126-TRC-11-008

SAFETY COMPLIANCE TESTING FOR FMVSS 126
Electronic Stability Control Systems

Kia Motors Corporation
2011 Kia Soul
NHTSA No. CB0513

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

October 13, 2011

FINAL REPORT

Prepared Under Contract No.: DTNH22-08-D-00097

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

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16. Abstract A test was conducted on a 2011 Kia Soul, NHTSA No. CB0513, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-126-02 for the determination of FMVSS 126 compliance. Test failures identified were as follows: None			
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this test is to determine if the test vehicle, a MY 2011 Kia Soul meets the minimum equipment and performance requirements stated in Federal Motor Vehicle Safety Standard (FMVSS) 126, "Electronic Stability Control Systems."

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 2011 Kia Soul 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.

System malfunction simulations were executed to verify vehicle could identify and indicate a malfunction.

The vehicle's ESC System appears to meet the performance and equipment requirements as required by FMVSS 126. 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: Kia / Soul / MPV

VEHICLE NHTSA NO.: CB0513 VIN: KNDJT2A23B7306367

VEHICLE TYPE: MPV DATE OF MANUFACTURE: 04/11

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
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

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 3,500 kg (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

REMARKS

3.0 TEST DATA

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

NHTSA No.: CB0513 TEST DATE: 8-22-11

VIN: KNDJT2A23B7306367 MANUFACTURE DATE: 04/11

GVWR: 1,760 KG FRONT GAWR: 980 KG REAR GAWR 970 KG

SEATING POSITIONS: FRONT 2 REAR 3

ODOMETER READING AT START OF TEST: 139 (224) Miles (Kilometers)

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING:

Front Axle P205 / 55R 16 Rear Axle P205 / 55R 16

INSTALLED TIRE SIZE(S) ON VEHICLE:

From Tire Sidewall	Front Axle	Rear Axle
Manufacturer and Model	Nexen CP662	Nexen CP662
Tire Size Designation	P205 / 55R 16 89H	P205 / 55R 16 89H

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):

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

Drive Configuration _____
Mode(s) _____

Drive Configuration _____
Mode(s) _____

VEHICLE STABILITY SYSTEMS (Check applicable technologies):

X ESC X Traction Control X Roll Stability Control

_____ Active Suspension X Electronic Throttle Control _____ Active Steering

X ABS

List other systems; _____

REMARKS:

RECORDED BY: Alan Ida DATE: 8-22-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

NHTSA No.: CB0513 TEST DATE: 8-23-11

ESC SYSTEM IDENTIFICATION:

Manufacturer / Model Mando / MGH 60 ESC

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 SYSTEM OPERATIONAL CHARACTERISTICS:

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

List and describe component(s): Brake Slip Controller, Wheel Brake Cylinders, Hydraulic Control Unit

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 ECU collects signals from the wheel speed sensors, brake pressure sensor, steering wheel angle, yaw rate sensor, lateral acceleration sensor, and CAN output of the engine management system, which are fed to the signal processing and observer module. In this functional block, the signals are filtered, and the values of additional variables such as coefficient of friction, slip angle of wheels, and slip angle of the vehicle are estimated. The signals are used to determine estimated side slip or the 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: If wheel brake slip cannot sufficiently be reduced by pressure increase, the engine torque can be reduced using ignition or spark timing and cutting fuel delivery.

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. 15 km/h (9.3 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 can activate during all driving phases (acceleration, braking, coasting, during activation of the ABS or traction control), but ESC control is disabled during reverse driving and low speed driving.

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

DATA INDICATES COMPLIANCE PASS/FAIL PASS

RECORDED BY: Alan Ida DATE: 8-23-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

VEHICLE NHTSA NO. CB0513 TEST DATE: 8-24-11

ESC Malfunction Telltale

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

Telltale Location Instrument cluster, right side, between water temperature and fuel gauge

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: During ESC Activation, the ESC telltale flashes.

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, right side, between water temperature and fuel gauge

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: 8-24-11
APPROVED BY: Ken Webster DATE: 8-25-11

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)

_____X_____ Dedicated "ESC Off" control
_____ 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, below driver side vent

Labeling Skid car symbol with "Off" underneath

Modes ESC Off / Traction Control Off
ESC On / Traction Control On

Identify standard or default drive configuration Default – 2WD

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)
N/A		

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?

_____ 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?

_____ Yes ___X__ No

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

Ancillary Control: System N/A
Control Description
Labeling

Ancillary Control: System N/A
Control Description
Labeling

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
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)
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 _____ No (fail)

DATA INDICATES COMPLIANCE: PASS/FAIL PASS

REMARKS:

RECORDED BY: Alan Ida DATE: 8-24-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

NHTSA No.: CB0513 TEST DATE: 8-22-11

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

Peak Friction Coefficient (at least 0.9) 0.97

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

Tire Pressures: **Required:** Front Axle 230 kPa Rear Axle 230 kPa

Actual: LF: 230 kPa RF: 230 kPa LR: 230 kPa RR: 230 kPa

Vehicle Dimensions: Track Width 155.9 cm Wheelbase 255.1 cm

Roof Height 160.5 cm

Vehicle weight ratings: GAWR Front 980 KG GAWR Rear 970 KG

Unloaded Vehicle Weight (UVW)

Front Axle 814.4 KG Left Front 405.6 KG Right Front 408.8 KG

Rear Axle 503.0 KG Left Rear 255.8 KG Right Rear 247.2 KG

Total UVW 1,317.4 KG

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

Calculated Baseline Weight (UVW+ 73 kg) 1,390.4 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 854.0 KG Left Front 425.2 KG Right Front 428.8 KG

Rear Axle 542.0 KG Left Rear 275.4 KG Right Rear 266.6 KG

Total UVW w/ Outriggers 1,396.0 KG

Loaded Vehicle Weight w/ Driver and Instrumentation (No Ballast)

Front Axle 934.4 KG Left Front 473.6 KG Right Front 460.8 KG

Rear Axle 600.8 KG Left Rear 308.8 KG Right Rear 292.0 KG

Total Loaded Vehicle Weight 1,535.2 KG

Ballast Required = [**UVW w/ Outriggers** + 168 KG] - **Total Loaded Weight w/ Driver and Instrumentation**

= [1,396.0 KG + 168 KG] - 1,535.2 KG

= 28.8 KG

Total Loaded Vehicle Weight

Front Axle 947.6 KG Left Front 476.0 KG Right Front 471.6 KG

Rear Axle 616.4 KG Left Rear 314.6 KG Right Rear 301.8 KG

Total Loaded Vehicle Weight 1,564.0 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	100.5 cm	152.0 cm
y-distance	-0.9 cm	-1.9 cm
z-distance	61.0 cm	89.7 cm

Distance Between Ultrasonic Sensors: 178.3 cm

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

REMARKS:

RECORDED BY: Alan Ida DATE: 8-22-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

VEHICLE NHTSA No.: CB0513

Measured Cold Tire Pressures: LF 230 kPa RF 230 kPa

LR 230 kPa RR 230 kPa

Wind Speed 0.0 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)) 16.7 °C

Brake Conditioning Time; 7:03 AM Date; 8-23-11

56 km/h (35 mph) Brake Stops

Number of stops executed (10 required) 10 stops

Observed deceleration rate range (.5g target) 0.50 – 0.56 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 1.00 – 1.10 g

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

Duration of cool down period (5 minutes min.) 5:32 minutes

3.0 TEST DATA….continued

DATA SHEET 6 (Sheet 2 of 3)
BRAKE AND TIRE CONDITIONING

Tire Conditioning Series No. 1 Time: 7:21 AM Date: 8-23-11

Measured Tire Pressures: LF 238 kPa RF 238 kPa

LR 234 kPa RR 234 kPa

Wind Speed 0.0 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)) 16.7 °C

30 meter (100 ft) Diameter Circle Maneuver				
Test Runs	Steering Direction	Target Lateral Acceleration (g)	Observed Lateral Acceleration (g)	Observed Vehicle Speed (km/h)
1-3	Clockwise	0.5-0.6	0.55	32.2
4-6	Counterclockwise	0.5-0.6	0.55	32.2

1 Hz 5 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	0.27
2	56±2 (35±1)	60	0.5-0.6	0.49
3	56±2 (35±1)	70	0.5-0.6	0.54
4	56±2 (35±1)		0.5-0.6	

Steering wheel angle that corresponds to a peak 0.5–0.6g lateral acceleration; 70 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)	70 (cycles 1-10)	0.5-0.6	0.56
4	56±2 (35±1)	70 (cycles 1-9)	0.5-0.6	0.56
		140 (cycle 10)*	N/A	0.89

* 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)
BRAKE AND TIRE CONDITIONING

Tire Conditioning Series No. 2 Time: 10:16 AM Date: 8-23-11

Measured Tire Pressures: LF 241 kPa RF 241 kPa

LR 238 kPa RR 238 kPa

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)) 23.3 °C

30 meter (100 ft) Diameter Circle Maneuver				
Test Runs	Steering Direction	Target Lateral Acceleration (g)	Observed Lateral Acceleration (g)	Observed Vehicle Speed (km/h)
1-3	clockwise	0.5-0.6	0.55	32.2
4-6	counterclockwise	0.5-0.6	0.55	32.2

1 Hz 5 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)	N/A	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; 70 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)	70 (cycles 1-10)	0.5-0.6	0.54
4	56±2 (35±1)	70 (cycles 1-9)	0.5-0.6	0.54
		140 (cycle 10)*	N/A	0.90

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

REMARKS:

RECORDED BY: Alan Ida DATE: 8-23-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

VEHICLE NHTSA No.: CB0513 TEST DATE: 8-23-11

Wind Speed 0.0 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)) 18.3 °C

Static Data File Number: 0009

Selected Drive Configuration: 2WD

Selected Mode: default

Preliminary Left Steer Maneuver:

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

$a_{y,30\ degrees}$ = 0.37 g

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

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

δ_{SIS} = 44.6 degrees @ 0.55g

δ_{SIS} = 40 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	8:06 am	-28.5	Yes
0012	Left	8:09 am	-28.7	Yes
0014	Left	8:14 am	-28.7	Yes
0015	Right	8:17 am	28.3	Yes
0016	Right	8:20 am	27.7	Yes
0018	Right	8:25 am	29.2	Yes

3.0 TEST DATA….continued

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

Average Overall Steering Wheel Angle:

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

$\delta_{0.3\ g,\ overall}$ = 28.5 degrees
[to nearest 0.1 degree]

REMARKS:

RECORDED BY: Alan Ida DATE: 8-23-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

VEHICLE NHTSA No.: CB0513 TEST DATE: 8-23-11

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: 2WD
Selected Mode: default

