SAFETY COMPLIANCE TESTING FOR FMVSS 126
Electronic Stability Control Systems

Fuji Heavy Industries Ltd.
2010 Subaru Outback
NHTSA No. CA5503

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

November 17, 2010

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
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Prepared By: 

Approved By: Ken Webster

Approval Date: 11/17/10

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: 

Acceptance Date: 11/30/10
## Abstract

A test was conducted on a 2010 Subaru Outback, NHTSA No. CA5503, 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

### Key Words

Compliance Testing  
Safety Engineering  
FMVSS 126
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this test is to determine if the test vehicle, a MY 2010 Subaru Outback 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 2010 Subaru Outback 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:  ____________ Subaru / Outback / MPV ____________

VEHICLE NHTSA NO.:  CA5503 ___________________ VIN:  4S4BRBCC6A3378112 ____________

VEHICLE TYPE:  MPV ___________________ DATE OF MANUFACTURE:  04/10 ____________

LABORATORY:  Transportation Research Center Inc. __________________________

REQUIREMENTS

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
### DATA SUMMARY (Sheet 2 of 2)

#### REQUIREMENTS

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)  

<table>
<thead>
<tr>
<th>Requirement</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yaw Rate Ratio at 1 second after COS is less than 35% of peak value. (S126, S5.2.1)</td>
<td>PASS</td>
</tr>
<tr>
<td>Yaw Rate Ratio at 1.75 seconds after COS is less than 20% of peak value. (S126, S5.2.2)</td>
<td>PASS</td>
</tr>
</tbody>
</table>

#### Vehicle Lateral Stability (Data Sheet 8)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>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)</td>
<td>PASS</td>
</tr>
</tbody>
</table>

#### Vehicle Responsiveness (Data Sheet 8)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>PASS/FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning is provided to driver after malfunction occurrence. (S126, S5.3)</td>
<td>PASS</td>
</tr>
<tr>
<td>Malfunction telltale stayed illuminated as long as malfunction existed and must extinguish after malfunction was corrected. (S126, S5.3.7)</td>
<td>PASS</td>
</tr>
</tbody>
</table>
3.0 TEST DATA

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

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

NHTSA No.: CA5503 TEST DATE: 08-27-10

VIN: 4S4BRBCC8A3378112 MANUFACTURE DATE: 04/10

GVWR: 2,080 KG FRONT GAWR: 1,070 KG REAR GAWR: 1,060 KG

SEATING POSITIONS: FRONT 2 MID 0 REAR 3

ODOMETER READING AT START OF TEST: 119 (191.5) Miles (Kilometers)

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING:

Front Axle 225 / 60R 17 Rear Axle 225 / 60R 17

INSTALLED TIRE SIZE(S) ON VEHICLE:

<table>
<thead>
<tr>
<th>From Tire Sidewall</th>
<th>Front Axle</th>
<th>Rear Axle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer and Model</td>
<td>Continental ContiProContact</td>
<td>Continental ContiProContact</td>
</tr>
<tr>
<td>Tire Size Designation</td>
<td>P225 / 60R 17 98T</td>
<td>225 / 60R 17 98T</td>
</tr>
</tbody>
</table>

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

X _____ 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 ___________________________)

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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)

<table>
<thead>
<tr>
<th>Drive Configuration</th>
<th>AWD</th>
<th>Mode(s)</th>
<th>default</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Drive Configuration</th>
<th>Mode(s)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Drive Configuration</th>
<th>Mode(s)</th>
</tr>
</thead>
</table>


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: __________________________________________________________

REMARKS:_________________________________________________________________

RECORDED BY: Alan Ida  DATE: 08-27-10
APPROVED BY: Jeff Sankey DATE: 09-30-10
DATA SHEET 2 (Sheet 1 of 2)
ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

NHTSA No.: CA5503 TEST DATE: 08-27-10

ESC SYSTEM IDENTIFICATION:
Manufacturer / Model: Continental Teves Inc. / Mk60A

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: Pressure sensor, Engine Control Unit.

ESC SYSTEM OPERATIONAL CHARACTERISTICS:
System is capable of generating brake torques at each wheel
X Yes (PASS) ___ No (FAIL)

List and describe component(s): 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): To control the steerability of a vehicle, various inputs from sensors (Steering Angle, Yaw Rate, Lateral Acceleration and Wheel Velocities for understeering control) are necessary to provide vehicle behavior information to the electronic controller. Software algorithms process this information and engine output and brake pressure(s) are correspondingly adapted. There are 4 steps to control vehicle behavior: Step 1: Sensor Value Processing, Step 2: Vehicle Reference Model, Step 3: Driving State Estimation, and Step 4: Control Output.
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:  
In the case of understeering, the ESC System performs a reduction of 
engine torque by sending an engine torque request via the engine management interface. 
Engine torque is reduced by closing the throttle. After the engine control unit receives the request to reduce engine torque from 
VDC ECU via CAN, the throttle is closed.

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

Speed system becomes active.  The ESC system becomes fully active at 12.6 km/h (7.8 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.  ESC is active under all driving situations, except 
backwards driving, low velocity (less than 12.6 km/h) driving or if the ESC is disabled by optional ESC-off 
switch.

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:  08-27-10
APPROVED BY:  Jeff Sankey  DATE:  09-30-10
3.0 TEST DATA...continued

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

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

VEHICLE NHTSA NO. CA5503 TEST DATE: 08-27-10

ESC Malfunction Telltale

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

Telltale Location Center of instrument cluster, between the speedometer and tachometer

Telltale Color Amber

Telltale symbol or abbreviation used.

Or ESC

X Vehicle uses this symbol

X 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: The ESC telltale flashes
"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 _______ Left side of instrument cluster, inside the tachometer

Telltale Color _______ Amber

Telltale symbol or abbreviation used.

[Symbol images: car, 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

(Vehicle is compliant if equipped with a malfunction telltale)

PASS/FAIL _______ PASS

REMARKS:

__________________________________________________________________________

RECORDED BY: ___________ Alan Ida ___________ DATE: _______ 08-27-10

APPROVED BY: ___________ Jeff Sankey ___________ DATE: _______ 09-30-10
**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  \( \quad \) No

**Type of control or controls provided?**

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

**Identify each control location, labeling and selectable modes.**

<table>
<thead>
<tr>
<th>First Control:</th>
<th>Location</th>
<th>Instrument panel, left of steering column</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labeling</td>
<td>Skidding car symbol with the word “OFF”</td>
</tr>
<tr>
<td></td>
<td>Modes</td>
<td>ESC off and Traction Control off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ESC on and Traction Control on</td>
</tr>
</tbody>
</table>

**Identify standard or default drive configuration**

- AWD - default

**Verify standard or default drive configuration selected.**

- X Yes  \( \quad \) 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  \( \quad \) 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  \( \quad \) No (fail)

If no, describe how the off control functions:
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.

<table>
<thead>
<tr>
<th>Control Modes</th>
<th>&quot;ESC Off&quot; telltale illuminates upon activation of control? (Yes/No)</th>
<th>&quot;ESC Off&quot; telltale extinguishes upon cycling ignition? (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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  ____ No

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

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

**Ancillary Control:**
- System:  
- Control Description: N/A
- Labeling: N/A
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.

