REPORT NUMBER 138-STF-06-005

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

FORD MOTOR COMPANY
2006 EXPEDITION
FOUR-DOOR MPV
NHTSA NO. C60206

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

April 12, 2007

FINAL REPORT

PREPARED FOR

U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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16. Abstract Compliance tests were conducted on the subject 2006 Ford Expedition four-door MPV in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-138-02 for the determination of FMVSS 138 compliance. Test failures identified were as follows: NONE.		
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INTRODUCTION

1.1 PURPOSE OF COMPLIANCE TEST

A 2006 Ford Expedition four-door MPV was tested to determine if the vehicle was in compliance with the requirements of the standard. All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure TP-138-02 dated September 14, 2005.

1.2 TEST VEHICLE

The test vehicle was a 2006 Ford Expedition four-door MPV. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: 1FMFU15576LA76097

B. NHTSA No.: C60206

C. Manufacturer: Ford Motor Company

D. Manufacture Date: 03/2006

1.3 TEST DATE

The test vehicle was tested during the time period September 19 through October 6, 2006.

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 six tire deflation scenarios. This LLVW included the weights of driver, one passenger, and test equipment. The vehicle was loaded to its Gross Vehicle Weight Rating (GVWR) for four tire deflation scenarios. The gross vehicle weight included the weights of driver, one passenger, equipment, ballast in the rear seat, and ballast in the 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 driven (if necessary) between 50 -100 km/h until low tire pressure telltale illuminated.
3. Cool down phase: Vehicle was parked in the San Angelo Test Facility (SATF) garage. 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 (if necessary) until the telltale extinguished.

An indicant malfunction detection scenario was performed with the vehicle loaded to its GVWR. A malfunction was simulated by placing the full size spare tire (with no TPMS sensor) on the left front wheel position. The vehicle was driven until telltale illumination or until a minimum of 20 minutes of cumulative driving time between 50 and 100 km/h was attained.

2.2 SUMMARY OF RESULTS

Six tire deflation scenarios were performed on the test vehicle at LLVW: A. left front; D. left rear; E. right front; H. right rear; I. left front and left rear; and J. left front, left rear, right rear, right front. Four tire deflation scenarios were performed on the test vehicle at GVWR: B. right rear; C. left front, left rear, right rear, right front; F. left front; and G. left front, right front.

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

One indicant malfunction detection scenario was performed on the test vehicle at GVWR. The vehicle's combination low tire pressure warning and malfunction telltale indicated a malfunction, but did not flash and illuminate per the standard's requirements effective September 1, 2007.

SECTION 3

TEST DATA

FMVSS No. 138 – TEST DATA SUMMARY

TEST DATES: September 19 - October 6, 2006 LAB: U. S. DOT San Angelo Test Facility (SATF)

CONTRACT: N/A VEHICLE NHTSA NUMBER: C60206

VIN: 1FMFU15576LA76097 CERTIFICATION LABEL BUILD DATE: 03/2006

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	N/A
Symbol and color	N/A
Check of lamp function	N/A
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 TEST ONLY
TPMS WRITTEN INSTRUCTIONS S138: S4.5	
Image of telltales	PASS
Verbatim statements	PASS

REMARKS: The FMVSS 138 malfunction performance requirements do not become effective until September 1, 2007. The test vehicle is equipped with a malfunction capability that would not correctly meet the future requirements.

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

TEST DATE: September 19, 2006 LAB: U. S. DOT San Angelo Test Facility

CONTRACT: N/A VEHICLE NHTSA NUMBER: C60206

VIN: 1FMFU15576LA76097 CERTIFICATION LABEL BUILD DATE: 03/2006

MY/MAKE/MODEL/BODY STYLE: 2006 Ford Expedition four-door MPV

ENGINE: 5.4 L V-8

TIRE CONDITIONING:

(X) Tires used more than 100 km. Actual odometer reading : 112.2 km (69.7 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: Schrader Electronics (Ford PN 5L7T-1A150-AB)

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

TPMS MALFUNCTION INDICATOR TYPE:

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

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

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	P265/70R17	240 kPa (35 psi)	Vehicle placard
Rear	P265/70R17	240 kPa (35 psi)	Vehicle placard
Spare	P265/70R17	240 kPa (35 psi)	Vehicle placard

INSTALLED TIRE DATA (Use diagrams as reference):

Diagram - Passenger Car Tire Labeling

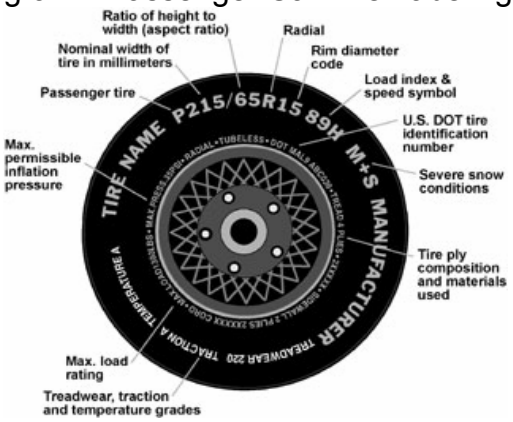
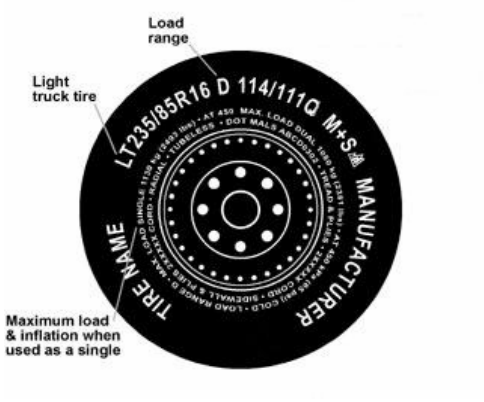


Diagram - Other Markings on Light Trucks



Front and Rear Axles

Tire Size (ex. P225/65R15 89H): P265/70R17 113S

Manufacturer/Tire Name: Continental Contitrac SUV

Sidewall Max Load Rating: 1,150 kg (2,535 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): 4 plies - 2 polyester, 2 steel

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	240 kPa x .75 = 180.0 kPa	240 kPa x .75 = 180.0 kPa
(B) Information from FMVSS 138 Table 1 below, Tire types are: Inflation pressure Minimum activation pressures from Table 1	(X) P-metric-Standard load ( ) P-metric-Extra Load Load Range ( ) C, ( ) D, or ( ) E (X) Maximum or ( ) Rated 300 kPa (44 psi) 140 kPa (20 psi)	(X) P-metric-Standard load ( ) P-metric-Extra Load Load Range ( ) C, ( ) D, or ( ) E (X) Maximum or ( ) Rated 300 kPa (44 psi) 140 kPa (20 psi)
(C) Telltale Warning Activation Pressure is the higher of Part (A) or (B)	180.0 kPa (26.1 psi)	180.0 kPa (26.1 psi)
(D) Pressure at which to deflate tire(s) = (C) – 7 kPa	173.0 kPa (25.1 psi)	173.0 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: David K. Banks DATE: September 19, 2006

APPROVED BY: Kenneth H. Yates

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

TEST DATE: September 19 - 20, 2006 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

TPMS Low Tire Pressure Warning Telltale

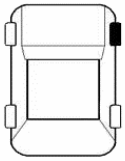
TPMS Low Tire Pressure Warning Telltale Location: Right side of instrument cluster

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

(X)YES ( )NO (fail)

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

Identify Telltale Symbol Used (check box above figure).

X		
		OTHER (fail) (describe below)

Note any words or additional symbols used.

Reconfigurable display shows “Tire Pressure Sensor Fault” when a tire sensor is malfunctioning, or when the spare is in use.

TPMS Malfunction Telltale

( ) None ( ) Dedicated stand-alone (X) Combined with low tire pressure telltale

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

Check Telltale Lamp Functions:

LOW TIRE PRESSURE TELLTALE AND MALFUNCTION INDICATION, IF COMBINED

Identify position of ignition locking system when telltale illuminates.

[ ] OFF/LOCK [ ] Between OFF/LOCK and ON/RUN

[X] ON/RUN [ ] Between OFF/RUN and START

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

Time telltale remains illuminated 3.19 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: David K. Banks DATE: September 20, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 1 of 33)
TPMS OPERATIONAL PERFORMANCE

TEST DATE: September 19, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 9:00 am

Ambient Temperature: Start: 21.0°C (69.8°F)

Odometer Reading: Start: 112.2 km (69.7 mi)

Fuel Level: Start: Full

Weather Conditions: Cool and clear

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

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)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)
Tire Sidewall Temp	21.4°C (70.5°F)	20.8°C (69.4°F)	21.4°C (70.5°F)	21.4°C (70.5°F)
San Angelo Test Facility Shop Floor Temp	23.8°C (74.8°F)	23.6°C (74.5°F)	23.8°C (74.8°F)	24.0°C (75.2°F)
Adjusted pre-test inflation pressure to recommended cold pressure	240.0 kPa (34.8 psi)	240.0 kPa (34.8 psi)	240.1 kPa (34.8 psi)	240.1 kPa (34.8 psi)

VEHICLE WEIGHT:

Vehicle Ratings from Certification Label:

GVWR: 3,221 kg (7,100 lbs)

GAWR (front): 1,429 kg (3,150 lbs)

GAWR (rear): 1,872 kg (4,128 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 743 kg (1,639 lbs)

Measured Unloaded Vehicle Weight:

LF	599 kg (1,321 lbs)	LR	622 kg (1,373 lbs)
RF	600 kg (1,323 lbs)	RR	622 kg (1,369 lbs)
Front Axle	1,199 kg (2,644 lbs)	Rear Axle	1,244 kg (2,742 lbs)

Total Vehicle 2,443 kg (5,386 lbs)

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

LF	643 kg (1,418 lbs)		LR	666 kg (1,468 lbs)	
RF	648 kg (1,429 lbs)		RR	666 kg (1,468 lbs)	
Front Axle	1,291 kg (2,847 lbs)	(≤ GAWR)	Rear Axle	1,332 kg (2,936 lbs)	(≤ GAWR)

Total Vehicle 2,623 kg (5,783 lbs) (not greater than GVWR)

Note: For scenarios A, D, E, H, I, and J, this total vehicle weight measures the vehicle loaded to LLVW, 180 kg (396 lbs) of passengers and equipment.

DATA SHEET 3 (Sheet 3 of 33)
TPMS OPERATIONAL PERFORMANCE

TEST DATE: September 19, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 10:20 am

Ambient Temperature: Start: 21.9°C (71.4°F)

Odometer Reading: Start: 112.2 km (69.7 mi)

Fuel Level: Start: Full

Weather Conditions: Cool and clear

VEHICLE WEIGHT:
Vehicle Ratings from Certification Label:

GVWR: 3,221 kg (7,100 lbs)

GAWR (front): 1,429 kg (3,150 lbs)

GAWR (rear): 1,872 kg (4,128 lbs)

Vehicle Capacity Weight:

Vehicle Capacity Weight 743 kg (1,639 lbs)

Measured Unloaded Vehicle Weight:

LF	599 kg (1,321 lbs)	LR	623 kg (1,373 lbs)
RF	600 kg (1,323 lbs)	RR	621 kg (1,369 lbs)
Front Axle	1,199 kg (2,644 lbs)	Rear Axle	1,244 kg (2,742 lbs)

Total Vehicle 2,443 kg (5,386 lbs)

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

LF	662 kg (1,459 lbs)		LR	932 kg (2,055 lbs)	
RF	671 kg (1,479 lbs)		RR	930 kg (2,050 lbs)	
Front Axle	1,333 kg (2,938 lbs)	(≤ GAWR)	Rear Axle	1,862 kg (4,105 lbs)	(≤ GAWR)

Total Vehicle 3,195 kg (7,043 lbs) (not greater than GVWR)

Note: For scenarios B, C, F, G, and K, this Total Vehicle Weight measures the vehicle loaded to GVWR, 752 kg (1,657 lbs) of passengers, equipment, and ballast.