Overall steering wheel angle ($\delta_{0.3\ g,\ overall}$) 28.5 degrees

Static Data File Number 0023

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
0024	10:40 am	1.5* $\delta_{0.3\ g}$	43	12.58	-0.19	-0.17	-1.53	Pass	-1.34	Pass
0025	10:43 am	2.0* $\delta_{0.3\ g}$	57	16.41	-0.19	-0.06	-1.16	Pass	-0.36	Pass
0026	10:46 am	2.5* $\delta_{0.3\ g}$	71	20.11	-0.09	-0.01	-0.46	Pass	-0.06	Pass
0027	10:49 am	3.0* $\delta_{0.3\ g}$	86	24.09	-0.16	-0.04	-0.66	Pass	-0.18	Pass
0028	10:52 am	3.5* $\delta_{0.3\ g}$	100	28.36	-0.06	-0.03	-0.20	Pass	-0.12	Pass
0029	10:55 am	4.0* $\delta_{0.3\ g}$	114	27.87	-0.22	-0.04	-0.78	Pass	-0.16	Pass
0030	10:58 am	4.5* $\delta_{0.3\ g}$	128	30.00	-0.14	-0.12	-0.47	Pass	-0.41	Pass
0031	11:02 am	5.0* $\delta_{0.3\ g}$	143	31.16	-0.09	-0.15	-0.29	Pass	-0.49	Pass
0032	11:07 am	5.5* $\delta_{0.3\ g}$	157	34.02	-0.06	-0.11	-0.17	Pass	-0.32	Pass
0033	11:10 am	6.0* $\delta_{0.3\ g}$	171	34.05	-0.05	-0.07	-0.14	Pass	-0.20	Pass
0034	11:13 am	6.5* $\delta_{0.3\ g}$	185	36.73	-0.20	-0.23	-0.54	Pass	-0.63	Pass
0035	11:16 am	7.0* $\delta_{0.3\ g}$	200	37.80	-0.12	-0.13	-0.32	Pass	-0.35	Pass
0036	11:19 am	7.5* $\delta_{0.3\ g}$	214	42.38	-0.06	-0.08	-0.14	Pass	-0.19	Pass
0037	11:22 am	8.0* $\delta_{0.3\ g}$	228	37.54	-0.14	-0.07	-0.38	Pass	-0.20	Pass
0038	11:25 am	8.5* $\delta_{0.3\ g}$	242	40.32	-0.06	0.13	-0.15	Pass	0.32	Pass
0040*	11:32 am	9.0* $\delta_{0.3\ g}$	257	40.79	-0.03	0.06	-0.09	Pass	0.14	Pass
0041	11:33 am	9.5* $\delta_{0.3\ g}$	270	44.81	-0.13	-0.07	-0.28	Pass	-0.16	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
0042	11:36 am	1.5* $\delta_{0.3\,g}$	43	-12.67	0.12	0.02	-0.95	Pass	-0.12	Pass
0043	11:39 am	2.0* $\delta_{0.3\,g}$	57	-16.81	0.15	0.04	-0.90	Pass	-0.21	Pass
0044	11:42 am	2.5* $\delta_{0.3\,g}$	71	-20.44	0.20	0.08	-0.99	Pass	-0.41	Pass
0045	11:45 am	3.0* $\delta_{0.3\,g}$	86	-24.60	0.01	-0.14	-0.02	Pass	0.56	Pass
0046	11:48 am	3.5* $\delta_{0.3\,g}$	100	-28.72	0.05	-0.09	-0.19	Pass	0.31	Pass
0047	11:51 am	4.0* $\delta_{0.3\,g}$	114	-29.29	0.13	0.02	-0.46	Pass	-0.08	Pass
0048	11:54 am	4.5* $\delta_{0.3\,g}$	128	-30.47	0.23	0.20	-0.75	Pass	-0.67	Pass
0049	11:57 am	5.0* $\delta_{0.3\,g}$	143	-33.64	0.12	0.13	-0.36	Pass	-0.39	Pass
0050	12:00 pm	5.5* $\delta_{0.3\,g}$	157	-36.52	0.24	0.19	-0.65	Pass	-0.53	Pass
0051	12:03 pm	6.0* $\delta_{0.3\,g}$	171	-38.32	0.13	0.10	-0.33	Pass	-0.26	Pass
0052	12:06 pm	6.5* $\delta_{0.3\,g}$	185	-34.27	0.05	-0.03	-0.16	Pass	0.10	Pass
0053	12:09 pm	7.0* $\delta_{0.3\,g}$	200	-35.50	0.07	0.00	-0.18	Pass	0.00	Pass
0054	12:14 pm	7.5* $\delta_{0.3\,g}$	214	-36.47	0.16	0.03	-0.44	Pass	-0.07	Pass
0055	12:19 pm	8.0* $\delta_{0.3\,g}$	228	-37.34	0.19	0.06	-0.52	Pass	-0.16	Pass
0056	12:22 pm	8.5* $\delta_{0.3\,g}$	242	-42.05	0.29	0.10	-0.69	Pass	-0.23	Pass
0057	12:25 pm	9.0* $\delta_{0.3\,g}$	257	-43.90	0.17	0.15	-0.39	Pass	-0.35	Pass
0058	12:28 pm	9.5* $\delta_{0.3\,g}$	270	-38.26	0.05	-0.03	-0.13	Pass	0.07	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 sine with dwell 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
0031	Counter Clockwise	5.0* $\delta_{0.3\ g}$	143	2.67	Pass
0032	Counter Clockwise	5.5* $\delta_{0.3\ g}$	157	2.77	Pass
0033	Counter Clockwise	6.0* $\delta_{0.3\ g}$	171	2.75	Pass
0034	Counter Clockwise	6.5* $\delta_{0.3\ g}$	185	2.88	Pass
0035	Counter Clockwise	7.0* $\delta_{0.3\ g}$	200	2.87	Pass
0036	Counter Clockwise	7.5* $\delta_{0.3\ g}$	214	3.01	Pass
0037	Counter Clockwise	8.0* $\delta_{0.3\ g}$	228	3.10	Pass
0038	Counter Clockwise	8.5* $\delta_{0.3\ g}$	242	3.19	Pass
0040	Counter Clockwise	9.0* $\delta_{0.3\ g}$	257	3.20	Pass
0041	Counter Clockwise	9.5* $\delta_{0.3\ g}$	270	3.03	Pass
0049	Clockwise	5.0* $\delta_{0.3\ g}$	143	2.73	Pass
0050	Clockwise	5.5* $\delta_{0.3\ g}$	157	2.86	Pass
0051	Clockwise	6.0* $\delta_{0.3\ g}$	171	2.92	Pass
0052	Clockwise	6.5* $\delta_{0.3\ g}$	185	3.05	Pass
0053	Clockwise	7.0* $\delta_{0.3\ g}$	200	3.08	Pass
0054	Clockwise	7.5* $\delta_{0.3\ g}$	214	3.12	Pass
0055	Clockwise	8.0* $\delta_{0.3\ g}$	228	3.10	Pass
0056	Clockwise	8.5* $\delta_{0.3\ g}$	242	3.15	Pass
0057	Clockwise	9.0* $\delta_{0.3\ g}$	257	3.27	Pass
0058	Clockwise	9.5* $\delta_{0.3\ g}$	270	3.24	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: *On Maneuver #0040, the time indicates more than 5 minute from previous maneuver since Maneuver #0039 was discarded due to steering controller malfunction.

RECORDED BY: Alan Ida DATE: 8-23-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

VEHICLE NHTSA No.: CB0513 TEST DATE: 8-24-11

METHOD OF MALFUNCTION SIMULATION:
Describe method of malfunction simulation: Disconnect the Right 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 Seconds (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 telltales. When the wheel speed sensor was disconnected, the ESC and ABS malfunction telltales illuminated. After the wheel speed sensor connector was restored, the ESC and ABS malfunction telltales had extinguished.

RECORDED BY: Alan Ida DATE: 8-24-11
APPROVED BY: Ken Webster DATE: 8-25-11

3.0 TEST DATA….continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Kia / Soul / MPV

VEHICLE NHTSA No.: CB0513 TEST DATE: 8-24-11

METHOD OF MALFUNCTION SIMULATION:
Describe method of malfunction simulation: Disconnect the brake pedal stop switch 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 Seconds (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 brake pedal stop switch connector was removed, the ESC malfunction telltale illuminated. After the brake pedal stop switch connector was restored, the ESC malfunction telltale extinguished.

RECORDED BY: Alan Ida DATE: 8-24-11
APPROVED BY: Ken Webster DATE: 8-25-11

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 0-60psi	N/A	By: TRC Date: 6-14-11 Due: 9-12-11
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 Toledo Date: 8-11-11 Due: 11-11-11
Automated Steering Machine with Steering Angle Encoder	Handwheel Angle	±800 deg	0.25 deg	±0.25 deg	Heitz Automotive Testing Model: Sprint 3	60303	By: ATI-Heitz Date: 2-18-11 Due: 2-18-12
Multi-Axis Inertial Sensing System	Longitudinal, Lateral, and Vertical Acceleration Roll, Yaw, and Pitch Rate	Accelerometers: ±2 g Angular Rate Sensors: ±100 deg/s	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: 1-10-11 Due: 1-10-12
Radar Speed Sensor and Dashboard Display	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: B+S Multidata Date: 2-14-11 Due: 2-14-12
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	104619 & 104613	By: Consumers Energy Laboratory Services Date: 1-20-11 Due: 1-20-12
Data Acquisition System [Amplify, Anti-Alias, and Digitize]	Record Time; Velocity; Distance; 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	Dewetron Sidehand DAS Model: DA-121-16 Digitizer Model: Dewe-Orion-1616-100 Amplifier/AntiAliasing: MDAQ-FILT-10-S	12060 1105	By: Dewetron Date: 12-02-10 Due: 12-02-11
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	U12-05-08-07116*	By: FARO Date: 12-27-10 Due: 12-27-11
Outriggers	No output. Safety Item.	N/A	N/A	N/A	NHTSA Titanium Outriggers Model: Docket 2007-27662-11	N/A	N/A

*Note: TRC Inc.'s FARO Arm was sent out for calibration at the time of the test, therefore, GFP was utilized from VRTC.

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 OFF TELLTALE
5.7 ESC MALFUNCTION 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
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

2011 KIA SOUL
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VEHICLE No.: CB0513
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5.1 ¾ FRONT VIEW FROM LEFT SIDE OF VEHICLE

5.2 ¾ REAR VIEW FROM RIGHT SIDE OF VEHICLE

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2011 KIA SOUL
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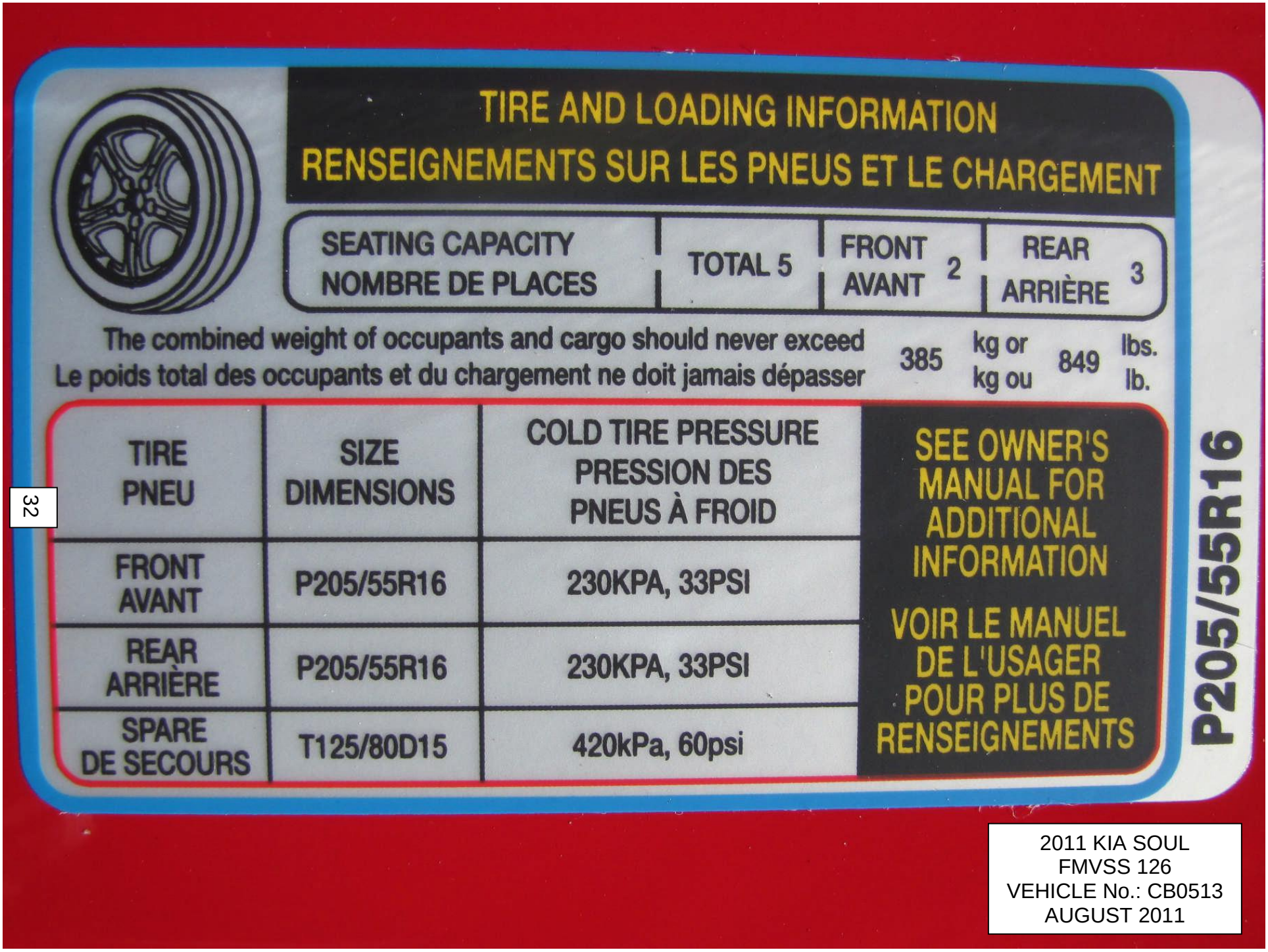
5.3 VEHICLE CERTIFICATION LABEL



