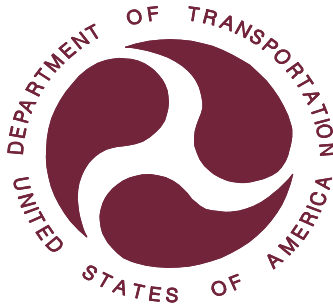


REPORT NUMBER 138-STF-07-002

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

GENERAL MOTORS CORPORATION  
2007 CHEVROLET COLORADO  
PICKUP TRUCK  
NHTSA NO. C70106

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



November 9, 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 Chevrolet Colorado pickup truck 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 Chevrolet Colorado pickup truck. Nomenclatures applicable to the test vehicle are:

A. Vehicle Identification Number: 1GCCS149278249529

B. NHTSA Number: C70106

C. Manufacturer: General Motors Corporation

D. Manufacture Date: 06/2007

1.3 TEST DATE

The test vehicle was tested during the time period August 28 through September 10, 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 behind 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 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 until the telltale extinguished.

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. Per the standard's requirements effective September 1, 2007, the vehicle's combination malfunction telltale and message center properly indicated a malfunction with an exception. See Data Sheet 4 Remarks.

SECTION 3  
TEST DATA



## FMVSS No. 138 – TEST DATA SUMMARY

TEST DATES: August 28 through September 10, 2007 LAB: U. S. DOT San Angelo Test Facility (SATF)  
 CONTRACT: N/A VEHICLE NHTSA NUMBER: C70106  
 VIN: 1GCCS149278249529 CERTIFICATION LABEL BUILD DATE: 06/2007

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

**REMARKS:** FMVSS 138 malfunction performance requirements did not become effective until September 1, 2007

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

TEST DATE: August 28, 2007 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106 VIN: 1GCCS149278249529

CERTIFICATION LABEL BUILD DATE: 06/2007 ENGINE: Vortec 2.9 i4

MY/MAKE/MODEL/BODY STYLE: 2007 Chevrolet Colorado pickup truck

**TIRE CONDITIONING:**

( X ) Tires used more than 100 km. Actual odometer reading : 111 km (69 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, inflation pressure sensor GM#15122618

Source: Information supplied by General Motors

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

Source: Information supplied by manufacturer

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

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

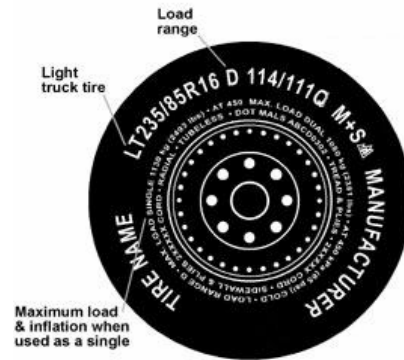
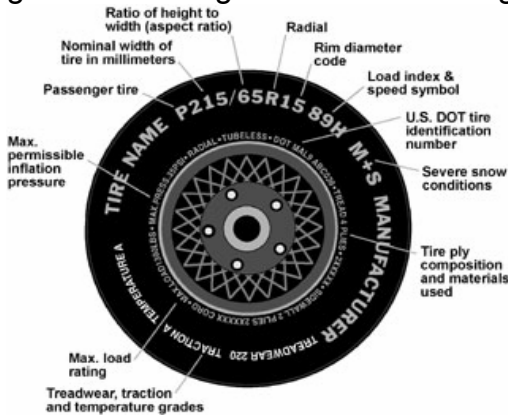
**DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING AND OWNER'S MANUAL:**

Axle	Tire Size	Recommended Cold Inflation Pressure	Source
Front	P205/75R15	240 kPa (35 psi)	Vehicle placard
Rear	P205/75R15	240 kPa (35 psi)	Vehicle placard
Spare	T155/90R16	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): P205/75R15 97S

Manufacturer/Tire Name: General Ameri\*GS60

Sidewall Max Load Rating: 725 kg (1,598 lbs)

Max Inflation Pressure: 300 kPa (44 psi)

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

Tread Construction (number of plies and ply material): 3 plies - 1 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**

<b>Worksheet for Determining FMVSS No. 138 Telltale Warning Activation Pressure for Tires Installed on Vehicle</b>		
<b>Part</b>	<b>Front Axle</b>	<b>Rear Axle</b>
<b>(A)</b> 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>(B)</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)
<b>(C)</b> 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)
<b>(D)</b> 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**

<b>Tire Type</b>	<b>Maximum or Rated Inflation Pressure</b>		<b>Minimum Activation Pressure</b>	
	<b>(kPa)</b>	<b>(psi)</b>	<b>(kPa)</b>	<b>(psi)</b>
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: August 28, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: August 28, 2007 LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

**TPMS Low Tire Pressure Warning Telltale**

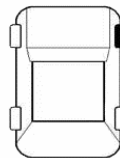
TPMS Low Tire Pressure Warning Telltale Location: Upper center of instrument cluster, between fuel gauge and water temperature gauge

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

YES     NO (fail)

Telltale is part of a reconfigurable display?                     YES     NO

Identify Telltale Symbol Used (check box above figure).



OTHER (fail)  
(describe below)

Note any words or additional symbols used.

None

**TPMS Malfunction Telltale**

None     Dedicated stand-alone     Combined with low tire pressure telltale

Telltale is part of a reconfigurable display?                     YES     NO

**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

ON/RUN

Between OFF/RUN and START

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

Time telltale remains illuminated 5.0 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:** In addition to the telltale, there is a message center that displays whether an illuminated telltale is from a TPMS low pressure or malfunction condition.

RECORDED BY: Robert N. Gregg

DATE: August 28, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: August 28, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

Time: Start: 9:12 am End: 9:50 am

Ambient Temperature: Start: 24.0°C (75.2°F) End: 25.0°C (77.0°F)

Odometer Reading: Start: 111 km (69 mi)

Fuel Level: Start: Full

Weather Conditions: Clear

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:**

<b>Execution Procedure</b>	<b>LF Tire</b>	<b>LR Tire</b>	<b>RR Tire</b>	<b>RF Tire</b>
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)	240.0 kPa (34.8 psi)
Tire Sidewall Temp	24.8°C (76.6°F)	24.8°C (76.6°F)	24.8°C (76.6°F)	24.8°C (76.6°F)

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

**VEHICLE WEIGHT:**

**Vehicle Ratings from Certification Label:**

GVWR: 2,200 kg (4,850 lbs)

GAWR (front): 1,149 kg (2,533 lbs)

GAWR (rear): 1,314 kg (2,896 lbs)

**Vehicle Capacity Weight from Vehicle Placard:**

Vehicle Capacity Weight 586 kg (1,291 lbs)

**Measured Unloaded Vehicle Weight:**

LF	<u>445 kg (980 lbs)</u>	LR	<u>353 kg (778 lbs)</u>
RF	<u>417 kg (920 lbs)</u>	RR	<u>333 kg (734 lbs)</u>
Front		Rear	
Axle	<u>862 kg (1,900 lbs)</u>	Axle	<u>686 kg (1,512 lbs)</u>
Total Vehicle		<u>1,548 kg (3,412 lbs)</u>	

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

LF	<u>492 kg (1,084 lbs)</u>	LR	<u>395 kg (870 lbs)</u>
RF	<u>468 kg (1,032 lbs)</u>	RR	<u>377 kg (831 lbs)</u>
Front		Rear	
Axle	<u>960 kg (2,116 lbs) ( ≤ GAWR )</u>	Axle	<u>772 kg (1,701 lbs) ( ≤ GAWR )</u>
Total Vehicle		<u>1,732 kg (3,817 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), 184 kg (405 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: August 28, 2007      LAB: U. S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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

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

<b>Execution Procedure</b>	<b>LF Tire</b>	<b>LR Tire</b>	<b>RR Tire</b>	<b>RF Tire</b>
After loading vehicle to lightly loaded vehicle weight, positioning vehicle at selected test start point, and vehicle cool down period: Ambient Temperature: <u>25.0°C (77.0°F)</u> Vehicle cool down period: <u>overnight</u>				
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	26.8°C (80.2°F)	27.4°C (81.3°F)	28.0°C (82.4°F)	27.2°C (81.0°F)
San Angelo Test Facility Shop Floor Temp	26.9°C (80.4°F)	27.6°C (81.7°F)	26.8°C (80.2°F)	26.6°C (79.9°F)

**SYSTEM CALIBRATION/LEARNING PHASE:**

(V-box time – see Section 6 test plots)

Time:                      Start: 15:18:18 UTC                      End: 15:42:12 UTC  
Odometer Reading:      Start: 112.8 km (70.1 mi)                      End: 140.5 km (87.3 mi)  
Ambient Temperature:    Start: 25.0°C (77.0°F)                      End: 26.0°C (78.8°F)  
Roadway Temperature:    Start: 33.4°C (92.1°F)                      End: 37.6°C (99.7°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  
10:29 minutes (stopwatch time)                      14.0 km (8.7 mi) distance

**Max speed: 81.5 km/hr (50.6 mph)**

**Total Driving Time: 20:50 minutes (V-Box 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	263.0 kPa (38.1 psi)	257.6 kPa (37.4 psi)	259.8 kPa (37.7 psi)	266.0 kPa (38.6 psi)
Tire Sidewall Temp	37.5°C (99.5°F)	35.8°C (96.4°F)	30.4°C (86.7°F)	30.8°C (87.4°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)	27.6°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: ( X )LF ( )LR ( )RR ( )RF Inflation Pressure	173.0 kPa (25.1 psi)			

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop Direction: east

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

Distance to illuminate:

0.8 km (0.5 mi) distance

Max speed: 55.6 km/hr (34.5 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> ( X )YES ( )NO (fail)
--

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

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

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

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

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

**TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:**

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>29.0°C (84.2°F)</u> Vehicle cool down period: <u>61</u> minutes				
Inflation Pressure	166.3 kPa (24.1 psi)	248.3 kPa (36.0 psi)	248.8 kPa (36.1 psi)	253.3 kPa (36.7 psi)
Tire Sidewall Temp	29.6°C (85.3°F)	29.6°C (85.3°F)	30.2°C (86.4°F)	29.0°C (84.2°F)
San Angelo Test Facility Shop Floor Temp	28.8°C (83.8°F)	28.6°C (83.5°F)	29.0°C (84.2°F)	28.6°C (83.5°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)	240.0 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

Distance to Extinguish:

0.8 km (0.5 mi) distance

**TEST RESULTS**

**TPMS Performance Test Results (PASS/FAIL)**

Left front tire was deflated at LLVW.

PASS

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 28, 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: August 28, 2007      LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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>31.4°C (88.5°F)</u> Vehicle cool down period: <u>60</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	30.4°C (86.7°F)	31.2°C (88.2°F)	32.2°C (90.0°F)	30.8°C (87.4°F)
San Angelo Test Facility Shop Floor Temp	29.6°C (85.3°F)	29.8°C (85.6°F)	30.6°C (87.1°F)	29.6°C (85.3°F)

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

Time:                              Start: 18:47:21 UTC                              End: 19:11:15 UTC  
Odometer Reading:              Start: 145.6 km (90.5 mi)                              End: 173.3 km (107.7 mi)  
Ambient Temperature:              Start: 31.2°C (88.2°F)                              End: 31.3°C (88.3°F)  
Roadway Temperature:              Start: 48.8°C (119.8°F)                              End: 49.8°C (121.6°F)

Driving in first direction:

Starting point: GAFB north gate                              Direction: south  
10:21 minutes (stopwatch time)                              13.7 km (8.5 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane                              Direction: north  
10:32 minutes (stopwatch time)                              14.0 km (8.7 mi) distance

**Max speed: 81.6 km/hr (50.7 mph)**

**Total Driving Time: 20:54 minutes (V-Box 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	257.1 kPa (37.3 psi)	254.0 kPa (36.8 psi)	254.8 kPa (37.0 psi)	257.6 kPa (37.4 psi)
Tire Sidewall Temp	37.4°C (99.3°F)	40.2°C (104.4°F)	41.0°C (105.8°F)	41.0°C (105.8°F)
San Angelo Test Facility Shop Floor Temp	30.5°C (86.9°F)	30.6°C (87.1°F)	30.6°C (87.1°F)	30.6°C (87.1°F)

**SYSTEM DETECTION PHASE:**

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

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

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop Direction: east

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

Distance to illuminate:  
0.8 km (0.5 mi) distance

Max speed: 47.5 km/hr (29.5 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> (X)YES ( )NO (fail)
--

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

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

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

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

**TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:**

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>33.3°C (91.9°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	245.3 kPa (35.6 psi)	244.5 kPa (35.5 psi)	167.1 kPa (24.2 psi)	244.8 kPa (35.5 psi)
Tire Sidewall Temp	34.0°C (93.2°F)	33.4°C (92.1°F)	34.2°C (93.6°F)	33.6°C (92.5°F)
San Angelo Test Facility Shop Floor Temp	30.2°C (86.4°F)	30.6°C (87.1°F)	30.8°C (87.4°F)	30.6°C (87.1°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)	240.0 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

Distance to Extinguish:

0.4 km (0.25 mi) distance

**TEST RESULTS**

**TPMS Performance Test Results (PASS/FAIL)**

**PASS**

Right rear tire was deflated at LLVW.

