126-TRC-10-011

SAFETY COMPLIANCE TESTING FOR FMVSS 126
Electronic Stability Control Systems

Toyota Motor Corporation
2010 Lexus GX460
NHTSA No. CA5109

TRANSPORTATION RESEARCH CENTER INC.
10820 State Route 347
East Liberty, Ohio 43319

January 14, 2011

FINAL REPORT

Prepared Under Contract No.: DTNH22-07-D-00060
Task Order No.: 0084

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
1200 New Jersey Avenue, SE
West Building, 4th Floor (NVS-221)
Washington, DC 20590

Prepared for the Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-07-D-00060, Task Order No. 0084.

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Approval Date: 01/14/11

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted by:

Acceptance Date: 8/29/11

1. Report No. 126-TRC-10-011	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS 126 Compliance Testing of 2010 Lexus GX460 MPV, NHTSA No. CA5109.		5. Report Date January 14, 2011	
		6. Performing Organization Code TRC 20100404 / 3000	
7. Author(s) Alan Ida, Project Engineer Ken Webster, Manager, DDO Project Operations		8. Performing Organization Report No. N/A	
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. Work Unit No.	
		11. Contract or Grant No. DTNH22-07-D-00060	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance 1200 New Jersey Avenue, SE, West Building, 4th Floor (NVS-221) Washington, D.C. 20590		13. Type of Report and Period Covered Final test report April 30, 2010 to January 14, 2011	
		14. Sponsoring Agency Code N/A	
15. Supplementary Notes			
16. Abstract A test was conducted on a 2010 Lexus GX460, NHTSA No. CA5109, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-126-02 for the determination of FMVSS No. 126 compliance. In April 2010, Toyota began a recall campaign (NHTSA Campaign No. 10V159000) on the MY2010 Lexus GX460 vehicles to reprogram the ESC control algorithm. The test vehicle in this report did have the reprogrammed control algorithm. Test failures identified were as follows: None			
17. Key Words Compliance Testing Safety Engineering FMVSS 126		18. Distribution Statement Copies of this report are available from: NHTSA Technical Information Services (TIS) (NPO 411) 200 New Jersey Avenue, SE Washington, D.C. 20590 Email: tis@nhtsa.dot.gov FAX: (202) 493-2833	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 61	22.

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1.0 PURPOSE OF TEST

The purpose of this test is to determine if the test vehicle, a MY 2010 Lexus GX460 meets the minimum equipment and performance requirements stated in Federal Motor Vehicle Safety Standard (FMVSS) 126, "Electronic Stability Control Systems" after the ESC ECU control algorithm was reprogrammed (NHTSA Recall Campaign No. 10V159000)

This standard establishes performance and equipment requirements for Electronic Stability Control (ESC) Systems installed in passenger cars, multipurpose passenger vehicles, trucks, and buses with a gross vehicle weight rating of 4,536 kilograms or less.

2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS

Testing of the MY 2010 Lexus GX460 was conducted at Transportation Research Center Inc. (TRC Inc.) in accordance with NHTSA TP-126-02, dated November 19, 2008.

The vehicle was inspected to ensure it was equipped with an ESC System that:

- Augments vehicle directional stability by applying and adjusting brake torques individually at each wheel to induce a correcting yaw moment to a vehicle;

- Is computer controlled with the computer using a closed-loop algorithm to limit vehicle oversteer and to limit vehicle understeer;

- Has a means to determine the vehicle's yaw rate and to estimate its side slip or side slip derivative with respect to time;

- Has a means to monitor driver steering inputs;

- Has an algorithm to determine the need, and a means to modify engine torque, as necessary, to assist the driver in maintaining control of the vehicle, and

- Is operational over the full speed range of the vehicle (except at vehicle speeds less than 20km/h (12.4mph), when being driven in reverse, or during system initialization).

The vehicle was subjected to a 0.7Hz Sine with Dwell (SWD) Steering Maneuver to ensure that it would meet the stability and responsiveness requirements of the standard as follows:

- At 1.0 second after completion of a required sine with dwell steering input, the yaw rate of the vehicle must not exceed 35 percent of the first peak value of yaw rate recorded after the steering wheel angle changes sign (between first and second peaks during the same test run).

- At 1.75 seconds after completion of a required sine with dwell steering input, the yaw rate of the vehicle must not exceed 20 percent of the first peak value of yaw

rate recorded after the steering wheel angle changes sign (between first and second peaks during the same test run).

- The lateral displacement of the vehicle center of gravity with respect to its initial straight path must be at least 1.83 m (6 feet) (for vehicles with a GVWR of 3,500kg (7,716 lb) or less) when computed 1.07 seconds after the Beginning of Steer (BOS) at the specified steering wheel angles.

The vehicle's ESC System appears to meet the performance requirements as required by FMVSS 126. In April 2010, Toyota began a recall campaign (NHTSA Campaign No. 10V159000) on the MY2010 Lexus GX460 vehicles to reprogram the ESC control algorithm. The test vehicle in this report did have the reprogrammed control algorithm. The test results are summarized on the following summary sheet.

2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS …continued

DATA SUMMARY (Sheet 1 of 2)

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA NO.: CA5109 VIN: JTJBM7FX7A5010469

VEHICLE TYPE: MPV DATE OF MANUFACTURE: 03/10

LABORATORY: Transportation Research Center Inc.

REQUIREMENTS	**PASS/FAIL**
ESC Equipment and Operational Characteristics (Data Sheet 2)	
The vehicle is to be equipped with an ESC System that meets the equipment and operational characteristics requirements. (S126, S5.1, S5.6)	PASS
ESC Malfunction Telltale (Data Sheet 3)	
The vehicle is equipped with a telltale that indicates one or more ESC System malfunctions. (S126, S5.3)	PASS
"ESC Off" and other System Controls and Telltale (Data Sheet 3 & 4)	
The vehicle is equipped with an ESC off telltale indicating the vehicle has been put into a mode that renders the ESC System unable to satisfy the performance requirements of the standard, if such a mode exists. (S5.5.1)	PASS
If provided, off control and other system controls as well as the ESC off telltale meets the operational requirements (S126, S5.4, S5.4.1, S5.4.2, S5.5.4, and S5.5.9)	PASS

2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS …continued

DATA SUMMARY (Sheet 2 of 2)

REQUIREMENTS	PASS/FAIL
Vehicle Lateral Stability (Data Sheet 8)	
Yaw Rate Ratio at 1 second after COS is less than 35% of peak value. (S126, S5.2.1)	PASS
Yaw Rate Ratio at 1.75 seconds after COS is less than 20% of peak value. (S126, S5.2.2)	PASS
Vehicle Responsiveness (Data Sheet 8)	
Lateral displacement at 1.07 seconds after BOS is at least 1.83 m (6 feet) for vehicles with a GVWR of 3,500kg (7,716 lbs.) or less, and 1.52 m (5 feet) for vehicles with a GVWR greater than 3,500 kg (7,716 lbs.). (S126 S5.2.3)	PASS
ESC Malfunction Warning (Data Sheet 9)	
Warning is provided to driver after malfunction occurrence. (S126. S5.3)	PASS
Malfunction telltale stayed illuminated as long as malfunction existed and must extinguish after malfunction was corrected. (S126, S5.3.7)	PASS

3.0 TEST DATA

DATA SHEET 1 (Sheet 1 of 2)
TEST VEHICLE INSPECTION AND TEST PREPARATION

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

NHTSA No.: CA5109 TEST DATE: 5-20-10

VIN: JTJBM7FX7A5010469 MANUFACTURE DATE: 03/10

GVWR: 2,990 KG FRONT GAWR: 1,450 KG REAR GAWR 1,795 KG

SEATING POSITIONS: FRONT 2 MID 3 REAR 2

ODOMETER READING AT START OF TEST: 231 (372) Miles (Kilometers)

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING:

Front Axle P265 / 60R 18 Rear Axle P265 / 60R 18

INSTALLED TIRE SIZE(S) ON VEHICLE:

From Tire Sidewall	Front Axle	Rear Axle
Manufacturer and Model	Bridgestone Dueler H/T	Bridgestone Dueler H/T
Tire Size Designation	P265 / 60R 18 109H	P265 / 60R 18 109H

Are installed tire sizes same as labeled tire sizes? X Yes _____ No
If no, contact COTR for further guidance.

DRIVE CONFIGURATIONS (MARK ALL THAT APPLY):

_____ Two Wheel Drive (2WD): ( ) Front Wheel Drive ( ) Rear Wheel Drive
_____ All Wheel Drive (AWD)
_____ Four Wheel Drive Automatic – differential not locked full time (4WD Automatic)
X Four Wheel Drive High Gear Unlocked Center Differential
X Four Wheel Drive High Gear Locked Center Differential
X Four Wheel Drive Low Gear Unlocked Center Differential
X Four Wheel Drive Low Gear Locked Center Differential
_____ Other (define _____)

3.0 TEST DATA….continued

DATA SHEET 1 (Sheet 2 of 2)
TEST VEHICLE INSPECTION AND TEST PREPARATION

DRIVE CONFIGURATIONS AND MODES: (ex. default, performance, off)
(For each of the vehicle's drive configurations identify available operating modes)

Drive Configuration 4WD High Unlocked Center Differential
Mode(s) default - ESC On; ESC Off

Drive Configuration 4WD High Locked Center Differential
Mode(s) ESC On; ESC Off

Drive Configuration 4WD Low Unlocked Center Differential
Mode(s) ESC Off

Drive Configuration 4WD Low Locked Center Differential
Mode(s) ESC Off

VEHICLE STABILITY SYSTEMS (Check applicable technologies):

X ESC	X Traction Control	Roll Stability Control
Active Suspension	X Electronic Throttle Control	Active Steering
X ABS		

List other systems; Electronic Brakeforce Distribution (EBD); Hillstart Assist Control (HAC), Downhill Assist Control (DAC)

REMARKS:

RECORDED BY: Alan Ida DATE: 04-19-10
APPROVED BY: Jeff Sankey DATE: 05-25-10

3.0 TEST DATA….continued

DATA SHEET 2 (Sheet 1 of 2)
ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

NHTSA No.: CA5109 TEST DATE: 04-21-10

ESC SYSTEM IDENTIFICATION:
Manufacturer / Model Advics Co., Ltd. / 47210-60230 (with DAC or CRAWL, MTS)

ESC SYSTEM HARDWARE (Check applicable hardware):

X Electronic Control Unit	X Hydraulic Control Unit
X Wheel Speed Sensors	X Steering Angle Sensor
X Yaw Rate Sensor	X Lateral Acceleration Sensor

List other components; ESC Buzzer

ESC SYSTEM OPERATIONAL CHARACTERISTICS:

System is capable of generating brake torques at each wheel — X Yes (PASS) / ____ No (FAIL)

List and describe component(s): Brake Actuator with ESC computer

System is capable of determining yaw rate — X Yes (PASS) / ____ No (FAIL)

List and describe component(s): Yaw Rate Sensor

System is capable of monitoring driver steering input — X Yes (PASS) / ____ No (FAIL)

List and describe component(s): Steering Wheel Angle Sensor

System is capable of estimating side slip or side slip derivation — X Yes (PASS) / ____ No (FAIL)

List and describe component(s): The ESC system collects wheel speed, lateral acceleration and yaw rate data to estimate the vehicle side slip derivative. Vehicle speed is estimated from the wheel speed and estimated yaw rate is calculated by dividing the lateral acceleration by vehicle speed. The estimated vehicle side slip derivative is obtained as the difference between the estimated yaw rate and the actual yaw rate detected by the yaw sensor. The ESC system estimates vehicle side slip by the integration of the estimated vehicle side slip derivative.

3.0 TEST DATA….continued

DATA SHEET 2 (Sheet 2 of 2)
ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

ESC SYSTEM OPERATIONAL CHARACTERISTICS (continued):

System is capable of modifying engine torque during ESC activation. __X__ Yes (PASS)
_____ No (FAIL)

Method used to modify engine torque: The ESC computer outputs an engine output control signal to the ECM. Upon receiving this signal, the ECM effects throttle control to regulate the engine output.

System is capable of activation at speeds of 20 km/h (12.4 mph) and higher. __X__ Yes (PASS)
_____ No (FAIL)

Speed system becomes active. above 15 km/h (8.9 mph)

System is capable of activation during the following driving phases (acceleration, deceleration, coasting, and during activation of ABS or traction control). __X__ Yes (PASS)
_____ No (FAIL)

Driving phases that the system is capable of activation. The ESC system is capable of activation under acceleration, deceleration, coasting and during activation of ABS or traction control.

Vehicle manufacturer submitted documentation explaining how the ESC system mitigates understeer? __X__ Yes (PASS)
_____ No (FAIL)

DATA INDICATES COMPLIANCE PASS/FAIL PASS

REMARKS:

RECORDED BY: Alan Ida DATE: 05-18-10
APPROVED BY: Jeff Sankey DATE: 05-25-10

3.0 TEST DATA….continued

DATA SHEET 3 (Sheet 1 of 2)
ESC MALFUNCTION AND OFF TELLTALES

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA NO. CA5109 TEST DATE: 05-21-10

ESC Malfunction Telltale

Vehicle is equipped with malfunction telltale? X Yes (Pass) _____ No (Fail)

Telltale Location Instrument cluster, inside the tachometer

Telltale Color Amber

Telltale symbol or abbreviation used.

Or **ESC**

X Vehicle uses this symbol
_____ Vehicles uses this abbreviation
_____ Neither symbol or abbreviation is used

If different than identified above, make note of any message, symbol or abbreviation used.

Is telltale part of a common space? _____ Yes X No

Is telltale also used to indicate activation of the ESC system? X Yes _____ No

If yes, explain telltale operation during ESC activation: telltale symbol flashes; also the ESC signals an audible alert

3.0 DATA SHEETS....continued

DATA SHEET 3 (Sheet 2 of 2)
ESC MALFUNCTION AND OFF TELLTALES

"ESC OFF" Telltale (if provided)

Vehicle is equipped with "ESC Off" telltale? ___X_ Yes _____ No

Is "ESC OFF" telltale combined with "ESC Malfunction" telltale utilizing a two part telltale?

_____ Yes ___X_ No

Telltale Location ___Instrument cluster, inside the tachometer_____

Telltale Color ____Amber_____

Telltale symbol or abbreviation used.

Or **ESC OFF**

____X___ Vehicle uses this symbol
_____ Vehicle uses this abbreviation
_____ Neither symbol or abbreviation is used

If different than identified above, make note of any message, symbol or abbreviation used.

