126-DRI-10-009
SAFETY COMPLIANCE TESTING FOR FMVSS 126
Electronic Stability Control Systems

General Motors LLC
2010 GMC Acadia
NHTSA No. CA0111

DYNAMIC RESEARCH, INC.
355 Van Ness Avenue, STE 200
Torrance, California 90501

10 November, 2010
Final Report
Prepared Under Contract No.: DTNH22-08-D-00098

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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Prepared By:  _______________________

Approved By:  _______________________

Approval Date:  10 November, 2010

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:  _______________________

Acceptance Date:  11/14/10
**Title and Subtitle**
Final Report of FMVSS 126 Compliance Testing of 2010 GMC Acadia multipurpose passenger vehicle, NHTSA No. CA0111

**Report Date**
10 November, 2010

**Performing Organization Name and Address**
Dynamic Research, Inc.
355 Van Ness Ave, STE 200
Torrance, CA 90501

**Sponsoring Agency Name and Address**
U.S. Department of Transportation
National Highway Traffic Safety Administration Enforcement
Office of Vehicle Safety Compliance
1200 New Jersey Avenue, SE,
West Building, 4th Floor (NVS-221)
Washington, D.C. 20590

**Type of Report and Period Covered**
Final Test Report
5 May, 2010 to 10 November, 2010

**Abstract**
A test was conducted on a 2010 GMC Acadia, NHTSA No. CA0111, 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 2010 GMC Acadia, meets the minimum equipment and performance requirements stated in Federal Motor Vehicle Safety Standard (FMVSS) 126, "Electronic Stability Control Systems."

2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS

Testing of the 2010 GMC Acadia was conducted at Dynamic Research, Inc (DRI) 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 20 km/h (12.4 mph), when being driven in reverse, or during system initialization).

The vehicle was subjected to a 0.7 Hz Sine with Dwell 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).
2.0 TEST PROCEDURE AND DISCUSSION OF RESULTS (CONTINUED)

– 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 (CONTD)

Data Summary Sheet (Page 1 of 2)

Vehicle: 2010 GMC Acadia
NHTSA No. CA0111 VIN: 1GKLRLED2AJ180906
Vehicle Type: MPV Manufacture Date: 01/10
Laboratory: Dynamic Research, 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)
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)
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 (CONTD)

Data Summary Sheet (Page 2 of 2)

___________________________________________________________________

REQUIREMENTS:                  PASS/FAIL

Vehicle Lateral Stability (Data Sheet 8)
   Yaw Rate Ratio at 1 second after COS is less than 35% of peak value. (S126, S5.2.1)  PASS

   Yaw Rate Ratio at 1.75 seconds after COS is less than 20% of peak value. (S126, S5.2.2)  PASS

Vehicle Responsiveness (Data Sheet 8)
   Lateral displacement at 1.07 seconds after BOS is at least 1.83 m (6 feet) for vehicles with a GVWR of 3,500kg (7,716 lb) or less, and 1.52 m (5 feet) for vehicles with a GVWR greater than 3,500 Kg (7,716 lb). (S126, S5.2.3)  PASS

ESC Malfunction Warning (Data Sheet 9)
   Warning is provided to driver after malfunction occurrence. (S126, S5.3)  PASS

   Malfunction telltale stayed illuminated as long as malfunction existed and must extinguish after malfunction was corrected. (S126, S5.3.7)  PASS
3.0 TEST DATA

Data Sheet 1 (Page 1 of 2)
TEST VEHICLE INSPECTION AND TEST PREPARATION

Vehicle: **2010 GMC Acadia MPV**
NHTSA No. **CA0111** Data Sheet Completion Date: **5/24/2010**
VIN **1GKLRLED2AJ180906** Manufacture Date: **01/10**
GVWR (kg): **2908.0** Front GAWR (kg): **1450.0** Rear GAWR (kg): **1600.0**
Seating Positions Front: **2** Mid: **3** Rear **3**
Odometer reading at time of inspection: **27 miles (43.2 km)**

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING:

Front axle: **P255/65 R18** Rear axle: **P255/65 R18**

INSTALLED TIRE SIZE(S) ON VEHICLE (from tire sidewall)