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5.4 TIRE AND LOADING INFORMATION LABEL

2011 B2522 KIA SOUL +
MODEL YEAR MODEL MODEL DESCRIPTION

MOLTEN/BLK
EXTERIOR / INTERIOR COLOR

KNDJT2A23B7306367 G4GCBH57
VEHICLE NUMBER ENGINE NUMBER

TACOMA TRUCK
PORT OF ENTRY MODE OF TRANSPORTATION

SOLD TO:
MI024
SUMMIT PLACE KIA
2200 ELIZABETH LAKE ROAD
WATERFORD MI 48328

SHIP TO:
MI024

STANDARD FEATURES

MECHANICAL
2.0L 16-Valve DOHC CVVT 4-Cylinder Engine
4-Speed Automatic Transmission
16" Tires with Alloy Wheels
Front and Rear Disc Brakes

SAFETY
Dual Front Advanced Airbags
Front Seat-Mounted Side Airbags
Full-Length Side Curtain Airbags
3-Point Seatbelts for All Seating Positions
Front Active Headrests
Lower Anchors and Tethers for Children (LATCH)
Anti-Lock Brake System (ABS) w/Brake Assist (BAS)
Traction Control System (TCS)
Electronic Stability Control (ESC)
Tire Pressure Monitoring System (TPMS)

INTERIOR
Air Conditioning
Power Windows, Door Locks & Outside Mirrors
Keyless Entry w/ Folding Key
AM/FM/CD/MP3 Audio w/6 Speakers
SIRIUS Satellite Radio w/ a 3-month complimentary subscription included**
USB and Auxiliary Input Jacks
60/40 Split Folding Rear Seats
Cruise Control
BLUETOOTH Wireless Technology
Tilt Steering Column

ERIOR
k Front Fender Garnish
able Intermittent Front Wipers
Wiper & Washer
Solar Glass
Privacy Glass

WARRANTY
10 Year/100,000 Mile Limited Powertrain Warranty
5 Year/60,000 Mile Limited Basic Warranty
5 Year/60,000 Mile Roadside Assistance
**Ask dealer for details

MANUFACTURER'S SUGGESTED RETAIL PRICE ➤	$16,495.00
ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features)	
Rear Bumper Applique	$50.00
Body Kit	$1,295.00
Carpeted Floor Mats	$95.00
Wheel Locks	$45.00
MSRP INCLUDING OPTIONS	$17,980.00
INLAND FREIGHT AND HANDLING	$695.00
TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE ➤	$18,675.00

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. License and title fees, state and local taxes and other dealer installed options and accessories are not included in the manufacturer's suggested retail price.

TOTAL ADDITIONAL WEIGHT: 48.2

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EPA Fuel Economy Estimates

These estimates reflect new EPA methods beginning with 2008 models.

CITY MPG
24
Expected range for most drivers
19 to 29 MPG

Estimated Annual Fuel Cost
$1732.00
based on 15,000 miles at $3.00 per gallon

Combined Fuel Economy
This Vehicle
26
19 — 34
SMALL STATION WAGON

HIGHWAY MPG
30
Expected range for most drivers
24 to 36 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

GOVERNMENT SAFETY RATINGS

Frontal Crash — Driver ★★★★ / Passenger ★★★★
Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat ★★★★ / Rear seat ★★★★★
Star ratings based on the risk of injury in a side impact.

Rollover ★★★★
Star ratings based on the risk of rollover in a single vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.

Source: National Highway Traffic Safety Administration (NHTSA).

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

Environmental Performance

Protect the environment, choose vehicles with **higher scores:**

Global Warming Score: 8 (1 — Average new vehicle — 10 Cleanest)
Smog Score: 5 (1 — Average new vehicle — 10 Cleanest)

Using alternative fuels may improve scores. See www.DriveClean.ca.gov

Vehicle emissions are a primary contributor to global warming and smog. Scores are determined by the California Air Resources Board based on this vehicle's measured emissions. Please visit www.DriveClean.ca.gov for more information. California Environmental Protection Agency AIR RESOURCES BOARD

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 3%

MAJOR SOURCES OF FOREIGN PARTS:

KOREA: 94%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE FINAL ASSEMBLY POINT:
KOREA

COUNTRY OF ORIGIN
ENGINE : KOREA
TRANSMISSION : KOREA

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5.5 WINDOW STICKER - MONRONEY LABEL

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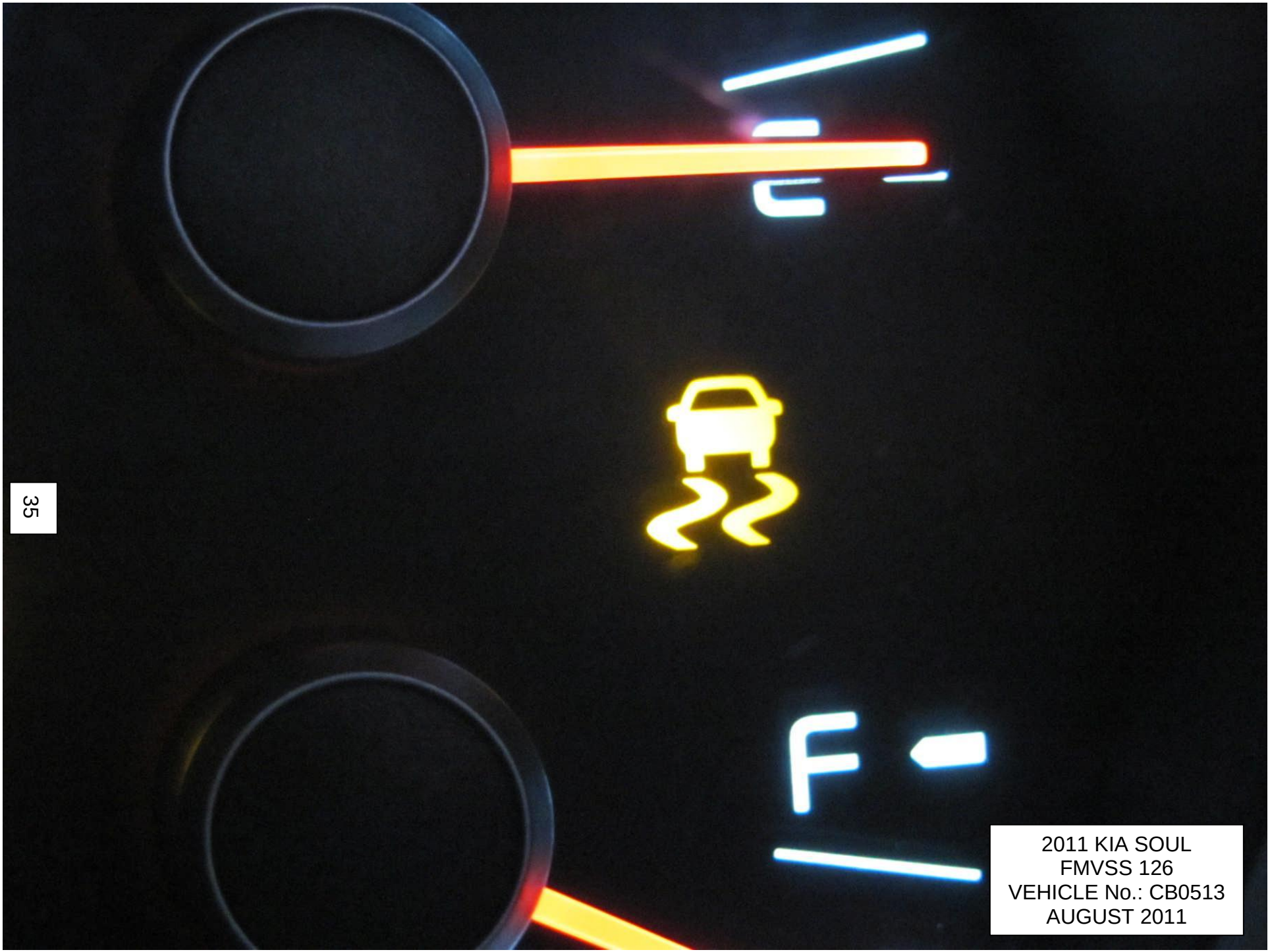
VEHICLE No.: CB0513
AUGUST 2011

5.6 ESC OFF TELLTALE



5.7 ESC MALFUNCTION TELLTALE

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FMVSS 126
VEHICLE No.: CB0513
AUGUST 2011