**REMARKS:** None

RECORDED BY: Robert N. Gregg

DATE: August 28, 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: August 29, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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>22.2°C (72.0°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	25.0°C (77.0°F)	26.2°C (79.2°F)	25.4°C (77.7°F)	25.6°C (78.1°F)
San Angelo Test Facility Shop Floor Temp	27.2°C (81.0°F)	27.2°C (81.0°F)	27.4°C (81.3°F)	27.6°C (81.7°F)

**SYSTEM CALIBRATION/LEARNING PHASE:**

(V-box time – see Section 6 test plots)

Time: Start: 12:22:38 UTC End: 12:46:53 UTC  
 Odometer Reading: Start: 178.2 km (110.7 mi) End: 205.8 km (127.9 mi)  
 Ambient Temperature: Start: 22.6°C (72.7°F) End: 23.3°C (73.9°F)  
 Roadway Temperature: Start: 26.0°C (78.8°F) End: 26.6°C (79.9°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south  
10:25 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north  
10:31 minutes (stopwatch time) 13.8 km (8.6 mi) distance

**Max speed: 87.6 km/hr (54.4 mph)**

**Total Driving Time: 20:55 minutes (V-Box 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:**

<b>Execution Procedure</b>	<b>LF Tire</b>	<b>LR Tire</b>	<b>RR Tire</b>	<b>RF Tire</b>
Immediately, after vehicle is stopped, engine off: Inflation Pressure	254.0 kPa (36.8 psi)	251.9 kPa (36.5 psi)	252.5 kPa (36.6 psi)	254.4 kPa (36.9 psi)
Tire Sidewall Temp	33.0°C (91.4°F)	29.6°C (85.3°F)	29.6°C (85.3°F)	30.2°C (86.4°F)
San Angelo Test Facility Shop Floor Temp	27.4°C (81.3°F)	27.2°C (81.0°F)	27.4°C (81.3°F)	27.6°C (81.7°F)

**SYSTEM DETECTION PHASE:**

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

<b>Execution Procedure</b>	<b>LF Tire</b>	<b>LR Tire</b>	<b>RR Tire</b>	<b>RF Tire</b>
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 Direction: east

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

Distance to illuminate:  
0.8 km (0.5 mi) distance

Max speed: 34.6 km/hr (21.5 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> (X)YES ( )NO (fail)
--

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

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



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

**SCENARIO C – Left Rear and Right 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>24.6°C (76.3°F)</u> Vehicle cool down period: <u>62</u> minutes				
Inflation Pressure	245.3 kPa (35.0 psi)	169.0 kPa (23.9 psi)	244.3 kPa (34.9 psi)	167.2 kPa (24.1 psi)
Tire Sidewall Temp	27.6°C (84.2°F)	26.6°C (84.2°F)	27.6°C (84.9°F)	27.8°C (84.2°F)
San Angelo Test Facility Shop Floor Temp	27.2°C (81.7°F)	27.6°C (81.7°F)	27.4°C (81.0°F)	27.6°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:				
	240.1 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: east

Distance to Extinguish:

0.8 km (0.5 mi) distance

**TEST RESULTS**

**TPMS Performance Test Results (PASS/FAIL)**

Left rear and right front tires were deflated at LLVW.

PASS

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 29, 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 29, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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>26.9°C (80.4°F)</u> Vehicle cool down period: <u>65</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	29.0°C (84.2°F)	28.5°C (83.3°F)	28.8°C (83.8°F)	28.4°C (83.1°F)
San Angelo Test Facility Shop Floor Temp	28.2°C (82.8°F)	28.4°C (83.1°F)	28.4°C (83.1°F)	28.6°C (83.5°F)

**SYSTEM CALIBRATION/LEARNING PHASE:**

(V-box time – see Section 6 test plots)

Time: Start: 15:53:25 UTC End: 16:17:06 UTC  
 Odometer Reading: Start: 210.5 km (130.8 mi) End: 238.2 km (148.0 mi)  
 Ambient Temperature: Start: 27.1°C (80.8°F) End: 27.7°C (81.9°F)  
 Roadway Temperature: Start: 39.8°C (103.6°F) End: 43.4°C (110.1°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south  
10:16 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north  
10:31 minutes (stopwatch time) 13.8 km (8.6 mi) distance

**Max speed:** 82.5 km/hr (51.3 mph)

**Total Driving Time:** 20:51 minutes (V-Box 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:**

<b>Execution Procedure</b>	<b>LF Tire</b>	<b>LR Tire</b>	<b>RR Tire</b>	<b>RF Tire</b>
Immediately, after vehicle is stopped, engine off: Inflation Pressure	255.8 kPa (37.1 psi)	254.4 kPa (36.9 psi)	256.1 kPa (37.1 psi)	257.7 kPa (37.4 psi)
Tire Sidewall Temp	42.8°C (109.0°F)	38.4°C (101.1°F)	37.8°C (100.0°F)	39.8°C (103.6°F)
San Angelo Test Facility Shop Floor Temp	29.4°C (84.9°F)	29.2°C (84.6°F)	29.6°C (85.3°F)	29.6°C (85.3°F)

**SYSTEM DETECTION PHASE:**

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

<b>Execution Procedure</b>	<b>LF Tire</b>	<b>LR Tire</b>	<b>RR Tire</b>	<b>RF Tire</b>
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)	173.0 kPa (25.1 psi)

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop Direction: east

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

Distance to illuminate:  
0.6 km (0.4 mi) distance

Max speed: 31.0 km/hr (19.3 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> ( X )YES ( )NO (fail)
--

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

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

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

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

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

**TIRE INFLATION PRESSURES AND TEMPERATURES AFTER TELLTALE ILLUMINATION:**

Execution Procedure	LF Tire	LR Tire	RR Tire	RF Tire
After vehicle cool down period: Ambient Temperature: <u>31.4°C (102.6°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	167.7 kPa (24.3 psi)	169.1 kPa (24.5 psi)	168.6 kPa (24.5 psi)	166.5 kPa (24.1 psi)
Tire Sidewall Temp	31.2°C (88.2°F)	31.4°C (88.5°F)	32.2°C (90.0°F)	30.2°C (86.4°F)
San Angelo Test Facility Shop Floor Temp	29.4°C (84.9°F)	29.4°C (84.9°F)	29.6°C (85.3°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)	240.1 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

Distance to Extinguish:

0.3 km (0.2 mi) distance

**TEST RESULTS**

**TPMS Performance Test Results (PASS/FAIL)**

**PASS**

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

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 29, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: August 30, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

Time: Start: 8:21 am End: 11:07am

Ambient Temperature: Start: 25.3°C (77.5°F) End: 29.0°C (84.2°F)

Odometer Reading: Start: 360.5 km (224.0 mi)

Fuel Level: Start: Full

Weather Conditions: Clear

Time vehicle has remained with engine off and tires shielded from direct sunlight:  
 (1 hour minimum): 90 minutes (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)	240.1 kPa (34.8 psi)	240.0 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: 2,200 kg (4,850 lbs)

GAWR (front): 1,149 kg (2,533 lbs)

GAWR (rear): 1,314 kg (2,896 lbs)

**Vehicle Capacity Weight from Vehicle Placard:**

Vehicle Capacity Weight 586 kg (1,291 lbs)

**Measured Unloaded Vehicle Weight:**

LF	<u>444 kg (978 lbs)</u>	LR	<u>356 kg (785 lbs)</u>
RF	<u>417 kg (919 lbs)</u>	RR	<u>333 kg (735 lbs)</u>
Front		Rear	
Axle	<u>861 kg (1,897 lbs)</u>	Axle	<u>689 kg (1,520 lbs)</u>
Total Vehicle		<u>1,550 kg (3,417 lbs)</u>	

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

LF	<u>494 kg (1,088 lbs)</u>	LR	<u>603 kg (1,330 lbs)</u>
RF	<u>460 kg (1,014 lbs)</u>	RR	<u>581 kg (1,281 lbs)</u>
Front		Rear	
Axle	<u>954 kg (2,102 lbs) ( ≤ GAWR )</u>	Axle	<u>1,184 kg (2,611 lbs) ( ≤ GAWR )</u>
Total Vehicle		<u>2,138 kg (4,713 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), 586 kg (1,291 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 30, 2007      LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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>29.7°C (85.5°F)</u> Vehicle cool down period: <u>60</u> minutes				
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)
Tire Sidewall Temp	29.8°C (85.6°F)	31.0°C (87.8°F)	32.4°C (90.3°F)	29.6°C (85.3°F)
San Angelo Test Facility Shop Floor Temp	29.0°C (84.2°F)	30.6°C (87.1°F)	30.8°C (87.4°F)	28.8°C (83.8°F)

**SYSTEM CALIBRATION/LEARNING PHASE:**

(V-box time – see Section 6 test plots)

Time:                              Start: 17:16:48 UTC      End: 17:40:52 UTC  
Odometer Reading:            Start: 361.1 km (224.4 mi)      End: 388.8 km (241.6 mi)  
Ambient Temperature:        Start: 29.9°C (85.8°F)      End: 31.8°C (89.2°F)  
Roadway Temperature:        Start: 40.8°C (105.4°F)      End: 48.4°C (119.1°F)

Driving in first direction:

Starting point: GAFB north gate      Direction: south  
10:16 minutes (stopwatch time)      13.8 km (8.6 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane      Direction: north  
10:20 minutes (stopwatch time)      13.8 km (8.6 mi) distance

**Max speed:** 81.6 km/hr (50.7 mph)

**Total Driving Time:** 20:42 minutes (V-Box 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	259.6 kPa (37.7 psi)	261.6 kPa (37.9 psi)	261.0 kPa (37.9 psi)	259.9 kPa (37.7 psi)
Tire Sidewall Temp	44.0°C (111.2°F)	40.2°C (104.4°F)	42.2°C (108.0°F)	43.0°C (109.4°F)
San Angelo Test Facility Shop Floor Temp	30.8°C (87.4°F)	31.2°C (88.2°F)	31.0°C (87.8°F)	30.4°C (86.7°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 ( )RR ( )RF Inflation Pressure		173.0 kPa (25.1 psi)		

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop      Direction: east

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

Distance to illuminate:  
0.5 km (0.3 mi) distance

Max speed: 32.2 km/hr (20.0 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> ( X )YES    ( )NO (fail)
---

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

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



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

**SCENARIO E – Left Rear Tire Deflation at 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>33.0°C (91.4°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	248.3 kPa (36.0 psi)	165.1 kPa (23.9 psi)	247.2 kPa (35.9 psi)	247.9 kPa (36.0 psi)
Tire Sidewall Temp	33.4°C (92.1°F)	33.8°C (92.8°F)	33.4°C (92.1°F)	32.2°C (90.0°F)
San Angelo Test Facility Shop Floor Temp	29.6°C (85.3°F)	29.8°C (85.6°F)	30.2°C (86.4°F)	29.6°C (85.3°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)	240.0 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: east

Distance to Extinguish:

0.5 km (0.3 mi) distance

**TEST RESULTS**

**TPMS Performance Test Results (PASS/FAIL)**

Left rear tire was deflated at VCW.