<table>
<thead>
<tr>
<th></th>
<th>Front Axle</th>
<th>Rear Axle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tire Manufacturer</td>
<td>Goodyear</td>
<td>Goodyear</td>
</tr>
<tr>
<td>Tire Model</td>
<td>Fortera HL Edition</td>
<td>Fortera HL Edition</td>
</tr>
<tr>
<td>Tire Size</td>
<td>P255/65 R18</td>
<td>P255/65 R18</td>
</tr>
<tr>
<td>TIN</td>
<td>4BXM ARDR 0210</td>
<td>4BXM ARDR 0310</td>
</tr>
<tr>
<td>Left Front</td>
<td>4BXM ARDR 0210</td>
<td>4BXM ARDR 0210</td>
</tr>
<tr>
<td>Left Rear</td>
<td>4BXM ARDR 0210</td>
<td>4BXM ARDR 0210</td>
</tr>
</tbody>
</table>

Are installed tire sizes same as labeled tire sizes? **Yes**
If no, contact COTR for further guidance

DRIVE CONFIGURATION(S):(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 no locked full time (4WD Automatic)
- [ ] Four Wheel Drive (High Gear Locked Differential 4WD HGLD)
- [ ] Four Wheel Drive Low Gear (4WD Low)
- [ ] Other (Describe)
DRIVE CONFIGURATIONS AND MODES: (ex. default, performance, off)
(For each of the vehicle's drive configurations identify available operating modes)

Drive Configuration: **FWD**
Mode: **Standard**

Drive Configuration: ______________________
Mode: ______________________

Drive Configuration: ______________________
Mode: ______________________

VEHICLE STABILITY SYSTEMS (Check applicable technologies):
List other systems:

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

REMARKS:

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RECORDED BY: **P Broen**
DATE RECORDED: **5/24/2010**

APPROVED BY: **J Lenkeit**
DATE APPROVED: **6/2/2010**
3.0 TEST DATA (CONTD)

Data Sheet 2 (Page 1 of 2)
ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

Vehicle: 2010 GMC Acadia MPV
NHTSA No__CA0111__ Data Sheet Completion Date: 5/21/2010

ESC SYSTEM IDENTIFICATION
Manufacturer/Model Robert Bosch LLC/Bosch ESP Gen 8

ESC SYSTEM HARDWARE (Check applicable hardware)

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

List other Components: ________

ESC OPERATIONAL CHARACTERISTICS

System is capable of generating brake torque at each wheel
Brief explanation: The ESC electronic control unit modulates electrical solenoids that open and close valves within the hydraulic control unit, controlling brake fluid pressure the brake calipers.

☐ Yes (Pass)  ☒ No (Fail)

System is capable of determining yaw rate
Brief explanation: Yaw rate is measured by a combination gyroscopic rate sensor/lateral acceleration sensor

☐ Yes (Pass)  ☒ No (Fail)

System is capable of monitoring driver steering input
Brief explanation: Driver steering input is measured by a steering wheel angle sensor that is mounted on the steering column.

☐ Yes (Pass)  ☒ No (Fail)

System is capable of estimating side slip or side slip derivative
Brief explanation: Side slip and side slip derivative are calculated values within the ESC electronic control unit based on the following sensor inputs: four independent wheel speeds (from the wheel speed sensors mounted at each wheel), yaw rate (from the combination yaw/lateral acceleration sensor mounted underneath the front center console), lateral acceleration (from the combination yaw/lateral acceleration sensor mounted underneath the front center console), and steering wheel angle (from the steering wheel angle sensor mounted on the steering column).

☐ Yes (Pass)  ☒ No (Fail)
3.0 TEST DATA (CONT'D)

Data Sheet 2 (Page 2 of 2)
ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

ESC OPERATIONAL CHARACTERISTICS (continued)

System is capable of modifying engine torque during ESC activation. Method used to modify torque: *The ESC electronic control unit sends a signal to the powertrain control module requesting an appropriate percent reduction in engine torque. Torque is modified using a combination of ignition timing and throttle angle.*

Yes (Pass)  No (Fail)

System is capable of activation at speeds of 20 km/h (12.4 mph) and higher

Yes (Pass)  No (Fail)

Speed system becomes active: 14.4 km/h

System is capable of activation during the following driving phases:
- acceleration
- braking
- coasting
- during activation of ABS or traction control