_____

_____

Is telltale part of a common space? _____ Yes ___X_ No

DATA INDICATES COMPLIANCE PASS/FAIL ____PASS___
(Vehicle is compliant if equipped with a malfunction telltale)

REMARKS:

RECORDED BY: ___Alan Ida_____ DATE:___05-20-10_____
APPROVED BY: ___Jeff Sankey_____ DATE:___05-25-10_____

3.0 TEST DATA….continued

DATA SHEET 4 (Sheet 1 of 3)
ESC AND ANCILLARY SYSTEM CONTROLS

“ESC OFF” Controls Identification and Operational Check:

Is the vehicle equipped with a control or controls whose purpose is to deactivate the ESC system or place the ESC system in a mode or modes that may no longer satisfy the performance requirements of the standard?

___X__ Yes _____ No

Type of control or controls provided? (mark all that apply)

_____ Dedicated “ESC Off” control
_____X____ Multi-functional control with an “ESC Off” mode
_____ Other (describe)

Identify each control location, labeling and selectable modes.

First Control:
Location ___Instrument panel, left of steering column_____
Labeling ___Skidding car symbol_____
Modes ____Traction Control off_____
_____ESC off_____
_____ESC & Traction Control on_____

Identify standard or default drive configuration _____Full Time 4WD - default_____

Verify standard or default drive configuration selected. ___X__ Yes _____ No

Does the “ESC Off” telltale illuminate upon activation of the dedicated ESC off control or selection of the “ESC Off” mode on the multi-function control?

___X__ Yes _____ No (fail)

Does the “ESC Off” telltale extinguish when the ignition is cycled from “On” (“Run”) to “Lock” or “Off” and then back again to the “On” (“Run”) position?

___X__ Yes _____ No (fail)

If no, describe how the off control functions:

_____

_____

3.0 TEST DATA….continued

DATA SHEET 4 (Sheet 2 of 3)
ESC AND ANCILLARY SYSTEM CONTROLS

If a multi-function control is provided, cycle through each mode setting on the control and record which modes illuminate the "ESC Off" telltale. Also, for those modes that illuminate the ESC Off" telltale identify if the telltale extinguishes upon cycling the ignition system.

Control Modes	"ESC Off" telltale illuminates upon activation of control? (Yes/No)	"ESC Off" telltale extinguishes upon cycling ignition? (Yes/No)
ESC & Traction Control on	No	N/A
Traction Control off	No	N/A
ESC off	Yes	Yes

For each mode that illuminates the "ESC Off" telltale, did the telltale extinguish when the ignition was cycled from "On" ("Run") to "Lock" or "Off" and then back again to the "On" ("Run") position?

__X__ Yes _____ No (fail)

Other System Controls that have an ancillary effect on ESC Operation:

Is the vehicle equipped with any ancillary controls that upon activation may deactivate the ESC System or place the ESC System in a mode or modes that may no longer satisfy the performance requirements of the standard?

__X__ Yes _____ No

List and describe each control (i.e. alternate drive configuration selection controls):

Ancillary Control: System 4WD Low
Control Description Push switch on center console
Labeling 4WD L4 (4Lo – telltale on instrument cluster)

Ancillary Control: System N/A
Control Description N/A
Labeling N/A

3.0 TEST DATA….continued

DATA SHEET 4 (Sheet 3 of 3)
ESC AND ANCILLARY SYSTEM CONTROLS

Activate each control listed above and record whether the control illuminates the "ESC Off" telltale. Also, record warnings or messages provided regarding the ESC System.

Ancillary Control	Control Activates "ESC Off" Telltale? (Yes/No)	Warnings or Messages Provided
4WD Low	Yes	Skidding car telltale, 4Lo telltale
N/A	N/A	N/A
N/A	N/A	N/A

For those controls that illuminate the "ESC Off" telltale above identify if the "ESC Off" telltale extinguishes upon cycling the ignition system.

Ancillary Control	"ESC Off" telltale extinguishes upon cycling ignition? (Yes/No)
4WD Low	No
N/A	N/A
N/A	N/A

For each control that illuminates the "ESC Off" telltale, did the telltale extinguish when the ignition is cycled from "On" ("Run") to "Lock" or "Off" and then back again to the "On" ("Run") position? If the control activated places the vehicle into a low-range four-wheel drive configuration designed for low-speed, off–road driving, the ESC System may remain turned off after the ignition has been cycled off and then back on and therefore the "ESC Off" telltale may not extinguish.

_____ Yes ___X (See Remarks)__ No

DATA INDICATES COMPLIANCE: PASS/FAIL ___PASS____

REMARKS:

The control places the vehicle in low range four wheel drive configuration, which automatically turns off the ESC system and illuminates the ESC off telltale. Upon cycling the ignition the ESC system remains off and the ESC off telltale remains illuminated. This is an acceptable condition, so the vehicle does not fail the ancillary system controls.

RECORDED BY: Alan Ida DATE: 05-24-10
APPROVED BY: Jeff Sankey DATE: 05-25-10

3.0 TEST DATA….continued

DATA SHEET 5 (Sheet 1 of 3)
VEHICLE AND TEST TRACK DATA

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA NO. CA5109 TEST DATE: 5/20/10

Test Track Requirements: Test Surface Slope (0-1 %) 1 %

Peak Friction Coefficient (at least 0.9) 0.95

Full Fluid Levels: Fuel X Coolant X Other Fluids washer (specify)

Tire Pressures: Front Axle 220 kPa Rear Axle 220 kPa

Actual: LF: 220 kPa RF: 220.0 kPa LR: 220.0 kPa RR: 220.0 kPa

Vehicle Dimensions: Track Width 158.8 cm Wheelbase 279.6 cm

Roof Height 178.2 cm

Vehicle weight ratings: GAWR Front 1,450 kg GAWR Rear 1,795 kg

Unloaded Vehicle Weight (UVW)

Front Axle	1,219.8 kg	Left Front	617.6 kg	Right Front	602.2 kg
Rear Axle	1,169.6 kg	Left Rear	600.6 kg	Right Rear	569.0 kg
Total UVW	2,389.4 kg				

Baseline Weight and Outrigger Selection (only for MPVs, Trucks, Buses)

Calculated Baseline Weight (UVW+ 73 kg) 2,462.4 kg

Outrigger size required ("Standard" or "Heavy") Standard

Standard - Baseline weight under 2,722 kg (6,000 lbs.)
Heavy - Baseline weight equal to or greater than 2,722 kg (6,000 lbs.)

3.0 TEST DATA….continued

DATA SHEET 5 (Sheet 2 of 3)
VEHICLE AND TEST TRACK DATA

UVW with Outriggers (only for MPVs, Trucks, Buses)

Front Axle 1,246.8 kg Left Front 630.6 kg Right Front 616.2 kg

Rear Axle 1,220.4 kg Left Rear 628.4 kg Right Rear 592.0 kg

Total UVW w/ Outriggers 2,467.2 kg

Total Loaded Vehicle Weight w/ Driver, Instrumentation and Ballast

Front Axle 1,337.8 kg Left Front 681.8 kg Right Front 656.0 kg

Rear Axle 1,297.4 kg Left Rear 663.8 kg Right Rear 633.6 kg

Total Loaded Vehicle Weight 2,635.2 kg

3.0 TEST DATA….continued

DATA SHEET 5 (Sheet 3 of 3)
VEHICLE AND TEST TRACK DATA

Center of Gravity and Inertial Sensing System Location at Loaded Vehicle Condition

x-distance (longitudinal) Point of reference is the front axle centerline. (Positive from front axle toward rear of vehicle.)

y-distance (lateral) Point of reference is the vehicle centerline. (Positive from the center toward the right.)

z-distance (vertical) Point of reference is the ground plane. (Positive from the ground up.)

Locations:

	Center of Gravity	Inertial Sensing System
x-distance	137.6 cm	152.6 cm
y-distance	-1.69 cm	-1.05 cm
z-distance	68.6 cm	80.1 cm

Distance Between Ultrasonic Sensors: 194.2 cm

TEST TRACK DATA MEETS REQUIREMENTS: YES/NO YES
If no, explain: _____

REMARKS:

RECORDED BY: Alan Ida DATE: 5/20/10
APPROVED BY: Jeff Sankey DATE: 5/31/10

3.0 TEST DATA….continued

DATA SHEET 6 (Sheet 1 of 3)
BRAKE AND TIRE CONDITIONING

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA No.: CA5109

Measured Cold Tire Pressures: LF 220 KPA RF 220 KPA

LR 220 KPA RR 220 KPA

Wind Speed 4.0 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 13.3 °C

Brake Conditioning Time; 9:55 AM Date; 04-21-10*

56 km/h (35 mph) Brake Stops

Number of stops executed (10 required) 10 stops

Observed deceleration rate range (.5g target) 0.45 – 0.49 g

72 km/h (45 mph) Brake Stops

Number of stops executed (3 required) 3 stops

Number of stops ABS activated (3 required) 3 stops

Observed deceleration rate range 1.0 – 1.15 g

72 km/h (45 mph) Brake Cool Down Period

Duration of cool down period (5 minutes min.) 5:40 minutes

*Note: Brake Conditioning was performed on 4/21/10, while conducting the Pre-ECU Flash testing.

3.0 TEST DATA….continued

DATA SHEET 6 (Sheet 2 of 3)
TIRE CONDITIONING

Tire Conditioning Series No. 1 Time: 8:55 AM Date: 5/20/10

Measured Tire Pressures: LF 234 kPa RF 234 kPa

LR 228 kPa RR 234 kPa

Wind Speed 1.3 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 16.1 °C

30 meter (100 ft) Diameter Circle Maneuver				
Test Runs	Steering Direction	Target Lateral Acceleration (g)	Observed Lateral Acceleration (g)	Observed Vehicle Speed (kph)
1-3	Clockwise	0.5-0.6	0.55	30.6
4-6	Counterclockwise	0.5-0.6	0.55	30.6

1 Hz 3 Cycle Sinusoidal Steering Maneuver to Determine Steering Wheel Angle For 0.5-0.6g Lateral Acceleration				
Test Runs	Vehicle Speed Km/h(mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1	56±2 (35±1)	30	0.5-0.6	0.2
2	56±2 (35±1)	100	0.5-0.6	0.55
3	56±2 (35±1)		0.5-0.6	
4	56±2 (35±1)		0.5-0.6	

Steering wheel angle that corresponds to a peak 0.5–0.6g lateral acceleration; 100 degrees

1 Hz 10 Cycle Sinusoidal Steering Maneuver				
Test Runs	Vehicle Speed Km/h (mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1 - 3	56±2 (35±1)	100 (cycles 1-10)	0.5-0.6	0.54
4	56±2 (35±1)	100 (cycles 1-9)	0.5-0.6	0.54
		200 (cycle 10)*	NA	0.82

* The steering wheel angle used for cycle 10 should be twice the angle used for cycles 1-9.

3.0 TEST DATA….continued

DATA SHEET 6 (Sheet 3 of 3)
TIRE CONDITIONING

Tire Conditioning Series No. 2 Time: 11:20 AM Date: 5/20/10

Measured Tire Pressures: LF 238 kPa RF 238 kPa

LR 231 kPa RR 241 kPa

Wind Speed 1.8 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 21.1 °C

30 meter (100 ft) Diameter Circle Maneuver				
Test Runs	Steering Direction	Target Lateral Acceleration (g)	Observed Lateral Acceleration (g)	Observed Vehicle Speed
1-3	clockwise	0.5-0.6	0.55	30.6
4-6	counterclockwise	0.5-0.6	0.55	30.6

1 Hz 3 Cycle Sinusoidal Steering Maneuver to Determine Steering Wheel Angle For 0.5-0.6g Lateral Acceleration				
Test Runs	Vehicle Speed Km/h (mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1	56±2 (35±1)	30	0.5-0.6	N/A
2	56±2 (35±1)		0.5-0.6	
3	56±2 (35±1)		0.5-0.6	
4	56±2 (35±1)		0.5-0.6	

Steering wheel angle that corresponds to a peak 0.5–0.6g lateral acceleration; 100 degrees

1 Hz 10 Cycle Sinusoidal Steering Maneuver				
Test Runs	Vehicle Speed (mph)	Steering Wheel Angle (degrees)	Target Peak Lateral Acceleration (g)	Observed Peak Lateral Acceleration (g)
1 - 3	56±2 (35±1)	100 (cycles 1-10)	0.5-0.6	0.53
4	56±2 (35±1)	100 (cycles 1-9)	0.5-0.6	0.53
		200 (cycle 10)*	NA	0.82

* The steering wheel angle used for cycle 10 should be twice the angle used for cycles 1-9.

