Date: 8/21/07
Data File Time: 6:50 minutes
Cumulative Driving Time to Illumination: 00:32 minutes
Start Point: San Angelo Test Facility Shop

Malfunction Detection Test:

2007 Hyundai Entourage (C70504) LF Spare Tire / Dedicated Low Tire / Malfunction Telltale Illumination / LLVW

Log Rate := 100.00 Hz