Yes (Pass)  No (Fail)

Driving phases during which ESC is capable of activation:
*The ESC system is active under driving phases of acceleration, deceleration, coasting, and during activation of ABS or traction control, except if the vehicle is being driven in reverse or if the forward vehicle speed is less than 14.4 km/h.*

Yes (Pass)  No (Fail)

Vehicle manufacturer submitted documentation explaining how the ESC mitigates understeer

Yes (Pass)  No (Fail)

DATA INDICATES COMPLIANCE:

Yes (Pass)  No (Fail)

REMARKS:

_____________________________________________________________________

RECORDED BY: Joe Kelly  DATE RECORDED: 5/21/2010
APPROVED BY: J Lenkeit  DATE APPROVED: 6/2/2010
3.0 TEST DATA (CONTD)

Data Sheet 3 (Page 1 of 2)

ESC MALFUNCTION AND OFF TELLTALES

Vehicle: 2010 GMC Acadia MPV

NHTSA No. CA0111 Data Sheet completion date: 5/21/2010

------------------------------------------------------------------------

ESC Malfunction Telltale

Vehicle is equipped with malfunction telltale? Yes

Telltale Location: Lower right corner of the instrument panel cluster (Figure 5.6).

Telltale Color: Amber

Telltale symbol or abbreviation used

☑ Esc

☐ Vehicle uses this symbol

☐ Vehicle uses this abbreviation

☐ X Neither symbol or abbreviation is used

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

The symbol used is similar to that shown above, but also includes an equilateral triangle around the rear-view silhouette of the vehicle (Figure 5.6). It remains illuminated when there is an ESC malfunction.

Is telltale part of a common space? No

Is telltale also used to indicate activation of the ESC system? Yes

If yes explain telltale operation during ESC activation:

This telltale flashes when the ESC system is active.

------------------------------------------------------------------------
3.0 TEST DATA (CONTD)

Data Sheet 3 (Page 2 of 2)
ESC MALFUNCTION AND OFF TELLTALES

"ESC OFF" Telltale (if provided)
Vehicle is equipped with "ESC OFF" telltale? **No**

Is "ESC Off" telltale combined with "ESC Malfunction" telltale utilizing a two part telltale? **NA**

Telltale Location: **NA**

Telltale Color: **NA**

Telltale symbol or abbreviation used

[ ] 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? **NA**

DATA INDICATES COMPLIANCE **Yes**
(Vehicle is compliant if equipped with a malfunction telltale)

Remarks: _The vehicle has a Driver Information Center (DIC) that can display ESC and other information. The message “SERVICE STABILITRAK” is displayed if there is an ESC malfunction (see owner’s manual page 5-41 in Section 7.1). The vehicle Acadia does not have an ESC off control or ESC off telltale._

RECORDED BY:  
**Joe Kelly**  
DATE RECORDED:  **5/21/2010**

APPROVED BY:  
**Brian Kebschull**  
DATE APPROVED:  **6/1/2010**
3.0 TEST DATA (CONTD)

Data Sheet 4 (Page 1 of 3)
ESC AND ANCILLARY SYSTEM CONTROLS

Vehicle: 2010 GMC Acadia MPV
NHTSA No. CA0111  Data Sheet completion date: 6/1/2010

“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?  ___ Yes  ___ No

Type of control or controls provided?  
- Dedicated “ESC Off” Control
- Multi-functional control with an “ESC Off” mode
- Other (describe) NA

Identify each control location, labeling and selectable modes.

First Control:  
Location  NA
Labeling  
Modes  

Second Control:  
Location  
Labeling  
Modes  

Identify standard or default drive configuration  Standard

Verify standard or default drive configuration  ___ 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 ___ NA  ___ 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?  ___ Yes  ___ No (Fail)

If no, describe how the “Off” control functions  NA
### 3.0 TEST DATA (CONTD)

#### Data Sheet 4 (Page 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.

<table>
<thead>
<tr>
<th>Control Mode</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>NA</td>
<td></td>
<td></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?

\[
\begin{array}{ccc}
X & NA & Yes & No \\
\end{array}
\]

**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?

\[
\begin{array}{ccc}
\text{Yes} & X & \text{No} \\
\end{array}
\]

**Ancillary Control:** System ____________

Control Description ____________________________________________

Labeling ______________________________________________________

**Ancillary Control:**

Control Description ____________________________________________

Labeling ______________________________________________________

**Ancillary Control:**

Control Description ____________________________________________

Labeling ______________________________________________________
3.0 TEST DATA (CONT'D)

Data Sheet 4 (Page 3 of 3)
ESC ANDANCILLARY 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 “ESC Off” Telltale? (Yes/No)</th>
<th>Warnings or Messages Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></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>“ESC Off” telltale extinguishes upon cycling ignition? (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></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 activating the control 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.