PASS

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: August 30, 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: September 5 2007      LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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>22.2°C (72.0°F)</u> Vehicle cool down period: <u>overnight</u>				
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	23.4°C (74.1°F)	23.6°C (74.5°F)	23.8°C (74.8°F)	23.8°C (74.8°F)
San Angelo Test Facility Shop Floor Temp	24.4°C (75.9°F)	24.2°C (75.6°F)	24.4°C (75.9°F)	24.4°C (75.9°F)

**SYSTEM CALIBRATION/LEARNING PHASE:**

(V-box time – see Section 6 test plots)

Time:                              Start: 13:52:09 UTC                              End: 14:16:24 UTC  
Odometer Reading:              Start: 395.1 km (245.5 mi)                              End: 422.8 km (262.7 mi)  
Ambient Temperature:              Start: 22.6°C (72.7°F)                              End: 23.1°C (73.6°F)  
Roadway Temperature:              Start: 24.8°C (76.6°F)                              End: 26.6°C (79.9°F)

Driving in first direction:

Starting point: GAFB north gate                              Direction: south  
10:15 minutes (stopwatch time)                              13.8 km (8.6 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane                              Direction: north  
10:21 minutes (stopwatch time)                              13.8 km (8.6 mi) distance

**Max speed:** 81.1 km/hr (50.4 mph)

**Total Driving Time:** 21:39 minutes (V-Box 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	256.0 kPa (37.1 psi)	258.6 kPa (37.5 psi)	257.6 kPa (37.4 psi)	257.3 kPa (37.3 psi)
Tire Sidewall Temp	33.4°C (92.1°F)	30.4°C (86.7°F)	33.5°C (92.3°F)	33.0°C (91.4°F)
San Angelo Test Facility Shop Floor Temp	24.8°C (76.6°F)	25.6°C (78.1°F)	25.8°C (78.4°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: ( )LF ( )LR ( )RR ( X)RF Inflation Pressure				173.0 kPa (25.1 psi)

**TELLTALE ILLUMINATION:**

Starting point: San Angelo Test Facility shop Direction: east

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

Distance to illuminate:  
1.1 km (0.7 mi) distance

Max speed: 55.9 km/hr (34.7 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> ( X )YES ( )NO (fail)
--

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

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

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

**SCENARIO F – Right Front Tire Deflation at 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>24.7°C (76.5°F)</u> Vehicle cool down period: <u>60</u> minutes				
Inflation Pressure	247.9 kPa (36.0 psi)	247.2 kPa (35.9 psi)	245.7 kPa (35.6 psi)	167.8 kPa (24.3 psi)
Tire Sidewall Temp	26.6°C (79.9°F)	26.6°C (79.9°F)	26.8°C (80.2°F)	27.8°C (82.0°F)
San Angelo Test Facility Shop Floor Temp	25.8°C (78.4°F)	26.0°C (78.8°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)	240.1 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: east

Distance to Extinguish:

0.3 km (0.2 mi) distance

**TEST RESULTS**

**TPMS Performance Test Results (PASS/FAIL)**

Right front tire was deflated at VCW.

PASS

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: September 5, 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: September 5, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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>26.5°C (79.7°F)</u> Vehicle cool down period: <u>60</u> minutes				
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	27.4°C (81.3°F)	27.8°C (82.0°F)	27.2°C (81.0°F)	27.8°C (82.0°F)
San Angelo Test Facility Shop Floor Temp	25.2°C (77.4°F)	26.2°C (79.2°F)	26.4°C (79.5°F)	26.2°C (79.2°F)

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

Time: Start: 17:14:33 UTC End: 17:39:28 UTC  
 Odometer Reading: Start: 428.6 km (266.3 mi) End: 456.2 km (283.5 mi)  
 Ambient Temperature: Start: 26.5°C (79.7°F) End: 27.2°C (81.0°F)  
 Roadway Temperature: Start: 32.8°C (91.0°F) End: 33.2°C (91.8°F)

Driving in first direction:

Starting point: GAFB north gate Direction: south  
10:10 minutes (stopwatch time) 13.8 km (8.6 mi) distance

Driving in opposite direction:

Starting point: Brodnax Lane Direction: north  
10:22 minutes (stopwatch time) 13.8 km (8.6 mi) distance

**Max speed:** 82.3 km/hr (51.1 mph)

**Total Driving Time:** 20:33 minutes (V-Box 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	254.4 kPa (36.9 psi)	256.2 kPa (37.2 psi)	258.2 kPa (37.4 psi)	254.1 kPa (36.9 psi)
Tire Sidewall Temp	39.6°C (103.3°F)	38.4°C (101.1°F)	38.2°C (100.8°F)	38.6°C (101.5°F)
San Angelo Test Facility Shop Floor Temp	26.2°C (79.2°F)	26.6°C (79.9°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 ( 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 Direction: east

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

Distance to illuminate:  
0.5 km (0.3 mi) distance

Max speed: 30.8 km/hr (19.1 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> ( X )YES ( )NO (fail)
--

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

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

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

**SCENARIO G – Left 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>28.8°C (83.8°F)</u> Vehicle cool down period: <u>61</u> minutes				
Inflation Pressure	243.4 kPa (35.3 psi)	166.0 kPa (24.1 psi)	165.3 kPa (24.0 psi)	242.4 kPa (35.2 psi)
Tire Sidewall Temp	27.8°C (82.0°F)	28.0°C (82.4°F)	28.0°C (82.4°F)	28.6°C (83.5°F)
San Angelo Test Facility Shop Floor Temp	26.8°C (80.2°F)	26.6°C (79.9°F)	26.8°C (80.2°F)	26.6°C (79.9°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? ( X )YES ( )NO

Driving direction:

Starting point: San Angelo Test Facility shop Direction: east

Distance to Extinguish:

0.5 km (0.3 mi) distance

**TEST RESULTS**

**TPMS Performance Test Results (PASS/FAIL)**

Left rear, right rear tires were deflated at VCW.

PASS

REMARKS: None

RECORDED BY: Robert N. Gregg

DATE: September 5, 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: September 6, 2007 LAB: U.S. DOT San Angelo Test Facility

VEHICLE NHTSA NUMBER: C70106

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>24.5°C (76.1°F)</u> Vehicle cool down period: <u>overnight</u>				
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	25.4°C (77.7°F)	25.8°C (78.4°F)	25.8°C (78.4°F)	26.0°C (78.8°F)
San Angelo Test Facility Shop Floor Temp	25.6°C (78.1°F)	26.0°C (78.8°F)	26.2°C (79.2°F)	25.8°C (78.4°F)

**SYSTEM CALIBRATION/LEARNING PHASE:**

(V-box time – see Section 6 test plots)

Time: Start: 15:53:25 UTC End: 16:17:26 UTC  
 Odometer Reading: Start: 460.3 km (286.0 mi) End: 488.0 km (303.2 mi)  
 Ambient Temperature: Start: 24.4°C (75.9°F) End: 24.5°C (76.1°F)  
 Roadway Temperature: Start: 24.4°C (75.9°F) End: 26.6°C (79.9°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  
10:24 minutes (stopwatch time) 14.0 km (8.7mi) distance

**Max speed: 82.5 km/hr (51.3 mph)**

**Total Driving Time: 20:51 minutes (V-Box 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	254.7 kPa (36.9 psi)	256.7 kPa (37.2 psi)	259.2 kPa (37.6 psi)	257.7 kPa (37.4 psi)
Tire Sidewall Temp	36.0°C (96.8°F)	35.4°C (95.7°F)	36.4°C (97.5°F)	35.6°C (96.1°F)
San Angelo Test Facility Shop Floor Temp	26.4°C (79.5°F)	26.4°C (79.5°F)	26.2°C (79.2°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 ( X )LR ( X )RR ( X )RF Inflation Pressure	173.0 kPa (25.1 psi)	173.1 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: east

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

Distance to illuminate:  
0.5 km (0.3 mi) distance

Max speed: 31.0 km/hr (19.3 mph)

<b>TELLTALE ILLUMINATES WITHIN 20 MINUTES:</b> ( X )YES ( )NO (fail)
--

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

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

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

**SCENARIO H – Left Front, Left Rear, Right Rear, and Right Front Tire Deflation at 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>26.1°C (79.0°F)</u> Vehicle cool down period: <u>60:30</u> minutes				
Inflation Pressure	168.1 kPa (24.4 psi)	167.2 kPa (24.3 psi)	166.6 kPa (24.2 psi)	167.8 kPa (24.3 psi)
Tire Sidewall Temp	28.2°C (82.8°F)	28.0°C (82.4°F)	28.2°C (82.8°F)	28.0°C (82.4°F)
San Angelo Test Facility Shop Floor Temp	27.0°C (80.6°F)	27.0°C (80.6°F)	27.2°C (81.0°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

Distance to Extinguish:

0.3 km (0.2 mi) distance

**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: September 6, 2007

APPROVED BY: Kenneth H. Yates

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

TEST DATE: August 30, 2007      LAB: SATF      VEHICLE NHTSA NO: C70106

Time:                                      Start: 19:42:25 UTC                      End: 20:01:34 UTC  
Odometer Reading:                      Start: 318.3 km (197.8 mi)                      End: 338.3 km (210.2 mi)  
Ambient Temperature:                      Start: 23.7°C (74.7°F)  
Roadway Temperature:                      Start: 27.0°C (80.6°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 at LLVW.

**MALFUNCTION TELLTALE ILLUMINATION**

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

***Combination Low Tire Pressure Warning / Malfunction Telltale***

Driving in first direction:

Starting point: San Angelo Test Facility shop                      Direction: south

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

14:40 minutes (stopwatch time)      19.9 km ( 12.4 mi) distance

**Max speed: 84.0 km/hr (52.2 mph)**

**Total Driving Time: 19:09 minutes (VBox time)**

After stopping the vehicle, does the telltale remain illuminated for at least 60 seconds (after flashing)?  
(  )YES      (  )NO

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

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

After 5 minutes with the ignition locking system in the “Off” or “Lock” position, does the telltale re-illuminate and stay illuminated for at least 60 seconds when the ignition locking system is activated to the “On” or “Run” position?       YES     NO (fail)

Time it takes before telltale starts flashing    6.5    seconds  
Time telltale remains flashing                    66.8    seconds  
Time telltale remains illuminated                140+    seconds  
(Verified for a minimum of 60 seconds)

Deactivate the ignition locking system and then re-start the vehicle engine. Does the telltale re-illuminate and stay illuminated (not flashing) for at least 60 seconds after flashing when the ignition locking system is activated and the engine running?  
 YES     NO (fail)

**Extinguishment Phase:**

Restore the TPMS to normal operation. Does the malfunction telltale extinguish when the engine is started?                                     YES     NO

Driving in first direction:

Starting point: San Angelo Test Facility shop      Direction: east

**Did the telltale extinguish?**                                     YES     NO

0.8 km (.5 mi) distance

**Max speed:** 46.7 km/hr (29.0 mph)

**Total Driving Time:** 01:46 minutes (VBox time)

<b>DEDICATED MALFUNCTION TELLTALE EXTINGUISHES WITHIN 20 MINUTES:</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
--

**TPMS MALFUNCTION PERFORMANCE TEST RESULTS (PASS/FAIL)**

Compact spare tire assembly was installed on left front wheel position at LLVW.

**INDICANT**  
**FAIL**

**REMARKS:** Upon activation the telltale illuminates by flashing for a minimum of sixty seconds, then becomes steady. The illumination sequence repeated when the engine was turned off and then restarted. When the vehicle is then driven with the simulation set up, the malfunction process resets the telltale and message center after a short driving distance. If the engine is not turned off after indication of malfunction, the malfunction telltale and message center do not reset with additional driven mileage. Testing of the extinguishment phase, with the original tire with sensor in place, does not distinguish between proper extinguishing operation and the resetting seen in illumination.

RECORDED BY: Robert N. Gregg

DATE: August 30, 2007

APPROVED BY: Kenneth H. Yates

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

TEST

DATE: August 28, 2007 LAB: San Angelo Test Facility VEHICLE NHTSA NO: C70106

**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  N/A

**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    N/A

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

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

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

YES    NO    N/A

*The following statement is required for all vehicles certified to the standard starting on September 1, 2007 and for vehicles voluntarily equipped with a compliant TPMS MIL before that time.*

When the malfunction indicator is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of replacement or alternate tires or wheels on the vehicle that prevent the TPMS from functioning properly. Always check the TPMS malfunction telltale after replacing one or more tires or wheels on your vehicle to ensure that the replacement or alternate tires and wheels allow the TPMS to continue to function properly."

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

YES    NO

DATA INDICATES COMPLIANCE: PASS/FAIL

PASS/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 did not become effective until September 1, 2007.