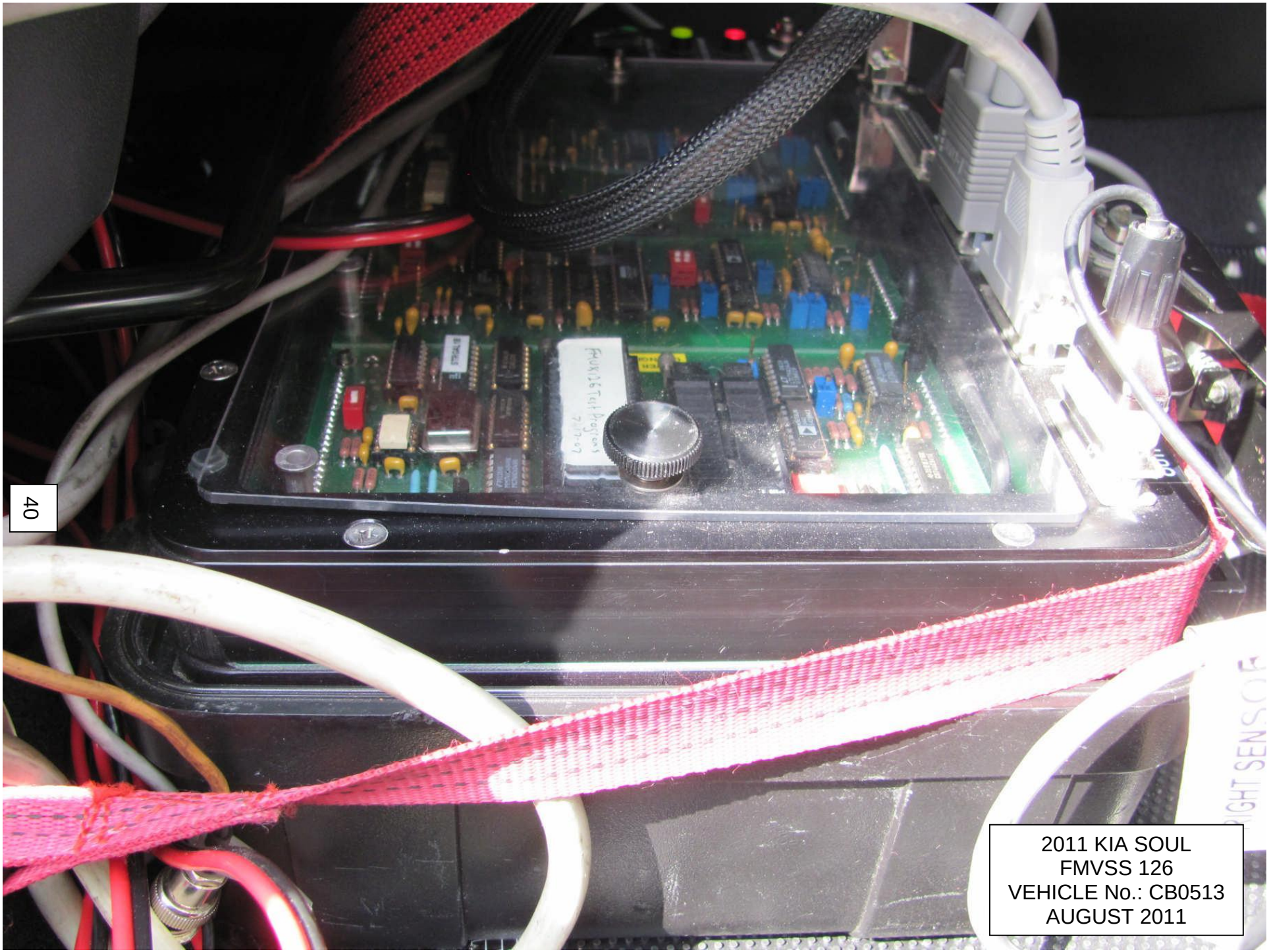
5.8 ESC OFF CONTROL

5.9 ¾ FRONT VIEW - TEST VEHICLE INSTRUMENTED

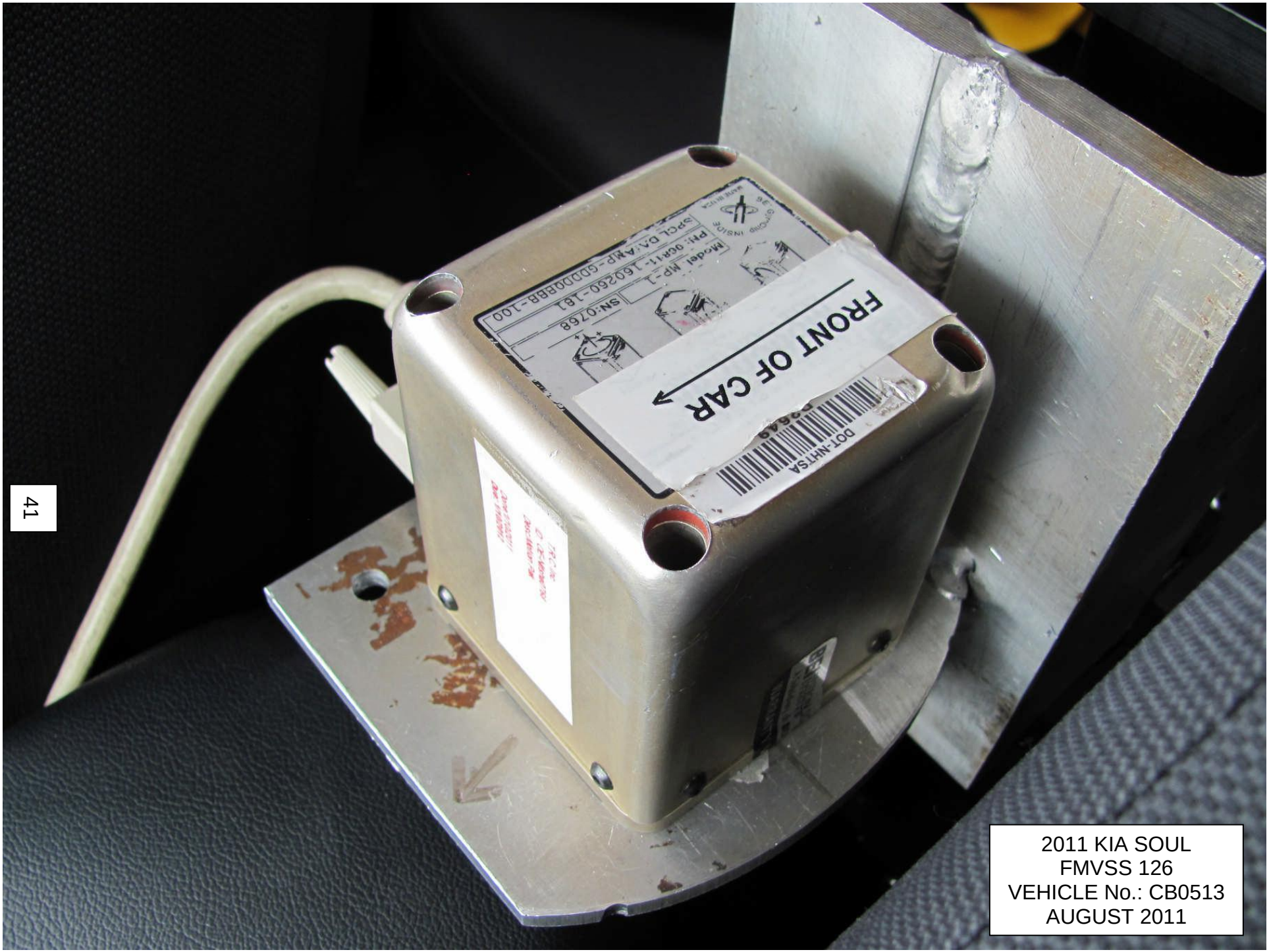
5.10 ¾ REAR VIEW - TEST VEHICLE INSTRUMENTED