<table>
<thead>
<tr>
<th>Ancillary Control</th>
<th>Control Activates &quot;ESC Off&quot; Telltale? (Yes/No)</th>
<th>Warnings or Messages Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Ancillary Control</th>
<th>&quot;ESC Off&quot; telltale extinguishes upon cycling ignition? (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

NHTSA No.: CA5503 TEST DATE: 08-27-10

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 220 kPa Rear Axle 210 kPa
- Actual: LF: 220 kPa RF: 220 kPa LR: 210 kPa RR: 210 kPa

Vehicle Dimensions:
- Track Width 157.2 cm Wheelbase 274.0 cm
- Roof Height 159.9 cm

Vehicle weight ratings:
- GAWR Front 1,070 KG GAWR Rear 1,060 KG

Unloaded Vehicle Weight (UVW)

Front Axle 893.0 KG Left Front 449.6 KG Right Front 443.4 KG
Rear Axle 699.2 KG Left Rear 362.0 KG Right Rear 337.2 KG
Total UVW 1,592.2 KG

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

Calculated Baseline Weight (UVW+ 73 kg) 1,665.2 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 __________ 931.4 ___KG  Left Front __________ 469.8 ___KG  Right Front __________ 461.6 ___KG
Rear Axle __________ 743.0 ___KG  Left Rear __________ 382.6 ___KG  Right Rear __________ 360.4 ___KG

Total UVW w/ Outriggers ______ 1,674.4 ___KG

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

Front Axle __________ 1,003.8 ___KG  Left Front __________ 514.6 ___KG  Right Front __________ 489.2 ___KG
Rear Axle __________ 804.2 ___KG  Left Rear __________ 418.6 ___KG  Right Rear __________ 385.6 ___KG

Total Loaded Vehicle Weight ______ 1,808.0 ___KG

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

= [________ 1,674.4 ___KG + 168 KG] - ______ 1,808.0 ___KG

= ______ 34.4 ___KG

Total Loaded Vehicle Weight

Front Axle __________ 1,017.6 ___KG  Left Front __________ 516.4 ___KG  Right Front __________ 501.2 ___KG
Rear Axle __________ 824.8 ___KG  Left Rear __________ 425.8 ___KG  Right Rear __________ 399.0 ___KG

Total Loaded Vehicle Weight ______ 1,842.4 ___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.  
(Please from front axle toward rear of vehicle.)

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

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

Locations:

<table>
<thead>
<tr>
<th></th>
<th>Center of Gravity</th>
<th>Inertial Sensing System</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-distance</td>
<td>122.7 cm</td>
<td>159.4 cm</td>
</tr>
<tr>
<td>y-distance</td>
<td>-1.8 cm</td>
<td>-3.2 cm</td>
</tr>
<tr>
<td>z-distance</td>
<td>60.8 cm</td>
<td>90.2 cm</td>
</tr>
</tbody>
</table>

Distance Between Ultrasonic Sensors: 184.9 cm

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

REMARKS:

RECORDED BY: Alan Ida  DATE: 08-30-10
APPROVED BY: Jeff Sankey  DATE: 09-30-10
DATA SHEET 6 (Sheet 1 of 3)
BRAKE AND TIRE CONDITIONING

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

VEHICLE NHTSA No.: CA5503

Measured Cold Tire Pressures:
- LF 220 KPA
- RF 220 KPA
- LR 210 KPA
- RR 210 KPA

Wind Speed: 2.2 m/sec
(10 m/sec (22 mph) max for passenger cars; 5 m/s (11 mph) max for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)): 28.3°C

Brake Conditioning

Time: 11:50 AM
Date: 08-31-10

56 km/h (35 mph) Brake Stops
- Number of stops executed (10 required): 10 stops
- Observed deceleration rate range (.5g target): 0.50 - 0.57 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 - 1.20 g

72 km/h (45 mph) Brake Cool Down Period
- Duration of cool-down period (5 minutes min.): 5:13 minutes
DATA SHEET 6 (Sheet 2 of 3)
BRAKE AND TIRE CONDITIONING

Tire Conditioning Series No. 1  Time: 12:32 PM  Date: 08-31-10

Measured Tire Pressures:

<table>
<thead>
<tr>
<th></th>
<th>LF 252 kPa</th>
<th>RF 246 kPa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LR 234 kPa</td>
<td>RR 234 kPa</td>
</tr>
</tbody>
</table>

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)) 28.9°C

<table>
<thead>
<tr>
<th>30 meter (100 ft) Diameter Circle Maneuver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Runs</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>1-3</td>
</tr>
<tr>
<td>4-6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 Hz 5 Cycle Sinusoidal Steering Maneuver to Determine Steering Wheel Angle For 0.5-0.6g Lateral Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Runs</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

Steering wheel angle that corresponds to a peak 0.5–0.6g lateral acceleration; 80 degrees

<table>
<thead>
<tr>
<th>1 Hz 10 Cycle Sinusoidal Steering Maneuver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Runs</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>1 - 3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

* The steering wheel angle used for cycle 10 should be twice the angle used for cycles 1-9.
DATA SHEET 6 (Sheet 3 of 3)
BRAKE AND TIRE CONDITIONING

Tire Conditioning Series No. 2

Time: 2:47 PM          Date: 08-31-10

Measured Tire Pressures:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LF</td>
<td>248   kPa</td>
</tr>
<tr>
<td>RF</td>
<td>245   kPa</td>
</tr>
<tr>
<td>LR</td>
<td>231   kPa</td>
</tr>
<tr>
<td>RR</td>
<td>231   kPa</td>
</tr>
</tbody>
</table>

Wind Speed: 2.7 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)) 30.6°C

### 30 meter (100 ft) Diameter Circle Maneuver

<table>
<thead>
<tr>
<th>Test Runs</th>
<th>Steering Direction</th>
<th>Target Lateral Acceleration (g)</th>
<th>Observed Lateral Acceleration (g)</th>
<th>Observed Vehicle Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>clockwise</td>
<td>0.5-0.6</td>
<td>0.55</td>
<td>32.5</td>
</tr>
<tr>
<td>4-6</td>
<td>counterclockwise</td>
<td>0.5-0.6</td>
<td>0.55</td>
<td>32.8</td>
</tr>
</tbody>
</table>

### 1 Hz 5 Cycle Sinusoidal Steering Maneuver to Determine Steering Wheel Angle For 0.5-0.6g Lateral Acceleration

<table>
<thead>
<tr>
<th>Test Runs</th>
<th>Vehicle Speed Km/h (mph)</th>
<th>Steering Wheel Angle (degrees)</th>
<th>Target Peak Lateral Acceleration (g)</th>
<th>Observed Peak Lateral Acceleration (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>56+2 (35+1)</td>
<td>30</td>
<td>0.5-0.6</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>56+2 (35+1)</td>
<td></td>
<td>0.5-0.6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>56+2 (35+1)</td>
<td></td>
<td>0.5-0.6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>56+2 (35+1)</td>
<td></td>
<td>0.5-0.6</td>
<td></td>
</tr>
</tbody>
</table>

Steering wheel angle that corresponds to a peak 0.5-0.6g lateral acceleration; 80 degrees

### 1 Hz 10 Cycle Sinusoidal Steering Maneuver

<table>
<thead>
<tr>
<th>Test Runs</th>
<th>Vehicle Speed (mph)</th>
<th>Steering Wheel Angle (degrees)</th>
<th>Target Peak Lateral Acceleration (g)</th>
<th>Observed Peak Lateral Acceleration (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>56+2 (35+1)</td>
<td>80 (cycles 1-10)</td>
<td>0.5-0.6</td>
<td>0.54</td>
</tr>
<tr>
<td>4</td>
<td>56+2 (35+1)</td>
<td>80 (cycles 1-9)</td>
<td>0.5-0.6</td>
<td>0.54</td>
</tr>
</tbody>
</table>