DATA INDICATES COMPLIANCE:  PASS

Remarks: The 2010 Acadia does not have an ESC off control or ESC off telltale. Vehicle has a button that disables traction control. The symbol on the button is the SLIP icon (car silhouette with slippery lines below it) with a diagonal line through it. When pressed, the ESC/Traction control telltale illuminates, as well as a message in the common area, "Traction Control Off".
### 3.0 TEST DATA (CONTD)

#### Data Sheet 5 (Page 1 of 3)

**TEST TRACK AND VEHICLE DATA**

<table>
<thead>
<tr>
<th>Vehicle:</th>
<th>2010 GMC Acadia MPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHTSA No.</td>
<td>CA0111</td>
</tr>
<tr>
<td>Data Sheet completion date:</td>
<td>6/1/2010</td>
</tr>
</tbody>
</table>

**Test Track Requirements:**
- Test surface slope (0-1%): **0.5%**
- Peak Friction Coefficient (at least 0.9): **0.936**

Test track data meets requirements: **Yes**  If no, explain:

**Full Fluid Levels:**
- Fuel: **Yes**
- Other Fluids: **Yes** (specify)
- Coolant: **Yes**
- Oil, washer fluid, brake fluid

**Tire Pressures:**

<table>
<thead>
<tr>
<th>Required;</th>
<th>Front Axle</th>
<th>240</th>
<th>KPA</th>
<th>Rear Axle</th>
<th>240</th>
<th>KPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual;</td>
<td>LF</td>
<td>240</td>
<td>KPA</td>
<td>RF</td>
<td>240</td>
<td>KPA</td>
</tr>
<tr>
<td></td>
<td>LR</td>
<td>240</td>
<td>KPA</td>
<td>RR</td>
<td>240</td>
<td>KPA</td>
</tr>
</tbody>
</table>

**Vehicle Dimensions:**
- Front Track Width: **171.4** cm
- Wheelbase: **302.5** cm
- Rear Track Width: **170.4** cm

**Vehicle Weight Ratings:**
- GAWR Front: **1450.0** KG
- GAWR Rear: **1600.0** KG

**Unloaded Vehicle Weight (UVW):**

| Front Axle | 1196.5 | KG | Left Front | 592.8 | KG | Right Front | 603.7 | KG |
| Rear Axle  | 950.8  | KG | Left Rear  | 489.0 | KG | Right Rear  | 461.8 | KG |
| Total UVW  | 2147.3 | KG |

**Baseline Weight and Outrigger Selection** (only for MPVs, Trucks, Buses)
- Calculated baseline weight (UVW + 73kg): **2220.3** KG
- Outrigger size required ("Standard" or "Heavy"): **Standard**

Standard - Baseline weight under 2772 kg (6000 lb)
Heavy - Baseline weight equal to or greater than 2772 kg (6000 lb)
3.0 TEST DATA (CONTD)