---

RECORDED BY: Robert N. Gregg

DATE: August 28, 2007

APPROVED BY: Kenneth H. Yates



**SECTION 4**  
**TEST EQUIPMENT LIST AND CALIBRATION INFORMATION**

TABLE 1 - INSTRUMENTATION AND EQUIPMENT INFORMATION LIST

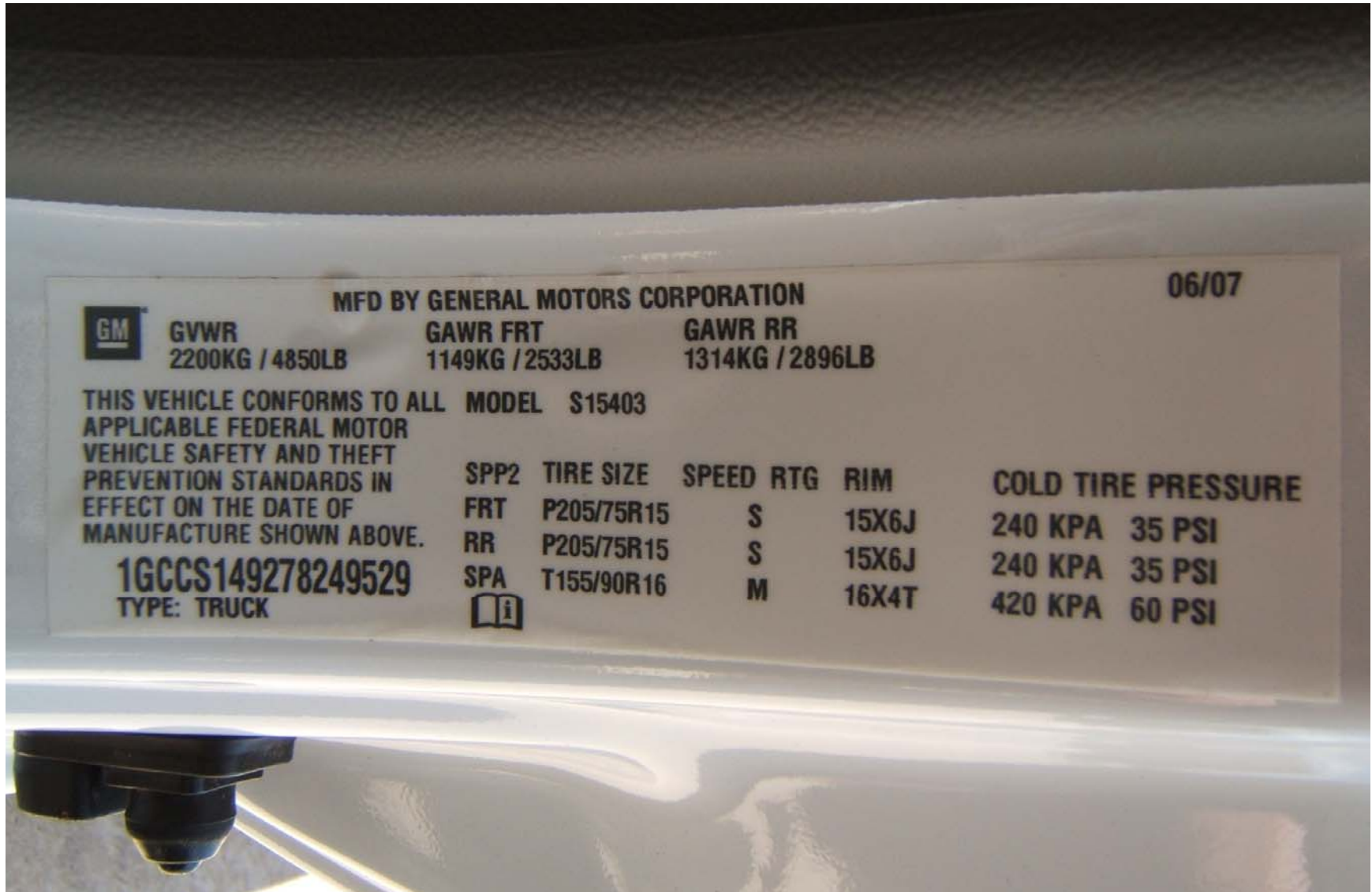
<b>EQUIPMENT</b>	<b>DESCRIPTION</b>	<b>MODEL/ SERIAL NO</b>	<b>CAL. DATE</b>	<b>NEXT CAL. DATE</b>
STOPWATCH	WESTCLOX QUARTZ STOPWATCH	NONE	N/A	N/A
VBOX RECORDING DEVICE	RACELOGIC VBOX III	SERIAL #030209	2/28/2007	2/27/2008
AMBIENT TEMPERATURE GAUGE	FLUKE 50D K/J THERMOMETER	SERIAL #80840101	3/8/2007	3/8/2008
LASER TEMPERATURE GAUGE (TIRES AND GROUND)	RAYNGER ST20 PRO NON- CONTACT INFRARED THERMOMETER	SERIAL #2065640101-0014	8/14/2007	8/14/2008
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

SECTION 5  
PHOTOGRAPHS



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO.138

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



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO.138

FIGURE 5.2  
VEHICLE CERTIFICATION LABEL



2007 CHEVROLET COLORADO  
 NHTSA NO. C70106  
 FMVSS NO. 138

FIGURE 5.3  
 VEHICLE PLACARD



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.4  
TIRE SHOWING BRAND



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.5  
TIRE SHOWING MODEL



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

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





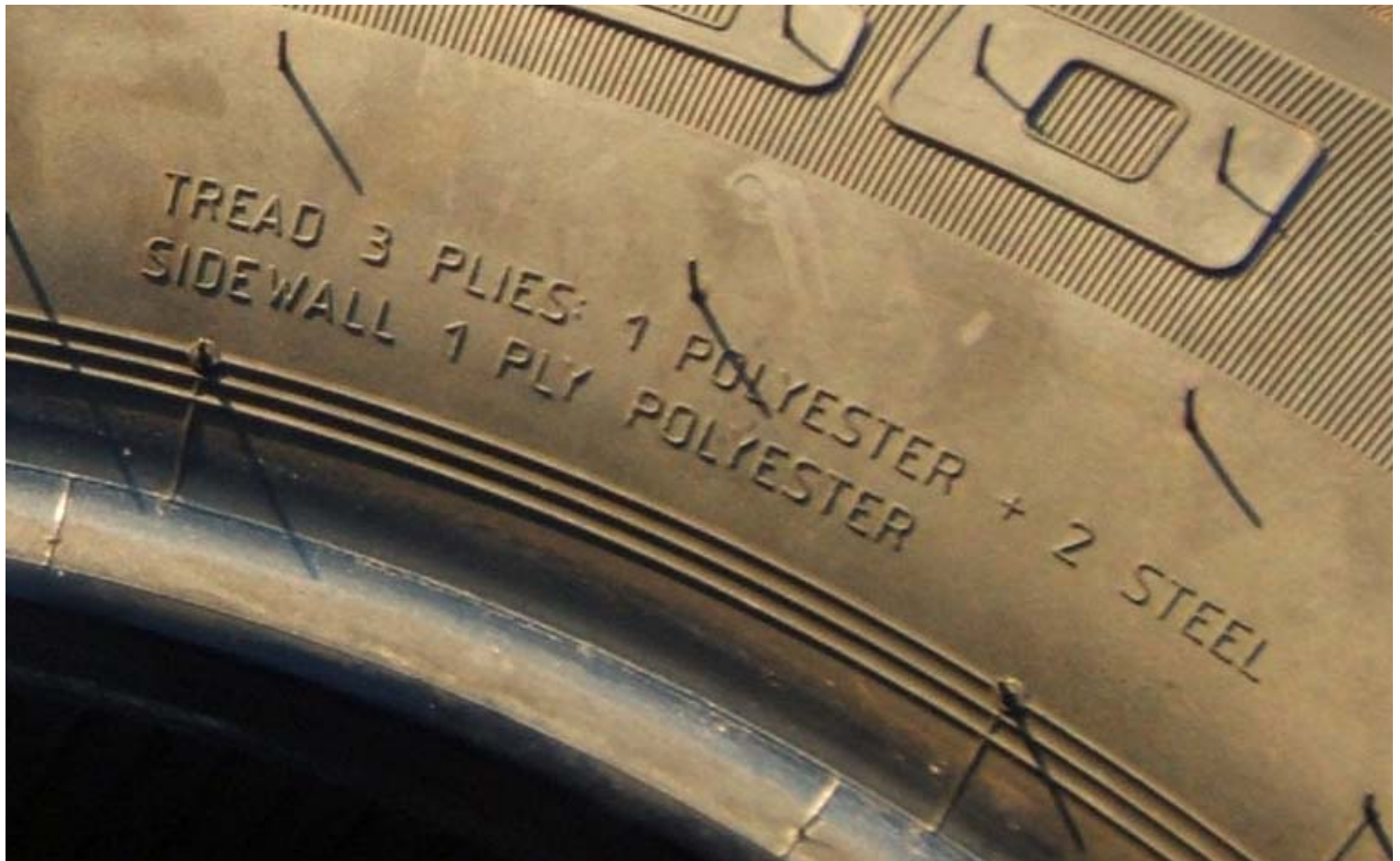
2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.7  
TIRE SHOWING DOT SERIAL NUMBER



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

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



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.9  
TIRE SHOWING SIDEWALL/TREAD CONSTRUCTION



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.10  
RIM SHOWING VALVE STEM



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

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



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO 138

FIGURE 5.12  
TEST INSTRUMENTATION ON VEHICLE



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.13  
VEHICLE CAB BALLAST FOR VCW LOAD



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.14  
REAR OF VEHICLE BALLAST  
FOR VCW LOAD





2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.15  
VEHICLE ON WEIGHT SCALES



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.16  
SPARE INSTALLED ON LEFT FRONT POSITION  
FOR MALFUNCTION DETECTION TEST



2007 CHEVROLET COLORADO  
NHTSA NO. C70106  
FMVSS NO. 138

FIGURE 5.17  
INSTRUMENT PANEL SHOWING  
COMBINATION LOW TIRE PRESSURE  
TELLTALE / MALFUNCTION TELLTALE  
AND MESSAGE CENTER MALFUNCTION  
WARNING

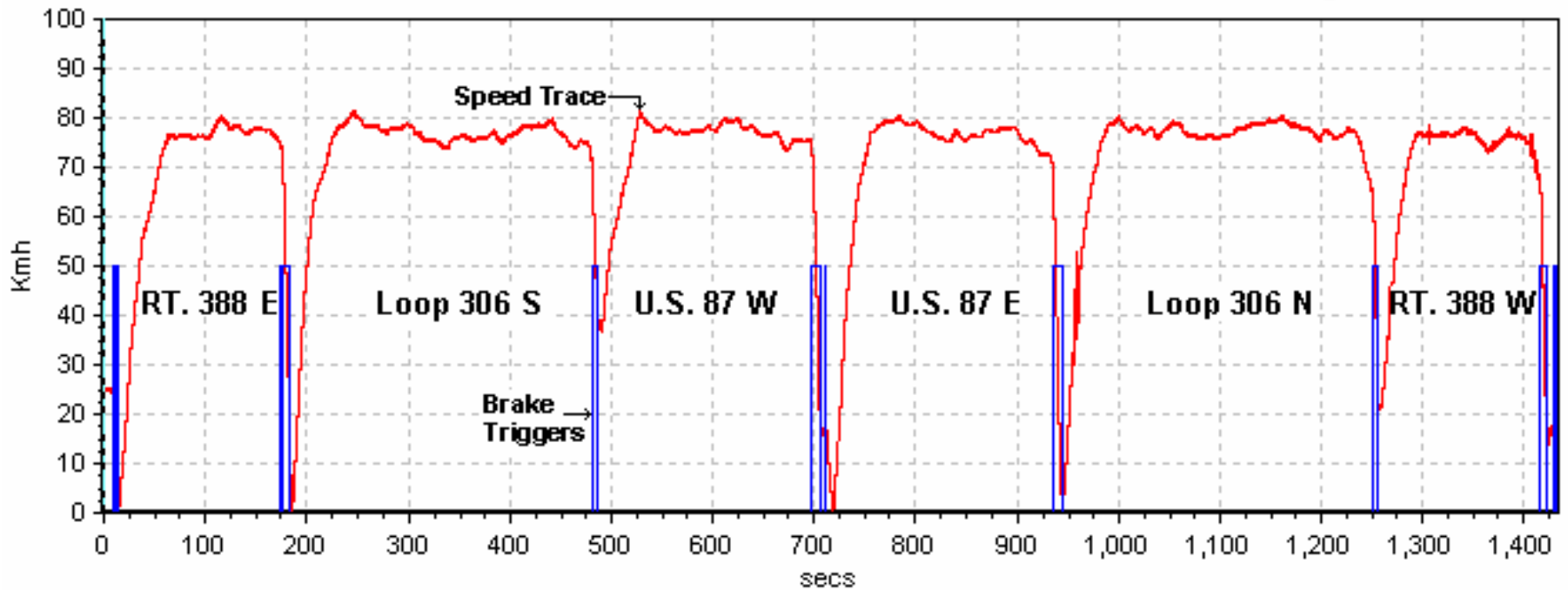
SECTION 6  
TEST PLOTS

Scenario A: Left Front Tire  
Test Date: 8/26/07  
Data File Time: 23:54 minutes  
Cumulative Driving Time: 20:50 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) LF Calibration LLW