DATA SHEET 3 (Sheet 4 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO A - Left Front Tire Deflation at LLVW

TEST DATE: September 19, 2006 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 11:16 am

Odometer Reading: Start: 112.2 km (69.7 mi)

Note: See Data Sheet 3 (Sheet 2 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 21.0°C (69.8°F) Vehicle cool down period: overnight				
Inflation Pressure	240.0 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	21.4°C (70.5°F)	20.8°C (69.4°F)	21.4°C (70.5°F)	21.4°C (70.5°F)
San Angelo Test Facility Shop Floor Temp	23.8°C (74.8°F)	23.6°C (74.5°F)	23.8°C (74.8°F)	24.0°C (75.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

9:51 minutes (stopwatch time) 14.3 km (8.9 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:25 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 86.6 km/hr (53.8 mph)

Total Driving Time: 20:20 minutes (V-Box time)

DATA SHEET 3 (Sheet 5 of 33)
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	254.4 kPa (36.9 psi)	268.5 kPa (38.9 psi)	268.1 kPa (38.9 psi)	259.1 kPa (37.6 psi)
Tire Sidewall Temp	34.6°C (94.3°F)	37.2°C (99.0°F)	38.6°C (101.5°F)	34.2°C (93.6°F)
San Angelo Test Facility Shop Floor Temp	25.8°C (78.4°F)	25.8°C (78.4°F)	25.2°C (77.4°F)	25.6°C (78.1°F)

SYSTEM DETECTION PHASE:

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

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

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination with ignition switch activation. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 6 of 33)
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: 27.5°C (81.5°F) Vehicle cool down period: 135 minutes				
Inflation Pressure	165.2 kPa (24.0 psi)	250.5 kPa (36.3 psi)	249.3 kPa (36.2 psi)	247.5 kPa (35.9 psi)
Tire Sidewall Temp	27.8°C (82.0°F)	29.0°C (84.2°F)	27.8°C (82.0°F)	27.4°C (81.3°F)
San Angelo Test Facility Shop Floor Temp	26.0°C (78.8°F)	26.8°C (80.2°F)	25.8°C (78.4°F)	25.8°C (78.4°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)	250.5 kPa (36.3 psi)	249.3 kPa (36.2 psi)	247.5 kPa (35.9 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: south

Time to Extinguish:

51 seconds (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: September 19, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 7 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO B – Right Rear Tire Deflation at GVWR

TEST DATE: September 20, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 9:33 am

Odometer Reading: Start: 141.9 km (88.2 mi)

Note: See Data Sheet 3 (Sheet 3 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 21.8°C (71.2°F) Vehicle cool down period: overnight Road Surface Temp: 25.0°C (77.0°F)				
Inflation Pressure	240.1 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	22.4°C (72.3°F)	22.6°C (72.7°F)	23.8°C (74.8°F)	24.0°C (75.2°F)
San Angelo Test Facility Shop Floor Temp	24.8°C (76.6°F)	24.7°C (76.5°F)	24.8°C (76.6°F)	25.0°C (77.0°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:07 minutes (stopwatch time) 14.2 km (8.8 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:13 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 89.4 km/hr (55.6 mph)

Total Driving Time: 20:25 minutes (V-Box time)

DATA SHEET 3 (Sheet 8 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO B – Right Rear Tire Deflation at GVWR

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 27.6°C (81.7°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	254.9 kPa (37.0 psi)	263.3 kPa (38.2 psi)	263.3 kPa (38.2 psi)	256.5 kPa (37.2 psi)
Tire Sidewall Temp	32.4°C (98.6°F)	35.8°C (100.8°F)	36.2°C (100.8°F)	32.6°C (99.0°F)
San Angelo Test Facility Shop Floor Temp	25.4°C (77.7°F)	25.2°C (77.4°F)	25.9°C (78.6°F)	25.4°C (77.7°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 ( )LR (X)RR ( )RF Inflation Pressure	N/A	N/A	173.1 kPa (25.1 psi)	N/A

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination under 10 seconds. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 9 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO B – Right Rear Tire Deflation at GVWR

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 25.3°C (77.5°F) Vehicle cool down period: 65 minutes				
Inflation Pressure	245.5 kPa (35.6 psi)	244.3 kPa (35.4 psi)	165.5 kPa (24.0 psi)	246.3 kPa (35.7 psi)
Tire Sidewall Temp	27.0°C (80.6°F)	27.6°C (81.7°F)	28.2°C (82.8°F)	27.0°C (80.6°F)
San Angelo Test Facility Shop Floor Temp	26.0°C (78.8°F)	25.9°C (78.6°F)	26.0°C (78.8°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:	245.5 kPa (35.6 psi)	244.3 kPa (35.4 psi)	240.1 kPa (34.8 psi)	246.3 kPa (35.7 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: south

Time to Extinguish:

28 seconds (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: September 20, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 10 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO C – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at GVWR

TEST DATE: September 20, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 12:47 pm

Odometer Reading: Start: 170.8 km (106.1 mi)

Note: See Data Sheet 3 (Sheet 3 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 27.3°C (81.1°F) Vehicle cool down period: 120 minutes Road Surface Temp: 39.2°C (102.6°F)				
Inflation Pressure	244.3 kPa (35.4 psi)	241.5 kPa (35.0 psi)	240.1 kPa (34.8 psi)	245.4 kPa (35.6 psi)
Tire Sidewall Temp	27.6°C (81.7°F)	27.4°C (81.3°F)	27.4°C (81.3°F)	27.2°C (81.0°F)
San Angelo Test Facility Shop Floor Temp	26.0°C (78.8°F)	26.2°C (79.2°F)	26.2°C (79.2°F)	26.4°C (79.5°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

9:57 minutes (stopwatch time) 14.2 km (8.8 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:19 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 87.4 km/hr (54.3 mph)

Total Driving Time: 20:19 minutes (V-Box time)

DATA SHEET 3 (Sheet 11 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO C – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at GVWR

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 40.6°C (105.1°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	259.3 kPa (37.6 psi)	258.3 kPa (37.5 psi)	257.8 kPa (37.4 psi)	261.2 kPa (37.9 psi)
Tire Sidewall Temp	37.9°C (100.2°F)	37.5°C (99.5°F)	37.6°C (99.7°F)	36.8°C (98.2°F)
San Angelo Test Facility Shop Floor Temp	26.4°C (79.5°F)	26.8°C (80.2°F)	26.8°C (80.2°F)	26.2°C (79.2°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: (X)LF (X)LR (X)RR (X)RF Inflation Pressure	173.0 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 Direction: south

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

Time to Illuminate:

Illumination under 10 seconds. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 12 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO C – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at GVWR

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 30.2°C (86.4°F) Vehicle cool down period: 68 minutes				
Inflation Pressure	168.4 kPa (24.4 psi)	170.0 kPa (24.7 psi)	167.1 kPa (24.2 psi)	163.5 kPa (23.7 psi)
Tire Sidewall Temp	30.6°C (87.1°F)	30.6°C (87.1°F)	30.4°C (86.7°F)	30.4°C (86.7°F)
San Angelo Test Facility Shop Floor Temp	27.4°C (81.3°F)	27.8°C (82.0°F)	27.6°C (81.7°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:	240.1 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? (X)YES ( )NO

Driving direction:
Starting point: San Angelo Test Facility shop Direction: south

Time to Extinguish:

1:06 minutes (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: September 20, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 13 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO D – Left Rear Tire Deflation at LLVW

TEST DATE: September 22, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 7:55 am

Odometer Reading: Start: 205.0 km (127.4 mi)

Note: See Data Sheet 3 (Sheet 2 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 22.7°C (72.9°F) Vehicle cool down period: overnight Roadway Surface Temp: 22.6°C (72.7°F)				
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)
Tire Sidewall Temp	24.4°C (75.9°F)	24.6°C (76.3°F)	24.6°C (76.3°F)	24.4°C (75.9°F)
San Angelo Test Facility Shop Floor Temp	26.2°C (79.2°F)	25.9°C (78.6°F)	26.0°C (78.8°F)	26.2°C (79.2°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

9:51 minutes (stopwatch time) 14.2 km (8.8 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:15 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 98.6 km/hr (61.3 mph)

Total Driving Time: 20:21 minutes (V-Box time)

DATA SHEET 3 (Sheet 14 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO D – Left Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 23.4°C (74.1°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	251.2 kPa (36.4 psi)	254.6 kPa (36.9 psi)	255.5 kPa (37.1 psi)	252.5 kPa (36.6 psi)
Tire Sidewall Temp	29.8°C (85.6°F)	31.2°C (88.2°F)	32.0°C (89.6°F)	30.8°C (87.4°F)
San Angelo Test Facility Shop Floor Temp	26.0°C (78.8°F)	26.2°C (79.2°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: ( )LF (X)LR ( )RR ( )RF Inflation Pressure	N/A	173.1 kPa (25.1 psi)	N/A	N/A

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination under 10 seconds. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 15 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO D – Left 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: 26.1°C (79.0°F) Vehicle cool down period: 60 minutes				
Inflation Pressure	245.2 kPa (35.6 psi)	168.4 kPa (24.4 psi)	245.5 kPa (35.6 psi)	245.3 kPa (35.6 psi)
Tire Sidewall Temp	27.2°C (81.0°F)	26.9°C (80.4°F)	27.0°C (80.6°F)	27.2°C (81.0°F)
San Angelo Test Facility Shop Floor Temp	26.6°C (79.9°F)	26.4°C (79.5°F)	26.4°C (79.5°F)	26.8°C (80.2°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:	245.2 kPa (35.6 psi)	240.0 kPa (34.8 psi)	245.5 kPa (35.6 psi)	245.3 kPa (35.6 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: south

Time to Extinguish:

51 seconds (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: September 22, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 16 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO E – Right Front Tire Deflation at LLVW

TEST DATE: September 22, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 10:12 am

Odometer Reading: Start: 235.4 km (146.3 mi)

Road Surface Temp: Start: 30.8°C (87.4°F)

Note: See Data Sheet 3 (Sheet 2 of 33) for Test Weight. Tire pressures were re-adjusted to cold inflation pressure of 240 kPa before calibration phase.