REMARKS:

RECORDED BY: Alan Ida DATE: 5/20/10
APPROVED BY: Jeff Sankey DATE: 5/31/10

3.0 TEST DATA….continued

DATA SHEET 7 (1 of 2)
SLOWLY INCREASING STEER (SIS) MANEUVER

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA NO. CA5109 TEST DATE: 5/20/10

Wind Speed 0.4 m/sec
(10m/sec (22mph) max for passenger cars; 5m/s (11mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 17.2 °C

Static Data File Number 0009

Selected Drive Configuration: 4WD High (H4)

Selected Mode: default – ESC On

Preliminary Left Steer Maneuver:

Lateral Acceleration measured at 30 degrees steering wheel angle ($a_{y,30\ degrees}$)

$a_{y,30\ degrees}$ = 0.34 g

Assuming a linear relationship the following ratio should be used to calculate the steering wheel angle at .55g.

$$\frac{30\,\text{degrees}}{a_{y,30\,\text{degrees}}} = \frac{\delta_{SIS}}{0.55\,\text{g}}$$

δ_{SIS} = 48.5 degrees @ 0.55g

δ_{SIS} = 50.0 degrees (rounded)

Steering Wheel Angle at Corrected 0.3 g Lateral Acceleration:

Maneuver #	Initial Steer Direction	Time Clock (5 min max between runs)	Steering Wheel Angle to nearest 0.1 degree (degrees)	All Conditions Met?
0011	Left	9:12 AM	-32.7	Yes
0012	Left	9:19 AM	-31.5	Yes
0013	Left	9:22 AM	-32.6	Yes
0014	Right	9:25 AM	33.1	Yes
0015	Right	9:28 AM	33.1	Yes
0016	Right	9:31 AM	32.6	Yes

3.0 TEST DATA….continued

DATA SHEET 7 (2 of 2)
SLOWLY INCREASING STEER (SIS) MANEUVER

Average Overall Steering Wheel Angle:

$$\delta_{0.3\ g,\ overall} = (|\ \delta_{0.3\ g,\ left\ (1)}\ | + |\ \delta_{0.3\ g,\ left\ (2)}\ | + |\ \delta_{0.3\ g,\ left\ (3)}\ | + \delta_{0.3\ g,\ right\ (1)} + \delta_{0.3\ g,\ right\ (2)} + \delta_{0.3\ g,\ right\ (3)}) / 6$$

$\delta_{0.3\ g,\ overall}$ = 32.6 degrees
[to nearest 0.1 degree]

REMARKS:

RECORDED BY: Alan Ida DATE: 5/20/10
APPROVED BY: Jeff Sankey DATE: 5/31/10

3.0 TEST DATA….continued

DATA SHEET 8 (1 of 3)
VEHICLE LATERAL STABILITY AND RESPONSIVENESS

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA NO. CA5109 TEST DATE: 5/20/10

Tire conditioning completed	X Yes	No
ESC system is enabled	X Yes	No
On track calibration checks have been completed	X Yes	No
On track static data file for each sensor obtained	X Yes	No

Selected Drive Configuration: 4WD High (H4)
Selected Mode: default – ESC On

Overall steering wheel angle ($\delta_{0.3\ g,\ overall}$) 32.6 degrees

Static Data File Number 0021

Lateral Stability Test Series No. 1 – Counterclockwise Initial Steer Direction

Maneuver #	Clock Time (1.5 – 5 min between each test run)	Commanded Steering Wheel Angle[1] (degrees)		Yaw Rates (degrees/sec)			YRR at 1.0 sec after COS [≤ 35%]		YRR at 1.75 sec after COS [≤ 20%]	
		Scalar	Angle	$\dot{\psi}_{Peak}$	$\dot{\psi}_{1.0sec}$	$\dot{\psi}_{1.75sec}$	%	Pass/ Fail	%	Pass/ Fail
0022	11:38 am	1.5* $\delta_{0.3\ g}$	49	12.22	-0.15	-0.03	-1.19	Pass	-0.27	Pass
0023	11:41 am	2.0* $\delta_{0.3\ g}$	65	16.51	0.04	0.01	0.23	Pass	0.08	Pass
0024	11:47 am	2.5* $\delta_{0.3\ g}$	82	21.31	0.10	-0.08	0.47	Pass	-0.39	Pass
0025	11:51 am	3.0* $\delta_{0.3\ g}$	98	26.16	-0.18	-0.27	-0.71	Pass	-1.02	Pass
0026	11:54 am	3.5* $\delta_{0.3\ g}$	114	31.07	-0.22	-0.18	-0.70	Pass	-0.56	Pass
0027	11:58 am	4.0* $\delta_{0.3\ g}$	130	36.49	-0.28	-0.23	-0.77	Pass	-0.64	Pass
0028	12:01 pm	4.5* $\delta_{0.3\ g}$	147	24.39	-0.30	-0.31	-1.24	Pass	-1.26	Pass
0029	12:04 pm	5.0* $\delta_{0.3\ g}$	163	25.75	-0.30	-0.17	-1.17	Pass	-0.67	Pass
0030	12:08 pm	5.5* $\delta_{0.3\ g}$	179	27.38	-0.14	-0.13	-0.51	Pass	-0.48	Pass
0031	12:11 pm	6.0* $\delta_{0.3\ g}$	196	29.36	-0.18	-0.16	-0.61	Pass	-0.56	Pass
0032	12:14 pm	6.5* $\delta_{0.3\ g}$	212	32.26	-0.18	-0.18	-0.56	Pass	-0.56	Pass
0033	12:18 pm	7.0* $\delta_{0.3\ g}$	228	31.05	-0.38	-0.29	-1.21	Pass	-0.93	Pass
0034	12:24 pm	7.5* $\delta_{0.3\ g}$	245	31.79	-0.19	-0.35	-0.60	Pass	-1.09	Pass
0035	12:27 pm	8.0* $\delta_{0.3\ g}$	261	30.67	-0.17	-0.29	-0.54	Pass	-0.94	Pass
0036	12:31 pm	8.3* $\delta_{0.3\ g}$	270	30.72	-0.34	-0.26	-1.12	Pass	-0.86	Pass

1. Maneuver execution should continue until a steering wheel angle magnitude factor of 6.5*$\delta_{0.3\ g,\ overall}$ or 270 degrees is utilized, whichever is greater provided the calculated magnitude of 6.5*$\delta_{0.3\ g,\ overall}$ is less than or equal to 300 degrees. If 6.5*$\delta_{0.3\ g,\ overall}$ is less than 270 degrees maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of 0.5*$\delta_{0.3\ g,\ overall}$ without exceeding the 270 degree steering wheel angle.

3.0 TEST DATA….continued

DATA SHEET 8 (2 of 3)
VEHICLE LATERAL STABILITY AND RESPONSIVENESS

Lateral Stability Test Series No. 2 – Clockwise Initial Steer Direction

Maneuver #	Clock Time (1.5 – 5 min between each test run)	Commanded Steering Wheel Angle[1] (degrees)		Yaw Rates (degrees/sec)			YRR at 1.0 sec after COS [≤ 35%]		YRR at 1.75 sec after COS [≤ 20%]	
		Scalar	Angle	$\dot{\psi}_{Peak}$	$\dot{\psi}_{1.0\text{sec}}$	$\dot{\psi}_{1.75\text{sec}}$	%	Pass/ Fail	%	Pass/ Fail
0037	12:34 pm	1.5* $\delta_{0.3\ g}$	49	-12.35	-0.07	0.07	0.58	Pass	-0.54	Pass
0038	12:37 pm	2.0* $\delta_{0.3\ g}$	65	-16.60	-0.02	0.06	0.11	Pass	-0.34	Pass
0039	12:42 pm	2.5* $\delta_{0.3\ g}$	82	-21.30	-0.50	-0.03	2.37	Pass	0.15	Pass
0040	12:45 pm	3.0* $\delta_{0.3\ g}$	98	-25.81	0.13	0.26	-0.51	Pass	-1.01	Pass
0041	12:49 pm	3.5* $\delta_{0.3\ g}$	114	-30.29	0.08	-0.03	-0.28	Pass	0.08	Pass
0042	12:52 pm	4.0* $\delta_{0.3\ g}$	130	-35.66	0.19	0.14	-0.54	Pass	-0.40	Pass
0043	12:55 pm	4.5* $\delta_{0.3\ g}$	147	-22.95	0.39	0.21	-1.70	Pass	-0.92	Pass
0044	12:58 pm	5.0* $\delta_{0.3\ g}$	163	-26.54	0.25	0.10	-0.93	Pass	-0.38	Pass
0045	1:02 pm	5.5* $\delta_{0.3\ g}$	179	-28.51	0.18	0.32	-0.62	Pass	-1.13	Pass
0046	1:05 pm	6.0* $\delta_{0.3\ g}$	196	-28.67	0.15	0.19	-0.53	Pass	-0.68	Pass
0047	1:08 pm	6.5* $\delta_{0.3\ g}$	212	-30.31	0.19	0.22	-0.62	Pass	-0.73	Pass
0048	1:11 pm	7.0* $\delta_{0.3\ g}$	228	-31.53	0.41	0.23	-1.29	Pass	-0.72	Pass
0049	1:16 pm	7.5* $\delta_{0.3\ g}$	245	-30.49	0.20	0.09	-0.67	Pass	-0.28	Pass
0050	1:20 pm	8.0* $\delta_{0.3\ g}$	261	-30.79	0.21	0.18	-0.69	Pass	-0.58	Pass
0051	1:24 pm	8.3* $\delta_{0.3\ g}$	270	-28.66	0.28	0.17	-0.96	Pass	-0.58	Pass

1. Maneuver execution should continue until a steering wheel angle magnitude factor of 6.5*$\delta_{0.3\ g,\ overall}$ or 270 degrees is utilized, whichever is greater provided the calculated 6.5*$\delta_{0.3\ g,\ overall}$ is less than or equal to 300 degrees. If 6.5*$\delta_{0.3\ g,\ overall}$ is less than 270 degrees maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of 0.5*$\delta_{0.3\ g,\ overall}$ without exceeding the 270 degree steering wheel angle.

During execution of the fishhook maneuvers were any of the following events observed?

Rim-to-pavement contact	_____ Yes	__X__ No
Tire debeading	_____ Yes	__X__ No
Loss of pavement contact of vehicle tires	_____ Yes	__X__ No
Did the test driver experience any vehicle loss of control or spinout?	_____ Yes	__X__ No

If "Yes" explain the event and consult with the COTR. _____

_____

_____

3.0 TEST DATA….continued

DATA SHEET 8 (3 of 3)
VEHICLE LATERAL STABILITY AND RESPONSIVENESS

Responsiveness – Lateral Displacement

Maneuver #	Initial Steer Direction	Commanded Steering Wheel Angle ($5.0*\delta_{0.3\ g,\ overall}$ or greater)		Calculated Lateral Displacement[1]	
		Scalar	Angle (degrees)	Distance (m)	Pass/Fail
0029	Counter Clockwise	5.0* $\delta_{0.3\ g}$	163	2.68	Pass
0030	Counter Clockwise	5.5* $\delta_{0.3\ g}$	179	2.71	Pass
0031	Counter Clockwise	6.0* $\delta_{0.3\ g}$	196	2.70	Pass
0032	Counter Clockwise	6.5* $\delta_{0.3\ g}$	212	2.77	Pass
0033	Counter Clockwise	7.0* $\delta_{0.3\ g}$	228	2.69	Pass
0034	Counter Clockwise	7.5* $\delta_{0.3\ g}$	245	2.76	Pass
0035	Counter Clockwise	8.0* $\delta_{0.3\ g}$	261	2.69	Pass
0036	Counter Clockwise	8.3* $\delta_{0.3\ g}$	270	2.66	Pass
0044	Clockwise	5.0* $\delta_{0.3\ g}$	163	2.70	Pass
0045	Clockwise	5.5* $\delta_{0.3\ g}$	179	2.71	Pass
0046	Clockwise	6.0* $\delta_{0.3\ g}$	196	2.73	Pass
0047	Clockwise	6.5* $\delta_{0.3\ g}$	212	2.78	Pass
0048	Clockwise	7.0* $\delta_{0.3\ g}$	228	2.80	Pass
0049	Clockwise	7.5* $\delta_{0.3\ g}$	245	2.81	Pass
0050	Clockwise	8.0* $\delta_{0.3\ g}$	261	2.77	Pass
0051	Clockwise	8.3* $\delta_{0.3\ g}$	270	2.77	Pass

1. Lateral displacement should be $\geq$ 1.83 m (6 ft) for vehicles with a GVWR of 3,500 kg (7,716 lb) or less; and $\geq$ 1.52 m (5ft) for vehicles with a GVWR greater than 3,500 kg (7,716 lb).

DATA INDICATES COMPLIANCE: PASS/FAIL PASS

REMARKS:

RECORDED BY: Alan Ida DATE: 5/20/10
APPROVED BY: Jeff Sankey DATE: 5/31/10

3.0 TEST DATA….continued

DATA SHEET 9 (Sheet 1 of 2)
MALFUNCTION WARNING TEST

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA No.: CA5109 TEST DATE: 05-21-10

METHOD OF MALFUNCTION SIMULATION:
Describe method of malfunction simulation: Disconnect the Left Front wheel speed sensor connector.

MALFUNCTION TELLTALE ILLUMINATION:
Telltale illuminates and remains illuminated after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

X Yes ____ No

Time for telltale to illuminate after ignition system is activated.
0 Seconds (must be within 2 minutes) X Pass ____ Fail

ESC SYSTEM RESTORATION:
Telltale extinguishes after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

X Yes ____ No

Time for telltale to extinguish after ignition system is activated and vehicle speed of 48± 8 km/h (30± 5mph) is reached.
0 Second (must be within 2 minutes) X Pass ____ Fail

DATA INDICATES COMPLIANCE: PASS/FAIL PASS

REMARKS:
The vehicle did not require driving to illuminate or extinguish the malfunction telltale. When the wheel speed sensor was disconnected, the ABS malfunction light was on and the AFS Off (Adaptive Front lighting System) telltale was flashing.

RECORDED BY: Alan Ida DATE: 05-21-10
APPROVED BY: Jeff Sankey DATE: 05-25-10

3.0 TEST DATA….continued

DATA SHEET 9 (Sheet 2 of 2)
MALFUNCTION WARNING TEST

VEHICLE MAKE/MODEL/BODY STYLE: Lexus / GX460 / MPV

VEHICLE NHTSA No.: CA05109 TEST DATE: 05-24-10

METHOD OF MALFUNCTION SIMULATION:
Describe method of malfunction simulation: Disconnect the steering wheel angle sensor connector.

MALFUNCTION TELLTALE ILLUMINATION:
Telltale illuminates and remains illuminated after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

X Yes ____ No

Time for telltale to illuminate after ignition system is activated.
0 Seconds (must be within 2 minutes) X Pass ____ Fail

ESC SYSTEM RESTORATION:
Telltale extinguishes after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

X Yes ____ No

Time for telltale to extinguish after ignition system is activated.
0 Second (must be within 2 minutes) X Pass ____ Fail

DATA INDICATES COMPLIANCE: PASS/FAIL PASS

REMARKS:
The vehicle did not require driving to illuminate or extinguish the malfunction telltale. When the steering wheel angle sensor was disconnected, the AFS Off (Adaptive Front lighting System) telltale was flashing.