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

REMARKS:

RECORDED BY: Alan Ida                 DATE: 08-31-10
APPROVED BY: Jeff Sankey              DATE: 09-30-10
DATA SHEET 7 (1 of 2)
SLOWLY INCREASING STEER (SIS) MANEUVER

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

VEHICLE NHTSA No.: CA5503 TEST DATE: 08-31-10

Wind Speed 4.5 m/sec
(10 m/sec (22 mph) max for passenger cars; 5 m/s (11 mph) max. for MPVs and Trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 29.4°C

Static Data File Number: 0006

Selected Drive Configuration: AWD

Selected Mode: default

Preliminary Left Steer Maneuver:

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

\[
a_{y,30\text{ degrees}} = 0.32 \text{ g}
\]

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

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

\[
\delta_{SIS} = 51.6 \text{ degrees @ 0.55g}
\]

\[
\delta_{SIS} = 60 \text{ degrees (rounded)}
\]

Steering Wheel Angle at Corrected 0.3 g Lateral Acceleration:

<table>
<thead>
<tr>
<th>Maneuver #</th>
<th>Initial Steer Direction</th>
<th>Time Clock (5 min max between runs)</th>
<th>Steering Wheel Angle to nearest 0.1 degree (degrees)</th>
<th>All Conditions Met?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0009</td>
<td>Left</td>
<td>12:42 pm</td>
<td>-35.4</td>
<td>Yes</td>
</tr>
<tr>
<td>0012</td>
<td>Left</td>
<td>12:49 pm</td>
<td>-34.0</td>
<td>Yes</td>
</tr>
<tr>
<td>0013</td>
<td>Left</td>
<td>12:55 pm</td>
<td>-35.1</td>
<td>Yes</td>
</tr>
<tr>
<td>0020</td>
<td>Right</td>
<td>1:05 pm</td>
<td>34.5</td>
<td>Yes</td>
</tr>
<tr>
<td>0023</td>
<td>Right</td>
<td>1:11 pm</td>
<td>33.9</td>
<td>Yes</td>
</tr>
<tr>
<td>0025</td>
<td>Right</td>
<td>1:14 pm</td>
<td>33.9</td>
<td>Yes</td>
</tr>
</tbody>
</table>
DATA SHEET 7 (2 of 2)
SLOWLY INCREASING STEER (SIS) MANEUVER

Average Overall Steering Wheel Angle:

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

\[ \delta_{0.3 \text{ g, overall}} = \underline{34.5} \text{ degrees} \]
[to nearest 0.1 degree]

REMARKS:

RECORDED BY: Alan Ida  DATE: 08-31-10
APPROVED BY: Jeff Sankey  DATE: 09-30-10
### DATA SHEET 8 (1 of 3)
#### VEHICLE LATERAL STABILITY AND RESPONSIVENESS

**VEHICLE MAKE/MODEL/BODY STYLE:** Subaru / Outback / MPV  
**VEHICLE NHTSA No.:** CA5503  
**TEST DATE:** 08-31-10

- Tire conditioning completed: X Yes  
- ESC system is enabled: X Yes  
- On track calibration checks have been completed: X Yes  
- On track static data file for each sensor obtained: X Yes

**Selected Drive Configuration:** AWD  
**Selected Mode:** default

**Overall steering wheel angle (δ₀.3_g, overall):** 34.5 degrees

**Static Data File Number:** 0027

---

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

<table>
<thead>
<tr>
<th>Maneuver #</th>
<th>Clock Time (1.5 – 5 min between each test run)</th>
<th>Commanded Steering Wheel Angle¹ (degrees)</th>
<th>Yaw Rates (degrees/sec)</th>
<th>YRR at 1.0 sec after COS ≤ 35%</th>
<th>YRR at 1.75 sec after COS ≤ 20%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scalar</td>
<td>Angle</td>
<td>$\psi'_{Peak}$</td>
<td>$\psi'_{1.0sec}$</td>
<td>$\psi'_{1.75sec}$</td>
</tr>
<tr>
<td>0028</td>
<td>2:56 pm</td>
<td>1.5° δ₀.3_g</td>
<td>52</td>
<td>14.48</td>
<td>-0.07</td>
</tr>
<tr>
<td>0029</td>
<td>2:59 pm</td>
<td>2.0° δ₀.3_g</td>
<td>69</td>
<td>19.33</td>
<td>-0.10</td>
</tr>
<tr>
<td>0030</td>
<td>3:04 pm</td>
<td>2.5° δ₀.3_g</td>
<td>86</td>
<td>24.71</td>
<td>0.32</td>
</tr>
<tr>
<td>0032</td>
<td>3:07 pm</td>
<td>3.0° δ₀.3_g</td>
<td>104</td>
<td>29.97</td>
<td>-0.11</td>
</tr>
<tr>
<td>0033</td>
<td>3:16 pm</td>
<td>3.5° δ₀.3_g</td>
<td>121</td>
<td>36.22</td>
<td>-0.21</td>
</tr>
<tr>
<td>0034</td>
<td>3:20 pm</td>
<td>4.0° δ₀.3_g</td>
<td>138</td>
<td>41.46</td>
<td>0.12</td>
</tr>
<tr>
<td>0035</td>
<td>3:23 pm</td>
<td>4.5° δ₀.3_g</td>
<td>155</td>
<td>46.17</td>
<td>0.43</td>
</tr>
<tr>
<td>0036</td>
<td>3:26 pm</td>
<td>5.0° δ₀.3_g</td>
<td>173</td>
<td>46.70</td>
<td>0.21</td>
</tr>
<tr>
<td>0037</td>
<td>3:30 pm</td>
<td>5.5° δ₀.3_g</td>
<td>190</td>
<td>53.09</td>
<td>0.83</td>
</tr>
<tr>
<td>0038</td>
<td>3:34 pm</td>
<td>6.0° δ₀.3_g</td>
<td>207</td>
<td>56.95</td>
<td>-3.97</td>
</tr>
<tr>
<td>0039</td>
<td>3:37 pm</td>
<td>6.5° δ₀.3_g</td>
<td>224</td>
<td>59.37</td>
<td>-6.02</td>
</tr>
<tr>
<td>0040</td>
<td>3:40 pm</td>
<td>7.0° δ₀.3_g</td>
<td>242</td>
<td>62.67</td>
<td>-6.20</td>
</tr>
<tr>
<td>0041</td>
<td>3:44 pm</td>
<td>7.5° δ₀.3_g</td>
<td>259</td>
<td>66.40</td>
<td>3.24</td>
</tr>
<tr>
<td>0042</td>
<td>3:47 pm</td>
<td>8.0° δ₀.3_g</td>
<td>270</td>
<td>64.31</td>
<td>3.70</td>
</tr>
</tbody>
</table>

---

1. Maneuver execution should continue until a steering wheel angle magnitude factor of 6.5°δ₀.3_g, overall or 270 degrees is utilized, whichever is greater provided the calculated magnitude of 6.5°δ₀.3_g, overall is less than or equal to 300 degrees. If 6.5°δ₀.3_g, overall is less than 270 degrees, maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of 0.5°δ₀.3_g, overall. Without exceeding the 270 degree steering wheel angle.