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:11 minutes (stopwatch time) 14.3 km (8.9 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:13 minutes (stopwatch time) 14.3 km (8.9 mi) distance

Max speed: 92.1 km/hr (57.2 mph)

Total Driving Time: 20:27 minutes (V-Box time)

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 35.2°C (95.4°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	258.9 kPa (37.6 psi)	255.6 kPa (37.1 psi)	262.6 kPa (38.1 psi)	260.0 kPa (37.7 psi)
Tire Sidewall Temp	37.4°C (99.3°F)	38.4°C (101.1°F)	36.2°C (97.2°F)	37.4°C (99.3°F)
San Angelo Test Facility Shop Floor Temp	27.6°C (81.7°F)	27.6°C (81.7°F)	27.4°C (81.3°F)	27.6°C (81.7°F)

DATA SHEET 3 (Sheet 17 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO E – Right Front Tire Deflation at LLVW

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	N/A	N/A	N/A	173.1 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination with ignition switch activation. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 18 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO E – Right Front Tire Deflation at LLVW

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 30.9°C (87.6°F) Vehicle cool down period: 83 minutes				
Inflation Pressure	250.0 kPa (36.3 psi)	242.9 kPa (35.2 psi)	249.5 kPa (36.2 psi)	166.9 kPa (24.2 psi)
Tire Sidewall Temp	30.2°C (86.4°F)	29.6°C (85.3°F)	30.6°C (87.1°F)	30.4°C (86.7°F)
San Angelo Test Facility Shop Floor Temp	28.4°C (83.1°F)	28.2°C (82.8°F)	28.2°C (82.8°F)	28.4°C (83.1°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:	250.0 kPa (36.3 psi)	242.9 kPa (35.2 psi)	249.5 kPa (36.2 psi)	240.1 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: south

Time to Extinguish:

20 seconds (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: September 22, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 19 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO F – Left Front Tire Deflation at GVWR

TEST DATE: October 2, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 10:21 am

Odometer Reading: Start: 265.5 km (165.0 mi)

Note: See Data Sheet 3 (Sheet 3 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 25.3°C (77.5°F) Vehicle cool down period: overnight Road Surface Temp: 33.0°C (91.4°F)				
Inflation Pressure	240.1 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	25.4°C (77.7°F)	25.6°C (78.1°F)	25.4°C (77.7°F)	26.6°C (79.9°F)
San Angelo Test Facility Shop Floor Temp	26.4°C (79.5°F)	26.2°C (79.2°F)	26.6°C (79.9°F)	26.4°C (79.5°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

9:48 minutes (stopwatch time) 14.2 km (8.8 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:42 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 94.4 km/hr (58.7 mph)

Total Driving Time: 20:38 minutes (V-Box time)

DATA SHEET 3 (Sheet 20 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO F – Left Front Tire Deflation at GVWR

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 31.8°C (89.2°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	254.9 kPa (37.0 psi)	259.4 kPa (37.6 psi)	262.1 kPa (38.0 psi)	254.8 kPa (37.0 psi)
Tire Sidewall Temp	35.6°C (96.1°F)	37.8°C (100.0°F)	38.4°C (101.1°F)	34.2°C (93.6°F)
San Angelo Test Facility Shop Floor Temp	26.8°C (80.2°F)	27.2°C (81.0°F)	26.8°C (80.2°F)	26.8°C (80.2°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: (X)LF ( )LR ( )RR ( )RF Inflation Pressure	173.1 kPa (25.1 psi)	N/A	N/A	N/A

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination with ignition switch activation. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 21 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO F – Left Front Tire Deflation at GVWR

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 27.8°C (82.0°F) Vehicle cool down period: 83 minutes				
Inflation Pressure	168.5 kPa (24.4 psi)	244.1 kPa (35.4 psi)	246.1 kPa (35.7 psi)	245.1 kPa (35.5 psi)
Tire Sidewall Temp	29.2°C (84.6°F)	29.0°C (84.2°F)	28.8°C (83.8°F)	29.2°C (84.6°F)
San Angelo Test Facility Shop Floor Temp	27.4°C (81.3°F)	27.4°C (81.3°F)	27.4°C (81.3°F)	27.4°C (81.3°F)

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)	244.1 kPa (35.4 psi)	246.1 kPa (35.7 psi)	245.1 kPa (35.5 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: south

Time to Extinguish:

1:09 minutes (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: October 2, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 22 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO G – Left Front, Right Front Tire Deflation at GVWR

TEST DATE: October 2, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 12:59 pm

Odometer Reading: Start: 310.6 km (193.0 mi)

Note: See Data Sheet 3 (Sheet 3 of 33) for Test Weight. Tire pressures were re-adjusted to cold inflation pressure of 240 kPa before calibration phase.

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

9:57 minutes (stopwatch time) 14.3 km (8.9 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:23 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 88.7 km/hr (55.1 mph)

Total Driving Time: 20:29 minutes (V-Box time)

DATA SHEET 3 (Sheet 23 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO G – Left Front, Right Front Tire Deflation at GVWR

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 40.4°C (104.7°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	254.4 kPa (36.9 psi)	264.2 kPa (38.3 psi)	267.8 kPa (38.8 psi)	259.9 kPa (37.7 psi)
Tire Sidewall Temp	39.6°C (103.3°F)	40.0°C (104.0°F)	42.0°C (107.6°F)	39.0°C (102.2°F)
San Angelo Test Facility Shop Floor Temp	26.8°C (80.2°F)	27.2°C (81.0°F)	27.4°C (81.3°F)	26.8°C (80.2°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: (X)LF ( )LR ( )RR (X)RF Inflation Pressure	173.0 kPa (25.1 psi)	N/A	N/A	173.1 kPa (25.1 psi)

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination with ignition switch activation. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 24 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO G – Left Front, Right Front Tire Deflation at GVWR

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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 30.3°C (86.5°F) Vehicle cool down period: 95 minutes				
Inflation Pressure	166.0 kPa (24.1 psi)	246.4 kPa (35.7 psi)	248.0 kPa (36.0 psi)	166.0 kPa (24.1 psi)
Tire Sidewall Temp	30.2°C (86.4°F)	30.4°C (86.7°F)	30.8°C (87.4°F)	30.2°C (86.4°F)
San Angelo Test Facility Shop Floor Temp	27.8°C (82.0°F)	28.0°C (82.4°F)	28.4°C (83.1°F)	27.8°C (82.0°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:	239.6 kPa (34.8 psi)	246.4 kPa (35.7 psi)	248.0 kPa (36.0 psi)	239.6 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: south

Time to Extinguish:

34.5 seconds (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: October 2, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 25 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO H – Right Rear Tire Deflation at LLVW

TEST DATE: October 4, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 12:47 pm

Odometer Reading: Start: 385.8 km (239.7 mi)

Note: See Data Sheet 3 (Sheet 2 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 27.4°C (81.3°F) Vehicle cool down period: 118 minutes Roadway Surface Temp: 37.8°C (100.0°F)				
Inflation Pressure	240.1 kPa (34.8 psi)	244.4 kPa (35.4 psi)	244.3 kPa (35.4 psi)	244.3 kPa (35.4 psi)
Tire Sidewall Temp	27.2°C (81.0°F)	27.0°C (80.6°F)	26.8°C (80.2°F)	26.6°C (79.9°F)
San Angelo Test Facility Shop Floor Temp	26.4°C (79.5°F)	26.2°C (79.2°F)	26.4°C (79.5°F)	26.4°C (79.5°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:04 minutes (stopwatch time) 14.3 km (8.9 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:22 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 87.6 km/hr (54.4 mph)

Total Driving Time: 20:41 minutes (V-Box time)

DATA SHEET 3 (Sheet 26 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO H – Right Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 44.2°C (111.6°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	256.2 kPa (37.2 psi)	263.8 kPa (38.3 psi)	263.9 kPa (38.3 psi)	260.3 kPa (37.8 psi)
Tire Sidewall Temp	39.0°C (102.2°F)	39.4°C (102.9°F)	39.2°C (102.6°F)	38.2°C (100.8°F)
San Angelo Test Facility Shop Floor Temp	28.6°C (83.5°F)	28.6°C (83.5°F)	28.6°C (83.5°F)	28.2°C (82.8°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 ( )LR (X)RR ( )RF Inflation Pressure	N/A	N/A	173.1 kPa (25.1 psi)	N/A

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination with ignition switch activation. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 27 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO H – 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: 30.7°C (87.3°F) Vehicle cool down period: 69 minutes				
Inflation Pressure	247.6 kPa (35.9 psi)	252.3 kPa (36.6 psi)	166.0 kPa (24.1 psi)	250.7 kPa (36.4 psi)
Tire Sidewall Temp	31.0°C (87.8°F)	32.2°C (90.0°F)	31.6°C (88.9°F)	31.2°C (88.2°F)
San Angelo Test Facility Shop Floor Temp	28.8°C (83.8°F)	28.2°C (82.8°F)	28.0°C (82.4°F)	28.0°C (82.4°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

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:	247.6 kPa (35.9 psi)	252.3 kPa (36.6 psi)	240.1 kPa (34.8 psi)	250.7 kPa (36.4 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: south

Time to Extinguish:

18 seconds (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: October 4, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 28 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO I – Left Front, Left Rear Tire Deflation at LLVW

TEST DATE: October 5, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 1:10 pm

Odometer Reading: Start: 415.9 km (258.4 mi)

Note: See Data Sheet 3 (Sheet 2 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 28.8°C (83.8°F) Vehicle cool down period: overnight Roadway Surface Temp: 44.4°C (111.9°F)				
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)	26.2°C (79.2°F)	26.2°C (79.2°F)
San Angelo Test Facility Shop Floor Temp	26.4°C (79.5°F)	26.2°C (79.2°F)	26.4°C (79.5°F)	26.4°C (79.5°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:03 minutes (stopwatch time) 14.2 km (8.8 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:17 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 85.5 km/hr (53.1 mph)

Total Driving Time: 20:34 minutes (V-Box time)

DATA SHEET 3 (Sheet 29 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO I – Left Front, Left Rear Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 43.8°C (110.8°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	259.4 kPa (37.6 psi)	262.1 kPa (38.0 psi)	261.7 kPa (38.0 psi)	259.9 kPa (37.7 psi)
Tire Sidewall Temp	39.6°C (103.3°F)	38.6°C (101.5°F)	38.4°C (101.1°F)	39.6°C (103.3°F)
San Angelo Test Facility Shop Floor Temp	28.6°C (83.5°F)	28.2°C (82.8°F)	27.6°C (81.7°F)	28.0°C (82.4°F)

SYSTEM DETECTION PHASE:

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

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

TELLTALE ILLUMINATION:

Starting point: San Angelo Test Facility shop Direction: south

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

Time to Illuminate:

Illumination with ignition switch activation. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 30 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO I – Left Front, Left 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: 31.0°C (87.8°F) Vehicle cool down period: 66 minutes				
Inflation Pressure	168.0 kPa (24.4 psi)	167.8 kPa (24.3 psi)	250.2 kPa (36.3 psi)	249.9 kPa (36.2 psi)
Tire Sidewall Temp	30.8°C (87.4°F)	31.8°C (89.2°F)	31.2°C (88.2°F)	30.6°C (87.1°F)
San Angelo Test Facility Shop Floor Temp	27.8°C (82.0°F)	28.0°C (82.4°F)	27.8°C (82.0°F)	27.8°C (82.0°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)

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)	250.2 kPa (36.3 psi)	249.9 kPa (36.2 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: south

Time to Extinguish:

1:08 minutes (stopwatch time)

TEST RESULTS

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

REMARKS: None

RECORDED BY: David K. Banks DATE: October 5, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 3 (Sheet 31 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO J – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at LLVW

TEST DATE: October 6, 2006 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C60206

Time: Start: 7:28 am

Odometer Reading: Start: 446.3 km (277.3 mi)

Note: See Data Sheet 3 (Sheet 2 of 33) 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 or GVWR, positioning vehicle at selected test start point, and vehicle cool down period. Ambient Temperature: 21.0°C (69.8°F) Vehicle cool down period: overnight Roadway Surface Temps: 22.6°C (72.7°F)				
Inflation Pressure	240.1 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	24.2°C (75.6°F)	23.2°C (73.8°F)	23.8°C (74.8°F)	24.0°C (75.2°F)
San Angelo Test Facility Shop Floor Temp	25.0°C (77.0°F)	26.0°C (78.8°F)	25.8°C (78.4°F)	25.8°C (78.4°F)

SYSTEM CALIBRATION/LEARNING PHASE:
(V-box time – see Section 6 test plots)

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time (10 – 15 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:17 minutes (stopwatch time) 14.3 km (8.9 mi) distance

Driving in opposite direction:

Starting point: Brodnax Road / Highway 87 Direction: north
Cumulative vehicle driving time (5 – 10 minutes) at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal is applied.