RECORDED BY: Alan Ida DATE: 05-24-10
APPROVED BY: Jeff Sankey DATE: 05-25-10

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

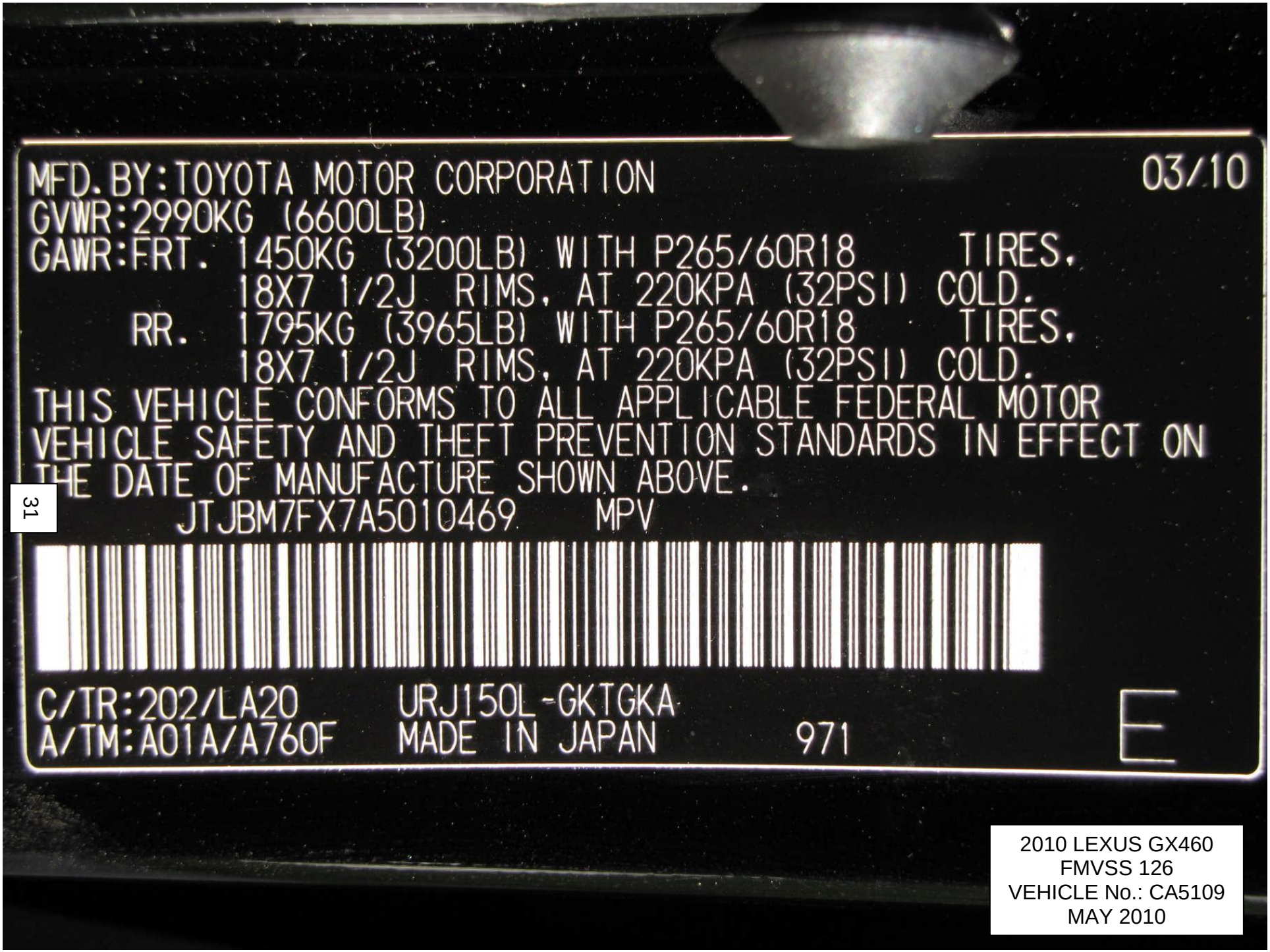
Type	Output	Range	Resolution	Accuracy	Specifics	Serial Number	Calibration
Tire Pressure Gauge	Vehicle Tire Pressure	0-60psi	0.5 psi	±0.5% of applied pressure	Moroso Model: 89562 0-60 psi	N/A	By: TRC Date: 4-15-10 Due: 7-14-10
Platform Scales	Vehicle Total, Wheel, and Axle Load	0-2500 lb per each of four pads	0.5 lb	±1.0% of applied load	Mettler Toledo Model: JXGA1000	5225831-5JC	By: Mettler Date: 5-18-10 Due: 8-18-10
Automated Steering Machine with Steering Angle Encoder	Handwheel Angle	±N/A deg	0.03 deg	±0.25 deg	SEA Limited Model: ASC II	S001	By: SEA Ltd Date: 2-24-10 Due: 2-24-11
Multi-Axis Inertial Sensing System	Longitudinal, Lateral, and Vertical Acceleration Roll, Yaw, and Pitch Rate	Accelerometers: ±2 g Angular Rate Sensors: ±100 deg/sec	Accelerometers: ≤10 ug Angular Rate Sensors: ≤0.004 deg/s	Accelerometers: ≤0.05% of full range Angular Rate Sensors: 0.05% of full range	BEI Technologies Model: MotionPAK MP-1	0768	By: BEI Tech. Date: 1-14-10 Due: 1-14-11
Radar Speed Sensor	Vehicle Speed	0-125 mph	0.009 mph	±0.25% of full scale	A-DAT Corp. Radar Model: DRS-6 Display Model: RD-2	1400603	By: A-DAT Date: 12-16-09 Due: 12-16-10
Ultrasonic Distance Measuring System	Left and Right Side Vehicle Height	5-24 inches	0.01 inches	±0.25% of maximum distance	Massa Products Corporation Model: M-5000 / 220	103255 & 103170	By: TRC Date: 11-19-09 Due: 11-19-10
Data Acquisition System	Record Time; Velocity; Lateral, Longitudinal, and Vertical Accelerations; Roll, Yaw, and Pitch Rates; Steering Wheel Angle.	Sufficient to meet or exceed individual sensors	200 Hz	Sufficient to meet or exceed individual sensors	3B Series Signal Conditioning Subsystem	N/A	By: SEA Ltd. Date: 2-25-10 Due: 2-25-11
Load Cell	Vehicle Brake Pedal Force	0-300 lb	1 lb	±0.05% of full scale	DATRON Model: DTM-LPA	4970-1103	By: TRC Date: per test Due: per test
Coordinate Measurement Machine	Inertial Sensing System Location	0-10 feet	0.001 inch	±0.003% of full scale	FARO International Model: Faro Arm N10	N10-02-03-01310	By: FARO Date: 9-1-09 Due: 9-1-10
Multifunction Calibrator	Voltage Input for Sensor Calibration	0-20 VDC	0.001 V	±0.015% of reading accuracy	Martel Electronics Model: MC-1000	10977	By: TRC Date: 10-27-09 Due: 10-27-10
Outriggers	No output. Safety Item.	N/A	N/A	N/A	NHTSA Titanium Outriggers Model: Docket 2007-27662-11	N/A	N/A

5.0 PHOTOGRAPHS

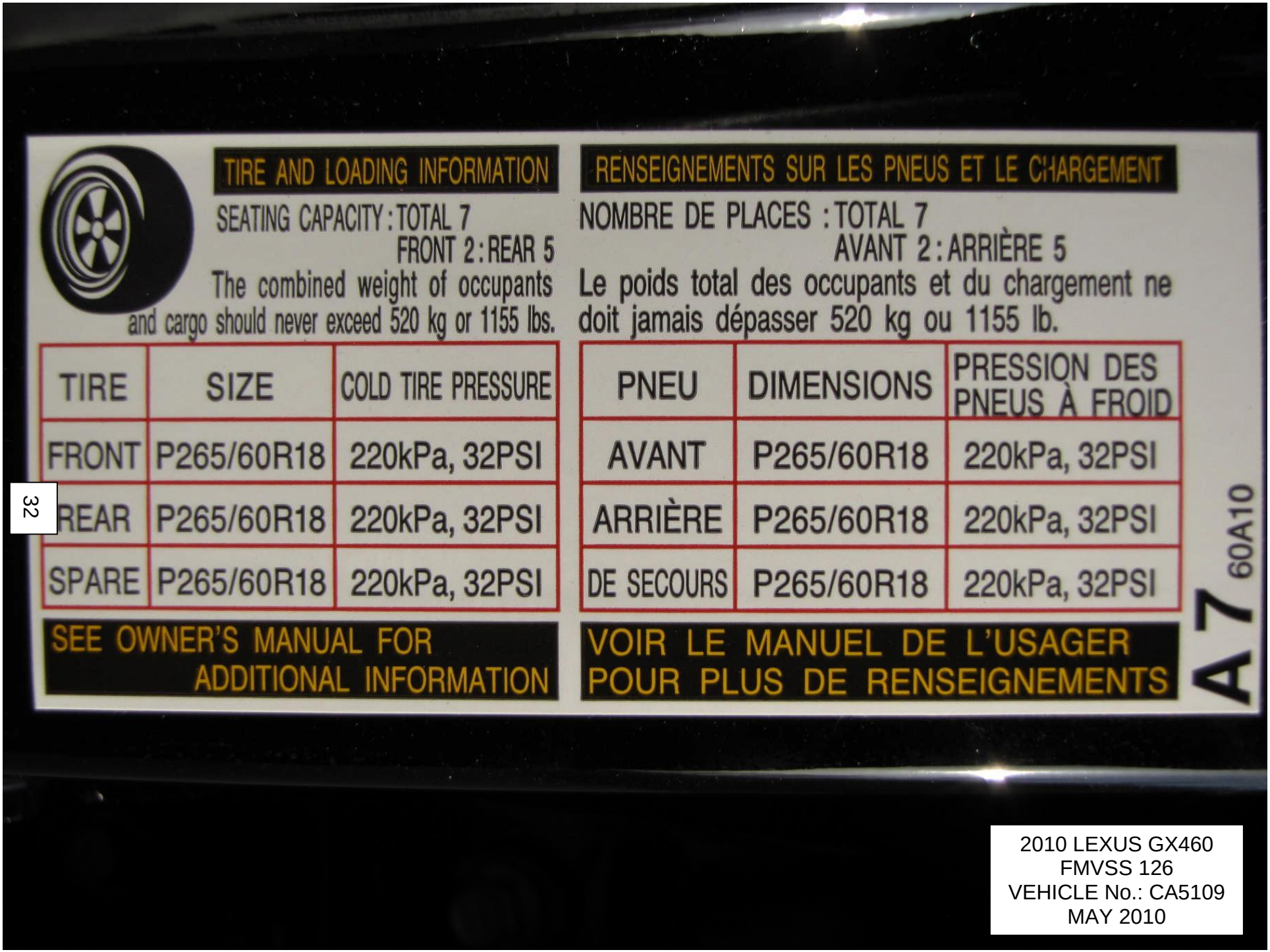
5.1 ¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE
5.2 ¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE
5.3 VEHICLE CERTIFICATION LABEL
5.4 TIRE AND LOADING INFORMATION LABEL
5.5 WINDOW STICKER (MONRONEY LABEL)
5.6 ESC MALFUNCTION TELLTALE
5.7 ESC OFF TELLTALE
5.8 ESC OFF CONTROL
5.9 ¾ FRONT VIEW - TEST VEHICLE INSTRUMENTED
5.10 ¾ REAR VIEW – TEST VEHICLE INSTRUMENTED
5.11 STEERING WHEEL CONTROLLER AND DATA ACQUISITION SYSTEM
5.12 STEERING CONTROLLER BATTERY BOX
5.13 INERTIA MEASUREMENT UNIT (CENTER CONSOLE)
5.14 VEHICLE SPEED SENSOR
5.15 BODY ROLL SENSOR (DRIVER SIDE)
5.16 BODY ROLL SENSOR (PASSENGER SIDE)
5.17 BRAKE PEDAL FORCE TRANSDUCER

5.1 ¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE

5.2 ¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE



5.3 VEHICLE CERTIFICATION LABEL



2010 LEXUS GX460
FMVSS 126
VEHICLE No.: CA5109
MAY 2010

5.4 TIRE AND LOADING INFORMATION LABEL

LEXUS
The Pursuit of Perfection

DESCRIPTION **2010 / 9700A GX460 5-DR SUV**
COLOR BLACK
VIN JTJBM7FX7A5010469
PORT/PLANT Portland, OR

Dealer Name / Address:
GERMAIN LEXUS OF DUBLIN
3885 W. DUBLIN-GRANVILLE
DUBLIN OH43017

Ship to: (Dealer, unless otherwise indicated)

STANDARD EQUIPMENT & INSTALLED OPTIONS

PERFORMANCE FEATURES
* 4.6L 301HP 32-Valve DOHC V8 Engine w/ dual VVT-i
* 6-Speed Sequential Shift Electronically Controlled Automatic Transmission (ECT-i)
* Full-Time 4WD w/Torsen Limited Slip Center Differential (w/ Electronic Locking Feature)
* Front Independent Double Wishbone Suspension
* 4-link Lateral Rod Rear Suspension
* Kinetic Dynamic Suspension System (KDSS)
* Power-assisted Rack & Pinion Steering
* 4-Wheel Ventilated Disc Brakes
* 18" Six-spoke Alloy Wheels w/ 265/60R18 Mud & Snow Tires

SAFETY FEATURES
* Dual-Stage Front Airbags, Front Seat-Mounted Side Airbags, Front Knee Airbags 2nd Row Outboard Seat-Mounted Side Airbags Roll-Sensing Fr, 2nd & 3rd Row Curtain Airbags
* Active Front Headrests, 3-Point Safety Belts
* Fr & 2nd Row Outboard Seat Belt Pretensioners
* Vehicle Stability Control (VSC)/Anti-Lock Brakes (ABS)/Brake Assist (BA)/Active Traction Control (A-TRAC)/Electronic Brakeforce Distribution (EBD) Hill-Start Assist Control (HAC)
* Safety Connect: Automatic Collision Notification, Stolen Vehicle Location, Emergency Assist Button (SOS), and Enhanced Roadside Assistance (1-year trial subscription included)
* Rain-Sensing Intermittent Wipers with Deicer
* Intermittent Rear Wiper with Washer
* Tool Kit and First Aid Kit

LUXURY AND CONVENIENCE FEATURES
* Leather Trimmed Interior w/ Lexus Memory System: Driver's Seat/Steering Wheel & Outside Mirrors
* Leather Trimmed Steering Wheel w/ Multifunction Controls/Steering Wheel Mounted Cruise Control
* Smart Access with Push Button Start/Stop
* 10-Way Power/Heated & Ventilated Front Seats
* Auburn Bubinga Wood Interior Trim, Power Tilt & Telescopic Steering Column w/ Auto Tilt-Away
* Power windows with one-touch auto open/close
* Electrochromic inside rearview mirror
* Reclining, sliding, 60/40 split middle-row seat
* Power fold-flat, 50/50 split third-row seat
* Dual-Zone Automatic Climate Control w/Interior Air Filter, Smog Sensor & Automatic Recirculation Mode
* One-Touch Open/Close Pwr Tilt-and-Slide Moonroof
* Lexus 9-Speaker Premium Sound System with Automatic Sound Levelizer (ASL) & In-Dash, Single-Feed, 6-disc CD Auto-Chgr/Bluetooth Technology/USB Audio Plug/XM Satellite Radio (incl. 90-day trial subscription), Multi-Info center-console display with backup camera
* Privacy glass and flip-open rear glass hatch
* Running boards with built-in courtesy lights
* Rear Spoiler / Carpeted Floor Mats

MANUFACTURER'S SUGGESTED RETAIL PRICE **$ 51,970.00**

** Convenience Package Electrochromic power-folding outside mirrors; Intuitive Parking Assist	800.00
** High Intesity Discharge Headlamps with dual-swivel Adaptive Front Lighting System (AFS)	815.00
** Hard Disk Drive Navigation System Lexus Enform with Destination Assist, and eDestination (includes 1-year trail subscription), Lexus Insider, Voice Command, XM NavTraffic, XM NavWeather, and XM Sports & Stocks (includes 90-day trial subscription)	1,990.00
** Comfort Plus Package Semi-aniline leather-trimmed interior; Wood & Leather-trimmed steering wheel & shift knob; Three-zone Automatic Climate Control with interior air filter, smog sensor and automatic recirculation mode; Heated middle row outboard seats	1,770.00
** Tow Hitch w/Ball Mount	459.00
** Preferred Accessory Package: Cargo Net, Cargo Mat & Wheel Locks	208.00
** Remote Engine Start	375.00

33

EPA Fuel Economy Estimates

CITY MPG

15

Expected range for most drivers
12 to 18 MPG

Estimated Annual Fuel Cost
$ 2,470
based on 15,000 miles at $2.80 per gallon

Combined Fuel Economy
This Vehicle
17
10 — 32
All SUVS

HIGHWAY MPG

20

Expected range for most drivers
17 to 23 MPG

Your actual mileage will vary depending on how you drive and maintain your vehicle.