---

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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%) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scalar</td>
<td>Angle</td>
<td>$\psi_{Peak}$</td>
<td>$\psi_{1.0sec}$</td>
<td>$\psi_{1.75sec}$</td>
</tr>
<tr>
<td>0043</td>
<td>3:51 pm</td>
<td>1.5° $\delta_{0.3,g}$</td>
<td>52</td>
<td>-14.35</td>
<td>0.04</td>
</tr>
<tr>
<td>0044</td>
<td>3:55 pm</td>
<td>2.0° $\delta_{0.3,g}$</td>
<td>69</td>
<td>-19.03</td>
<td>0.27</td>
</tr>
<tr>
<td>0045</td>
<td>3:58 pm</td>
<td>2.5° $\delta_{0.3,g}$</td>
<td>86</td>
<td>-24.12</td>
<td>-0.25</td>
</tr>
<tr>
<td>0046</td>
<td>4:01 pm</td>
<td>3.0° $\delta_{0.3,g}$</td>
<td>104</td>
<td>-30.27</td>
<td>0.13</td>
</tr>
<tr>
<td>0047</td>
<td>4:05 pm</td>
<td>3.5° $\delta_{0.3,g}$</td>
<td>121</td>
<td>-36.40</td>
<td>0.17</td>
</tr>
<tr>
<td>0048</td>
<td>4:08 pm</td>
<td>4.0° $\delta_{0.3,g}$</td>
<td>138</td>
<td>-41.84</td>
<td>0.12</td>
</tr>
<tr>
<td>0049</td>
<td>4:12 pm</td>
<td>4.5° $\delta_{0.3,g}$</td>
<td>155</td>
<td>-45.53</td>
<td>0.19</td>
</tr>
<tr>
<td>0050</td>
<td>4:16 pm</td>
<td>5.0° $\delta_{0.3,g}$</td>
<td>173</td>
<td>-49.96</td>
<td>-0.23</td>
</tr>
<tr>
<td>0051</td>
<td>4:18 pm</td>
<td>5.5° $\delta_{0.3,g}$</td>
<td>190</td>
<td>-52.42</td>
<td>-0.30</td>
</tr>
<tr>
<td>0052</td>
<td>4:22 pm</td>
<td>6.0° $\delta_{0.3,g}$</td>
<td>207</td>
<td>-57.53</td>
<td>-1.20</td>
</tr>
<tr>
<td>0053</td>
<td>4:26 pm</td>
<td>6.5° $\delta_{0.3,g}$</td>
<td>224</td>
<td>-59.50</td>
<td>2.47</td>
</tr>
<tr>
<td>0054</td>
<td>4:29 pm</td>
<td>7.0° $\delta_{0.3,g}$</td>
<td>242</td>
<td>-61.49</td>
<td>4.62</td>
</tr>
<tr>
<td>0055</td>
<td>4:32 pm</td>
<td>7.5° $\delta_{0.3,g}$</td>
<td>259</td>
<td>-62.53</td>
<td>4.87</td>
</tr>
<tr>
<td>0056</td>
<td>4:36 pm</td>
<td>8.0° $\delta_{0.3,g}$</td>
<td>270</td>
<td>-66.03</td>
<td>-1.66</td>
</tr>
</tbody>
</table>

1. Maneuver execution should continue until a steering wheel angle magnitude factor of 6.5°/δ0.3,g_average of 270 degrees is utilized, whichever is greater provided the calculated 6.5°/δ0.3,g_average is less than or equal to 300 degrees. If 6.5°/δ0.3,g_average is less than 270 degrees maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of 6.5°/δ0.3,g_average 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? X No

If “Yes” explain the event and consult with the COTR.
### DATA SHEET 8 (3 of 3)

**VEHICLE LATERAL STABILITY AND RESPONSIVENESS**

**Responsiveness – Lateral Displacement**

<table>
<thead>
<tr>
<th>Maneuver #</th>
<th>Initial Steer Direction</th>
<th>Commanded Steering Wheel Angle (5.0° or greater)</th>
<th>Calculated Lateral Displacement¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Scalar</td>
<td>Angle (degrees)</td>
</tr>
<tr>
<td>0036</td>
<td>Counter Clockwise</td>
<td>5.0° δ₀₃ₐ</td>
<td>173</td>
</tr>
<tr>
<td>0037</td>
<td>Counter Clockwise</td>
<td>5.5° δ₀₃ₐ</td>
<td>190</td>
</tr>
<tr>
<td>0038</td>
<td>Counter Clockwise</td>
<td>6.0° δ₀₃ₐ</td>
<td>207</td>
</tr>
<tr>
<td>0039</td>
<td>Counter Clockwise</td>
<td>6.5° δ₀₃ₐ</td>
<td>224</td>
</tr>
<tr>
<td>0040</td>
<td>Counter Clockwise</td>
<td>7.0° δ₀₃ₐ</td>
<td>242</td>
</tr>
<tr>
<td>0041</td>
<td>Counter Clockwise</td>
<td>7.5° δ₀₃ₐ</td>
<td>259</td>
</tr>
<tr>
<td>0042</td>
<td>Counter Clockwise</td>
<td>7.8° δ₀₃ₐ</td>
<td>270</td>
</tr>
<tr>
<td>0050</td>
<td>Clockwise</td>
<td>5.0° δ₀₃ₐ</td>
<td>173</td>
</tr>
<tr>
<td>0051</td>
<td>Clockwise</td>
<td>5.5° δ₀₃ₐ</td>
<td>190</td>
</tr>
<tr>
<td>0052</td>
<td>Clockwise</td>
<td>6.0° δ₀₃ₐ</td>
<td>207</td>
</tr>
<tr>
<td>0053</td>
<td>Clockwise</td>
<td>6.5° δ₀₃ₐ</td>
<td>224</td>
</tr>
<tr>
<td>0054</td>
<td>Clockwise</td>
<td>7.0° δ₀₃ₐ</td>
<td>242</td>
</tr>
<tr>
<td>0055</td>
<td>Clockwise</td>
<td>7.5° δ₀₃ₐ</td>
<td>259</td>
</tr>
<tr>
<td>0056</td>
<td>Clockwise</td>
<td>7.8° δ₀₃ₐ</td>
<td>270</td>
</tr>
</tbody>
</table>

¹ Lateral displacement should be ≥ 1.83 m (6 ft) for vehicles with a GVWR of 3,500 kg (7,716 lb) or less; and ≥ 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:** 08-31-10

**APPROVED BY:** Jeff Sankey  
**DATE:** 09-30-10
DATA SHEET 9 (Sheet 1 of 2)
MALFUNCTION WARNING TEST

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

VEHICLE NHTSA No.: CA5503 TEST DATE: 09-29-10

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

MALFUNCTION TELLETALE ILLUMINATION:
Telltales illuminate and remain illuminated after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

X Yes  No

Time for telltales to illuminate after ignition system is activated.
0 Seconds (must be within 2 minutes)

X Pass  Fail

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

X Yes  No

Time for telltales to extinguish after ignition system is activated and vehicle speed of 48± 8 km/h (30± 5mph) is reached.
2 Seconds (must be within 2 minutes)

X Pass  Fail

DATA INDICATES COMPLIANCE:
PASS/FAIL PASS

REMARKS:
The vehicle did not require driving to illuminate the ESC malfunction telltales. Initially after reconnecting the wheel speed sensor and restarting the vehicle, the ESC, ABS, Check Engine and Brake (flashing) malfunction telltales did not extinguish. After receiving guidance from the manufacturer that 3 good engine drive cycles above 0 mph is required to restore the system to normal after a wheel speed sensor malfunction is detected, the procedure was tested and verified. On the 4th ignition cycle, the ESC, ABS, Check Engine, and Brake (flashing) malfunction telltales extinguished.