10:09 minutes (stopwatch time) 14.5 km (9.0 mi) distance

Max speed: 87.7 km/hr (54.5 mph)

Total Driving Time: 20:34 minutes (V-Box time)

DATA SHEET 3 (Sheet 32 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO J – Left Front, Left Rear, Right Rear, Right Front Tire Deflation at LLVW

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER CALIBRATION PHASE:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
Road Surface Temp: 21.2°C (70.2°F)				
Immediately, after vehicle is stopped, engine off; Inflation Pressure	245.1 kPa (35.5 psi)	247.3 kPa (35.9 psi)	249.5 kPa (36.2 psi)	246.1 kPa (35.7 psi)
Tire Sidewall Temp	26.8°C (80.2°F)	26.6°C (79.9°F)	27.0°C (80.6°F)	26.0°C (78.8°F)
San Angelo Test Facility Shop Floor Temp	26.0°C (78.8°F)	26.0°C (78.8°F)	25.8°C (78.4°F)	25.0°C (77.0°F)

SYSTEM DETECTION PHASE:

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

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

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

Time to Illuminate:

Illumination with ignition switch activation. Driving was not required.

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

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

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

DATA SHEET 3 (Sheet 33 of 33)
TPMS OPERATIONAL PERFORMANCE

SCENARIO J – Left Front, Left Rear, Right Rear, 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

TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: 22.2°C (72.0°F) Vehicle cool down period: 61 minutes				
Inflation Pressure	171.4 kPa (24.9 psi)	169.7 kPa (24.6 psi)	169.3 kPa (24.6 psi)	170.5 kPa (24.7 psi)
Tire Sidewall Temp	24.4°C (75.9°F)	24.4°C (75.9°F)	24.8°C (76.6°F)	24.2°C (75.6°F)
San Angelo Test Facility Shop Floor Temp	25.8°C (78.4°F)	25.4°C (77.7°F)	25.6°C (78.1°F)	25.4°C (77.7°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)	240.1 kPa (34.8 psi)	240.1 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: south

Time to Extinguish:

1:31 minutes (stopwatch time)

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: David K. Banks DATE: October 6, 2006

APPROVED BY: Kenneth H. Yates

DATA SHEET 4 (Sheet 1 of 3)
TPMS OPERATIONAL PERFORMANCE

SCENARIO K – Malfunction Detection Test at GVWR

TEST DATE: October 4, 2006 LAB: San Angelo Test Facility VEHICLE NHTSA NO: C60206

Time:	Start:	8:53 am	; End	11:16 am
Ambient Temperature:	Start:	22.3°C (72.1°F)	; End	24.3°C (75.7°F)
Odometer Reading:	Start:	340.5 km (211.6 mi)	; End	385.8 km (239.7 mi)
Fuel Level:	Start:	Full	; End	Near full

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

TPMS MALFUNCTION TELLTALE:
( )Dedicated stand-alone (X)Combination low tire pressure warning/malfunction telltale

METHOD OF MALFUNCTION SIMULATION:

Describe method of malfunction simulation: Full size spare tire assembly without sensor was installed on left front wheel position.

COMBINATION LOW TIRE / MALFUNCTION TELLTALE ILLUMINATION (after ignition locking system is activated to "On" ("Run") position):

Note see Data Sheet 3 (Sheet 3 of 33) for Test Weight.

Driving in first direction:

Starting point: San Angelo Test Facility shop Direction: south
Cumulative vehicle driving time at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 15-17 minutes or until the telltale illuminates, whichever occurs first.

15:15 minutes (stopwatch time) 22.5 km (14.0 mi) distance

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

DATA SHEET 4 (Sheet 2 of 3)
TPMS OPERATIONAL PERFORMANCE

SCENARIO K – Malfunction Detection Test at GVWR

Driving in opposite direction (if required):

Starting point: Highway 277 Direction: north

Cumulative vehicle driving time at a vehicle speed of 75± 25 km/h excluding time periods when brake pedal was applied. Drive the vehicle for 5-10 minutes or until the telltale illuminates, whichever occurs first.

8:51 minutes (stopwatch time) 22.7 km (14.1 mi) distance

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

Illumination after 4:06 minutes of additional driving time above 20 minutes.

Max speed: 87.9 km/hr (54.6 mph)

Total Driving Time: 31:32 minutes (V-Box time)

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

After 5 minutes with the ignition locking system in the "Off" of "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 (X)NO

Time it takes before telltale starts flashing: 4.5 seconds

Time telltale remains flashing: 20.8 seconds

Time telltale remains illuminated: Telltale does not remain illuminated after flashing.

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

SCENARIO K – Malfunction Detection Test at GVWR

Deactivate the ignition locking system and then re-start the vehicle engine. When the ignition locking system is activated to the "On" or "Run" position, does the telltale's flashing and illumination sequence repeat? (X)YES ( )NO

After the TPMS is restored to normal operation and reset if necessary, is the malfunction telltale extinguished? (X)YES ( )NO

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

TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL) **N/A (INDICANT TEST ONLY)**
Spare tire assembly was installed on left front position at GVWR.

REMARKS: Telltale and reconfigurable display indicated a sensor fault at 24 minutes, 6 seconds of cumulative driving time (see Figure 5.12). This vehicle was manufactured before FMVSS 138 malfunction performance requirements become effective on September 1, 2007.

RECORDED BY: David K. Banks DATE: October 4, 2006

APPROVED BY: Kenneth H. Yates

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

TEST DATE: October 6, 2006 LAB: San Angelo Test Facility VEHICLE NHTSA NO: C60206

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.

Statement is provided verbatim: ( )YES ( )NO (X)N/A

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.

Statement is provided verbatim: ( )YES ( )NO (X)N/A

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

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

Statement is provided verbatim: ( )YES ( )NO (X)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."

Statement is provided verbatim: ( )YES ( )NO (X)N/A

DATA INDICATES COMPLIANCE: PASS/FAIL PASS/FAIL: N/A

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: R.N. Gregg DATE: October 6, 2006

APPROVED BY: Kenneth H. Yates

SECTION 4

INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

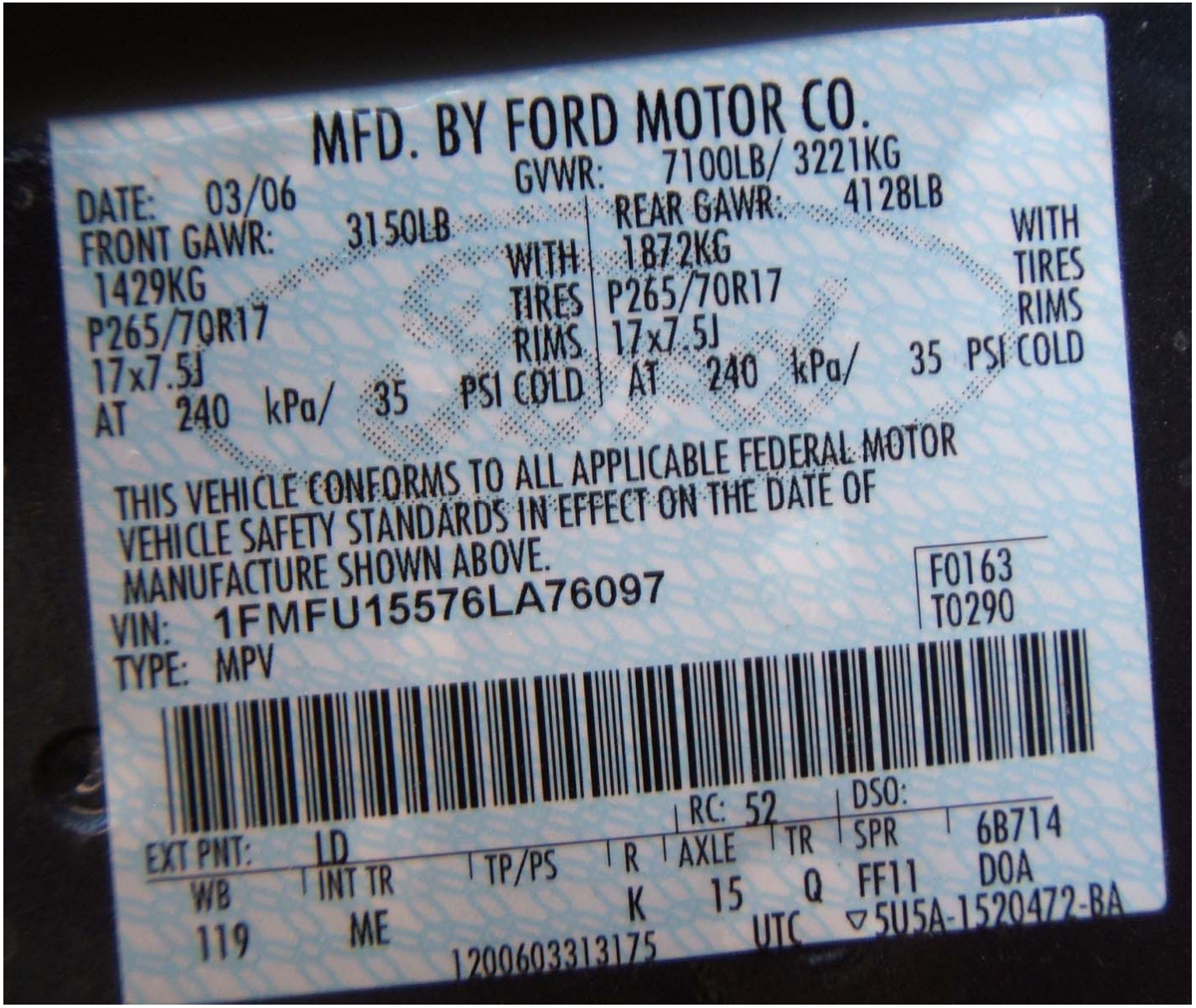
EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO	CAL. DATE	NEXT CAL. DATE
STOPWATCH	WESTCLOX QUARTZ STOPWATCH	NONE	N/A	N/A
V-BOX RECORDING DEVICE	RACELOGIC V-BOX III	SERIAL #030209	2/23/2006	2/23/2007
AMBIENT TEMPERATURE GAUGE	FLUKE 50D K/J THERMOMETER	SERIAL #80840101	7/26/2006	7/26/2007
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	RAYNGER ST20 PRO NON-CONTACT INFRARED THERMOMETER	SERIAL #2065640101-0014	8/10/2006	8/10/2007
AIR PRESSURE GAUGE	ASHCROFT GENERAL PURPOSE DIGITAL GAUGE	MODEL #25C1005 PS02L100-B1 SERIAL #1003098	12/15/2005	12/15/2006
FLOOR SCALES (VEHICLE)	INTERCOMP SW DELUXE SCALES	PART #100156 SERIAL #27032382	8/10/2006	8/10/2007
PLATFORM SCALE (BALLAST)	HOWE RICHARDSON	MODEL #6401 SERIAL #0181-5509-26	8/10/2006	8/10/2007