See the FREE Fuel Economy Guide at dealers or www.fueleconomy.gov

SUB-TOTAL	$ 58,387.00
DELIVERY, PROCESSING AND HANDLING FEE	875.00
TOTAL	**$ 59,262.00**

APPLICABLE FEDERAL TAXES NOT INCLUDED

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service.

License and title fees, state, local and applicable federal taxes, and dealer installed options and accessories are not included in the manufacturer's suggested retail price.

LEXUS NEW VEHICLE LIMITED WARRANTY
Limited warranty coverage highlights include
^ 4YR / 50000 mile basic coverage
^ 6YR / 70000 mile powertrain coverage
^ 6YR / Unlimited mile corrosion perforation warranty

See your Warranty and Services Guide for details.

LEXUS IS PLEASED TO OFFER THE FOLLOWING OWNER SUPPORT PACKAGE WITH EACH NEW LEXUS
^ 24 hour, 365 day/yr. roadside assistance plan
^ Complimentary 1st and 2nd scheduled maintenance services
^ Lodging for emergency breakdown 100 miles from home

An extended service contract may be available for this vehicle. Ask dealer for details

084A85 009 WC03 B1773

GOVERNMENT SAFETY RATINGS

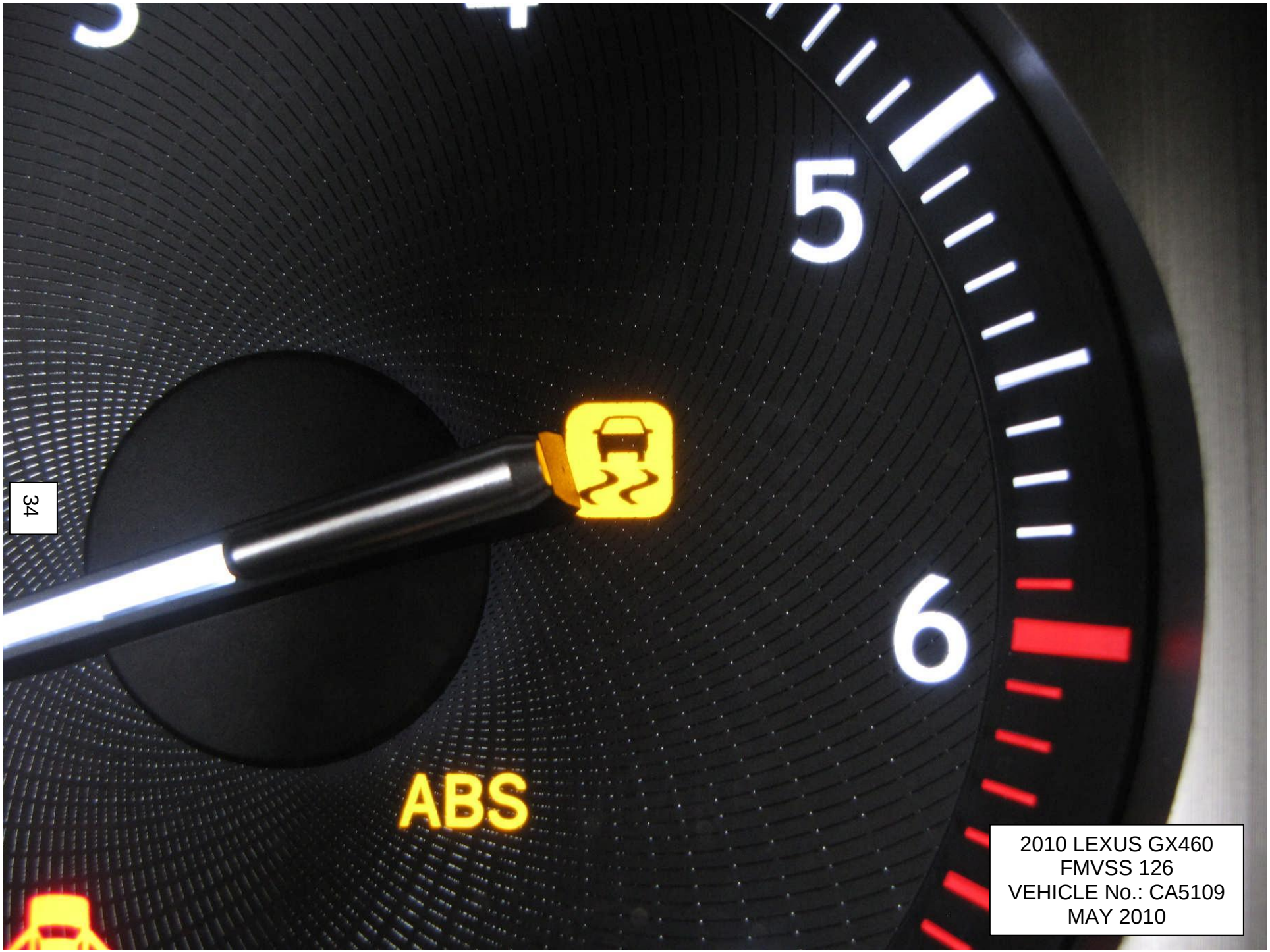
This vehicle has not been rated by the government for frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA).

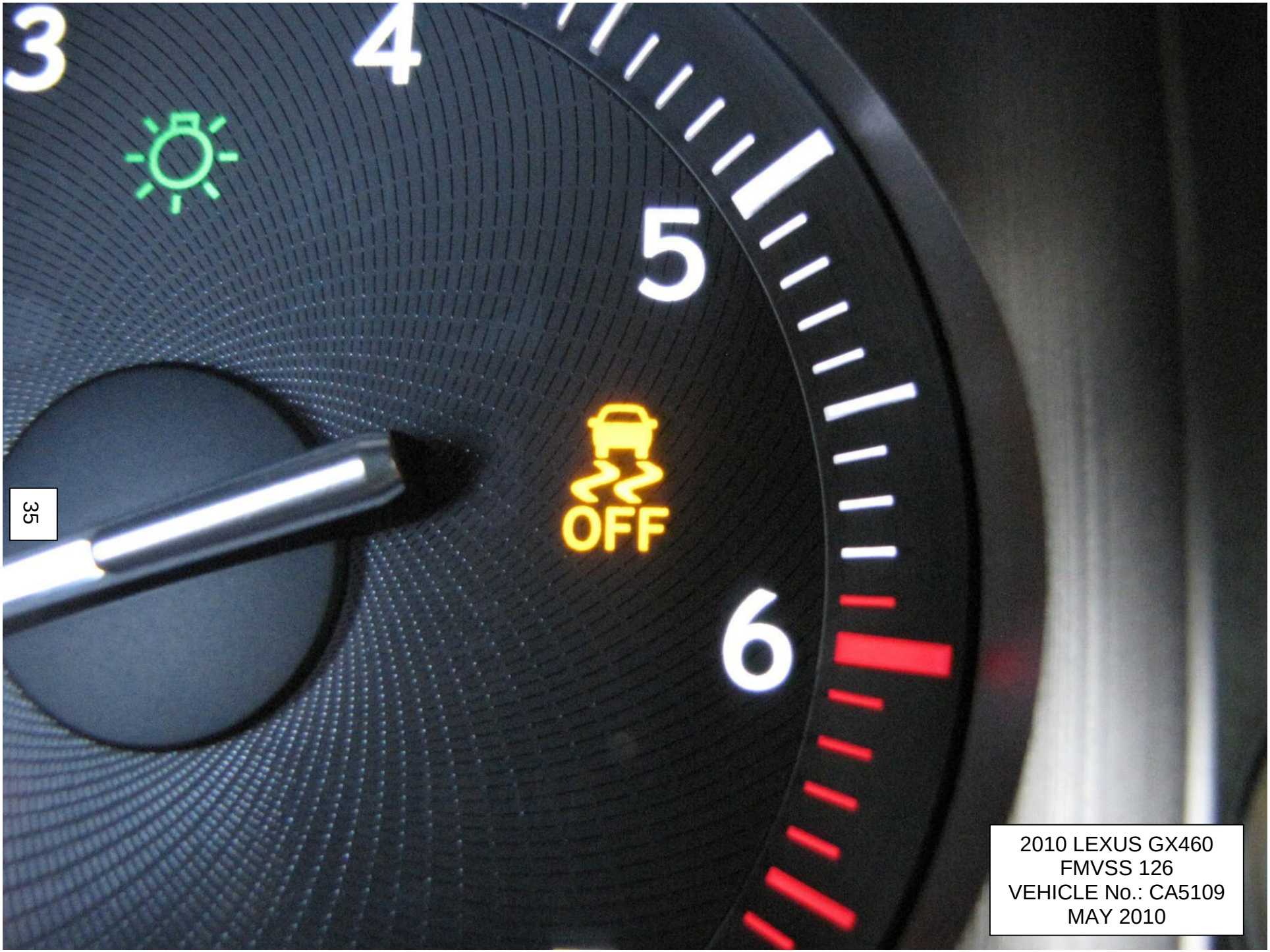
www.safercar.gov or 1-888-327-4236

2010 LEXUS GX460
FMVSS 126
VEHICLE No.: CA5109
MAY 2010

5.5 WINDOW STICKER - MONRONEY LABEL



5.6 ESC MALFUNCTION TELLTALE



5.7 ESC OFF TELLTALE

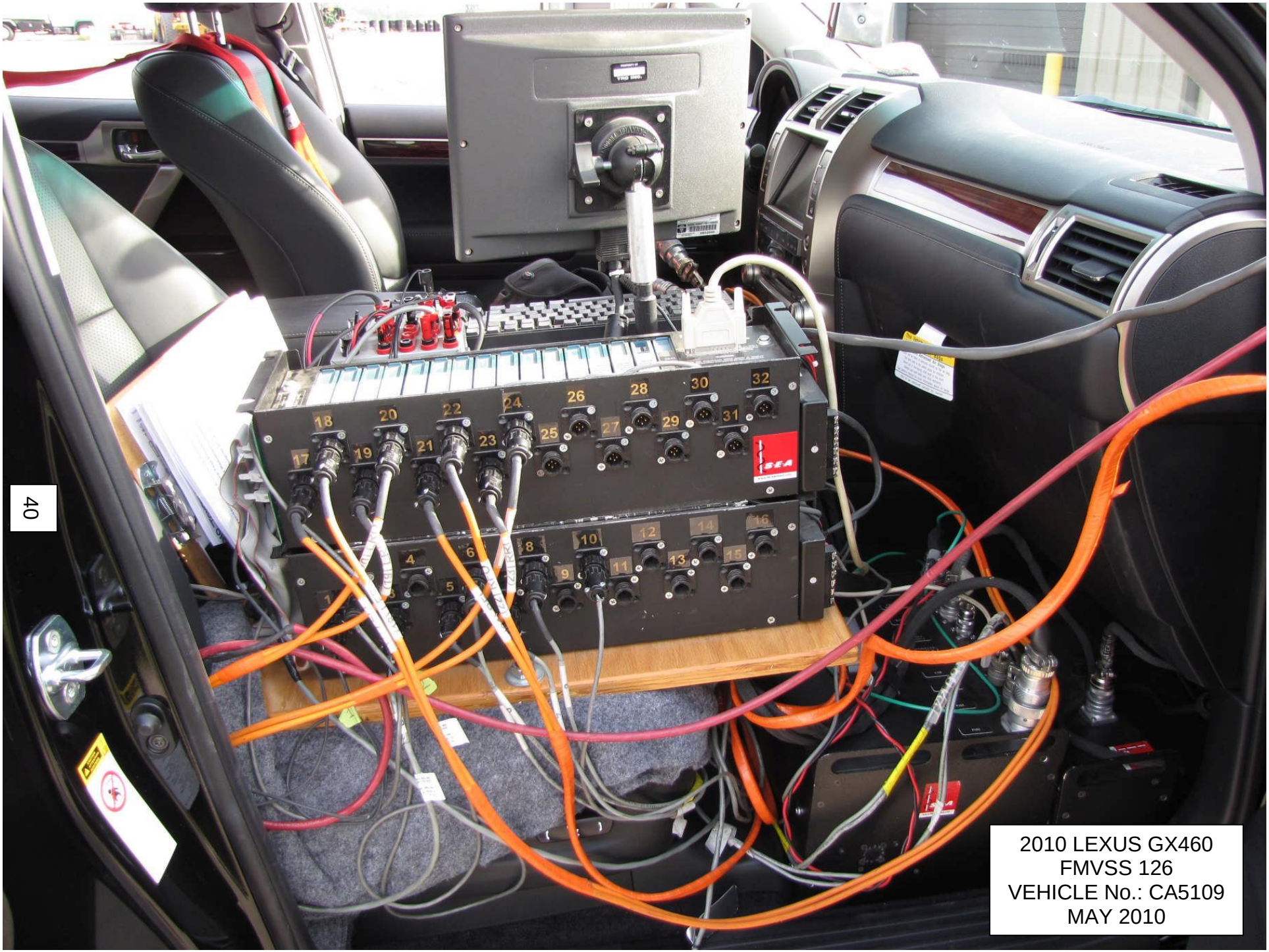
2010 LEXUS GX460
FMVSS 126
VEHICLE No.: CA5109
MAY 2010