2011 KIA SOUL
FMVSS 126
VEHICLE No.: CB0513
AUGUST 2011

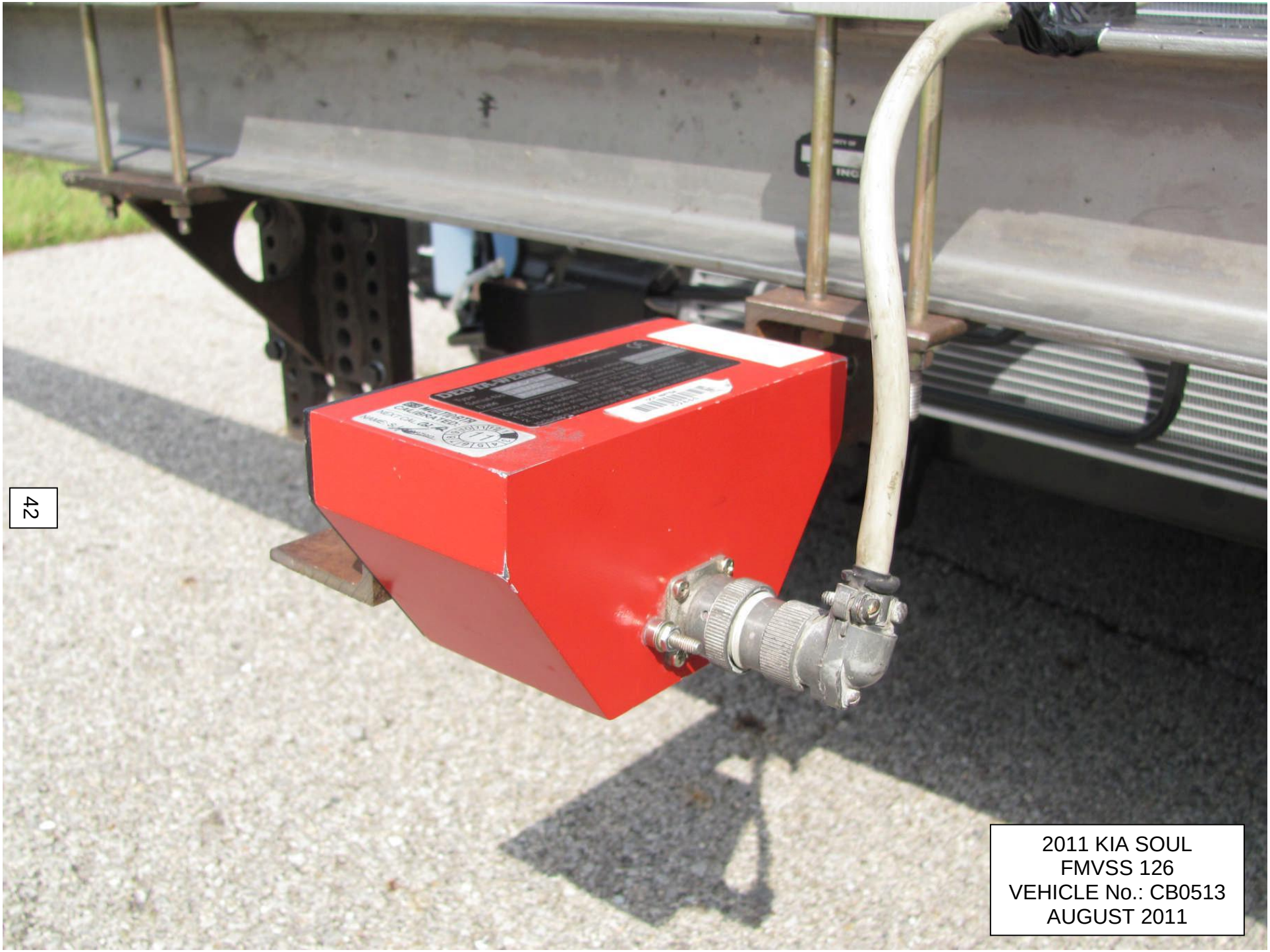
5.11 STEERING WHEEL CONTROLLER AND DATA ACQUISITION SYSTEM



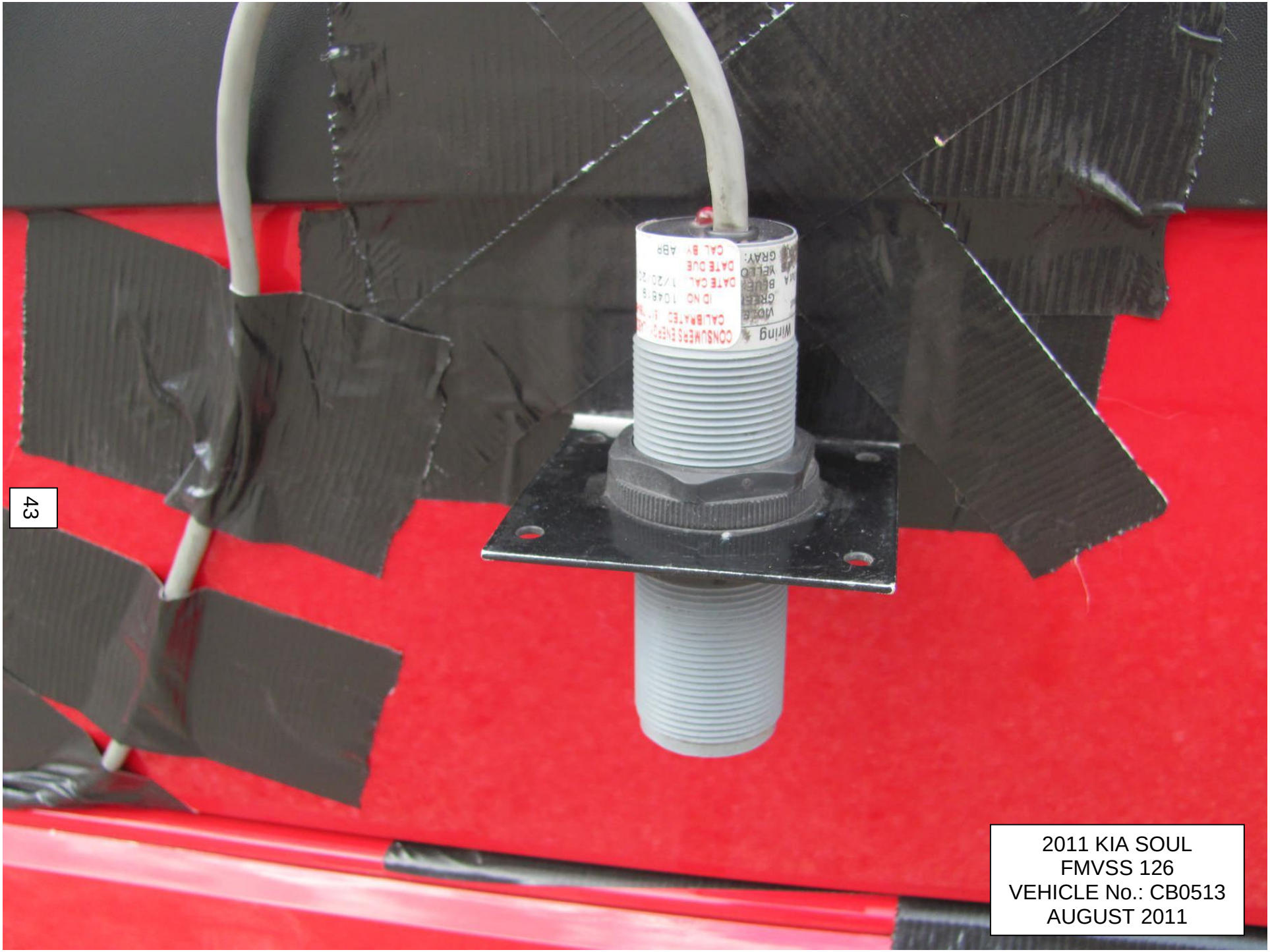
5.12 STEERING CONTROLLER BATTERY BOX



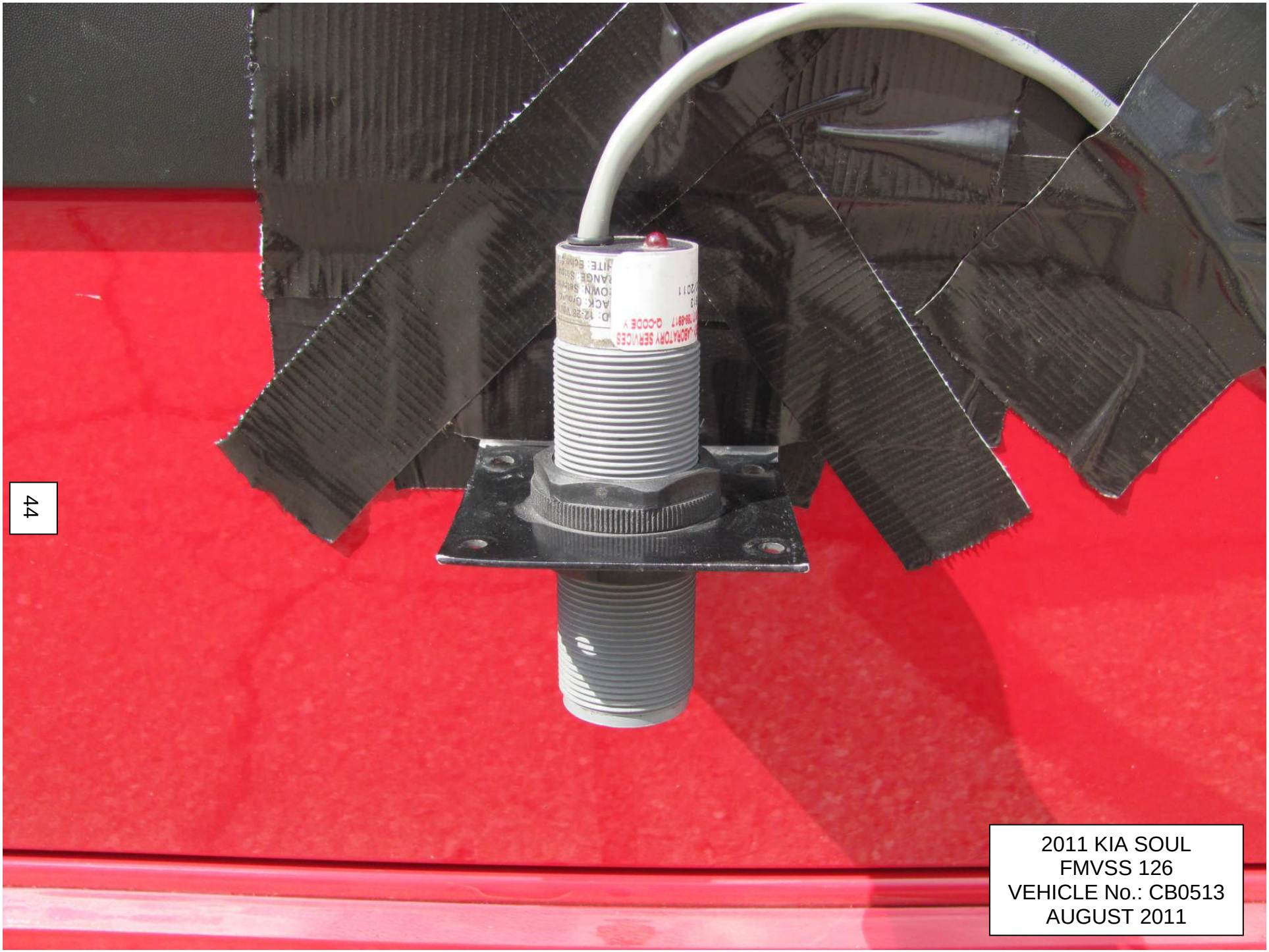
5.13 INERTIA MEASUREMENT UNIT



5.14 VEHICLE SPEED SENSOR



5.15 BODY ROLL SENSOR (DRIVER SIDE)



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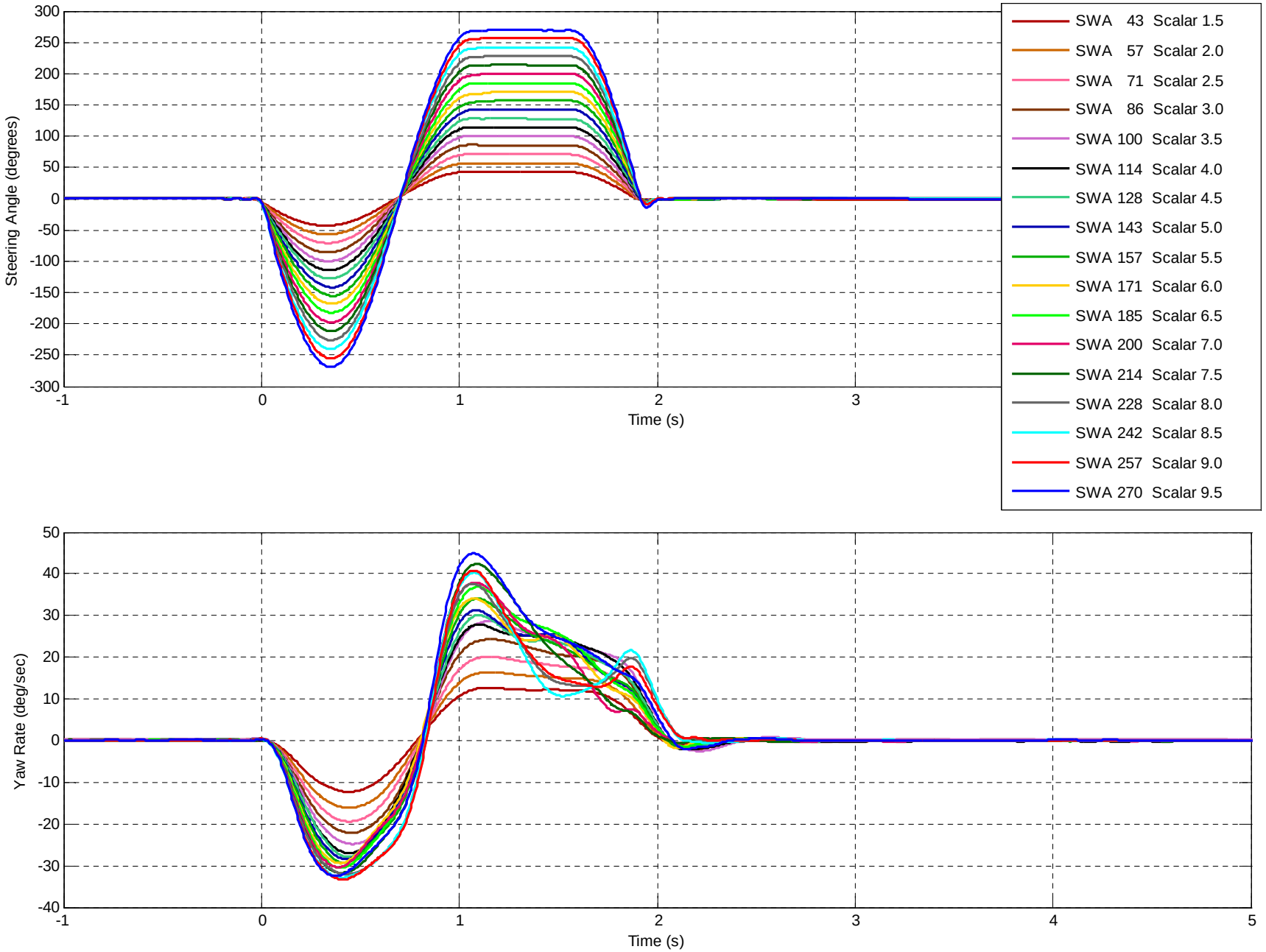
5.16 BODY ROLL SENSOR (PASSENGER SIDE)