SECTION 5

PHOTOGRAPHS

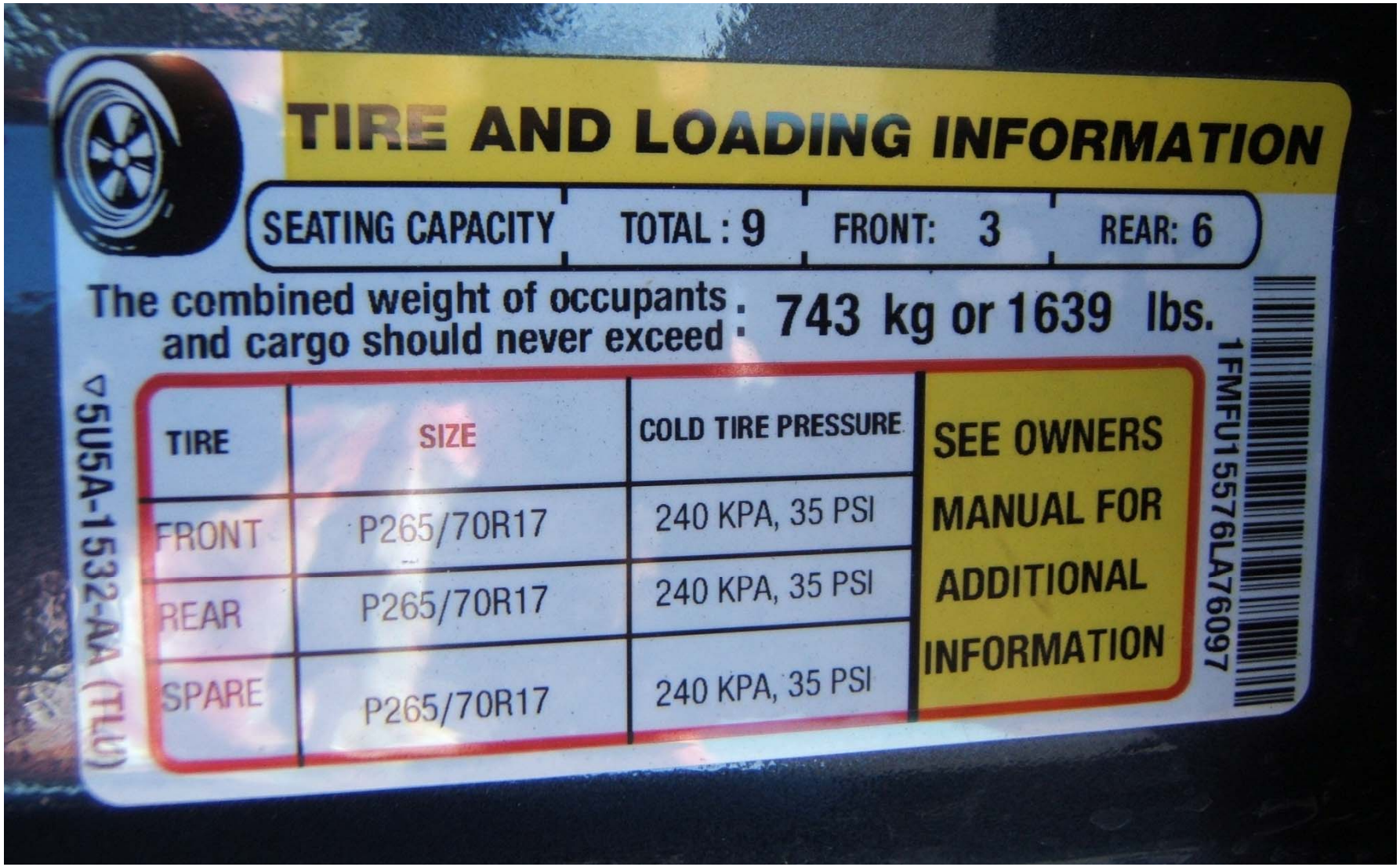
2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO.138

FIGURE 5.1
¾ FRONTAL VIEW FROM LEFT SIDE OF VEHICLE



2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO.138

FIGURE 5.2
VEHICLE CERTIFICATION LABEL



2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.3
VEHICLE PLACARD

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.4
TIRE SHOWING BRAND

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.5
TIRE SHOWING MODEL

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.6
TIRE SHOWING SIZE

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.7
TIRE SHOWING DOT SERIAL NUMBER

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

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

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.9
TIRE SHOWING SIDEWALL/TREAD CONSTRUCTION

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.10
RIM SHOWING VALVE STEM

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.11
INSTRUMENT PANEL SHOWING COMBINATION LOW TIRE PRESSURE WARNING AND MALFUNCTION TELLTALE

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO 138

FIGURE 5.12
RECONFIGURABLE DISPLAY SHOWING
TPMS MALFUNCTION WARNING

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.13
VEHICLE REAR SEAT BALLAST FOR GVWR LOAD

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.14
VEHICLE CARGO AREA BALLAST
FOR GVWR LOAD

2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.15
VEHICLE ON WEIGHT SCALES

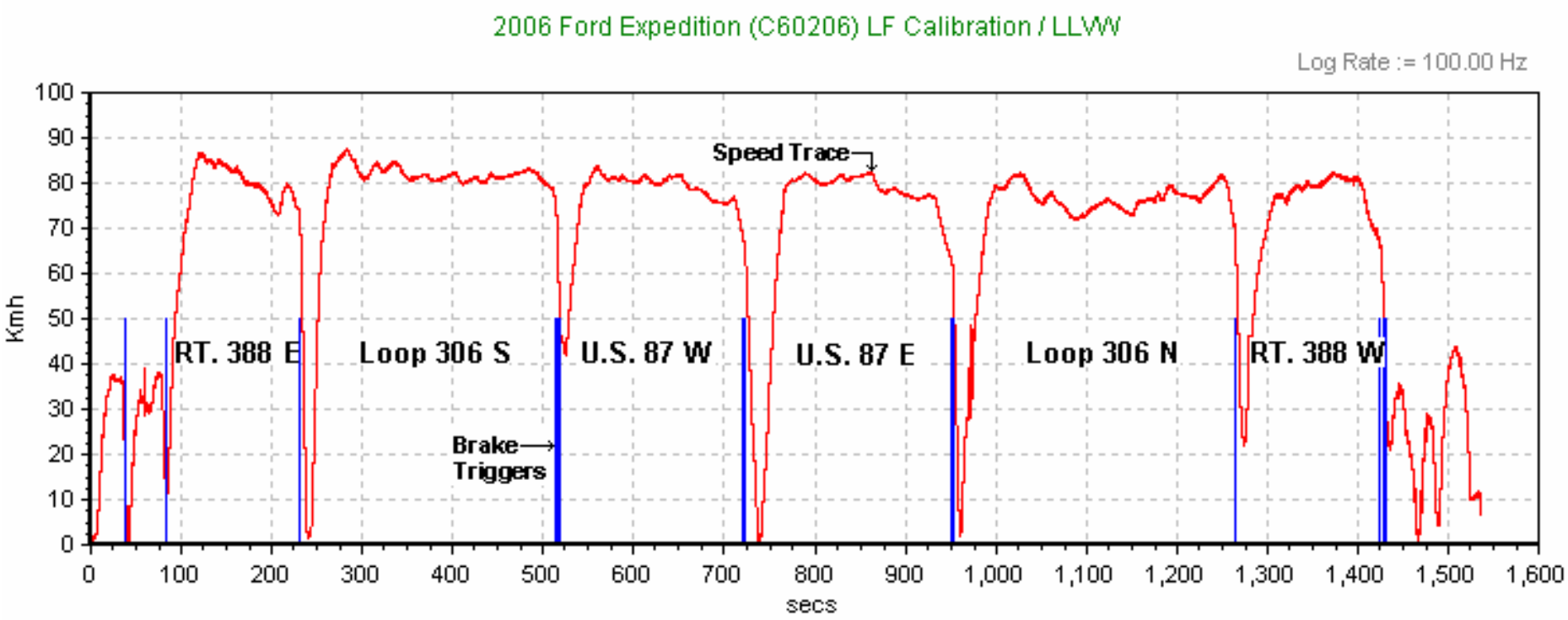
2006 FORD EXPEDITION
NHTSA NO. C60206
FMVSS NO. 138

FIGURE 5.16
SPARE ON LEFT FRONT POSITION
FOR MALFUNCTION DETECTION TEST

SECTION 6
TEST PLOTS

Scenario A:	Left Front Tire
Test Date:	9/19/06
Data File Time:	25:36 minutes
Cumulative Driving Time:	20:20 minutes
Start Point:	SATF shop