5.8 ESC OFF CONTROL

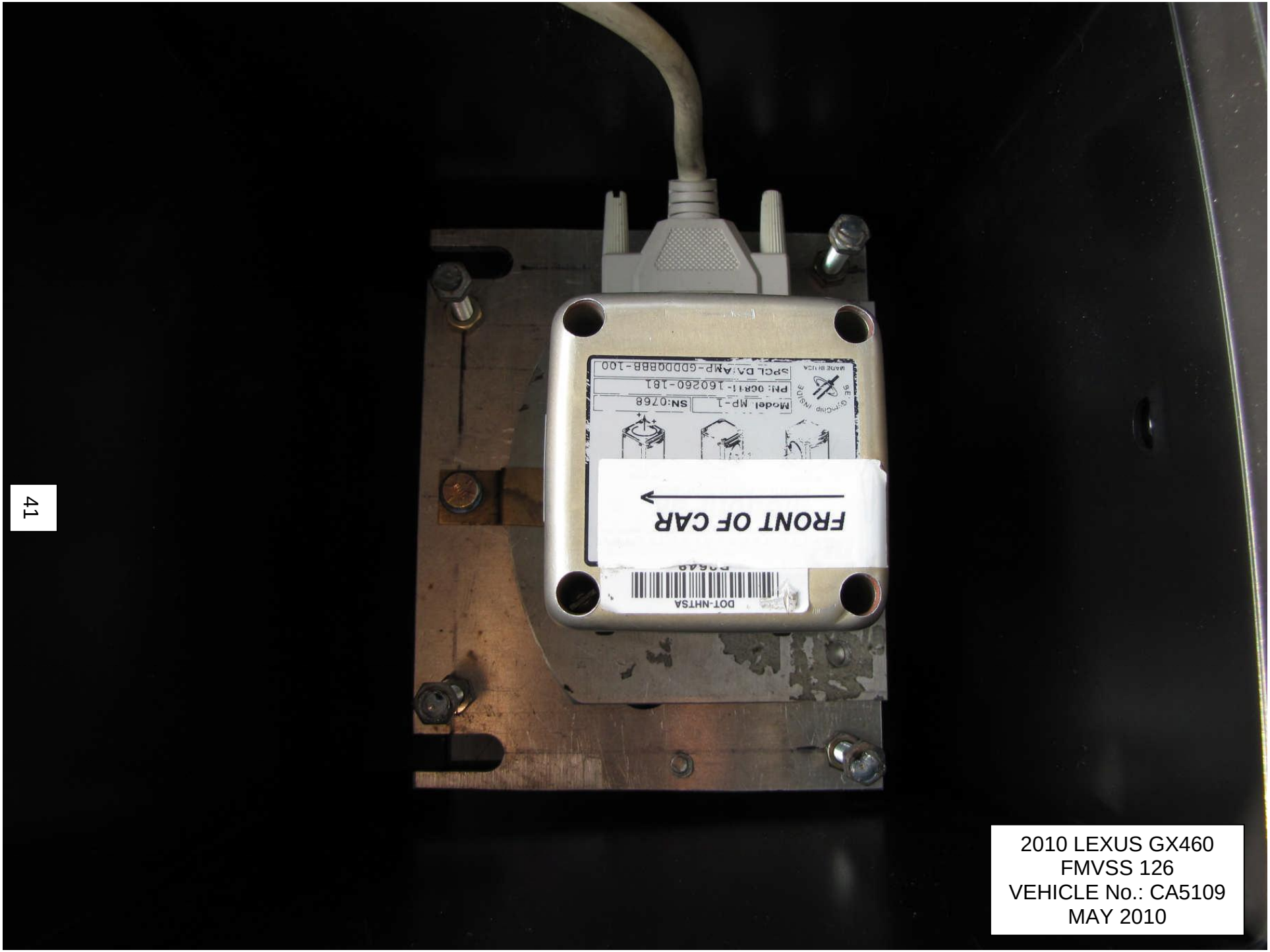
5.9 ¾ FRONT VIEW - TEST VEHICLE INSTRUMENTED

5.10 ¾ REAR VIEW - TEST VEHICLE INSTRUMENTED

5.11 STEERING WHEEL CONTROLLER AND DATA ACQUISITION SYSTEM



5.12 STEERING CONTROLLER BATTERY BOX

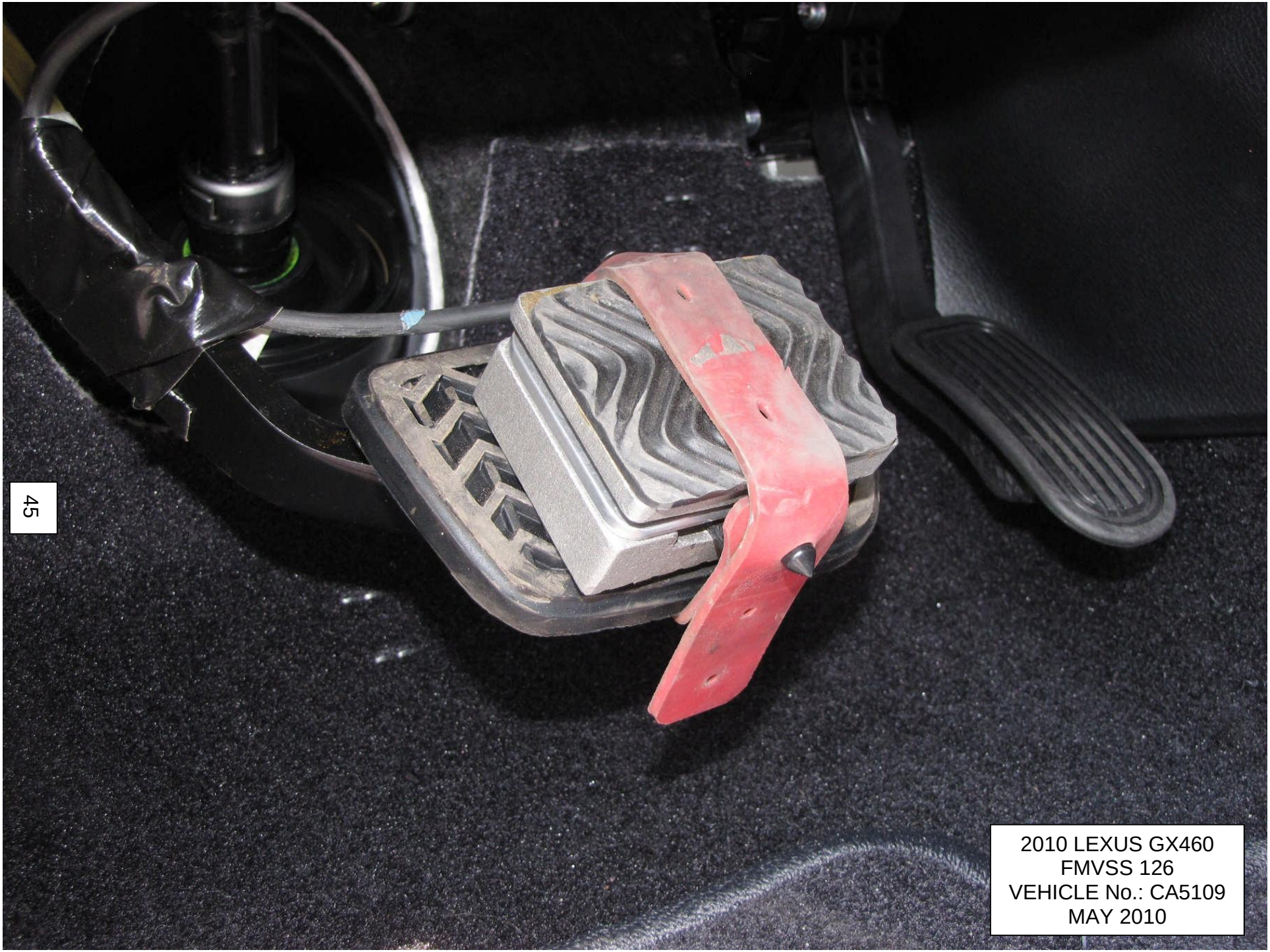


5.13 INERTIA MEASUREMENT UNIT (CENTER CONSOLE)

5.14 VEHICLE SPEED SENSOR

5.15 BODY ROLL SENSOR (DRIVER SIDE)

5.16 BODY ROLL SENSOR (PASSENGER SIDE)

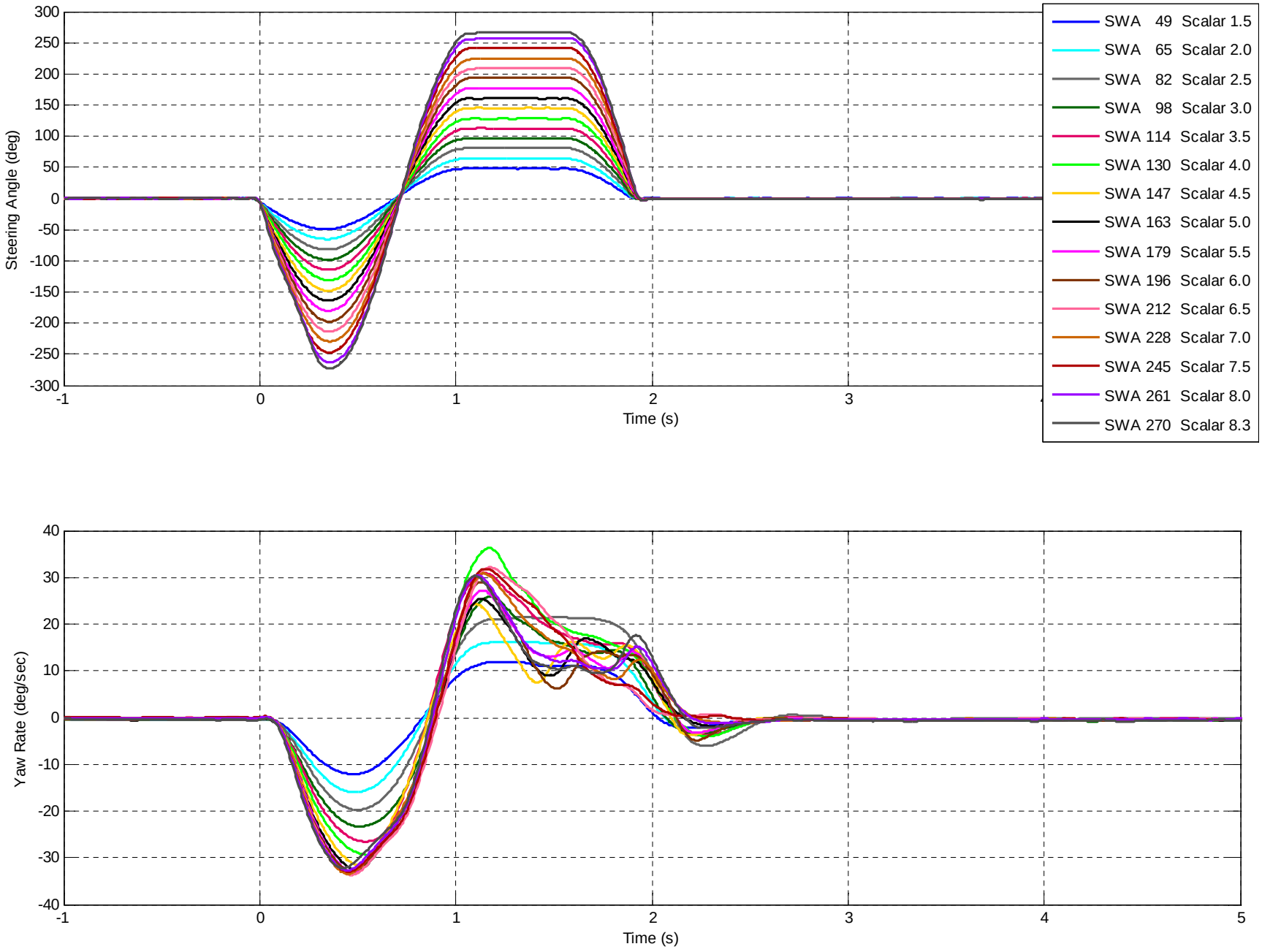


5.17 BRAKE PEDAL FORCE TRANSDUCER

6.0 DATA PLOTS

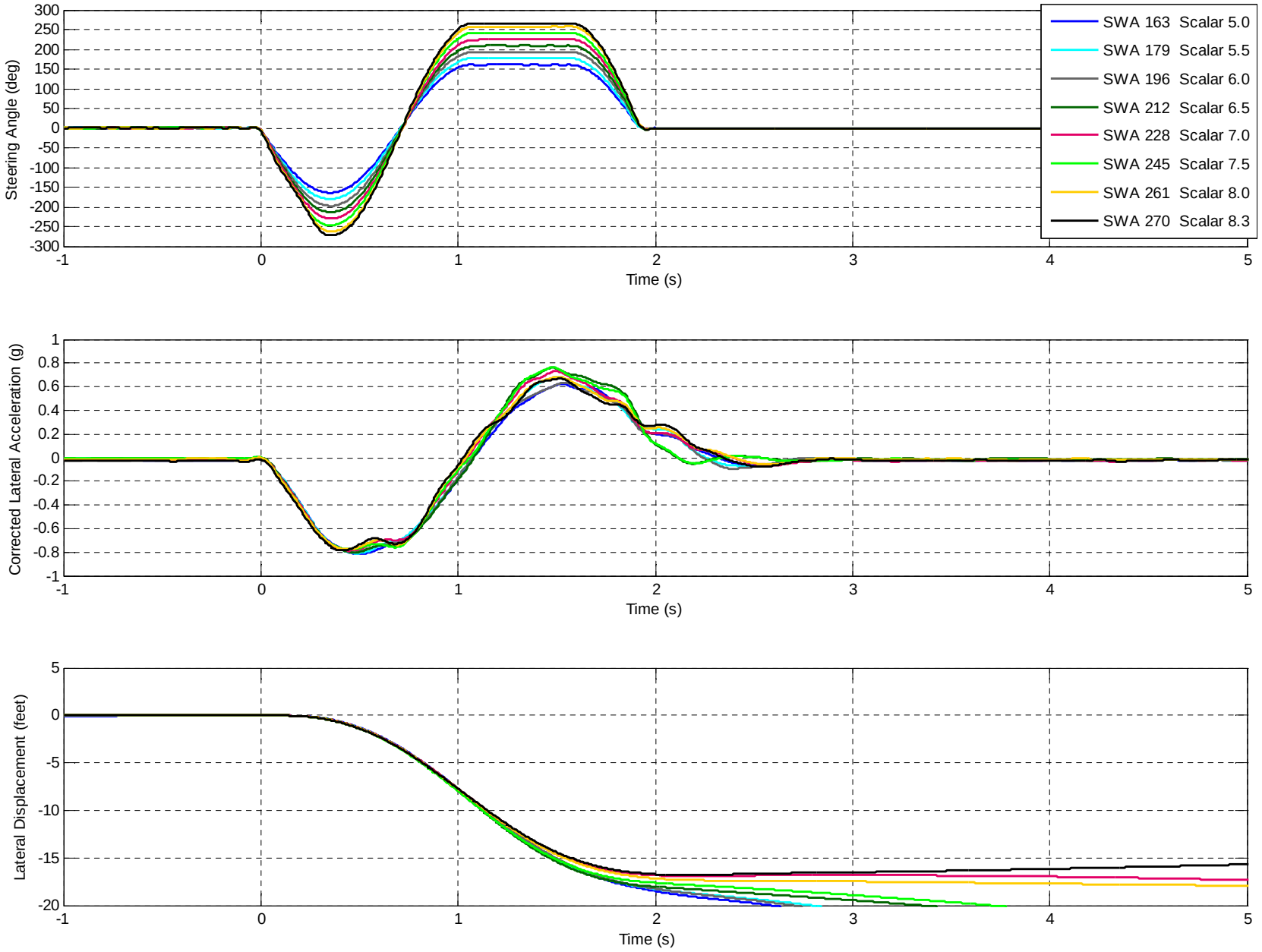
6.0 2010 LEXUS GX460 (POST-ECU FLASH) DATA PLOTS