5.17 BRAKE PEDAL FORCE TRANSDUCER

6.0 DATA PLOTS

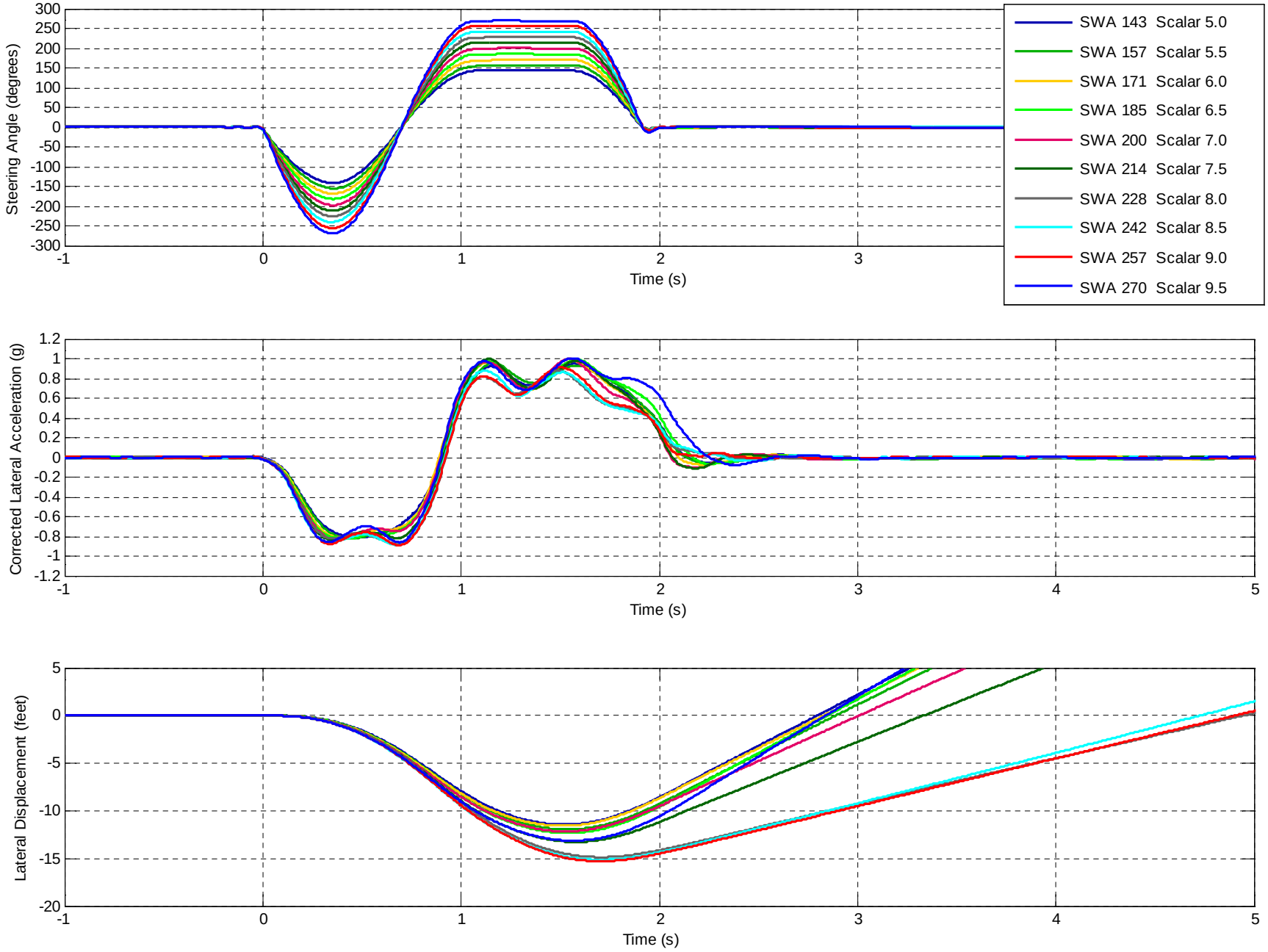
6.0 2011 KIA SOUL DATA PLOTS

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



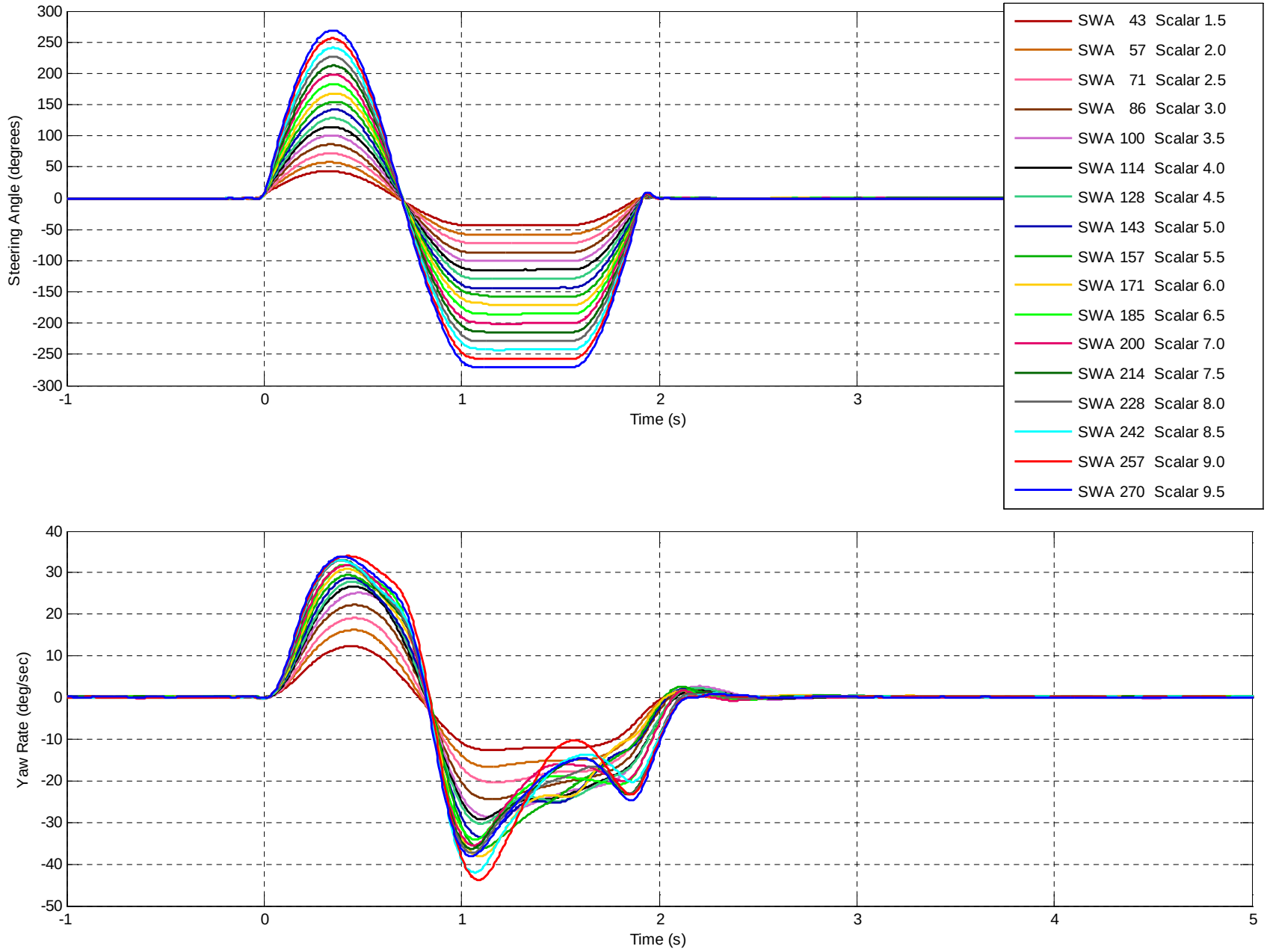
6.0 2011 KIA SOUL DATA PLOTS…continued

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



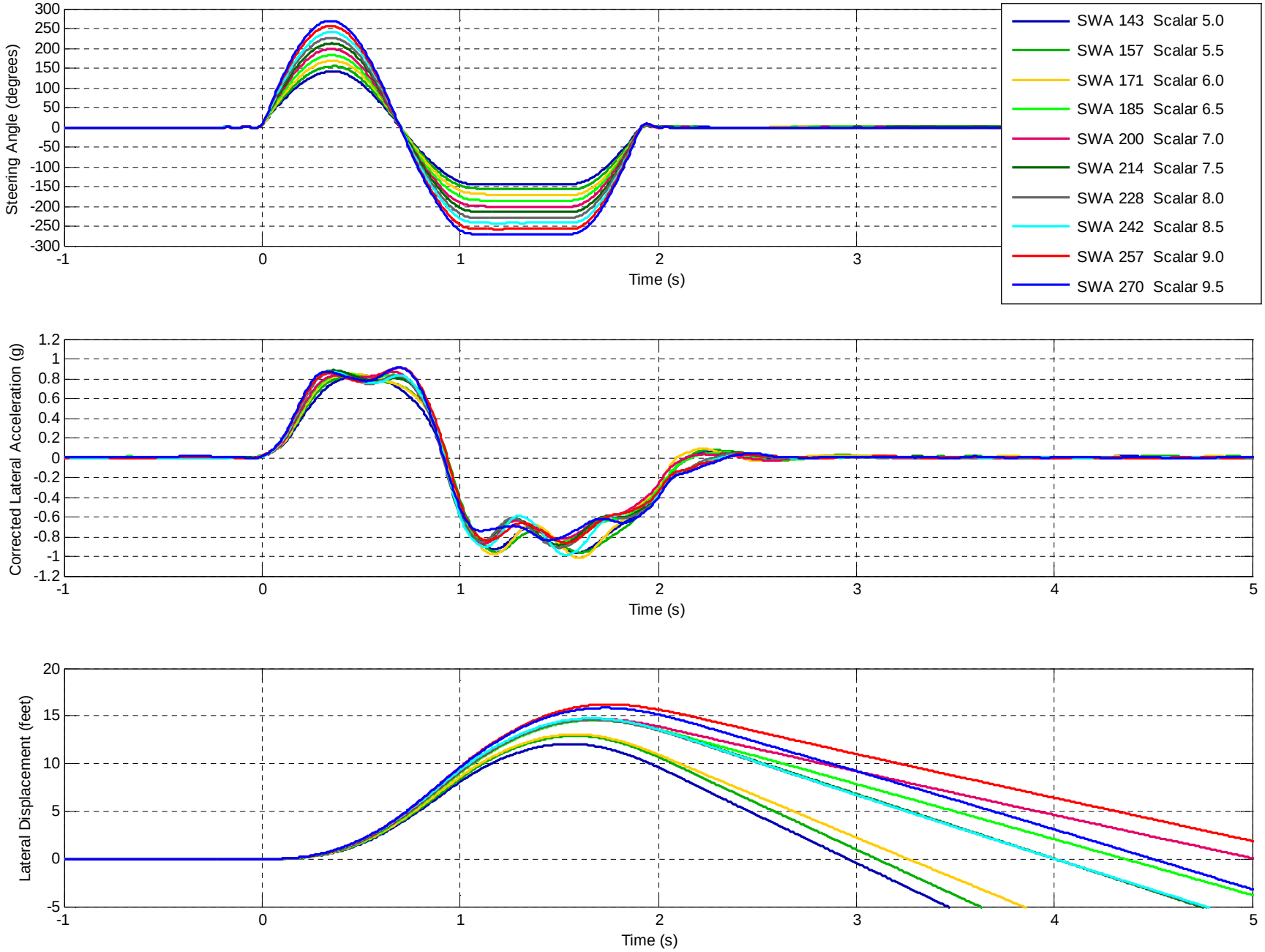
6.0 2011 KIA SOUL DATA PLOTS…continued

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



6.0 2011 KIA SOUL DATA PLOTS…continued

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



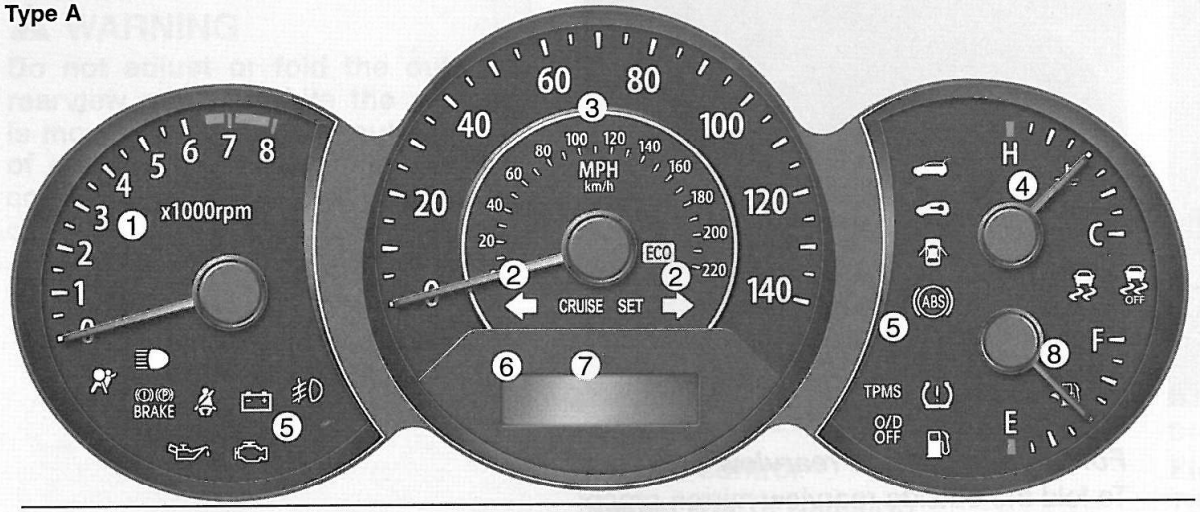
7.0 OTHER DOCUMENTATION

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

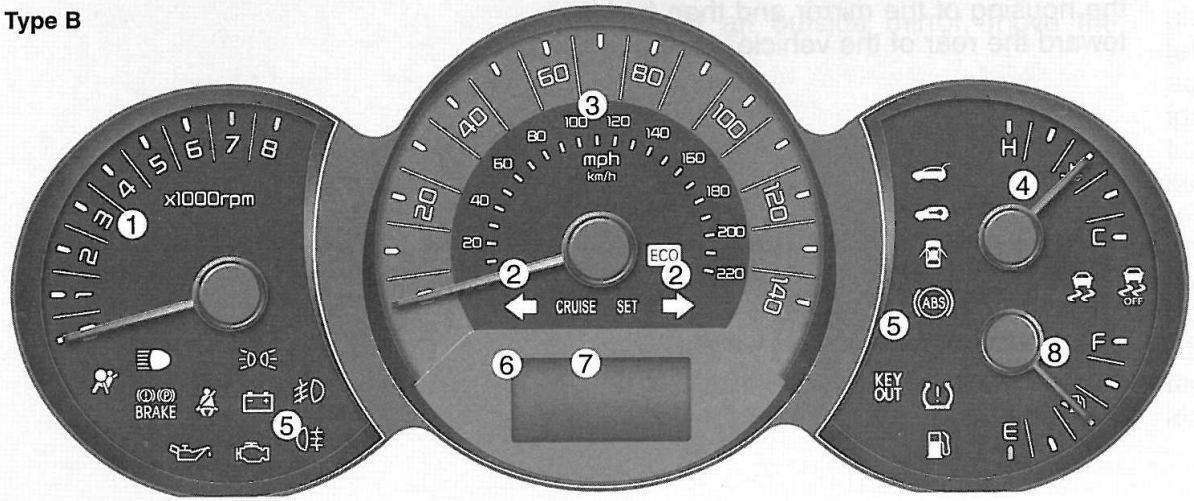
7.1 OWNER'S MANUAL PAGES

INSTRUMENT CLUSTER

Type A



Type B



D150000AAM-EU

1. Tachometer
2. Turn signal indicators
3. Speedometer
4. Engine temperature gauge
5. Warning and indicator lights
6. Shift position indicator* (Automatic transaxle only)
7. Odometer/Tripmeter*
8. Fuel gauge

* if equipped

* The actual cluster in the vehicle may differ from the illustration.
For more details refer to the "Gauges" in the next pages.

OAM049030N-1/OAM040130N

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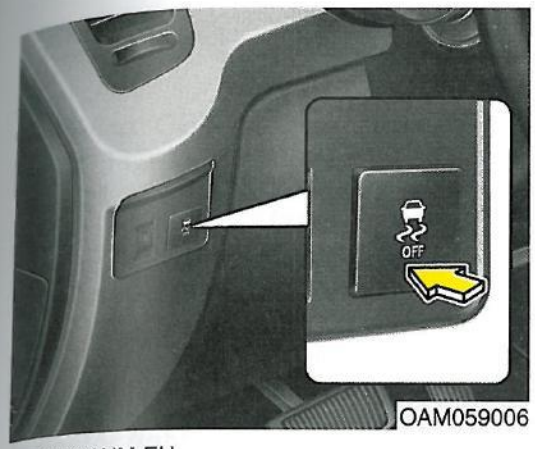
7.1 OWNER'S MANUAL PAGES



E070500AHM-EU

Electronic stability control (ESC) (If equipped)

The Electronic Stability control (ESC) system is designed to stabilize the vehicle during cornering maneuvers. ESC checks where you are steering and where the vehicle is actually going. ESC applies the brakes on individual wheels and intervenes with the engine management system to stabilize the vehicle.

⚠ WARNING

Never drive too fast according to the road conditions or too quickly when cornering. Electronic stability control (ESC) will not prevent accidents. Excessive speed in turns, abrupt maneuvers and hydroplaning on wet surfaces can still result in serious accidents. Only a safe and attentive driver can prevent accidents by avoiding maneuvers that cause the vehicle to lose traction. Even with ESC installed, always follow all the normal precautions for driving - including driving at safe speeds for the conditions.

The Electronic Stability Control (ESC) system is an electronic system designed to help the driver maintain vehicle control under adverse conditions. It is not a substitute for safe driving practices. Factors including speed, road conditions and driver steering input can all affect whether ESC will be effective in preventing a loss of control. It is still your responsibility to drive and corner at reasonable speeds and to leave a sufficient margin of safety.

When you apply your brakes under conditions which may lock the wheels, you may hear a "tik-tik" sound from the brakes, or feel a corresponding sensation in the brake pedal. This is normal and it means your ESC is active.

✻ NOTICE

A click sound may be heard in the engine compartment when the vehicle begins to move after the engine is started. These conditions are normal and indicate that the Electronic Stability Control System is functioning properly.

E070501AUN-EU

ESC operation

ESC ON condition

- When the ignition is turned ON, ESC and ESC OFF indicator lights illuminate for approximately 3 seconds, then ESC is turned on.
- Press the ESC OFF button for at least half a second after turning the ignition ON to turn ESC off. (ESC OFF indicator will illuminate). To turn the ESC on, press the ESC OFF button (ESC OFF indicator light will go off).
- When starting the engine, you may hear a slight ticking sound. This is the ESC performing an automatic system self-check and does not indicate a problem.

When operating

When the ESC is in operation, the ESC indicator light blinks.

- When the Electronic Stability Control is operating properly, you can feel a slight pulsation in the vehicle. This is only the effect of brake control and indicates nothing unusual.
- When moving out of the mud or driving on a slippery road, pressing the accelerator pedal may not cause the engine rpm (revolutions per minute) to increase.

E070502AUN-EU

ESC operation off

ESC OFF state

- To cancel ESC operation, press the ESC OFF button (ESC OFF indicator light illuminates).
- If the ignition switch is turned to LOCK position when ESC is off, ESC remains off. Upon restarting the engine, the ESC will automatically turn on again.

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■ ESC indicator light

■ ESC OFF indicator light

E070503AAM-EU

Indicator light

When the ignition switch is turned ON, the indicator light illuminates, then goes off if ESC system is operating normally.