RECORDED BY: Alan Ida DATE: 09-29-10
APPROVED BY: Jeff Sankey DATE: 09-30-10
DATA SHEET 9 (Sheet 2 of 2)
MALFUNCTION WARNING TEST

VEHICLE MAKE/MODEL/BODY STYLE: Subaru / Outback / MPV

VEHICLE NHTSA No.: CA5503 TEST DATE: 09-29-10

METHOD OF MALFUNCTION SIMULATION:
Describe method of malfunction simulation: Remove SBF-6 40-amp ABS motor fuse from engine compartment fuse box.

MALFUNCTION TELLTALE ILLUMINATION:
Telltales illuminate and remain illuminated after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes.

X Yes  No

Time for telltales to illuminate after ignition system is activated.
0 Seconds (must be within 2 minutes)

X Pass  Fail

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

X Yes  No

Time for telltales to extinguish after ignition system is activated.
2 Seconds (must be within 2 minutes)

X Pass  Fail

DATA INDICATES COMPLIANCE:
PASS/FAIL PASS

REMARKS:
The vehicle did not require driving to illuminate the ESC malfunction telltales. When the ABS motor fuse was removed, the ESC and ABS malfunction telltales also illuminated. When the ABS motor fuse was restored, the vehicle had to be driven to extinguish the telltales. Both the ESC and ABS malfunction telltales extinguished after 2 seconds of driving.

RECORDED BY: Alan Ida DATE: 09-29-10
APPROVED BY: Jeff Sankey DATE: 09-30-10
### 4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

<table>
<thead>
<tr>
<th>Type</th>
<th>Output</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Specifics</th>
<th>Serial Number</th>
<th>Calibration</th>
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<tbody>
<tr>
<td>Tire Pressure Gauge</td>
<td>Vehicle Tire Pressure</td>
<td>0-60psi</td>
<td>0.5 psi</td>
<td>±0.5% of applied pressure</td>
<td>Moroso Model: 89562</td>
<td>N/A</td>
<td>By: <em>TRC</em></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0-60psi</td>
<td></td>
<td>Date: 6-30-10</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Due: 9-30-10</td>
</tr>
<tr>
<td>Platform Scales</td>
<td>Vehicle Total, Wheel,</td>
<td>0-2500 lb per each of</td>
<td>0.5 lb</td>
<td>±1.0% of applied load</td>
<td>Mettler Toledo Model: JXGA1000</td>
<td>5225831-5JC</td>
<td>By: <em>Mettler_Toledo</em></td>
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<tr>
<td></td>
<td>and Axle Load</td>
<td>four pads</td>
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<td>Date: 8-25-10</td>
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<td>Due: 11-25-10</td>
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<tr>
<td>Automated Steering Machine with</td>
<td>Handwheel Angle</td>
<td>±800 deg</td>
<td>0.25 deg</td>
<td>±0.25 deg</td>
<td>Heitz Automotive Testing Model: Sprint 3</td>
<td>60303</td>
<td>By: <em>ATI-Heitz</em></td>
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<td>Steering Angle Encoder</td>
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<td></td>
<td></td>
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<td></td>
<td>Date: 1-05-10</td>
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<td>Due: 1-05-11</td>
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<tr>
<td>Multi-Axis Inertial Sensing</td>
<td>Longitudinal, Lateral,</td>
<td>Accelrometers: ±2 g</td>
<td>Accelrometer: ±10 ug</td>
<td>Accelerometers: ±0.05% of full range</td>
<td>BEI Technologies Model: MotionPAK MP-1</td>
<td>0768</td>
<td>By: <em>BEI_Tech</em></td>
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<tr>
<td>System</td>
<td>and Vertical Acceleration</td>
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<td>Angular Rate Senors: ±0.004 deg/s</td>
<td>Angular Rate Sensors: 0.05% of full range</td>
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<td></td>
<td>Date: 1-14-10</td>
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<tr>
<td>Roll, Yaw, and Pitch Rate</td>
<td>Roll, Yaw, and Pitch Rate</td>
<td>±100 deg/ s</td>
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<td>Due: 1-14-11</td>
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<tr>
<td>Radar Speed Sensor and Dashboard</td>
<td>Vehicle Speed</td>
<td>0-125 mph</td>
<td>0.009 mph</td>
<td>±0.25% of full scale</td>
<td>A-DAT Corp. Radar Model: DRS-6 Display Model: RD-2</td>
<td>1400603</td>
<td>By: <em>A-DAT</em></td>
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<tr>
<td>Display</td>
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<td></td>
<td>Date: 12-16-09</td>
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<td></td>
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<td></td>
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<td>Due: 12-16-10</td>
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<tr>
<td>Ultrasonic Distance Measuring</td>
<td>Left and Right</td>
<td>5-24 inches</td>
<td>0.01 inches</td>
<td>±0.25% of maximum distance</td>
<td>Massa Products Corporation Model: M-5000/220</td>
<td>104619 &amp; 104613</td>
<td>By: Consumers Energy Laboratory Services</td>
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<td>System</td>
<td>Side Vehicle Height</td>
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<td>Date: 12-18-10</td>
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<tr>
<td>Data Acquisition System</td>
<td>Record Time; Velocity;</td>
<td>Sufficient to meet or</td>
<td>Sufficient to meet or exceed individual sensors</td>
<td>200 Hz</td>
<td>Dewetron Sidehand DAS Model: DA-121-16 Digitizer Model: Dewe-Orion-1616-100 Amplifier/AntiAliasing: MDAQ-FILT-10-S</td>
<td>12060</td>
<td>By: <em>Dewetron</em></td>
</tr>
<tr>
<td>[Amplify, Anti-Alias, and Digitize]</td>
<td>Distance; Lateral,</td>
<td>exceed or exceed</td>
<td>exceed or exceed individual sensors</td>
<td></td>
<td></td>
<td>1105</td>
<td>Date: 7-01-09</td>
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<tr>
<td></td>
<td>Longitudinal, and</td>
<td>exceed individual</td>
<td>exceed individual sensors</td>
<td></td>
<td></td>
<td></td>
<td>Due: 7-01-10*</td>
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<tr>
<td></td>
<td>Vertical Accelerations; Roll, Yaw, and Pitch Rates; Steering Wheel Angle.</td>
<td>sensors</td>
<td>sensors</td>
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<td>Load Cell</td>
<td>Vehicle Brake Pedal</td>
<td>0-300 lb</td>
<td>1 lb</td>
<td>±0.05% of full scale</td>
<td>DATRON Model: DTM-LPA</td>
<td>4970-1103</td>
<td>By: <em>TRC</em></td>
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<td>Force</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Date: per test</td>
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<td></td>
<td></td>
<td></td>
<td>Due: per test</td>
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<tr>
<td>Coordinate Measurement Machine</td>
<td>Inertial Sensing System Location</td>
<td>0-10 feet</td>
<td>0.001 inch</td>
<td>±0.003% of full scale</td>
<td>FARO International Model: Faro Arm N10</td>
<td>U12-05-08-07108</td>
<td>By: <em>FARO</em></td>
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<tr>
<td></td>
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<td></td>
<td>Date: 7-30-10</td>
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<td>Due: 7-30-11</td>
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<tr>
<td>Outriggers</td>
<td>No output. Safety Item.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>NHTSA Titanium Outriggers Model: Docket 2007-27862-11</td>
<td>N/A</td>
<td>N/A</td>
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*The Dewetron data acquisition system calibration due date was extended to 9/17/10, per OVSC.
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
5.14 VEHICLE SPEED SENSOR
5.15 BODY ROLL SENSOR (DRIVER SIDE)
5.16 BODY ROLL SENSOR (PASSENGER SIDE)
5.17 BRAKE PEDAL FORCE TRANSUDER
MFD BY FUJI HEAVY INDUSTRIES LTD.