Log Rate := 100.00 Hz

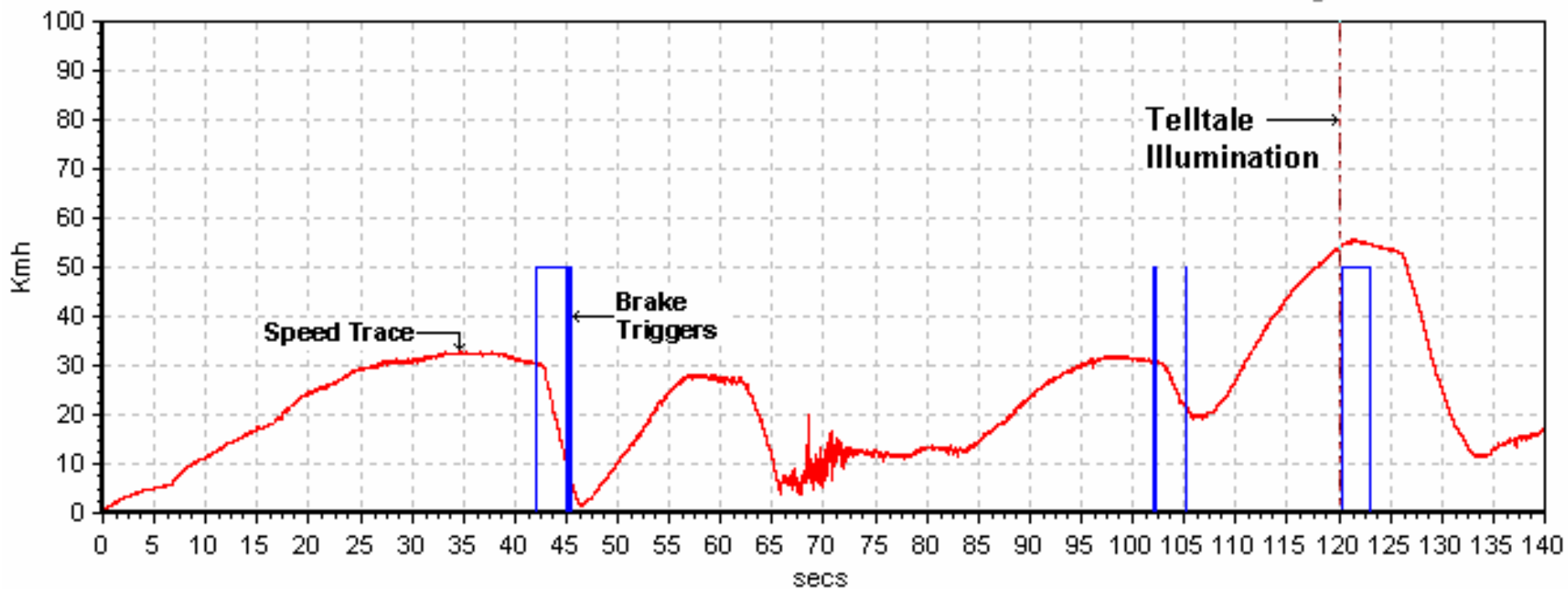


Scenario A: Left Front Tire  
Test Date: 8/26/07  
Data File Time: 03:15 minutes  
Cumulative Driving Time: 00:06 minutes  
Start Point: San Angelo Test Facility shop

Detection Phase:

### 2007 Chevrolet Colorado (C70106) LF Illumination LLWW

Log Rate := 100.00 Hz

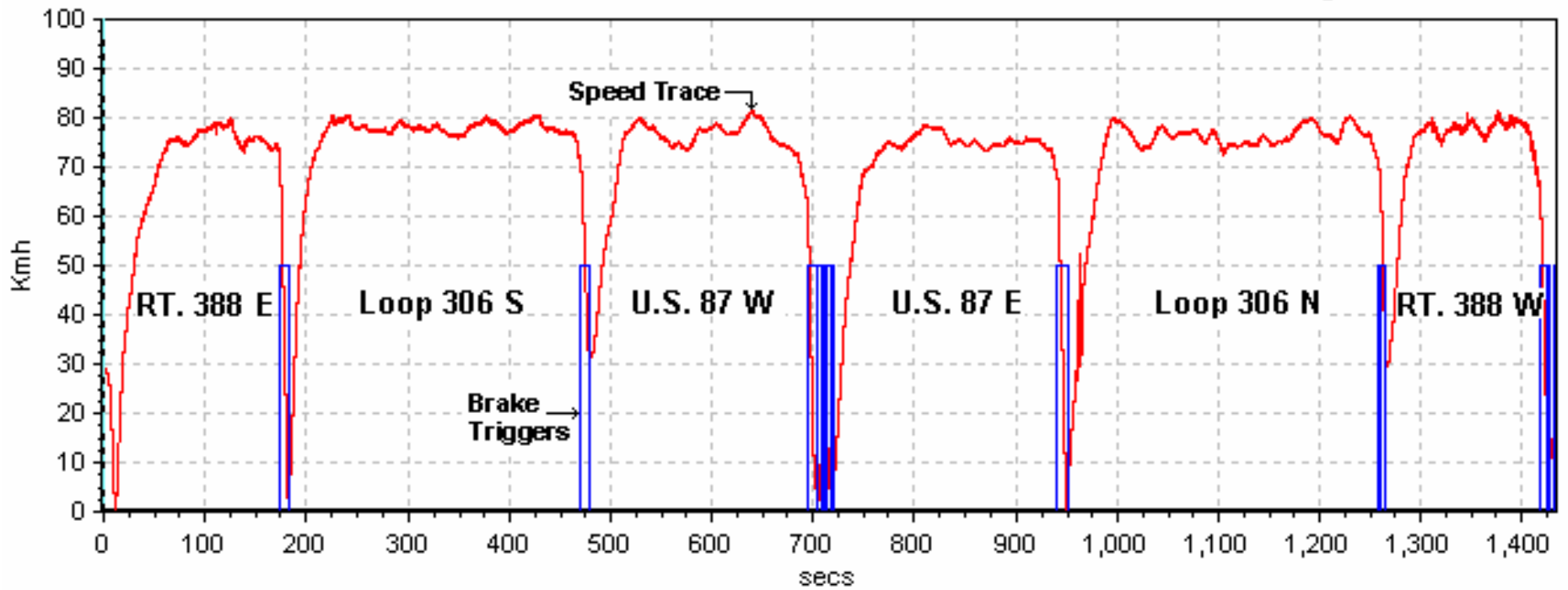


Scenario B: Right Rear Tire  
Test Date: 8/28/07  
Data File Time: 23:54 minutes  
Cumulative Driving Time: 20:54 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) RR Calibration LLWV

Log Rate := 100.00 Hz

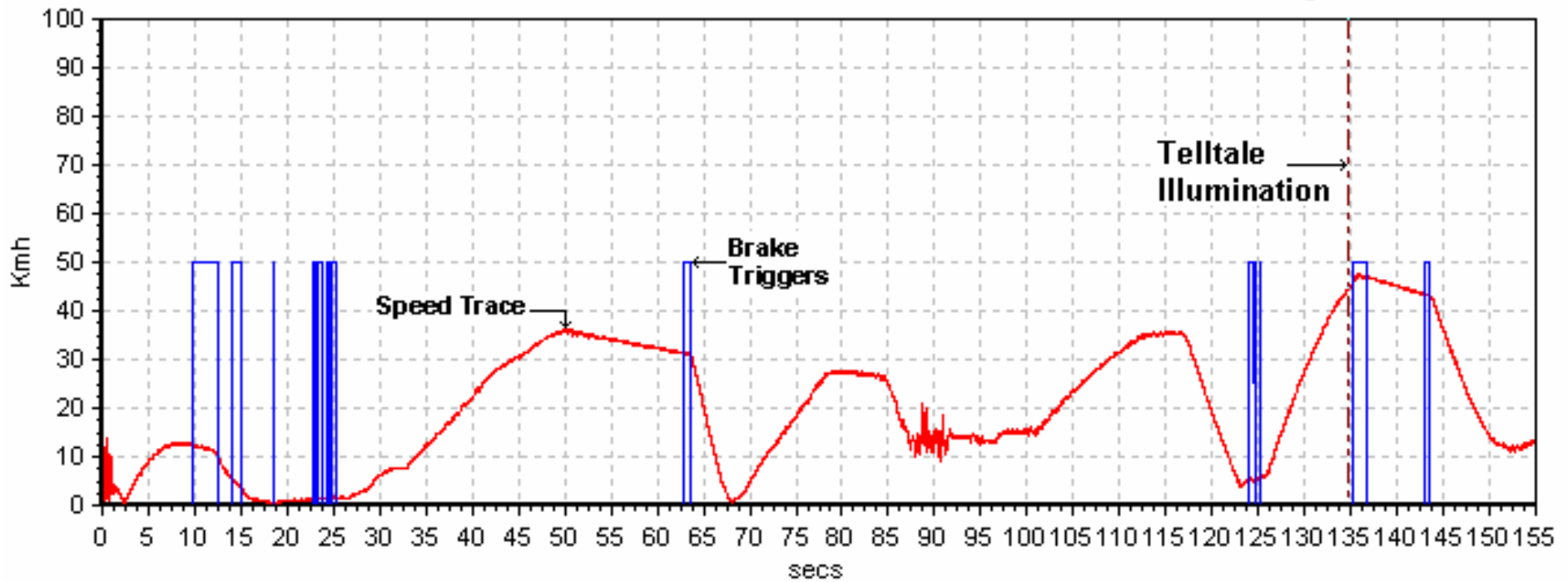


Scenario B: Right Rear Tire  
Test Date: 8/28/07  
Data File Time: 02:55 minutes  
Cumulative Driving Time: 00:00 minutes  
Start Point: San Angelo Test Facility Shop

Detection Phase:

2007 Chevrolet Colorado (C70106) RR Illumination LLWW

Log Rate := 100.00 Hz



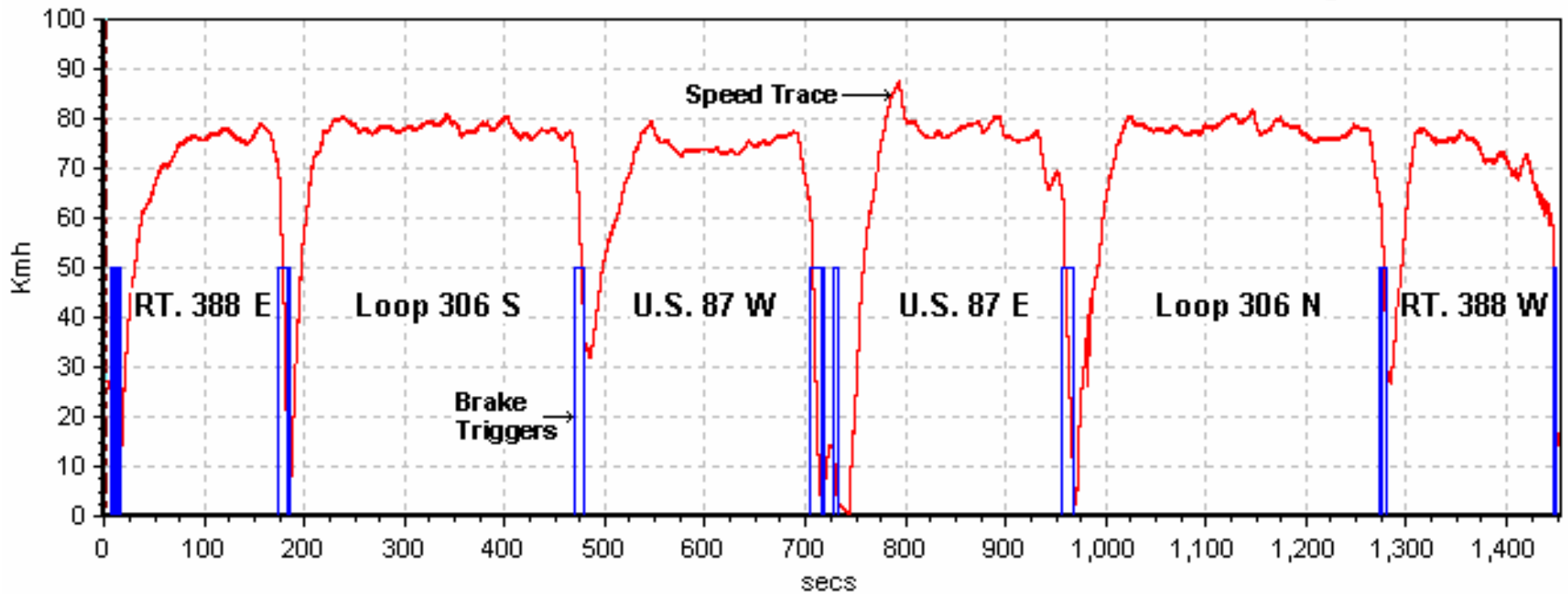


Scenario C: Right Front, Left Rear Tires  
Test Date: 8/29/07  
Data File Time: 24:15 minutes  
Cumulative Driving Time: 20:55 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) RF, LR Calibration LLWW