Figure 1. Steering Angle and Yaw Rate Time History, Counter-Clockwise Initial Steer Tests



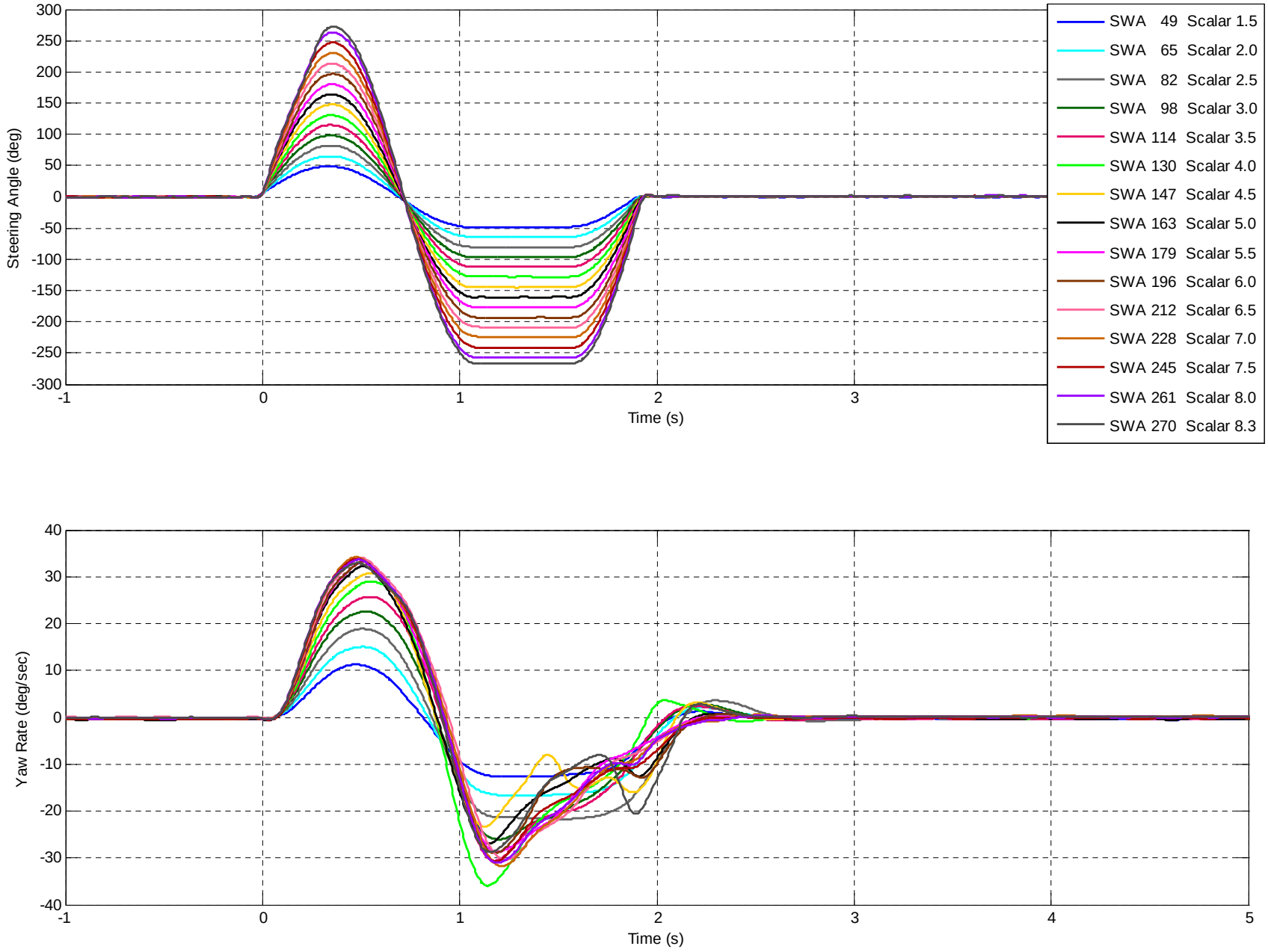
6.0 2010 LEXUS GX460 (POST-ECU FLASH) DATA PLOTS…continued

Figure 2. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Counter-Clockwise Initial Steer Tests



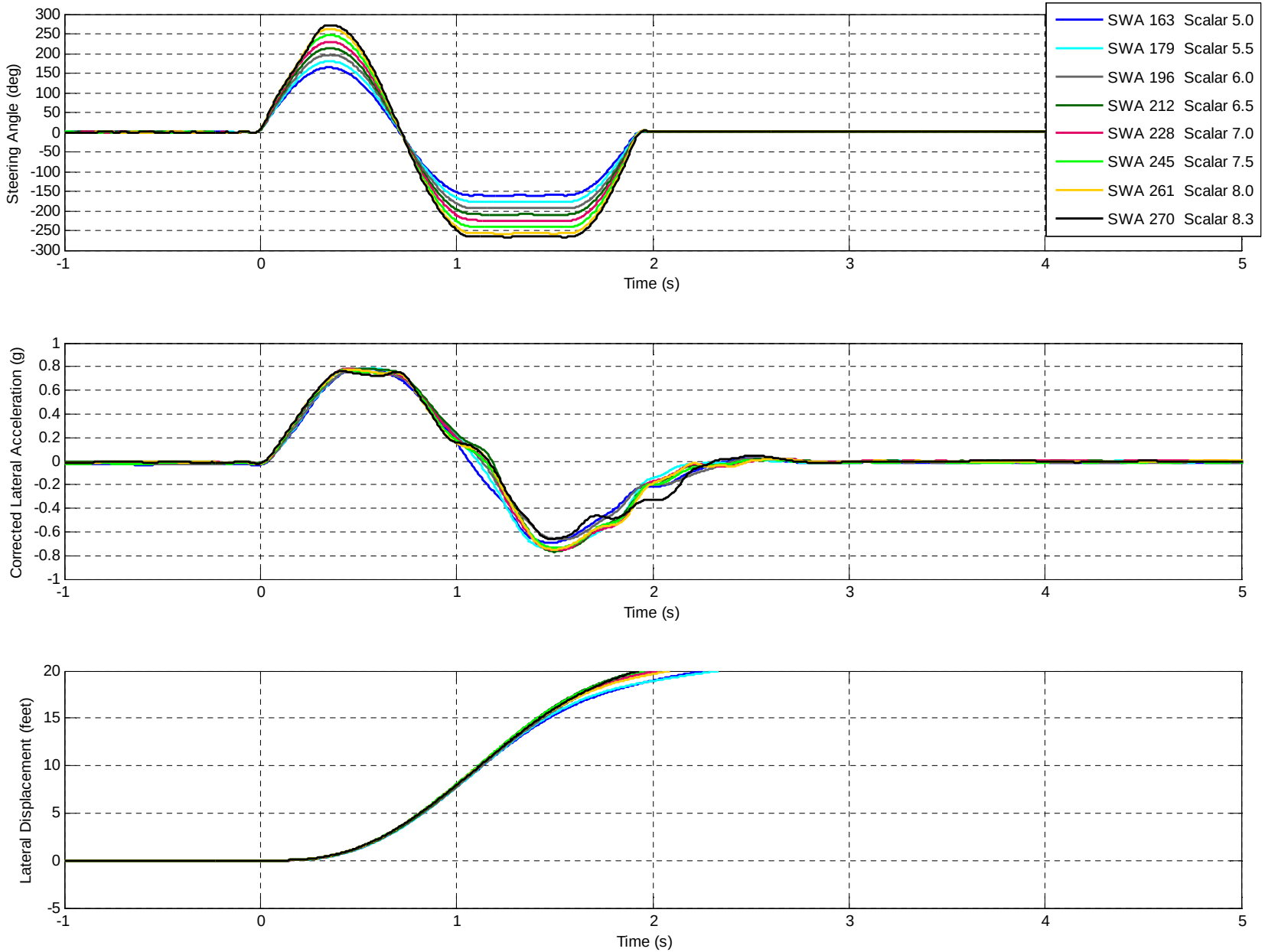
6.0 2010 LEXUS GX460 (POST-ECU FLASH) DATA PLOTS…continued

Figure 3. Steering Angle and Yaw Rate Time History, Clockwise Initial Steer Tests



6.0 2010 LEXUS GX460 (POST-ECU FLASH) DATA PLOTS…continued

Figure 4. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Clockwise Initial Steer Tests



7.0 OTHER DOCUMENTATION

7.1 OWNER'S MANUAL PAGES
7.2 VEHICLE ARRIVAL CONDITION REPORT
7.3 VEHICLE COMPLETION CONDITION REPORT
7.4 SINE WITH DWELL TEST RESULTS
7.5 SLOWLY INCREASING STEER TEST RESULTS
7.6 INERTIAL SENSING SYSTEM LOCATION COORDINATES

7.1 OWNER'S MANUAL PAGES

Driving assist systems

To help enhance driving safety and performance, the following systems operate automatically in response to various driving situations. Be aware, however, that these systems are supplementary and should not be relied upon too heavily when operating the vehicle.

- ABS (Anti-lock Brake System)

  Helps to prevent wheel lock when the brakes are applied suddenly, or if the brakes are applied while driving on a slippery road surface

- Multi Terrain ABS (Anti-lock Brake System) (vehicles with a Multi-terrain Select system)

  Helps to prevent wheel lock when the brakes are applied suddenly, or if the brakes are applied while driving on a slippery road surface, or in off-road conditions (such as rough roads, sand and mud)

  The Multi Terrain ABS operates in synchronization with the Multi-terrain Select

- Brake assist

  Generates an increased level of braking force after the brake pedal is depressed when the system detects a panic stop situation

- VSC (Vehicle Stability Control)

  Helps the driver to control skidding when swerving suddenly or turning on slippery road surfaces

When the VSC/TRAC or Active TRAC/hill-start assist control systems are operating

If the vehicle is in danger of slipping or rolling backward when starting on an incline, or if any of the drive wheels spins, the slip indicator light flashes to indicate that the VSC/TRAC or Active TRAC/hill-start assist control systems are operating.

A buzzer (intermittent) sounds to indicate that VSC is operating.

The stop lights and high mounted stoplight turn on when the hill-start assist control system is operating.

Disabling the TRAC or Active TRAC/VSC systems

If the vehicle gets stuck in fresh snow or mud, the TRAC or Active TRAC/VSC systems may reduce power from the engine to the wheels. You may need to turn the system off to enable you to rock the vehicle in order to free it.

n Turning off TRAC or Active TRAC system only

To turn the TRAC or Active TRAC system off, quickly press and release the button.

The TRAC OFF will be shown on the multi-information display.

Press the button again to turn the system back on.

n Turning off both TRAC or Active TRAC and VSC systems

To turn the TRAC or Active TRAC and VSC systems off, press and hold the button for more than 3 seconds while the vehicle is stopped.

The VSC OFF indicator light will come on and the TRAC OFF will be shown on the multi- information display.

Press the button again to turn the system back on.

n Hill-start assist control operation conditions

- The shift lever is in D or S.
- The brake pedal is not depressed.

n Sounds and vibrations caused by the ABS/Multi Terrain ABS, brake assist, VSC, TRAC/Active TRAC and hill-start assist control systems

- A sound may be heard from the engine compartment when the engine is started or just after the vehicle begins to move. This sound does not indicate that a malfunction has occurred in any of these systems.
- Any of the following conditions may occur when the above systems are operating. None of these indicates that a malfunction has occurred.
  - Vibrations may be felt through the vehicle body and steering.
  - A motor sound may be heard after the vehicle comes to a stop.
  - The brake pedal may pulsate slightly after the ABS/Multi Terrain ABS is activated.
  - The brake pedal may move down slightly after the ABS/Multi Terrain ABS is activated.

n Reactivation of the TRAC or Active TRAC/VSC systems after turning off the engine

Turning off the engine after turning off the TRAC or Active TRAC/VSC systems will automatically reactivate them.

n Reactivation of the TRAC or Active TRAC system linked to vehicle speed

When only the TRAC or Active TRAC system is turned off, the TRAC or Active TRAC system will turn on when vehicle speed increases. However, when both TRAC or Active TRAC and VSC systems are turned off, the systems will not turn on even when vehicle speed increases.

n **When the brake system operates continuously**

The brake actuator may overheat. In this case, the TRAC or Active TRAC and hill-start assist control systems will stop operating, a buzzer will sound and the TRAC OFF will be shown on the multi-information display. Refrain from using the system until the message goes off. (There is no problem with continuing normal driving.)

n **If the slip indicator comes on...**

It may indicate a malfunction in the VSC, TRAC/Active TRAC or hill-start assist control system. Consult your Lexus dealer.