DATE: 04/10

GVWR: 4585 LB (2080 KG)
GAWR:F 2360 LB (1070 KG) WITH P225/60R17 TIRES.
17X7J RIMS. AT 220 KPA (32 PSI) COLD
GAWR:R 2340 LB (1060 KG) WITH P225/60R17 TIRES.
17X7J RIMS. AT 210 KPA (30 PSI) COLD

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: 4S4BRBCC8A3378112 MPV

ASSEMBLED BY SIA INC. MADE IN U.S.A.

2010 SUBARU OUTBACK
FMVSS 126
VEHICLE No.: CA5503
AUGUST 2010

5.3 VEHICLE CERTIFICATION LABEL
<table>
<thead>
<tr>
<th>TIRE</th>
<th>SIZE DIMENSIONS</th>
<th>COLD TIRE PRESSURE</th>
<th>PRESSION DES PNEUS À FROID</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT AVANT</td>
<td>P225/60R17</td>
<td>220 KPA, 32 PSI</td>
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</tr>
<tr>
<td>REAR ARRIÈRE</td>
<td>P225/60R17</td>
<td>210 KPA, 30 PSI</td>
<td></td>
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<tr>
<td>SPARE DE SECOURS</td>
<td>T145/80R17</td>
<td>420 KPA, 60 PSI</td>
<td></td>
</tr>
</tbody>
</table>

The combined weight of occupants and cargo should never exceed 408kg or 900 lbs.
Le poids total des occupants et du chargement ne doit jamais dépasser 408 kg ou 900 lb.
SAFETY
- Symmetrical All-Wheel Drive (AWD)
- Vehicle Dynamics Control (VDC)
- Anti-Lock Brakes: 4-Wheel Disc
- Subaru Advanced Frontal Air Bag System
- Side-Curtain Airbags
- Front Seat Side-Impact Air Bags
- 3-Point Seatbelts, All Seating Positions
- LATCH System for Child Safety Seats
- Anti-Theft Alarm & Immobilizer
- Tire Pressure Monitoring System (TPMS)
- Rollover Sensor
- Brake Assist

PERFORMANCE AND EXTERIOR
- 2.5L Horizontally-Opposed 4-Cyl Engine
- Auto Lights w/ Daytime Running Lights
- 17-Inch Alloy Wheels
- Fully Independent Raised Suspension
- Roof Rails w/ Integrated Cross Bars
- Privacy Glass

SAFETY FEATURES
- Symmetrical All-Wheel Drive (AWD)
- Vehicle Dynamics Control (VDC)
- Anti-Lock Brakes: 4-Wheel Disc
- Subaru Advanced Frontal Air Bag System
- Side-Curtain Airbags
- Front Seat Side-Impact Air Bags
- 3-Point Seatbelts, All Seating Positions
- LATCH System for Child Safety Seats
- Anti-Theft Alarm & Immobilizer
- Tire Pressure Monitoring System (TPMS)
- Rollover Sensor
- Brake Assist

ertosment Features
- Air Conditioning w/ Air Filtration System
- AM/FM Stereo with CD Player
- Auxiliary Audio Jack
- Tilt / Telescopic Steering Column
- 10-Way Adjustable Power Driver’s Seat
- Outside Temperature Gauge
- Cruise Control
- Power Windows, Door Locks and Mirrors
- Remote Keyless Entry System
- Auto-Up/Down Front Driver’s Window
- Dual Illuminated Visor Vanity Mirrors
- 60/40 Fold-Down/Recline Rear Seatback
- Carpeted Floor Mats, Cargo Area Mat
- 8 Cupholders

Government Safety Ratings
- Frontal: Driver ****
- Crash: Passenger ****
- Crash: Side Front Seat ****
- Crash: Rear Seat ****
- Rollover: ****

Optional Equipment and Other Items
- Manufacturer’s Suggested Retail Price: $24,895.00
- Option Package: 02
- All-Weather Package
- Heated Front Seats, Windshield Wiper De-Icer, Heated Side Mirrors
- Lineartronic Continuously Variable
- Transmission w/ 6-Speed Manual Mode
- Full Tank of Gas
- Auto-Dim Mirror/Comp
- Media Hub
- Partial Zero Emission (PZEV)

EPA Fuel Economy Estimates
- CITY MPG: 22
- HIGHWAY MPG: 29

Estimated Annual Fuel Cost:
- $1,626

Combined Fuel Economy:
- This Vehicle: 24 mpg

Limited Warranty/Roadside Assistance
- 3 Years / 36,000 Miles Basic
- 5 Years / 60,000 Miles Powertrain
- 5 Yrs/Unlimited Mileage Rust Perforation
- 3 Yrs / 36,000 Mpg/24/7 Roadside Assistance

2010 SUBARU OUTBACK
FMVSS 126
VEHICLE No.: CA5503
AUGUST 2010

5.5 WINDOW STICKER - MONRONEY LABEL
6.0 DATA PLOTS

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

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

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

Figure 4. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Clockwise Initial Steer Tests
Figure 1. Steering Angle and Yaw Rate Time History, Counter-Clockwise Initial Steer Tests
Figure 2. Steering Angle, Lateral Acceleration, and Lateral Displacement Time History, Counter-Clockwise Initial Steer Tests

- Steering Angle (degrees)
- Corrected Lateral Acceleration (g)
- Lateral Displacement (feet)
Figure 3. Steering Angle and Yaw Rate Time History, Clockwise Initial Steer Tests

- Steering Angle (degrees)
- Yaw Rate (deg/sec)
- Time (s)

Key:
- SWA 52 Scalar 1.5
- SWA 69 Scalar 2.0
- SWA 86 Scalar 2.5
- SWA 104 Scalar 3.0
- SWA 121 Scalar 3.5
- SWA 138 Scalar 4.0
- SWA 155 Scalar 4.5
- SWA 173 Scalar 5.0
- SWA 190 Scalar 5.5
- SWA 207 Scalar 6.0
- SWA 224 Scalar 6.5
- SWA 242 Scalar 7.0
- SWA 259 Scalar 7.5
- SWA 270 Scalar 7.8
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
Vehicle Dynamics Control warning light

Vehicle Dynamics Control operation indicator light

The light illuminates when the ignition switch is turned to the "ON" position and turns off several seconds after the engine has started. This lighting pattern indicates that the Vehicle Dynamics Control system is operating normally.