Log Rate := 100.00 Hz

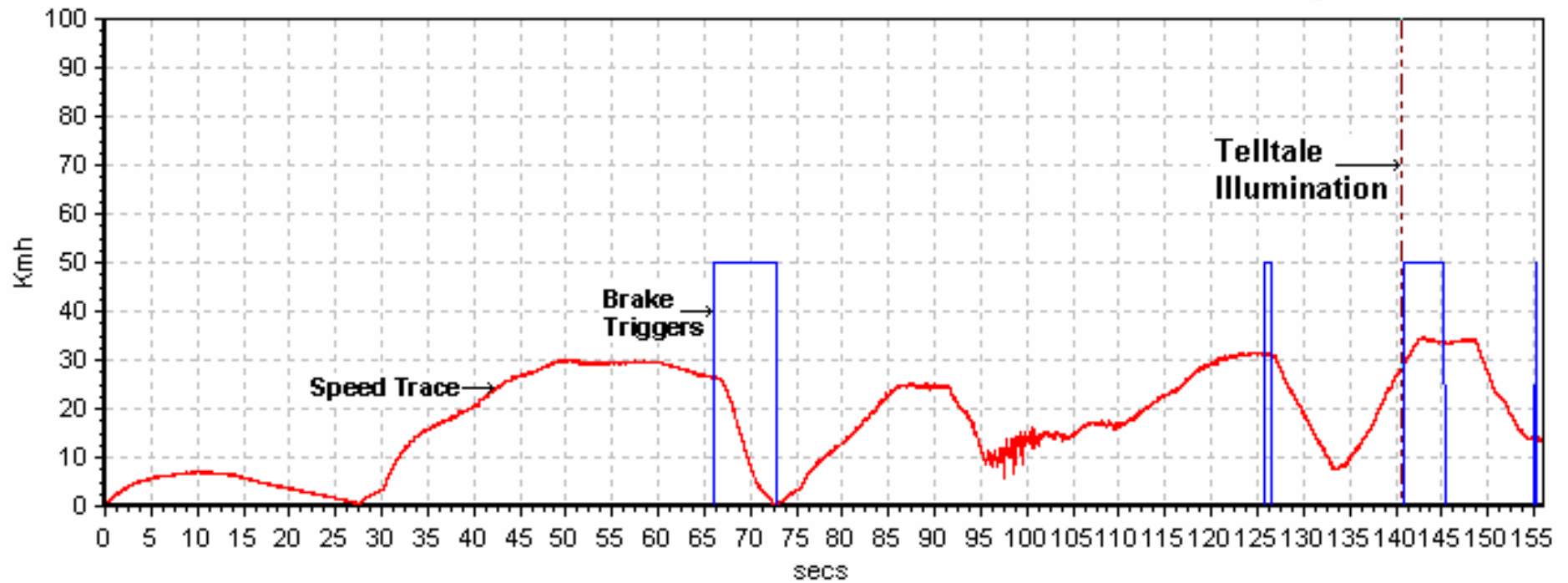


Scenario C: Right Front, Left Rear Tires  
Test Date: 8/29/07  
Data File Time: 03:04 minutes  
Cumulative Driving Time: 00:00 minutes  
Start Point: San Angelo Test Facility Shop

Detection Phase:

2007 Chevrolet Colorado (C70106) RF, LR Illumination LLWW

Log Rate := 100.00 Hz

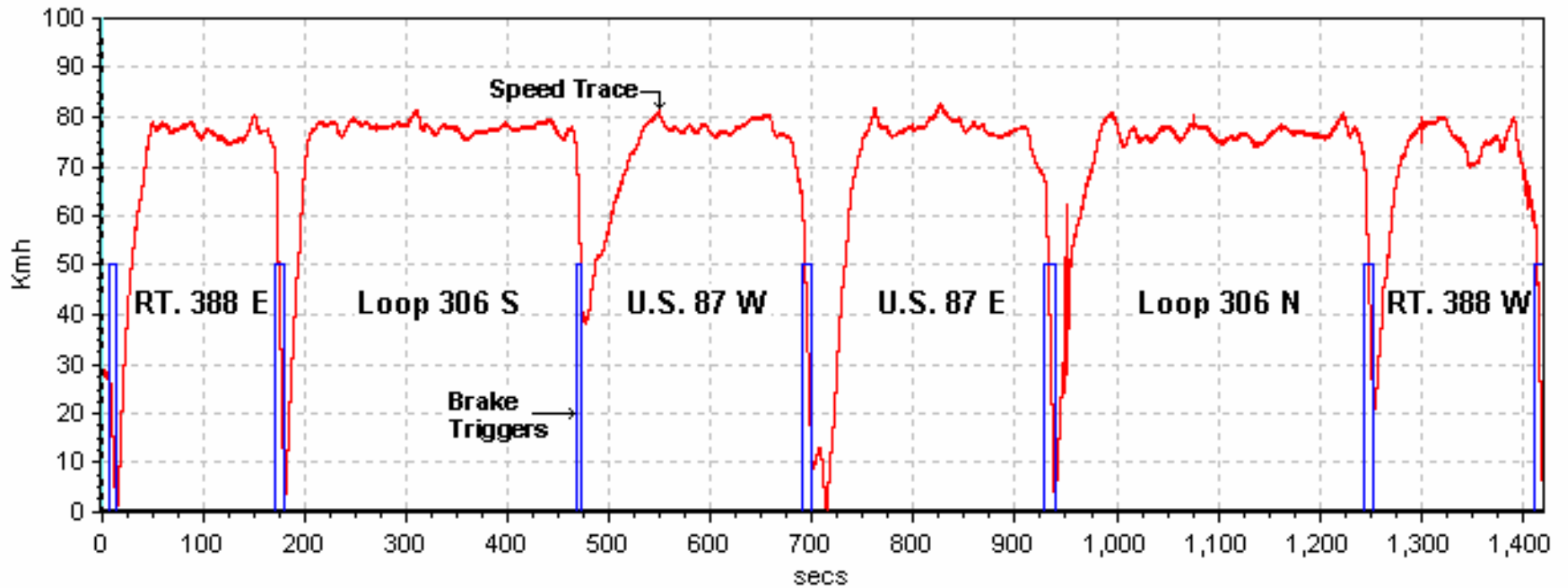


Scenario D: Left Front, Left Rear, Right Rear, Right Front Tire  
Test Date: 8/29/07  
Data File Time: 23:41 minutes  
Cumulative Driving Time: 20:51 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) LF, LR, RR, RF, Calibration LLWW

Log Rate := 100.00 Hz

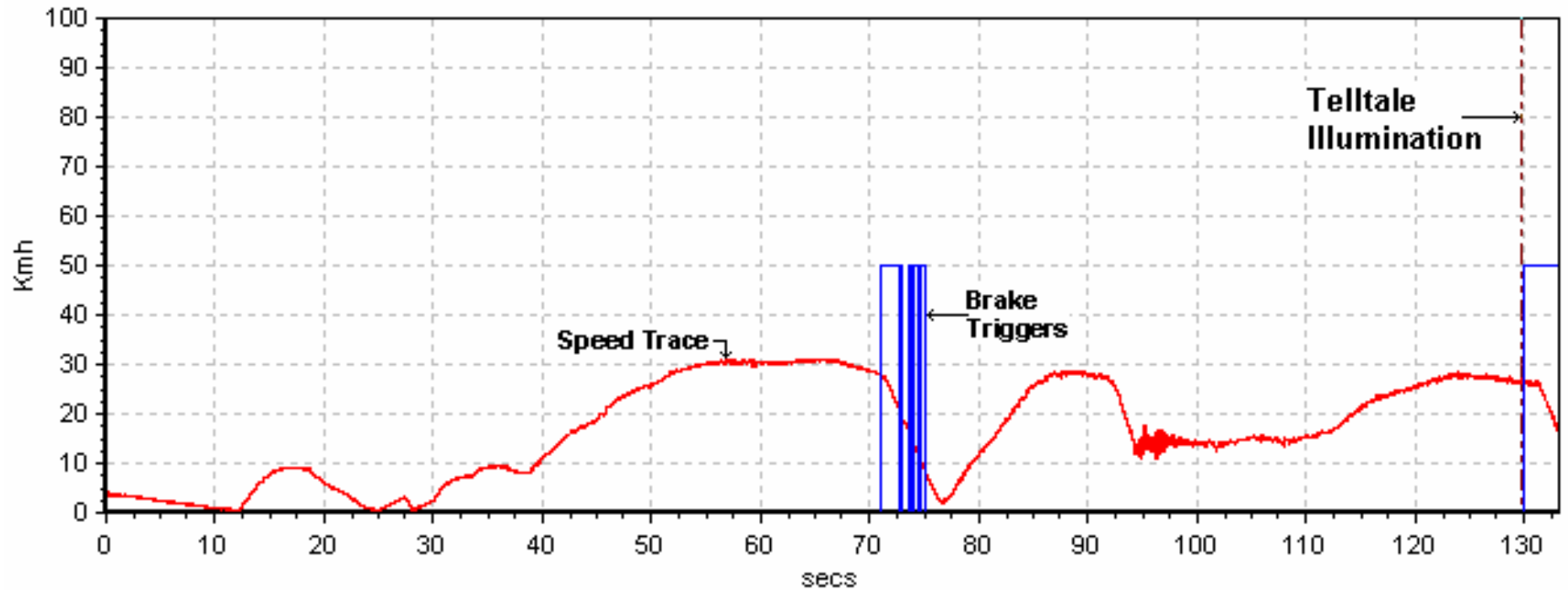


Scenario D: Left Front, Left Rear, Right Rear, Right Front Tire  
Test Date: 8/29/07  
Data File Time: 2:13 minutes  
Cumulative Driving Time: 00:00 minutes  
Start Point: San Angelo Test Facility Shop

Detection Phase:

2007 Chevrolet Colorado (C70106) LF, LR, RR, RF, Illumination LLWW

Log Rate := 100.00 Hz

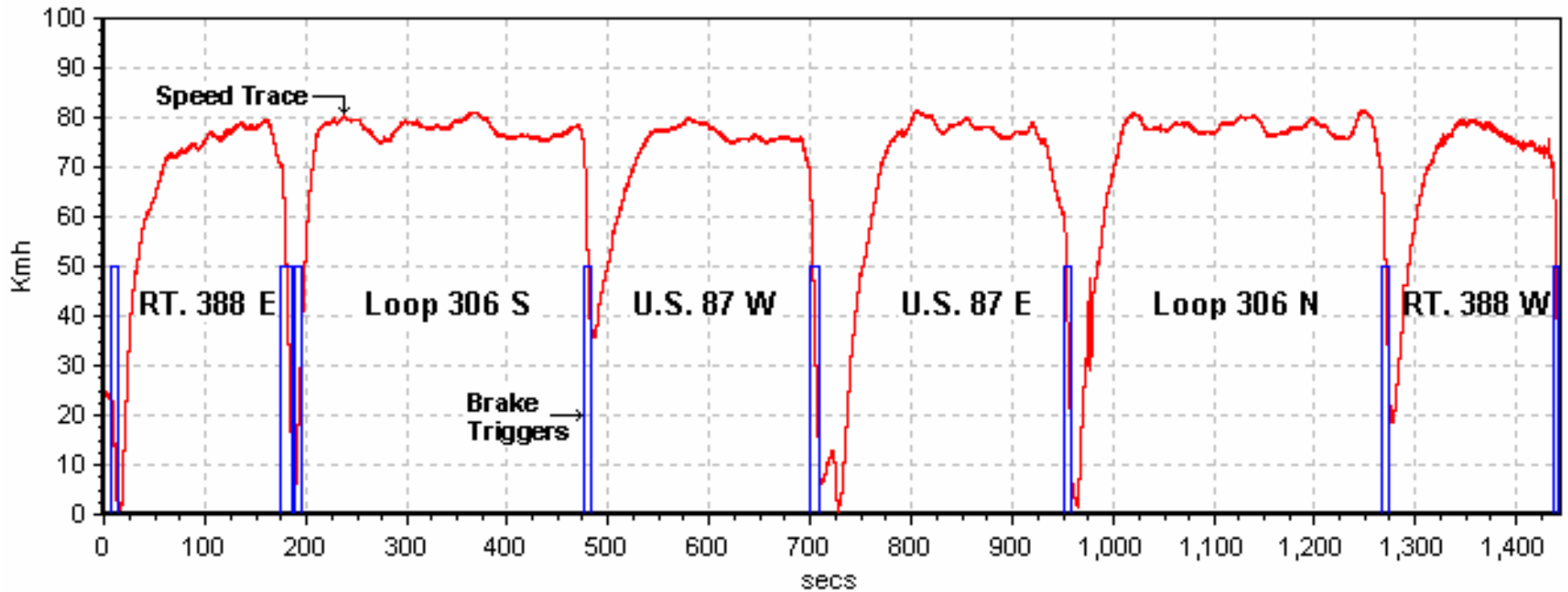


Scenario E: Left Rear Tire  
Test Date: 8/30/07  
Data File Time: 24:04 minutes  
Cumulative Driving Time: 20:42 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) LR Calibration VCW