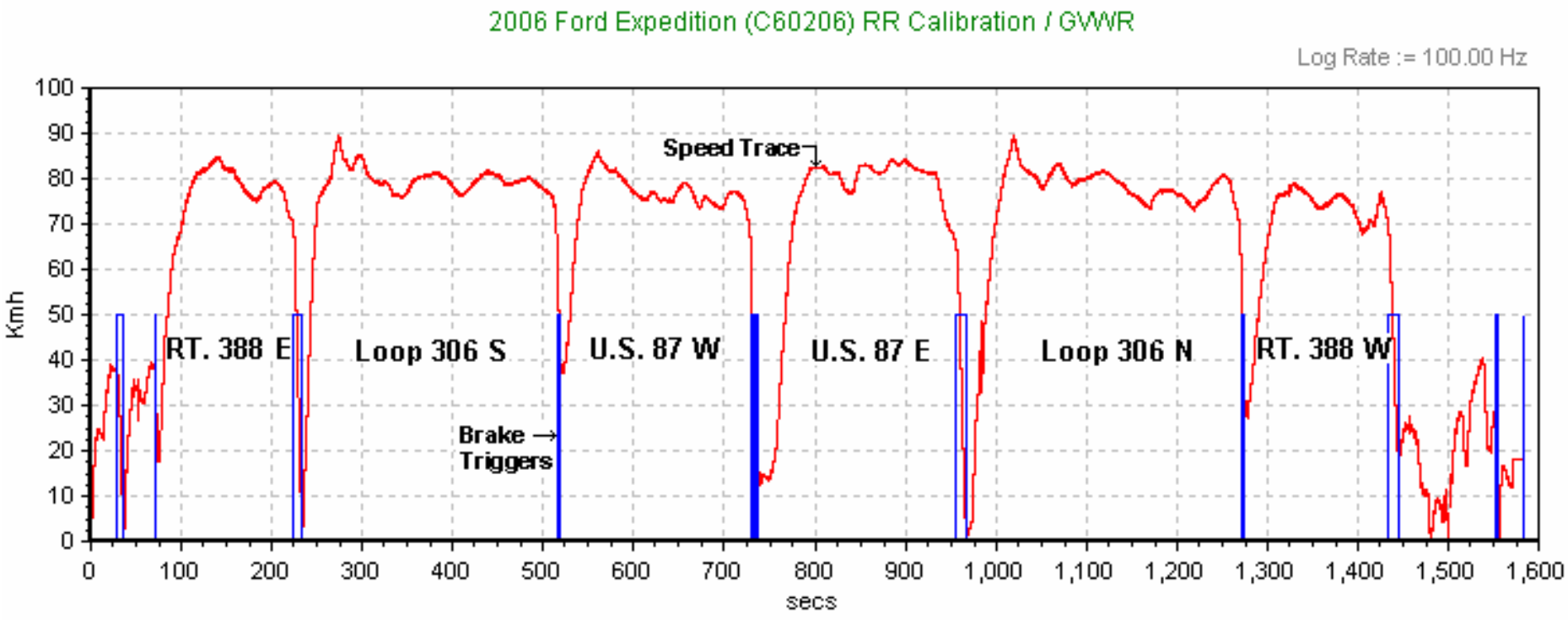
Calibration Phase



LF Detection Phase: Telltale illuminated upon ignition activation. Driving was not required.

Scenario B:	Right Rear Tire
Test Date:	9/20/06
Data File Time:	26:22 minutes
Cumulative Driving Time:	20:25 minutes
Start Point:	SATF shop

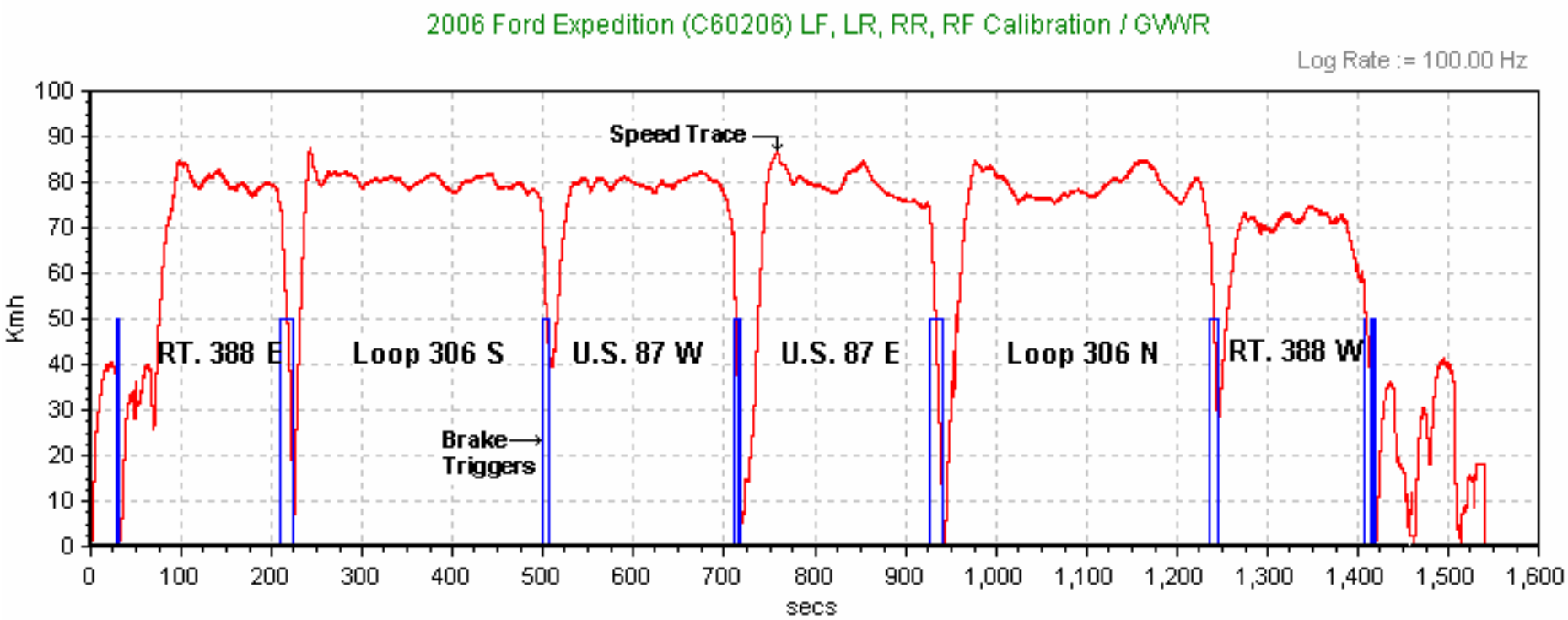
Calibration Phase



RR Detection Phase: Illumination under 10 seconds. Driving was not required.

Scenario C:	Left Front, Left Rear, Right Rear, Right Front Tires
Test Date:	9/20/06
Data File Time:	25:40 minutes
Cumulative Driving Time:	20:19 minutes
Start Point:	SATF shop

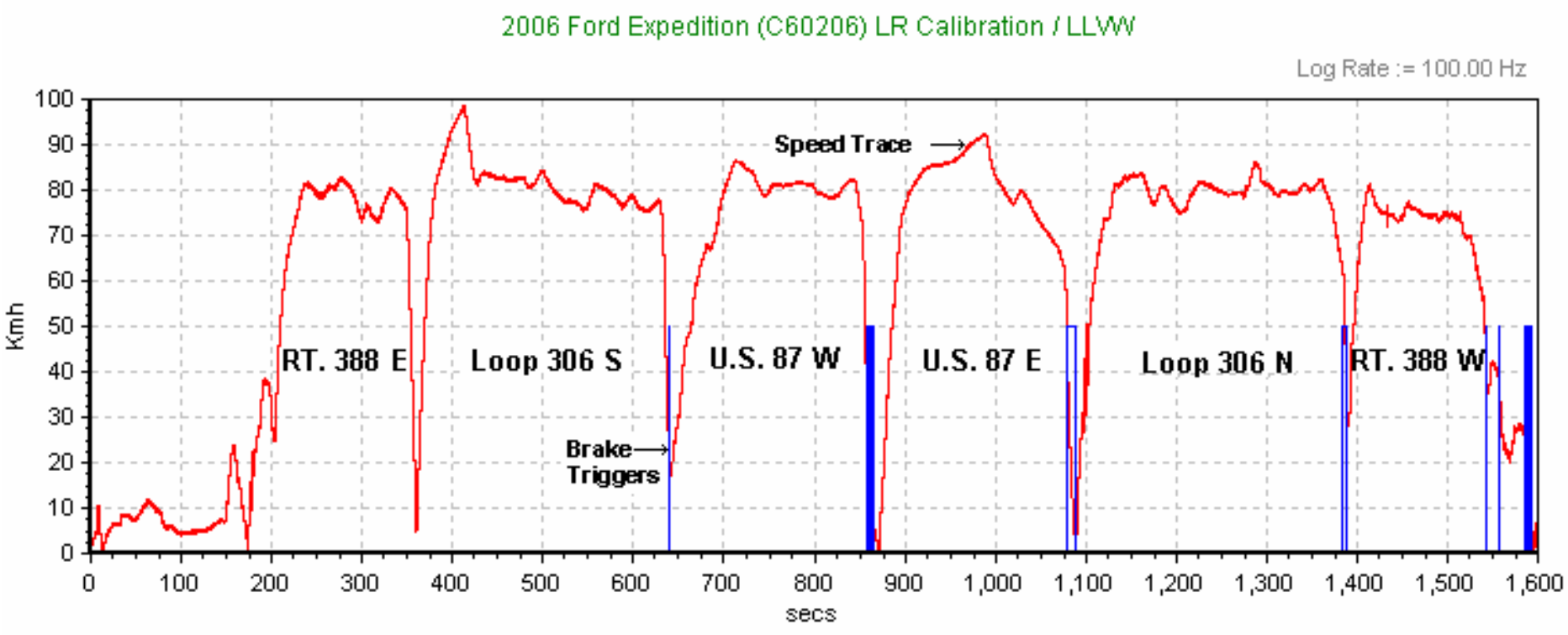
Calibration Phase



LF, LR, RR, RF Detection Phase: Illumination under 10 seconds. Driving was not required.

Scenario D:	Left Rear Tire
Test Date:	9/22/06
Data File Time:	27:59 minutes
Cumulative Driving Time:	20:21 minutes
Start Point:	SATF shop

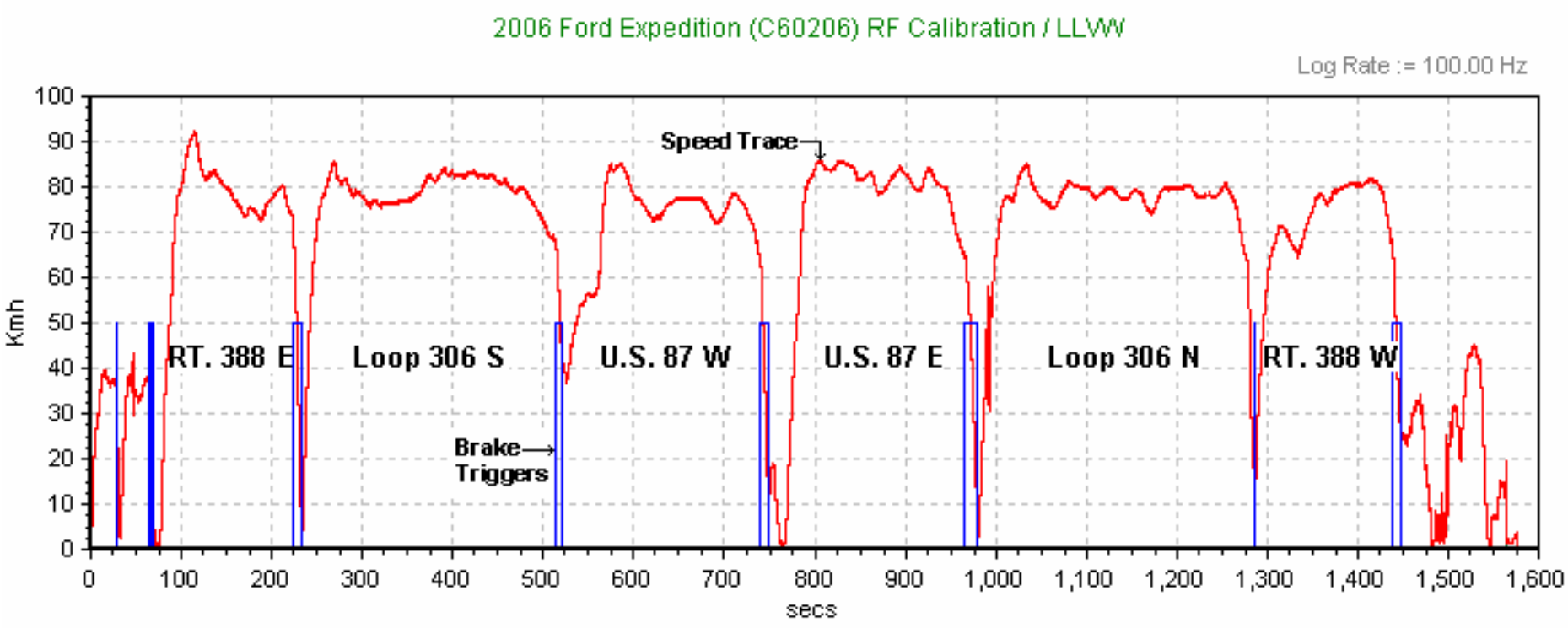
Calibration Phase



LR Detection Phase: Illumination under 10 seconds. Driving was not required.