Vehicle Dynamics Control warning light

CAUTION

The Vehicle Dynamics Control system provides its ABS control through the electrical circuit of the ABS system. Accordingly, if the ABS is inoperative, the Vehicle Dynamics Control system becomes unable to provide ABS control. As a result, the Vehicle Dynamics Control system also becomes inoperative, causing the warning light to illuminate. Though both the Vehicle Dynamics Control and ABS systems are inoperative in this case, the ordinary functions of the brake system are still available. You will be safe while driving with this condition, but drive carefully and we recommend that you have your vehicle checked at a SUBARU dealer as soon as possible.

NOTE

- If the electrical circuit of the Vehicle Dynamics Control system itself malfunctions, the warning light only illuminates. At this time, the ABS (Anti-lock Brake System) remains fully operational.
- The warning light illuminates when the electronic control system of the ABS/Vehicle Dynamics Control system malfunctions.

The Vehicle Dynamics Control system is probably inoperative under any of the following conditions. We recommend that you have your vehicle checked at a SUBARU dealer immediately.

- The warning light does not illuminate when the ignition switch is turned to the "ON" position.
- The warning light illuminates while the vehicle is running.

- CONTINUED -

NOTE

If the warning light behavior is as described in the following examples, the Vehicle Dynamics Control system may be considered normal.

- The warning light illuminates right after the engine is started but turns off immediately, remaining off.
- The warning light illuminates after the engine has started and turns off while the vehicle is subsequently being driven.
- The warning light illuminates during driving, but it turns off immediately and remains off.

Vehicle Dynamics Control operation indicator light

The indicator light flashes during activation of the skid suppression function and during activation of the traction control function.

NOTE

- The light may remain illuminated for a short period of time after the engine has been started, especially in cold weather. This does not indicate the existence of a problem. The light should turn off as soon as the engine has warmed up.
- The indicator light illuminates when the engine has developed a malfunction and the malfunction indicator lamp/CHECK ENGINE warning light is on.

The Vehicle Dynamics Control system is probably malfunctioning under the following condition. We recommend that you have your vehicle checked at a SUBARU dealer as soon as possible.

- The light does not turn off even after the lapse of several minutes (the engine has warmed up) after the engine has started.

Vehicle Dynamics Control OFF indicator light

The light illuminates when the ignition switch is turned to the "ON" position and turns off after approximately 2 seconds. The light illuminates when the Vehicle Dynamics Control OFF switch is pressed to deactivate the Vehicle Dynamics Control system.

The Vehicle Dynamics Control system is probably malfunctioning under any of the following conditions. We recommend that you have your vehicle checked at a SUBARU dealer immediately.

- The light does not illuminate when the ignition switch is turned to the "ON" position.
- The light does not turn off even after a period of approximately 2 seconds after the ignition switch has been turned to the "ON" position.
Vehicle Dynamics Control system

**WARNING**
Always use the utmost care in driving – overconfidence because you are driving with a Vehicle Dynamics Control system equipped vehicle could easily lead to a serious accident.

**CAUTION**
- Even if your vehicle is equipped with Vehicle Dynamics Control, winter tires or snow chains should be used when driving on snow-covered or icy roads; in addition, vehicle speed should be reduced considerably. Simply having a Vehicle Dynamics Control system does not guarantee that the vehicle will be able to avoid accidents in any situation.
- Activation of the Vehicle Dynamics Control system is an indication that the road being travelled on has a slippery surface; since having Vehicle Dynamics Control is no guarantee that full vehicle control will be maintained at all times and under all conditions, its activation should be seen as a sign that the speed of the vehicle should be reduced considerably.
- Wheneaverage suspension components, steering components, or an axle are removed from a vehicle equipped with Vehicle Dynamics Control, we recommend that you have an authorized SUBARU dealer perform an inspection of that system.
- The following precautions should be observed in order to ensure that the Vehicle Dynamics Control system is operating properly.
  - All four wheels should be fitted with tires of the same size, type, and brand. Furthermore, the amount of wear should be the same for all four tires.
  - Keep the tire pressure at the proper level as shown on the label attached to the vehicle’s door pillar.
  - Use only the special temporary spare tire to replace a flat tire. With a temporary spare tire, the effectiveness of the Vehicle Dynamics Control system is reduced and this should be taken into account when driving the vehicle in such a condition.

In the event of wheelspin and/or skidding on a slippery road surface and/or during cornering and/or an evasive maneuver, the Vehicle Dynamics Control system adjusts the engine's output and the wheels' respective braking forces to help maintain traction and directional control.

- **Traction Control Function**
  The traction control function is designed to prevent spinning of the driving wheels on slippery road surfaces, thereby helping to maintain traction and directional control. Activation of this function is indicated by flashing of the Vehicle Dynamics Control operation indicator light.

- **Skid Suppression Function**
  The skid suppression function is designed to help maintain directional stability by suppressing the wheels' tendency to slide sideways during steering operations. Activation of this function is indicated by flashing of the Vehicle Dynamics Control operation indicator light.

**NOTE**
- Slight twitching of the brake pedal may be felt when the Vehicle Dynamics Control system operates; a small degree of vehicle or steering wheel shaking may also be noticed in this situation. These are normal characteristics of Vehicle Dynamics Control operation and are no cause for alarm.
- You may briefly hear an operating sound from the engine compartment when starting the engine and when driving off after starting the engine. This noise is generated as a result of a check being performed on the Vehicle Dynamics Control system and is normal.
- Depending on the time of activation of the brakes, the brake pedal may seem to jolt when you drive off after starting the engine. This too is a consequence of the Vehicle Dynamics Control operational check and is normal.
- In the circumstances listed in the following, the vehicle may be more unstable than it feels to the driver. The Vehicle Dynamics Control System may therefore operate. Such operation does not indicate a system malfunction.
  - on gravel-covered or rutted roads
  - on unfinished roads
  - when the vehicle is towing a trailer
  - when the vehicle is fitted with snow tires or winter tires
  - Activation of the Vehicle Dynamics Control system will cause operation of the steering wheel to feel slightly different compared to that for normal conditions.
  - Even if the vehicle is equipped with a Vehicle Dynamics Control system, it is important that winter tires be used when driving on snow-covered or icy roads. (All four wheels should be fitted with tires of the same size and brand). Furthermore, if snow chains are to be used, they should be fitted on the front wheels. When a vehicle is fitted with snow chains, however, the effectiveness of the Vehicle Dynamics Control system is reduced and this should be taken into account when driving the vehicle in such a condition.
  - It is always important to reduce speed when approaching a corner, even if the vehicle is equipped with Vehicle Dynamics Control.
  - All four wheels should be fitted with tires of the same size, type, and brand.
furthermore, the amount of wear should be the same for all four tires. If these precautions are not observed and non-matching tires are used, it is quite possible that the Vehicle Dynamics Control system will be unable to operate correctly as intended.

- Always turn off the engine before replacing a tire. Failure to do so may render the Vehicle Dynamics Control system unable to operate correctly.

Vehicle Dynamics Control system monitor

Vehicle Dynamics Control warning light

Vehicle Dynamics Control operation indicator light

The light illuminates when the ignition switch is turned to the "ON" position and turns off several seconds after the engine has started. This lighting pattern indicates that the Vehicle Dynamics Control system is operating normally.

CAUTION

Because the Vehicle Dynamics Control system controls each brake through the ABS, whenever the ABS stops operating due to a malfunction in that electrical system, the Vehicle Dynamics Control will also become unable to control all four brakes. Thus Vehicle Dynamics Control system operation halts and the warning light illuminates.