Log Rate := 100.00 Hz

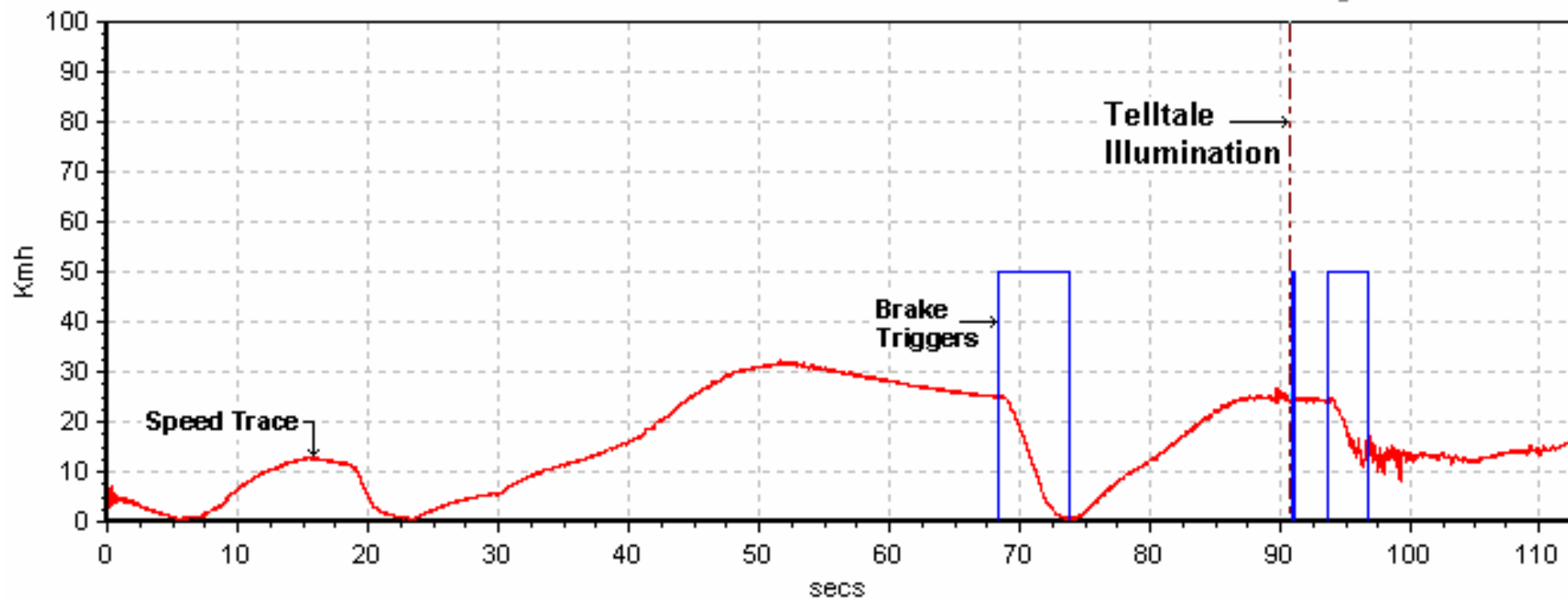


Scenario E: Left Rear Tire  
Test Date: 8/30/07  
Data File Time: 01:53 minutes  
Cumulative Driving Time: 00:00 minutes  
Start Point: San Angelo Test Facility Shop

Detection Phase:

### 2007 Chevrolet Colorado (C70106) LR Illumination VCW

Log Rate := 100.00 Hz

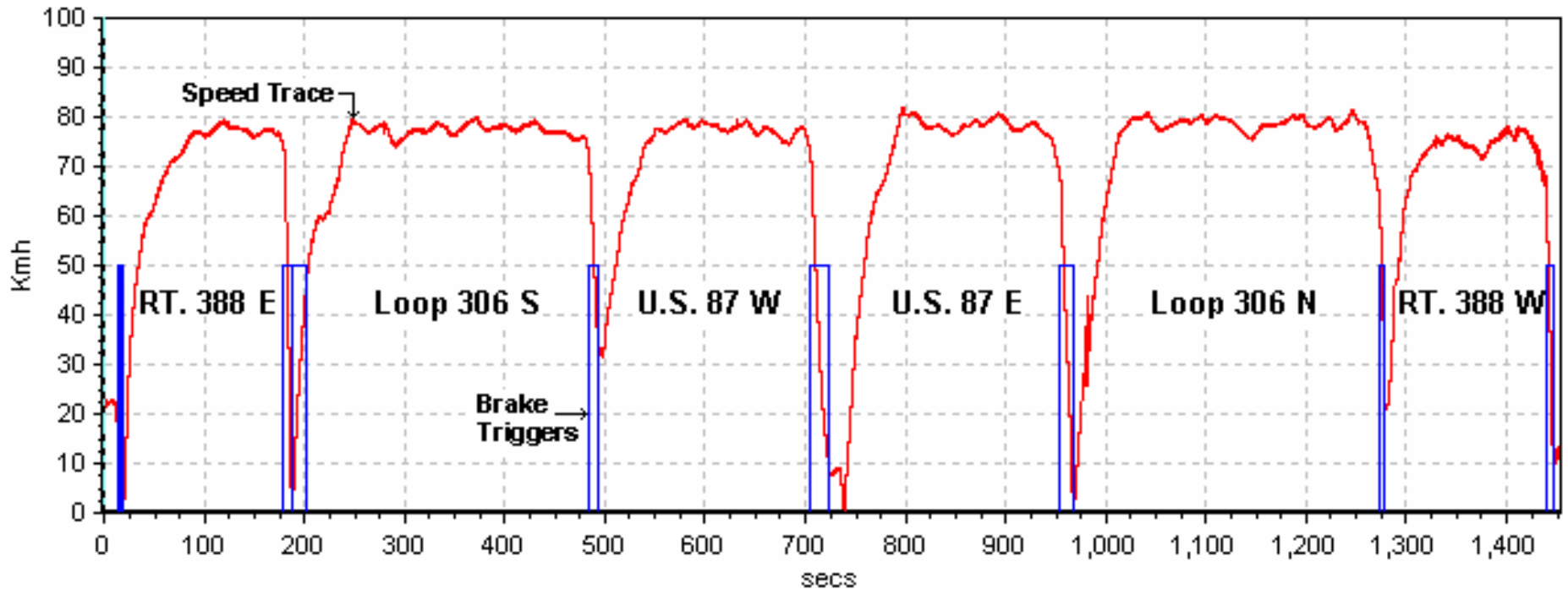


Scenario F: Right Front Tire  
Test Date: 9/5/07  
Data File Time: 24:15 minutes  
Cumulative Driving Time: 20:39 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) RF Calibration VCW

Log Rate := 100.00 Hz

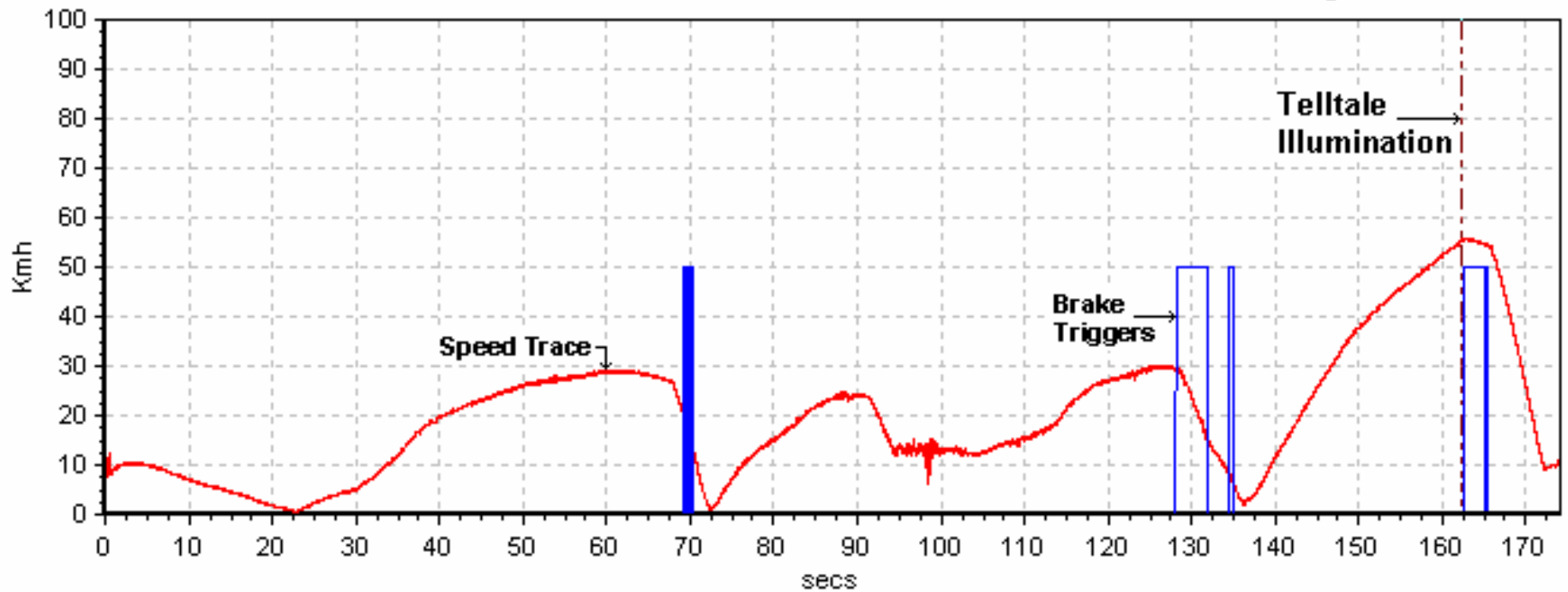


Scenario F: Right Front Tire  
Test Date: 9/5/07  
Data File Time: 02:55 minutes  
Cumulative Driving Time: 00:05 minutes  
Start Point: San Angelo Test Facility Shop

Detection Phase:

2007 Chevrolet Colorado (C70106) RF Illumination VCW

Log Rate := 100.00 Hz



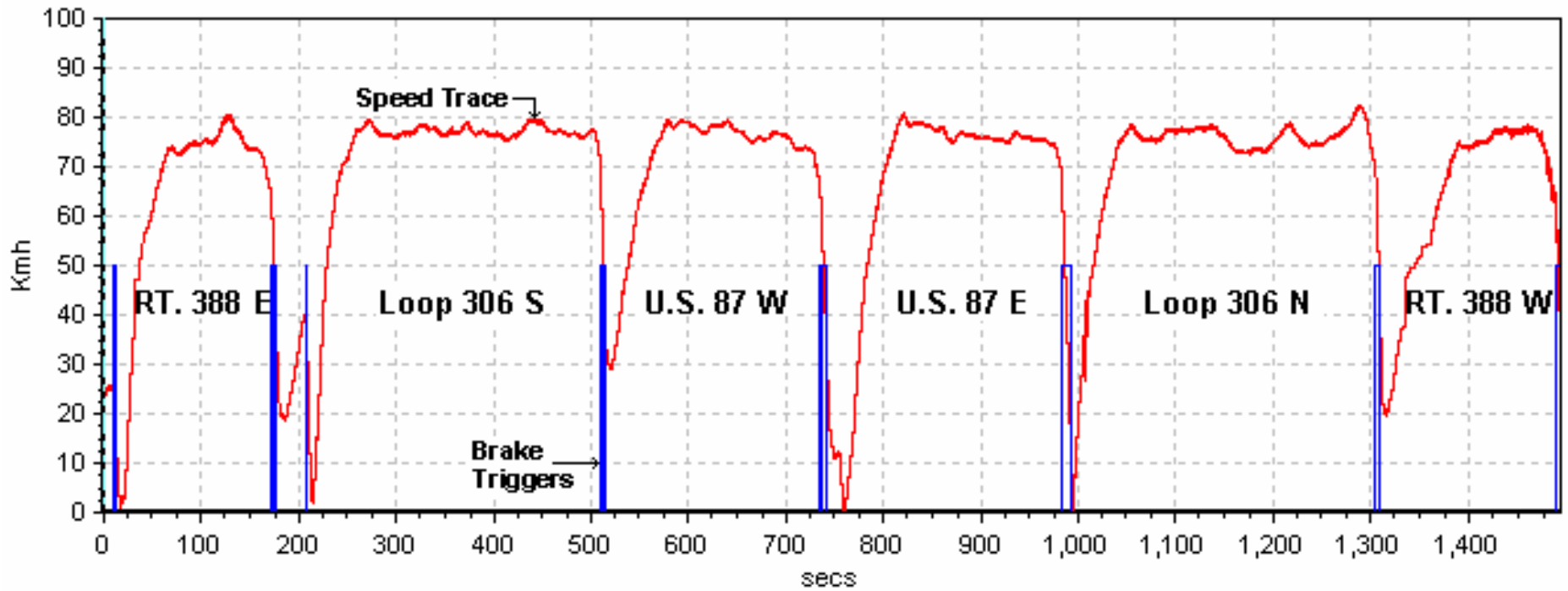


Scenario G: Left Rear, Right Rear Tires  
Test Date: 9/5/07  
Data File Time: 24:55 minutes  
Cumulative Driving Time: 20:33 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) LR, RR Calibration VCW

Log Rate := 100.00 Hz

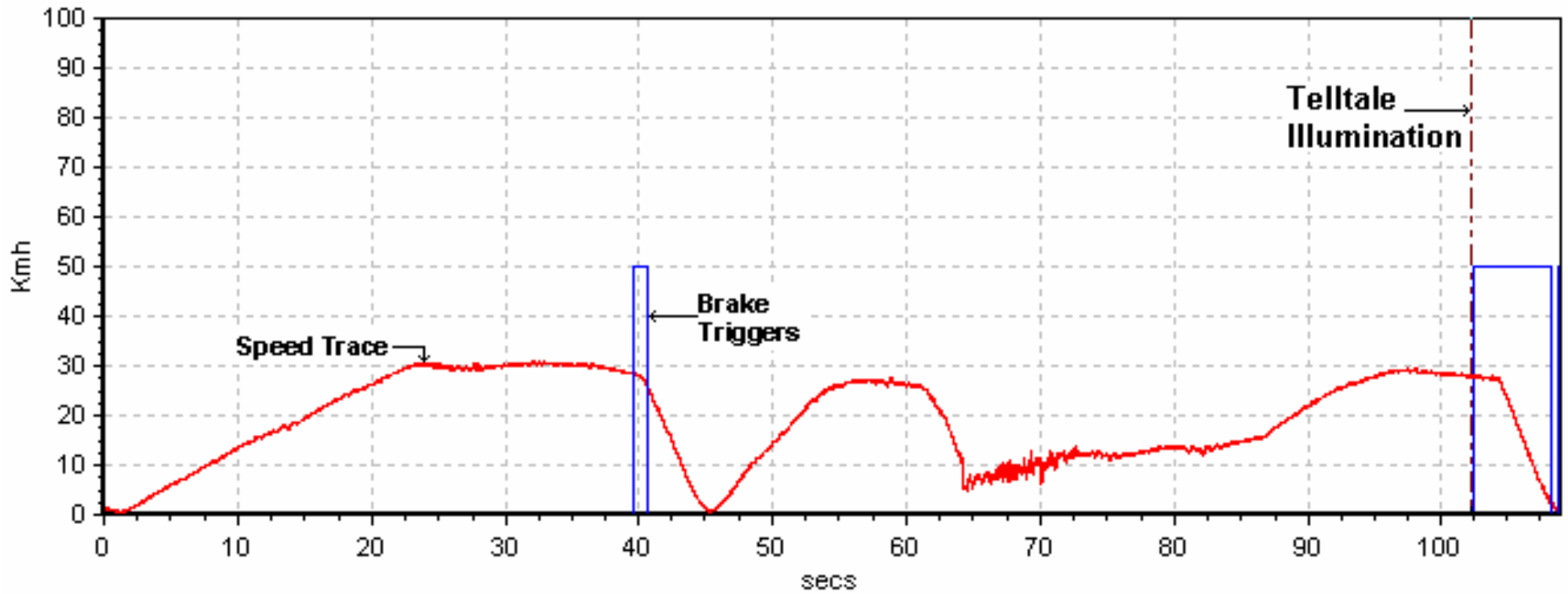


Scenario G: Left Rear, Right Rear Tires  
Test Date: 9/5/07  
Data File Time: 01:49 minutes  
Cumulative Driving Time: 00:00 minutes  
Start Point: San Angelo Test Facility Shop

Detection Phase:

2007 Chevrolet Colorado (C70106) LR, RR Illumination VCW

Log Rate := 100.00 Hz

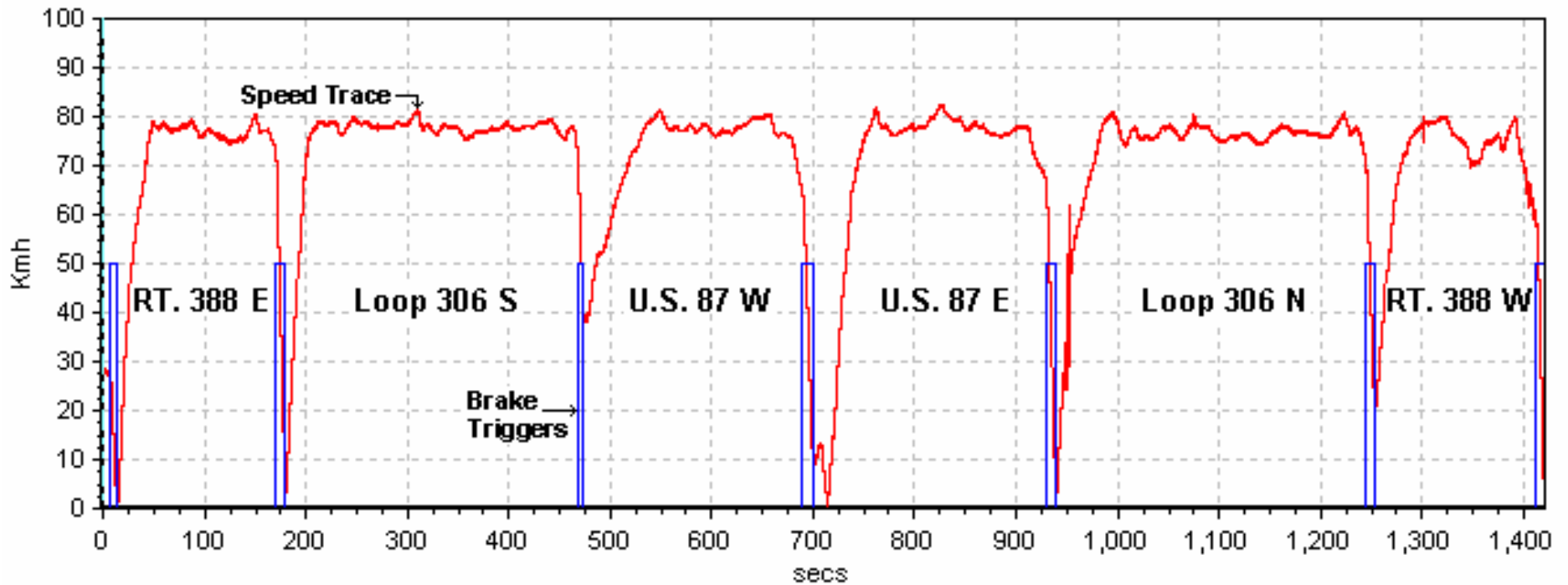


Scenario H: Left Front, Left Rear, Right Rear, Right Front Tires  
Test Date: 9/6/07  
Data File Time: 23:41 minutes  
Cumulative Driving Time: 20:51 minutes  
Start Point: GAFB North Gate

Calibration Phase:

2007 Chevrolet Colorado (C70106) LF, LR, RR, RF Calibration VCW

Log Rate := 100.00 Hz

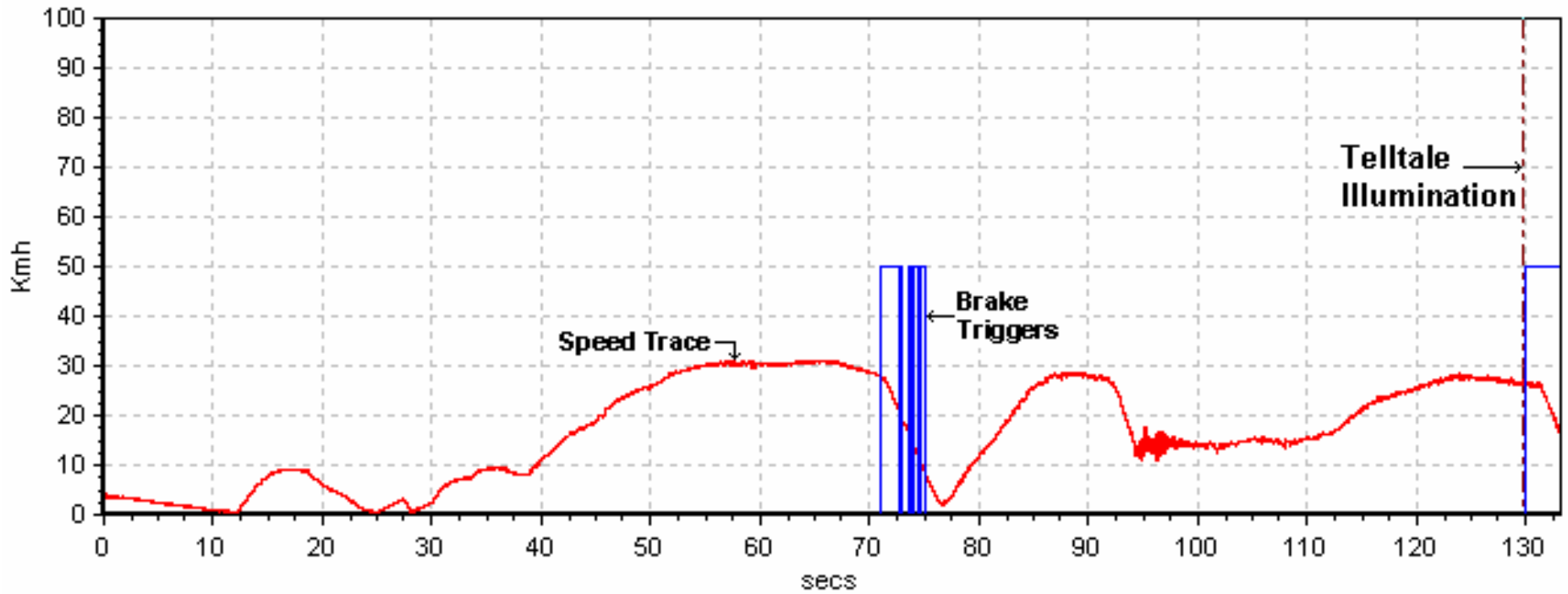


Scenario H: Left Front, Left Rear, Right Rear, Right Front Tires  
Test Date: 9/6/07  
Data File Time: 02:13 minutes  
Cumulative Driving Time: 00:00 minutes  
Start Point: San Angelo Test Facility Shop

Detection Phase:

2007 Chevrolet Colorado (C70106) LF, LR, RR, RF Illumination VCW

Log Rate := 100.00 Hz



Scenario I: Compact Spare without Sensor Installed on Left Front Position  
Test Date: 8/30/07  
Data File Time: 19:09 minutes  
Cumulative Driving Time  
to Illumination: 14:47 minutes  
Start Point: San Angelo Test Facility Shop

Malfunction Detection:

2007 Chevrolet Colorado (C70106) LF Spare Tire / Dedicated Low Tire / Malfunction Illumination / LLWW

Log Rate := 100.00 Hz