Scenario E:	Right Front Tire
Test Date:	9/22/06
Data File Time:	26:16 minutes
Cumulative Driving Time:	20:27 minutes
Start Point:	SATF shop

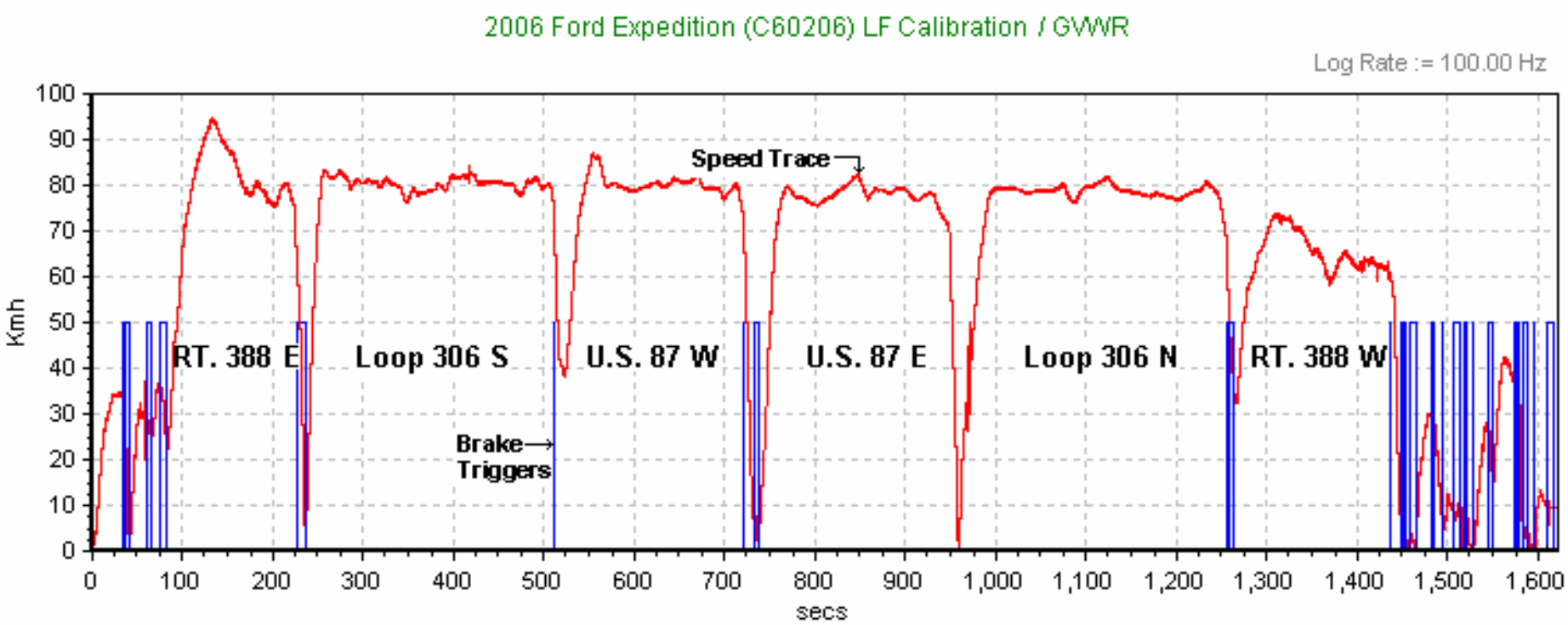
Calibration Phase



RF Detection Phase: Illumination with ignition switch activation. Driving was not required.

Scenario F:	Left Front Tire
Test Date:	10/2/06
Data File Time:	27:03 minutes
Cumulative Driving Time:	20:38 minutes
Start Point:	SATF shop

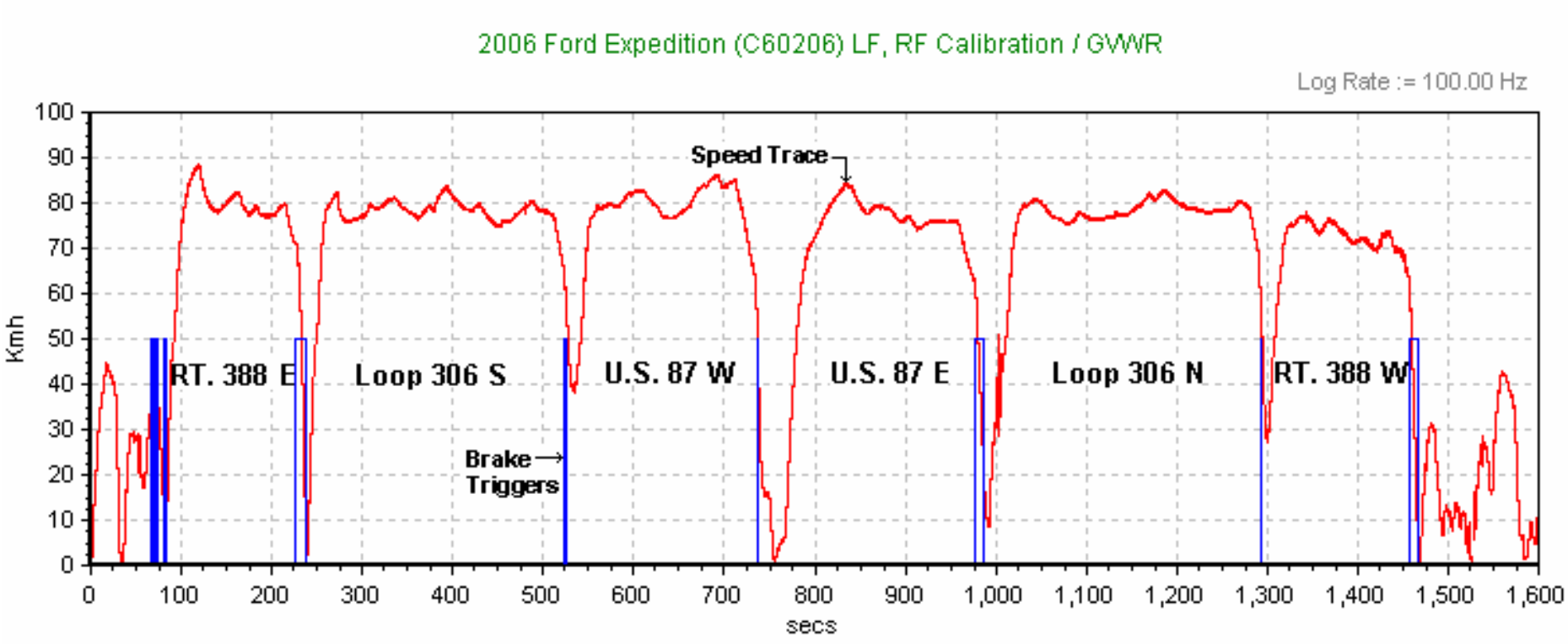
Calibration Phase



LF Detection Phase: Illumination with ignition switch activation. Driving was not required.

Scenario G:	Left Front, Right Front Tires
Test Date:	10/2/06
Data File Time:	26:58 minutes
Cumulative Driving Time:	20:29 minutes
Start Point:	SATF shop

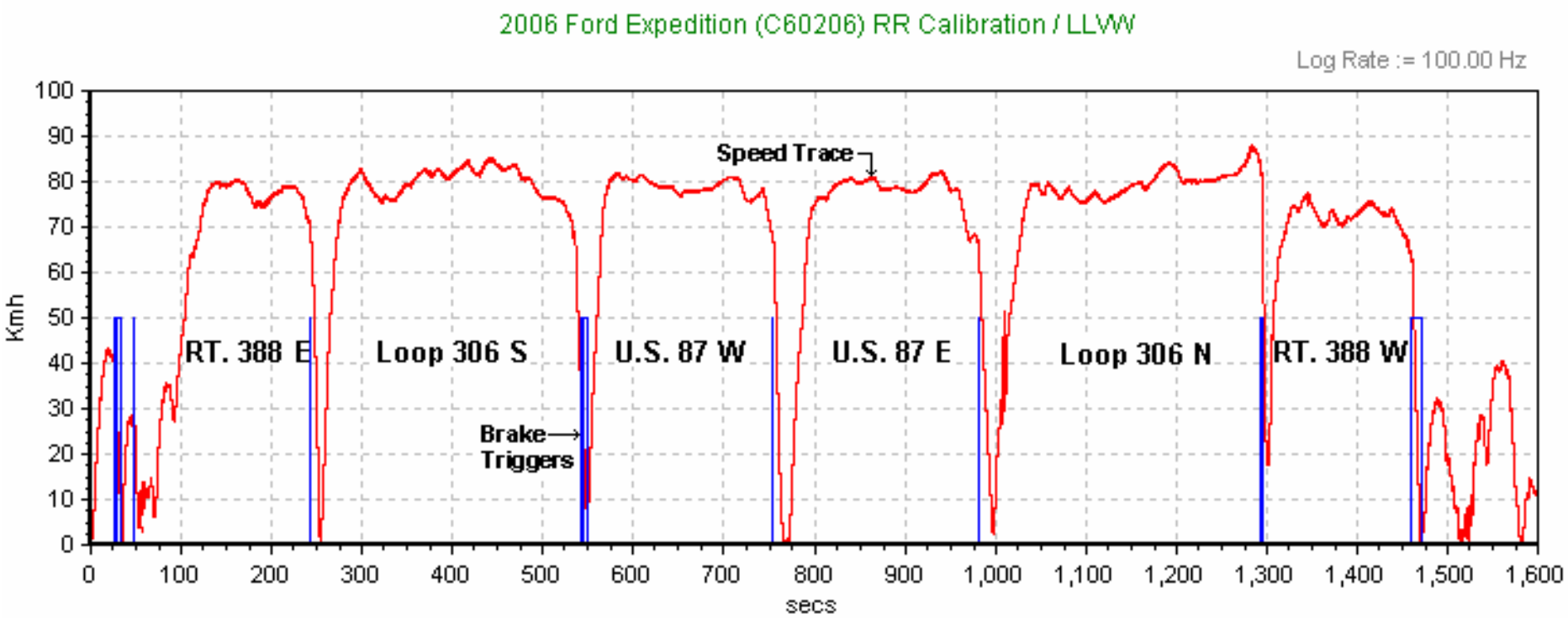
Calibration Phase



LF, RF Detection Phase: Illumination with ignition switch activation. Driving was not required.