The ESC indicator light blinks whenever ESC is operating and illuminates when ESC fails to operate.

The ESC OFF indicator light comes on when the ESC is turned off with the button.

⚠ CAUTION

Driving with varying tire or wheel sizes may cause the ESC system to malfunction. When replacing tires, make sure they are the same size as your original tires.

⚠ WARNING

The Electronic Stability Control system is only a driving aid; use precautions for safe driving by slowing down on curved, snowy, or icy roads. Drive slowly and don't attempt to accelerate whenever the ESC indicator light is blinking, or when the road surface is slippery.

E070504AAM-EU

ESC OFF usage

When driving

- It's a good idea to keep the ESC turned on for daily driving whenever possible.
- To turn ESC off while driving, press the ESC OFF button while driving on a flat road surface.

⚠ WARNING

Never press the ESC OFF button while ESC is operating (ESC indicator light blinks).

If ESC is turned off while ESC is operating, the vehicle may slip out of control.

✻ NOTICE

- **When operating the vehicle on a dynamometer, ensure that the ESC is turned off (ESC OFF light illuminated). If the ESC is left on, it may prevent the vehicle speed from increasing, and result in false diagnosis.**
- **Turning the ESC off does not affect ABS or brake system operation.**

SPECIAL DRIVING CONDITIONS

E110100AHM

Hazardous driving conditions

When hazardous driving conditions are encountered such as water, snow, ice, mud, sand, or similar hazards, follow these suggestions:

- Drive cautiously and allow extra distance for braking.
- Avoid sudden braking or steering.
- When braking with non-ABS brakes pump the brake pedal with a light up-and-down motion until the vehicle is stopped.

⚠ WARNING - ABS

Do not pump the brake pedal on a vehicle equipped with ABS.

- If stalled in snow, mud, or sand, use second gear. Accelerate slowly to avoid spinning the drive wheels.
- Use sand, rock salt, tire chains, or other non-slip material under the drive wheels to provide traction when stalled in ice, snow, or mud.

⚠ WARNING - Downshifting

Downshifting with an automatic transaxle, while driving on slippery surfaces can cause an accident. The sudden change in tire speed could cause the tires to skid. Be careful when downshifting on slippery surfaces.

E170800AAM

Reducing the risk of a rollover

This multi-purpose passenger vehicle is defined as a Crossover Utility Vehicle (CUV). CUV's have higher ground clearance and a narrower track to make them capable of performing in a wide variety of road applications. Specific design characteristics give them a higher center of gravity than ordinary vehicles. An advantage of the higher ground clearance is a better view of the road, which allows you to anticipate problems. They are not designed for cornering at the same speeds as conventional passenger vehicles. Due to this risk, driver and passengers are strongly recommended to buckle their seat belts. In a rollover crash, an unbelted person is more likely to die than a person wearing a seat belt. There are steps that a driver can make to reduce the risk of a rollover. If at all possible, avoid sharp turns or abrupt maneuvers, do not load your roof rack with heavy cargo, and never modify your vehicle in any way.

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⚠ WARNING - Rollover

As with other Crossover Utility Vehicle (CUV), failure to operate this vehicle correctly may result in loss of control, an accident or vehicle rollover.

- **Utility vehicles have a significantly higher rollover rate than other types of vehicles.**
- **Specific design characteristics (higher ground clearance, narrower track, etc.) give this vehicle a higher center of gravity than ordinary vehicles.**
- **A CUV is not designed for cornering at the same speeds as conventional vehicles.**
- **Avoid sharp turns or abrupt maneuvers.**
- **In a rollover crash, an unbelted person is significantly more likely to suffer severe or fatal injury than a person wearing a seatbelt.**

E170600AHM

⚠ WARNING

Your vehicle is equipped with tires designed to provide safe ride and handling capability. Do not use a size and type of tire and wheel that is different from the one that is originally installed on your vehicle. It can affect the safety and performance of your vehicle, which could lead to steering failure or rollover and serious injury. When replacing the tires, be sure to equip all four tires with the tire and wheel of the same size, type, tread, brand and load-carrying capacity. If you nevertheless decide to equip your vehicle with any tire/wheel combination not recommended by KIA for off road driving, you should not use these tires for highway driving.