Although both the Vehicle Dynamics Control system and the ABS will be inoperable in this situation, it will still be possible to stop the vehicle using normal braking. The Vehicle Dynamics Control system and the ABS do not adversely affect operation of the vehicle in any way when they are inoperable. However, should such a situation occur, drive with care and we recommend that you have an authorized SUBARU dealer carry out an inspection of those systems at the first available opportunity.

NOTE

- When a malfunction has occurred in the Vehicle Dynamics Control system, only the warning light will illuminate. In such an event, the ABS will still be operating normally.
- The warning light will also illuminate when a problem occurs with the ABS or Vehicle Dynamics Control electronic control systems.

The warning light illuminates when the ignition switch is turned to the "ON" position and turns off several seconds after the engine has started. This lighting pattern indicates that the Vehicle Dynamics Control system is operating normally.

The following situations could indicate a malfunction of the Vehicle Dynamics Control system. If any of these situations occur, we recommend that you have an authorized SUBARU dealer carry out an inspection of the system at the first available opportunity.

- The warning light does not illuminate when the ignition switch is turned to the

Continued

7-36 Starting and operating

ON position.

- The warning light illuminates while the vehicle is being driven.

NOTE

When the warning light turns on and off in the following way, it indicates that the Vehicle Dynamics Control system is operating normally.

- Although illuminating after the engine has been started, the warning light quickly turns off and remains off.
- The warning light illuminates when the vehicle is being driven, it then turns off and remains off.

Vehicle Dynamics Control operation indicator light

The indicator light flashes during activation of the skid suppression function and during activation of the traction control function.

NOTE

- The Indicator light may remain illuminated for a while after the engine has been started, especially in cold weather. This occurs because the engine has not yet warmed up and is completely normal. The light will turn off when the engine has reached a suitable operating temperature.

- When an engine problem occurs and the malfunction indicator lamp/ CHECK ENGINE warning light illuminates, the Indicator light will also illuminate.

The following two situations could indicate malfunction of the Vehicle Dynamics Control system. If either of these situations occurs, we recommend that you have an authorized SUBARU dealer carry out an inspection of that system at the first available opportunity.

- The indicator light does not illuminate when the ignition switch is turned to the "ON" position.
- The indicator light fails to turn on after the engine is started, even when several minutes have passed to allow the engine to heat up sufficiently.

Vehicle Dynamics Control OFF indicator light

The light illuminates when the ignition switch is turned to the "OFF" position and turns off after approximately 2 seconds. The light illuminates when the Vehicle Dynamics Control OFF switch is pressed to deactivate the Vehicle Dynamics Control system.

The following two situations could indicate a malfunction of the Vehicle Dynamics Control system. If either of these situations occurs, we recommend that you have an authorized SUBARU dealer carry out an inspection of that system at the first available opportunity.

- The indicator light does not illuminate when the ignition switch is turned to the

Continued
ON position.
- The indicator light does not turn off approximately 2 seconds after the ignition switch has been turned to the ON position.

### Vehicle Dynamics Control

**OFF switch**

Pressing the switch to deactivate the Vehicle Dynamics Control system can facilitate the following operations:
- A standing start on a steeply sloping road with a snowy, gravel-covered, or otherwise slippery surface
- Extrication of the vehicle when its wheels are stuck in mud or deep snow

When the switch is pressed during engine operation, the Vehicle Dynamics Control OFF indicator light illuminates. The Vehicle Dynamics Control system will be deactivated. When the switch is pressed again to reactivate the Vehicle Dynamics Control system, the indicator light turns off.

You should not deactivate the Vehicle Dynamics Control system except under the above-mentioned situations.

### CAUTION

The Vehicle Dynamics Control system helps prevent unstable vehicle motion such as skidding using control of the brakes and engine power. Do not turn off the Vehicle Dynamics Control system unless it is absolutely necessary. If you must turn off the Vehicle Dynamics Control system, drive very carefully based on the road surface condition.

### NOTE

- When the switch has been pressed to deactivate the Vehicle Dynamics Control system, the Vehicle Dynamics Control system automatically reactivates itself the next time the ignition switch is turned to the "LOCK"/"OFF" position and the engine is restarted.
- If the switch is held down for 10 seconds or longer, the indicator light turns off, the Vehicle Dynamics Control system is activated, and the system ignores any further pressing of the switch. To make the switch usable again, turn the ignition switch to the

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7-38 Starting and operating

"LOCK"/"OFF" position and restart the engine.
- When the switch is pressed to deactivate the Vehicle Dynamics Control system, the vehicle's running performance is comparable with that of a vehicle that does not have a Vehicle Dynamics Control system. Do not deactivate the Vehicle Dynamics Control system except when absolutely necessary.
- Even when the Vehicle Dynamics Control system is deactivated, components of the brake control system may still activate. When the brake control system is activated, the Vehicle Dynamics Control operation indicator light illuminates.
7.2 VEHICLE ARRIVAL CONDITION REPORT

CONTRACT NO. DTNH22-08-D-00097 DATE: 08/26/10
FROM: Automotive Allies
TO: TRC
PURPOSE: (X) Initial ( ) Received ( ) Present
Receipt via Transfer vehicle condition

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2010 / Subaru / Outback / MPV
MANUFACTURE DATE: 04/10 NHTSA NO.: CA5503
BODY COLOR: Silver VIN: 4S4BRBCC8A3378112
ODOMETER READING: 119 miles GVWR: 2,080 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: 08-26-10
APPROVED BY: Jeff Sankey DATE: 09-30-10
7.3 VEHICLE COMPLETION CONDITION REPORT

CONTRACT NO. ______ DTNH22-08-D-00097 ______ DATE: 09/27/10

MODEL YEAR/MAKE/MODEL/BODY STYLE: 2010 / Subaru / Outback / MPV

MANUFACTURE DATE: 04/10 NHTSA NO.: CA5503

BODY COLOR: Silver VIN: 4S4BRBCC8A3378112

ODOMETER READING: 181 miles GVWR: 2,080 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: 09-27-10
APPROVED BY: Jeff Sankey DATE: 09-30-10
### 7.4 SINE WITH DWELL TEST RESULTS

**2010 Subaru Outback**  
**NHTSA No.: CA5503**

**Date Created:** 31-Aug-10

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### 7.4 SINE WITH DWELL TEST RESULTS

2010 Subaru Outback

NHTSA No.: CA5503

**Date Created:** 31-Aug-10

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## 7.5 SLOWLY INCREASING STEER TEST RESULTS

2010 Subaru Outback  
NHTSA No.: CA5503

Date Created: 08/31/10

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<th>THETAENC_3 [degree]</th>
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### Averages

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7.6 INERTIA SENSOR MEASUREMENTS
2010 Subaru Outback
NHTSA No.: CA5503

Device: U12-05-08-07108
Device version: 2.24
Device certification date: 07/30/10
Today is: 8/31/2010
Units: Millimeters

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Track Width: 1571.625

Roof Height (relative to ground): 1599.174

Motion Pak - x-distance: 1593.522
Motion Pak - y-distance: -32.062
Motion Pak - z-distance: 901.746

Motion Pak - x-distance (inches): 62.737
Motion Pak - y-distance (inches): -1.262
Motion Pak - z-distance (inches): 35.502

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.)