⚠ CAUTION

n **The ABS/Multi Terrain ABS does not operate effectively when**

- Tires with inadequate gripping ability are used (such as excessively worn tires on a snow covered road).
- The vehicle hydroplanes while driving at high speed on wet or slick roads.

n **Stopping distance when the ABS/Multi Terrain ABS is operating will exceed that of normal conditions**

The ABS/Multi Terrain ABS is not designed to shorten the vehicle's stopping distance. Always maintain a safe distance from the vehicle in front of you in the following situations:

- When driving on dirt, gravel or snow-covered roads
- When driving with tire chains
- When driving over bumps in the road
- When driving over roads with potholes or roads with uneven surfaces

⚠ CAUTION

n **TRAC/Active TRAC may not operate effectively when**

Directional control and power may not be achievable while driving on slippery road surfaces, even if the TRAC/Active TRAC is operating.
Do not drive the vehicle in conditions where stability and power may be lost.

n **Hill- start assist control does not operate effectively when**

Do not overly rely on the hill-start assist control. The hill-start assist control may not operate effectively on steep inclines and roads covered with ice.

n **When the VSC is activated**

The slip indicator light flashes and a warning buzzer sounds. Always drive carefully. Reckless driving may cause an accident. Exercise particular care when the indicator light flashes and a buzzer sounds.

n **When the TRAC or Active TRAC/VSC systems are turned off**

Be especially careful and drive at a speed appropriate to the road conditions. As these are the systems to ensure vehicle stability and driving force, do not turn the TRAC or Active TRAC/VSC systems off unless necessary.

n **Replacing tires**

Make sure that all tires are of the same size, brand, tread pattern and total load capacity. In addition, make sure that the tires are inflated to the recommended tire inflation pressure level.

The ABS/Multi Terrain ABS and VSC systems will not function correctly if different tires are installed on the vehicle.
Contact your Lexus dealer for further information when replacing tires or wheels.

7.2 VEHICLE ARRIVAL CONDITION REPORT

CONTRACT NO. DTNH22-07-D-00060 DATE: 4/15/10

FROM: Germain Lexus

TO: TRC

PURPOSE: (X) Initial Receipt ( ) Received via Transfer ( ) Present vehicle condition

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2010 / Lexus / GX460 / MPV

MANUFACTURE DATE: 03/10 NHTSA NO.: CA5109

BODY COLOR: Black VIN: JTJBM7FX7A5010469

ODOMETER READING: 42 miles GVWR: 2,990 kg

PURCHASE PRICE: $ rented / leased DEALER'S NAME: Germain Lexus, 3885 West Dublin Granville Road, Dublin, OH 43016

X ALL OPTIONS LISTED ON "WINDOW STICKER" ARE PRESENT ON THE TEST VEHICLE

X TIRES AND WHEEL RIMS ARE NEW AND THE SAME AS LISTED

X THERE ARE NO DENTS OR OTHER INTERIOR OR EXTERIOR FLAWS

X THE VEHICLE HAS BEEN PROPERLY PREPARED AND IS IN RUNNING CONDITION

X THE GLOVE BOX CONTAINS AN OWNER'S MANUAL, WARRANTY DOCUMENT, CONSUMER INFORMATION, AND EXTRA SET OF KEYS

X PROPER FUEL FILLER CAP IS SUPPLIED ON THE TEST VEHICLE

X PLACE VEHICLE IN STORAGE AREA

X INSPECT THE VEHICLE'S INTERIOR AND EXTERIOR, INCLUDING ALL WINDOWS, SEATS, DOORS, ETC., TO CONFIRM THAT EACH SYSTEM IS COMPLETE AND FUNCTIONAL PER THE MANUFACTURER'S SPECIFICATIONS. ANY DAMAGE, MISADJUSTMENT, OR OTHER UNUSUAL CONDITION THAT COULD INFLUENCE THE TEST PROGRAM OR TEST RESULTS SHALL BE RECORDED. REPORT ANY ABNORMAL CONDITION TO THE NHTSA COTR BEFORE BEGINNING ANY TEST

RECORDED BY: Alan Ida DATE: 4-15-10
APPROVED BY: Jeff Sankey DATE: 5-31-10

7.3 VEHICLE COMPLETION CONDITION REPORT

CONTRACT NO. DTNH22-07-D-00060 DATE: 5/25/10

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2010 / Lexus / GX460 / MPV

MANUFACTURE DATE: 03/10 NHTSA NO.: CA5109

BODY COLOR: Black VIN: JTJBM7FX7A5010469

ODOMETER READING: 282 miles GVWR: 2,990 kg

LIST OF FMVSS TESTS PERFORMED BY THIS LAB: FMVSS 126
NHTSA Fishhook Test

X THERE ARE NO DENTS OR OTHER INTERIOR OR EXTERIOR FLAWS

X THE VEHICLE HAS BEEN PROPERLY MAINTAINED AND IS IN RUNNING CONDITION

X THE GLOVE BOX CONTAINS AN OWNER'S MANUAL, WARRANTY DOCUMENT, CONSUMER INFORMATION, AND EXTRA SET OF KEYS

X PROPER FUEL FILLER CAP IS SUPPLIED ON THE TEST VEHICLE

REMARKS:

Equipment that is no longer on the test vehicle as noted on Vehicle Arrival Condition Report:

None.

Explanation for equipment removal:

N/A

Test Vehicle Condition:

Like new.

RECORDED BY: Alan Ida DATE: 5-25-10
APPROVED BY: Jeff Sankey DATE: 5-31-10

7.4 SINE WITH DWELL TEST RESULTS
2010 Lexus GX460
NHTSA No.: CA5109

Date Created 20-May-10

LEFT-TO-RIGHT (INITIAL COUNTER-CLOCKWISE STEER)

File	SWA @ 5deg Ct	MES	Time@5deg	COS	Time@COS	MOS	Time@MOS	YRR1(%)	YR1 (deg/sec)	YRR1 Ct	YRR175(%)	YR175 (deg/sec)
0022	507	50.251	0.034	891	1.950	646	0.726	-1.193	-0.146	1091	-0.273	-0.033
0023	494	49.934	0.028	878	1.947	634	0.725	0.232	0.038	1078	0.082	0.013
0024	489	49.975	0.022	873	1.943	630	0.725	0.473	0.101	1073	-0.390	-0.083
0025	485	50.281	0.022	870	1.949	626	0.727	-0.707	-0.185	1070	-1.024	-0.268
0026	509	50.209	0.019	895	1.946	651	0.728	-0.702	-0.218	1095	-0.565	-0.175
0027	516	50.080	0.014	902	1.943	659	0.725	-0.770	-0.281	1102	-0.638	-0.233
0028	518	50.227	0.017	905	1.951	660	0.728	-1.240	-0.302	1105	-1.257	-0.307
0029	538	50.026	0.011	925	1.946	680	0.725	-1.165	-0.300	1125	-0.674	-0.174
0030	530	49.972	0.010	917	1.947	673	0.725	-0.510	-0.140	1117	-0.476	-0.130
0031	514	50.125	0.008	902	1.946	657	0.724	-0.606	-0.178	1102	-0.556	-0.163
0032	523	50.161	0.008	911	1.946	667	0.726	-0.561	-0.181	1111	-0.559	-0.180
0033	425	49.975	0.010	813	1.948	569	0.728	-1.209	-0.375	1013	-0.931	-0.289
0034	514	50.159	0.011	901	1.949	657	0.729	-0.600	-0.191	1101	-1.094	-0.348
0035	527	49.938	0.008	915	1.948	671	0.728	-0.545	-0.167	1115	-0.938	-0.288
0036	505	50.065	0.006	893	1.945	649	0.726	-1.121	-0.345	1093	-0.853	-0.262

RIGHT-TO-LEFT (INITIAL CLOCKWISE STEER)

0037	535	49.964	0.035	918	1.947	674	0.727	0.583	-0.072	1118	-0.543	0.067
0038	537	49.990	0.027	920	1.943	677	0.729	0.110	-0.018	1120	-0.339	0.056
0039	485	50.028	0.024	869	1.944	626	0.727	2.370	-0.505	1069	0.155	-0.033
0040	522	50.002	0.021	907	1.947	663	0.728	-0.513	0.132	1107	-1.014	0.262
0041	510	50.015	0.016	895	1.943	652	0.725	-0.281	0.085	1095	0.083	-0.025
0042	533	50.051	0.017	919	1.948	675	0.729	-0.539	0.192	1119	-0.405	0.144
0043	511	49.955	0.015	898	1.950	653	0.728	-1.698	0.390	1098	-0.921	0.211
0044	536	50.065	0.011	922	1.945	678	0.725	-0.934	0.248	1122	-0.383	0.102
0045	526	50.054	0.014	913	1.949	669	0.730	-0.624	0.178	1113	-1.126	0.321
0046	506	50.106	0.009	894	1.947	650	0.726	-0.528	0.151	1094	-0.677	0.194
0047	538	50.395	0.008	925	1.945	682	0.725	-0.617	0.187	1125	-0.732	0.222
0048	469	50.196	0.007	856	1.945	613	0.726	-1.289	0.406	1056	-0.722	0.228
0049	513	49.980	0.006	901	1.945	657	0.725	-0.666	0.203	1101	-0.281	0.086
0050	521	49.951	0.005	908	1.944	665	0.726	-0.690	0.212	1108	-0.579	0.178
0051	500	50.162	0.007	888	1.948	644	0.728	-0.962	0.276	1088	-0.579	0.166

7.4 SINE WITH DWELL TEST RESULTS
2010 Lexus GX460
NHTSA No.: CA5109

Date Created 20-May-10

LEFT-TO-RIGHT (INITIAL COUNTER-CLOCKWISE STEER)

File	YRR175 Ct	2nd Yaw Peak(deg/sec)	2nd Yaw Peak Ct	Lat Disp (ft)	Lat. Acc. 1.07s (g)	1st SWA Peak(deg)	1st SWA Peak Ct	2nd SWA Mean(deg)
0022	1241	12.222	766	-3.735	0.283	49.098	575	47.862
0023	1228	16.510	757	-4.895	0.338	65.202	564	63.634
0024	1223	21.307	746	-6.093	0.323	82.177	559	80.449
0025	1220	26.160	721	-7.059	0.245	98.213	555	96.347
0026	1245	31.070	739	-7.580	0.419	114.498	580	112.118
0027	1252	36.488	750	-8.062	0.323	130.734	587	128.059
0028	1255	24.386	738	-8.477	0.105	147.755	588	144.923
0029	1275	25.752	764	-8.778	-0.003	164.042	608	160.618
0030	1267	27.380	757	-8.875	0.005	180.217	600	176.437
0031	1252	29.363	740	-8.848	0.013	197.393	585	193.257
0032	1261	32.259	758	-9.088	-0.012	213.415	594	208.981
0033	1163	31.045	654	-8.814	0.057	229.542	497	224.955
0034	1251	31.794	744	-9.053	0.006	247.280	585	241.566
0035	1265	30.670	749	-8.825	0.053	262.821	599	257.301
0036	1243	30.722	725	-8.740	0.091	272.235	576	266.242

RIGHT-TO-LEFT (INITIAL CLOCKWISE STEER)

0037	1268	-12.346	790	3.628	-0.283	48.915	602	47.888
0038	1270	-16.596	789	4.724	-0.313	64.926	604	63.565
0039	1219	-21.301	755	5.830	-0.326	81.921	554	80.472
0040	1257	-25.813	762	6.846	-0.248	98.303	591	96.457
0041	1245	-30.289	746	7.575	-0.152	114.924	579	112.046
0042	1269	-35.660	762	8.176	-0.282	130.501	603	127.924
0043	1248	-22.949	736	8.468	0.035	147.592	582	144.848
0044	1272	-26.536	765	8.854	0.001	164.148	606	160.670
0045	1263	-28.512	764	8.903	0.069	180.401	597	176.376
0046	1244	-28.673	742	8.951	0.116	197.044	578	193.165
0047	1275	-30.310	785	9.127	0.143	213.300	609	209.252
0048	1206	-31.532	712	9.190	0.111	230.131	541	224.812
0049	1251	-30.492	749	9.215	0.123	246.906	584	241.851
0050	1258	-30.786	759	9.079	0.133	263.145	593	257.438
0051	1238	-28.657	731	9.099	0.166	272.147	572	266.361

7.5 SLOWLY INCREASING STEER TEST RESULTS
2010 Lexus GX460
NHTSA No.: CA5109

Date Created 20-May-10

File	Vehicle	EventPt	DOS	MES [mph]	Mean SPD [mph]	AYcount_3	THETAENCF_3 [degree]	AYCG_CD2_3 [g]	r_squared	ZeroBegin	ZeroEnd
0011	2010 Lexus GX460	518	1	50.13396166	49.90754538	1003	-32.65050887	-0.299914599	0.999050657	318	518
0012	2010 Lexus GX460	455	1	49.76061688	50.1342113	936	-31.51103655	-0.300509335	0.998198238	255	455
0013	2010 Lexus GX460	534	1	50.23710186	50.00962723	1037	-32.58287747	-0.297166654	0.998993136	334	534
0014	2010 Lexus GX460	492	0	49.82434214	50.34081552	993	33.13280246	0.303745902	0.997824299	292	492
0015	2010 Lexus GX460	541	0	50.42443439	49.88869989	1036	33.13839618	0.307500933	0.998653533	341	541
0016	2010 Lexus GX460	516	0	49.81412208	50.14634549	1009	32.61101301	0.301513203	0.997730447	316	516
	Averages						32.6	0.301725104			

Scalars	Steering Angles (deg)
1.5	49
2	65
2.5	82
3	98
3.5	114
4	130
4.5	147
5	163
5.5	179
6	196
6.5	212
7	228
7.5	245
8	261
8.3	270

7.6 INERTIA SENSOR MEASUREMENTS
2010 Lexus GX460
NHTSA No.: CA5109

Device : N10-02-03-01310
device version : 1.55
device certification date : 09/01/09
today is : 05/14/10
units : Millimeters

Label	ActualX	ActualY	ActualZ
C_DEVICEPOS001			
M_PLANE001	1373.703	-481.625	-363.018
M_LINE001	602.790	170.564	-63.286
M_ORIGIN_FRT_AXLE_CENTER	0.000	0.000	0.000
C_COORDSYS001	0.000	0.000	0.000
M_TIRE_TREAD_CENTER	355.781	180.870	-155.160
M_INERTIA_PACK	1525.603	964.105	481.504
M_TOP_OF_ROOF	2413.014	967.981	1418.701
M_GROUND	2413.586	-82.441	-363.791
Track Width		1587.500	
Roof Height (relative to ground)			1782.491
Motion Pak - x-distance	1525.603		
Motion Pak - y-distance		-10.516	
Motion Pak - z-distance			800.845
Motion Pak - x-distance (inches)	60.063		
Motion Pak - y-distance (inches)		-0.414	
Motion Pak - z-distance (inches)			31.529

x-distance (longitudinal)	Point of reference is the front axle centerline. (Positive from front axle toward rear of vehicle.)
y-distance (lateral)	Point of reference is the vehicle centerline. (Positive from the center toward the right.)
z-distance (vertical)	Point of reference is the ground plane. (Positive from the ground up.)