E110200AAM-EU

Rocking the vehicle

If it is necessary to rock the vehicle to free it from snow, sand, or mud, first turn the steering wheel right and left to clear the area around your front wheels. Then, shift back and forth between 1st (First) and R (Reverse) in vehicles equipped with a manual transaxle or R (Reverse) and any forward gear in vehicles equipped with an automatic transaxle. Do not race the engine, and spin the wheels as little as possible. If you are still stuck after a few tries, have the vehicle pulled out by a tow vehicle to avoid engine overheating and possible damage to the transaxle.

⚠ CAUTION

Prolonged rocking may cause engine overheating, transaxle damage or failure, and tire damage.

7.2 VEHICLE ARRIVAL CONDITION REPORT

CONTRACT NO. DTNH22-08-D-00097 DATE: 8/17/11

FROM: Automotive Allies

TO: TRC

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

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2011 / Kia / Soul / MPV

MANUFACTURE DATE: 04/11 NHTSA NO.: CB0513

BODY COLOR: Red VIN: KNDJT2A23B7306367

ODOMETER READING: 139 miles GVWR: 1,760 KG

PURCHASE PRICE: $ rented / leased DEALER'S NAME: Automotive Allies, 209 W. Alameda Avenue, Suite 101, Burbank, CA 91502

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: 8-17-11
APPROVED BY: Ken Webster DATE: 8-25-11

7.3 VEHICLE COMPLETION CONDITION REPORT

CONTRACT NO. DTNH22-08-D-00097 DATE: 8/24/11

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2011 / Kia / Soul / MPV

MANUFACTURE DATE: 04/11 NHTSA NO.: CB0513

BODY COLOR: Red VIN: KNDJT2A23B7306367

ODOMETER READING: 201 miles GVWR: 1,760 KG

LIST OF FMVSS TESTS PERFORMED BY THIS LAB: 126, 135

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: 8-24-11
APPROVED BY: Ken Webster DATE: 8-25-11

7.4 SINE WITH DWELL TEST RESULTS
2011 Kia Soul
NHTSA No.: CB0513

Date Create 23-Aug-11

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)
0024	619	50.210	3.088	1000	4.991	756	3.771	-1.529	-0.192	1200	-1.345	-0.169
0025	617	50.209	3.078	999	4.986	755	3.767	-1.158	-0.190	1199	-0.360	-0.059
0026	617	50.379	3.077	999	4.989	756	3.770	-0.461	-0.093	1199	-0.061	-0.012
0027	616	50.421	3.070	999	4.985	755	3.767	-0.664	-0.160	1199	-0.177	-0.043
0028	616	50.460	3.070	999	4.988	755	3.768	-0.203	-0.058	1199	-0.117	-0.033
0029	615	50.373	3.067	999	4.986	755	3.767	-0.776	-0.216	1199	-0.161	-0.045
0030	615	50.324	3.066	999	4.986	755	3.768	-0.474	-0.142	1199	-0.408	-0.122
0031	615	50.332	3.066	999	4.987	755	3.768	-0.292	-0.091	1199	-0.486	-0.152
0032	614	50.406	3.064	998	4.985	755	3.767	-0.174	-0.059	1198	-0.323	-0.110
0033	615	50.437	3.067	999	4.988	756	3.770	-0.140	-0.048	1199	-0.201	-0.069
0034	614	50.015	3.064	998	4.984	755	3.768	-0.536	-0.197	1198	-0.629	-0.231
0035	614	50.307	3.063	998	4.984	755	3.766	-0.321	-0.121	1198	-0.355	-0.134
0036	615	50.485	3.067	999	4.988	756	3.771	-0.136	-0.058	1199	-0.190	-0.081
0037	614	50.276	3.064	998	4.985	755	3.767	-0.382	-0.144	1198	-0.197	-0.074
0038	615	50.481	3.065	999	4.985	755	3.768	-0.149	-0.060	1199	0.317	0.128
0040	614	50.174	3.065	998	4.984	755	3.767	-0.085	-0.035	1198	0.139	0.057
0041	615	50.187	3.068	999	4.986	756	3.772	-0.284	-0.127	1199	-0.157	-0.070

RIGHT-TO-LEFT (INITIAL CLOCKWISE STEER)

0042	619	50.304	3.087	999	4.989	755	3.769	-0.950	0.120	1199	-0.119	0.015
0043	618	50.300	3.081	999	4.989	755	3.769	-0.896	0.151	1199	-0.211	0.035
0044	616	50.165	3.074	999	4.987	755	3.767	-0.986	0.201	1199	-0.412	0.084
0045	616	50.287	3.071	999	4.987	755	3.767	-0.021	0.005	1199	0.563	-0.139
0046	616	50.250	3.071	999	4.989	755	3.769	-0.191	0.055	1199	0.309	-0.089
0047	615	50.117	3.068	999	4.987	755	3.767	-0.456	0.134	1199	-0.082	0.024
0048	615	50.280	3.067	999	4.987	755	3.768	-0.746	0.227	1199	-0.670	0.204
0049	615	50.048	3.067	999	4.988	755	3.769	-0.359	0.121	1199	-0.390	0.131
0050	614	50.303	3.063	998	4.984	755	3.766	-0.647	0.236	1198	-0.534	0.195
0051	614	50.357	3.064	999	4.986	755	3.767	-0.334	0.128	1199	-0.257	0.099
0052	615	50.080	3.067	999	4.989	755	3.769	-0.160	0.055	1199	0.095	-0.033
0053	615	50.466	3.065	999	4.988	755	3.768	-0.183	0.065	1199	0.001	0.000
0054	615	50.517	3.067	999	4.988	755	3.770	-0.441	0.161	1199	-0.071	0.026
0055	615	50.109	3.065	999	4.986	755	3.768	-0.516	0.193	1199	-0.160	0.060
0056	615	50.321	3.067	999	4.987	755	3.770	-0.695	0.292	1199	-0.229	0.096
0057	615	50.253	3.065	999	4.985	755	3.767	-0.388	0.170	1199	-0.349	0.153
0058	615	50.251	3.065	998	4.985	755	3.768	-0.134	0.051	1198	0.068	-0.026

7.4 SINE WITH DWELL TEST RESULTS
2011 Kia Soul
NHTSA No.: CB0513

Date Create 23-Aug-11

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)
0024	1350	12.576	848	-4.072	0.389	43.088	684	42.884
0025	1349	16.407	847	-5.242	0.476	57.095	683	56.881
0026	1349	20.107	847	-6.329	0.544	71.003	684	70.814
0027	1349	24.092	848	-7.239	0.605	85.967	683	85.769
0028	1349	28.360	846	-7.990	0.634	100.094	684	100.034
0029	1349	27.870	834	-8.323	0.683	114.063	683	113.971
0030	1349	29.995	835	-8.553	0.715	127.829	684	127.961
0031	1349	31.165	832	-8.756	0.747	141.846	686	142.861
0032	1348	34.019	832	-9.084	0.753	155.475	686	156.932
0033	1349	34.046	830	-9.013	0.796	167.649	686	170.820
0034	1348	36.728	833	-9.437	0.807	181.908	685	184.845
0035	1348	37.795	830	-9.401	0.810	197.549	685	200.043
0036	1349	42.383	832	-9.874	0.815	211.569	685	213.975
0037	1348	37.541	828	-10.175	0.664	226.149	684	227.895
0038	1349	40.318	830	-10.450	0.728	240.144	684	241.690
0040	1348	40.788	828	-10.488	0.686	255.476	684	256.580
0041	1349	44.806	829	-9.948	0.818	268.594	685	269.636

RIGHT-TO-LEFT (INITIAL CLOCKWISE STEER)

0042	1349	-12.671	848	3.985	-0.371	43.517	684	43.445
0043	1349	-16.809	845	5.272	-0.468	57.576	684	57.397
0044	1349	-20.444	849	6.244	-0.522	71.478	684	71.334
0045	1349	-24.597	847	7.111	-0.570	86.422	684	86.408
0046	1349	-28.720	846	7.949	-0.603	100.656	684	100.573
0047	1349	-29.292	835	8.348	-0.641	114.602	684	114.597
0048	1349	-30.469	834	8.681	-0.678	128.338	684	128.505
0049	1349	-33.644	835	8.973	-0.719	142.325	686	143.457
0050	1348	-36.524	834	9.376	-0.704	154.774	687	157.376
0051	1349	-38.325	832	9.584	-0.749	168.068	686	171.336
0052	1349	-34.267	829	9.995	-0.649	182.368	685	185.304
0053	1349	-35.495	827	10.117	-0.667	198.155	685	200.549
0054	1349	-36.474	825	10.223	-0.656	212.243	685	214.470
0055	1349	-37.341	826	10.170	-0.653	226.570	685	228.419
0056	1349	-42.048	828	10.330	-0.722	240.958	685	242.339
0057	1349	-43.896	832	10.720	-0.693	256.408	684	257.361
0058	1348	-38.255	825	10.633	-0.607	269.343	684	270.079

7.5 SLOWLY INCREASING STEER TEST RESULTS
2011 Kia Soul
NHTSA No.: CB0513

Date Created 23-Aug-11

File	Vehicle	EventPt	DOS	MES [mph]	Mean SPD [mph]	AYcount_3	THETAENCF_3 [degree]	AYCG_CD2_3 [g]	r_squared	ZeroBegin	ZeroEnd
0011	2011 Kia Soul	705	1	50.214	49.816	1126	-28.451	-0.303	0.996	505	705
0012	2011 Kia Soul	704	1	49.850	50.041	1129	-28.702	-0.303	0.997	504	704
0014	2011 Kia Soul	706	1	50.239	50.175	1131	-28.745	-0.299	0.998	506	706
0015	2011 Kia Soul	697	0	50.318	50.053	1117	28.266	0.299	0.996	497	697
0016	2011 Kia Soul	699	0	50.099	50.119	1107	27.672	0.297	0.997	499	699
0018	2011 Kia Soul	700	0	50.378	49.668	1131	29.182	0.303	0.999	500	700
	Averages						28.5	0.301			

Scalars	Steering Angles (deg)
1.5	43
2	57
2.5	71
3	86
3.5	100
4	114
4.5	128
5	143
5.5	157
6	171
6.5	185
7	200
7.5	214
8	228
8.5	242
9	257
9.5	270

7.6 INERTIA SENSOR MEASUREMENTS
2011 Kia Soul
NHTSA No.: CB0513

Device : U12-05-08-07116
device version : 2.24
device certification date : 12/27/10
today is : 8/22/2011
units : Millimeters

Label	ActualX	ActualY	ActualZ
C_DEVICEPOS001			
M_PLANE001	959.410	-453.443	-296.791
M_LINE001	656.495	62.515	7.194
M_ORIGIN_FRT_AXLE_CENTER	0.000	0.000	0.000
C_COORDSYS001	0.000	0.000	0.000
M_TIRE_TREAD_CENTER	247.477	98.049	-208.511
M_INERTIA_PACK	1519.877	858.730	646.332
M_ROOF	1703.569	888.776	1309.799
M_GROUND	1703.377	-128.729	-295.390
Track Width		1558.925	
Roof Height (relative to ground)			1605.189
Motion Pak - x-distance (mm)	1519.877		
Motion Pak - y-distance (mm)		-18.781	
Motion Pak - z-distance (mm)			897.272
Motion Pak - x-distance (inches)	59.837		
Motion Pak - y-distance (inches)		-0.739	
Motion Pak - z-distance (inches)			35.326

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.)