Scenario H:	Right Rear Tire
Test Date:	10/4/06
Data File Time:	26:37 minutes
Cumulative Driving Time:	20:41 minutes
Start Point:	SATF shop

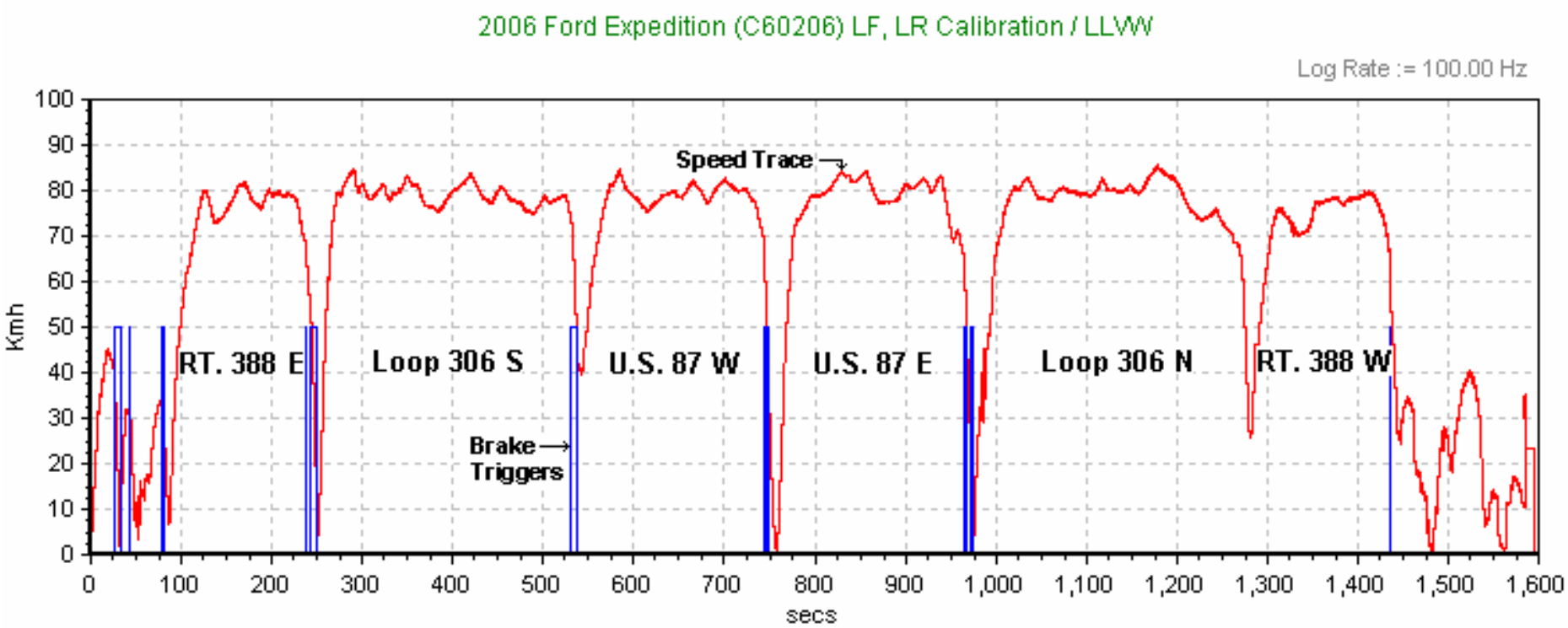
Calibration Phase



RR Detection Phase: Illumination with ignition switch activation. Driving was not required.

Scenario I:	Left Front, Left Rear Tires
Test Date:	10/5/06
Data File Time:	26:35 minutes
Cumulative Driving Time:	20:34 minutes
Start Point:	SATF shop

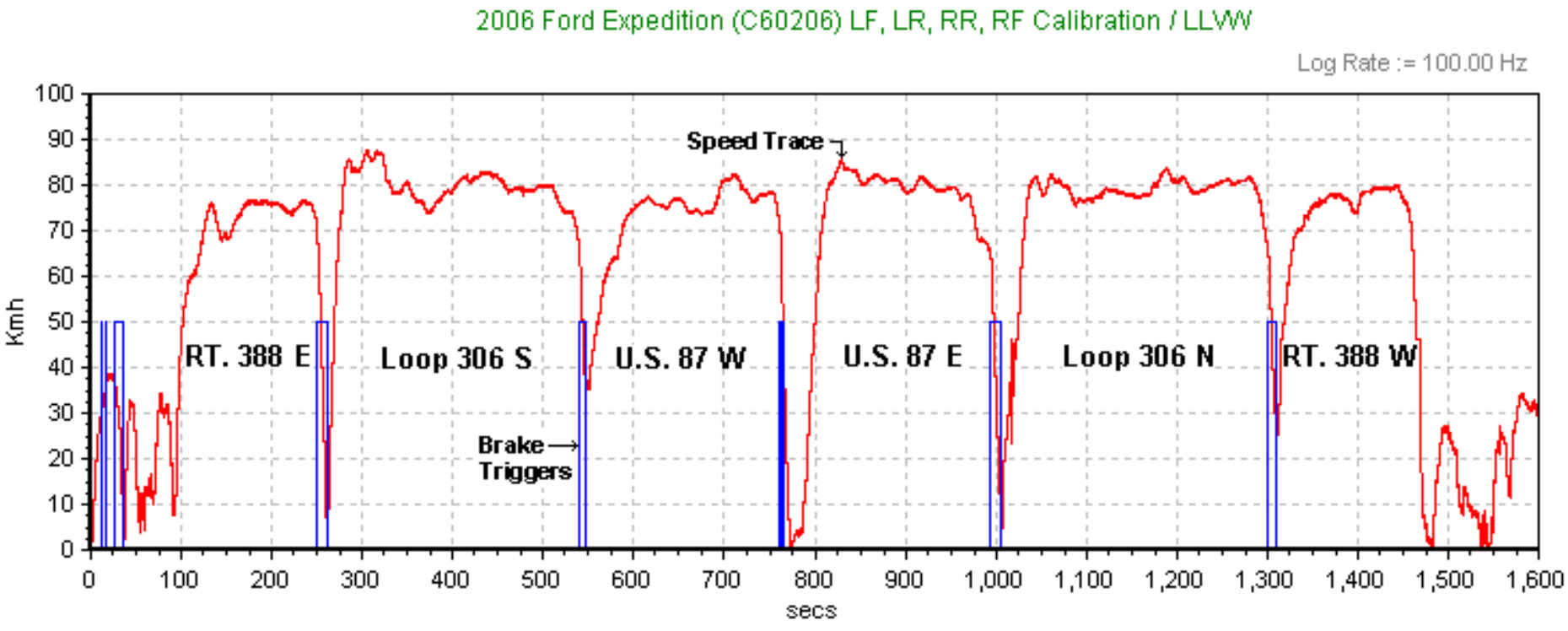
Calibration Phase



LF, LR Detection Phase: Illumination with ignition switch activation. Driving was not required.

Scenario J:	Left Front, Left Rear, Right Rear, Right Front Tires
Test Date:	10/6/06
Data File Time:	27:08 minutes
Cumulative Driving Time:	20:34 minutes
Start Point:	SATF shop

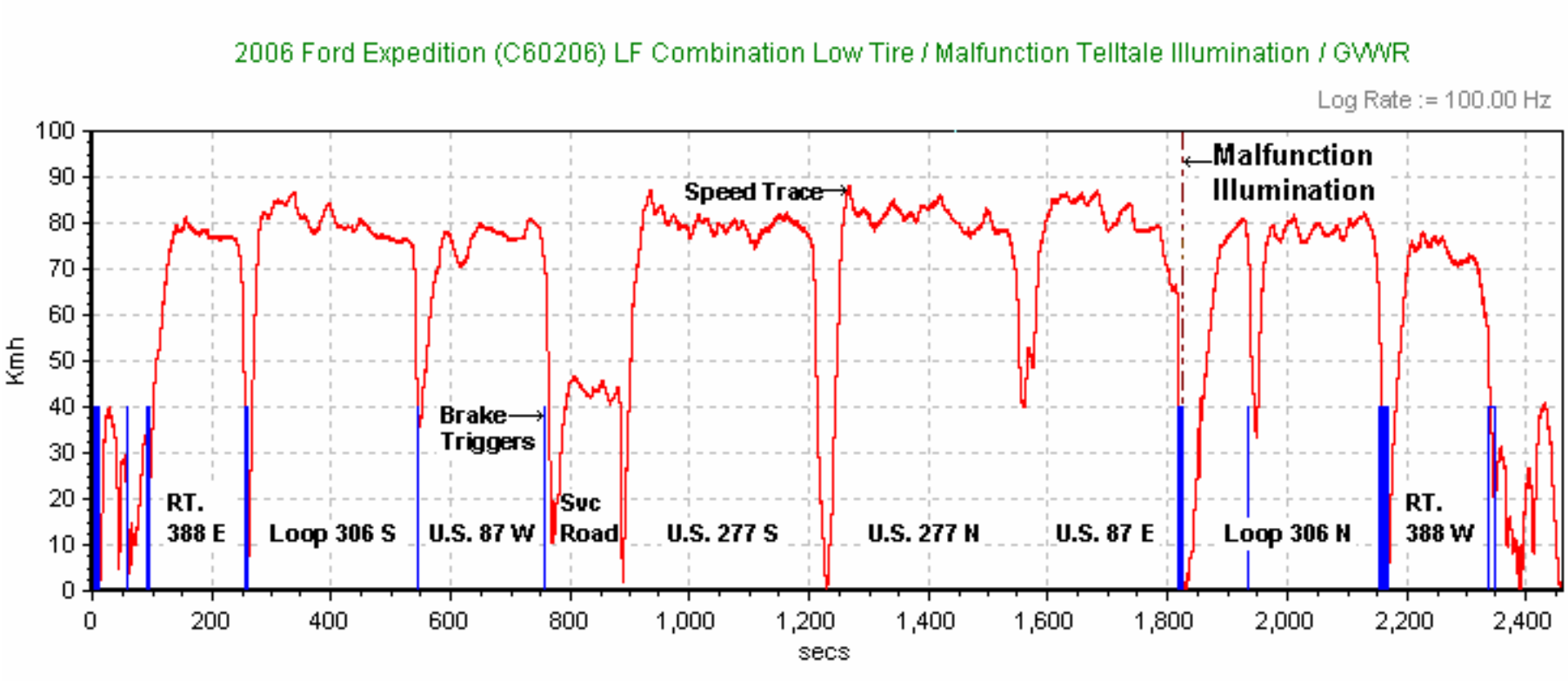
Calibration Phase



LF, LR, RR, RF Detection Phase: Illumination with ignition switch activation. Driving was not required.

Scenario K: Spare without Sensor Installed on Left Front Position
Test Date: 10/4/06
Data File Time: 41:01 minutes
Illumination: 24:06 minutes
Start Point: SATF shop

Malfunction Detection Test



LF Malfunction Telltale: Indicant test only