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

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

<table>
<thead>
<tr>
<th></th>
<th>Front axle</th>
<th>Left front</th>
<th>Right front</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1222.4 KG</td>
<td>610.5 KG</td>
<td>611.9 KG</td>
</tr>
<tr>
<td></td>
<td>993.9 KG</td>
<td>507.6 KG</td>
<td>486.3 KG</td>
</tr>
<tr>
<td>Total UVW with outriggers</td>
<td>2216.3 KG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Front axle</th>
<th>Left front</th>
<th>Right front</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1300.9 KG</td>
<td>645.0 KG</td>
<td>655.9 KG</td>
</tr>
<tr>
<td></td>
<td>1058.7 KG</td>
<td>558.8 KG</td>
<td>499.9 KG</td>
</tr>
<tr>
<td>Vehicle Weight</td>
<td>2359.6 KG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ballast Required =</th>
<th>[Total UVW with Outriggers (if applicable)]</th>
<th>+168</th>
<th>KG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2216.3 KG</td>
<td>+168</td>
<td>KG</td>
</tr>
<tr>
<td></td>
<td>- [Loaded Weight w/Driver and Instrumentation)]</td>
<td></td>
<td>KG</td>
</tr>
<tr>
<td></td>
<td>2216.3 KG</td>
<td>+168</td>
<td>KG</td>
</tr>
<tr>
<td></td>
<td>- 2359.6 KG</td>
<td></td>
<td>KG</td>
</tr>
<tr>
<td></td>
<td>= 2216.3 KG</td>
<td>+168</td>
<td>KG</td>
</tr>
<tr>
<td></td>
<td>= 24.7 KG</td>
<td></td>
<td>KG</td>
</tr>
</tbody>
</table>

Total Loaded Vehicle Weight w/Driver and Instrumentation and Ballast

<table>
<thead>
<tr>
<th></th>
<th>Front axle</th>
<th>Left front</th>
<th>Right front</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1311.4 KG</td>
<td>645.5 KG</td>
<td>665.9 KG</td>
</tr>
<tr>
<td></td>
<td>1072.7 KG</td>
<td>563.8 KG</td>
<td>508.9 KG</td>
</tr>
<tr>
<td>Total UVW</td>
<td>2384.1 KG</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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:**

<table>
<thead>
<tr>
<th></th>
<th>Center of Gravity</th>
<th>Inertial Sensing System</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-distance</td>
<td>53.6 in 136.1 cm</td>
<td>74.8 in 189.9 cm</td>
</tr>
<tr>
<td>y-distance</td>
<td>-0.5 in -1.2 cm</td>
<td>-0.7 in -1.7 cm</td>
</tr>
<tr>
<td>z-distance</td>
<td>26.4 in 66.9 cm</td>
<td>22.7 in 57.7 cm</td>
</tr>
<tr>
<td>Roof Height</td>
<td>69.4 in 176.2 cm</td>
<td></td>
</tr>
<tr>
<td>Distance between ultrasonic sensors</td>
<td>91.8 in 233.0 cm</td>
<td></td>
</tr>
</tbody>
</table>

Remarks:

_____________________________________________________________________

RECORDED BY: Peter Broen DATE RECORDED: 6/1/2010
APPROVED BY: Brian Kebschull DATE APPROVED: 6/1/2010
3.0 TEST DATA (CONTD)

Data Sheet 6 (Page 1 of 3)
BRAKE AND TIRE CONDITIONING

Vehicle: **2010 GMC Acadia MPV**
NHTSA No. **CA0111**

<table>
<thead>
<tr>
<th>Measured tire pressure:</th>
<th>LF 249 KPA</th>
<th>RF 248 KPA</th>
<th>LR 250 KPA</th>
<th>RR 245 KPA</th>
</tr>
</thead>
</table>

Wind Speed **2.4** m/s (10 m/sec (22 mph) max for passenger cars; 5m/sec (11 mph) max for MPVs and trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) **24.4** °C

Brake Conditioning Time: **11:08:00 AM** Date: **6/1/2010**

56 km/h (35 mph) Brake Stops

- Number of stops executed (10 required) **10** Stops
- Observed deceleration rate range (.5g target) **0.45-0.55** 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 **0.85-1.00** g

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

- Duration of cool down period (5 minutes min.) **5** Minutes
## 3.0 TEST DATA (CONTD)

### Data Sheet 6 (Page 2 of 3)

**BRAKE AND TIRE CONDITIONING**

<table>
<thead>
<tr>
<th>Tire Conditioning series No. 1</th>
<th>Time:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured cold tire pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF</td>
<td>263</td>
<td>KPA</td>
</tr>
<tr>
<td>RF</td>
<td>263</td>
<td>KPA</td>
</tr>
<tr>
<td>LR</td>
<td>266</td>
<td>KPA</td>
</tr>
<tr>
<td>RR</td>
<td>258</td>
<td>KPA</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>2.5 m/s</td>
<td>(10 m/sec (22 mph) max for passenger cars; 5m/sec (11 mph) max for MPVs and trucks)</td>
</tr>
</tbody>
</table>

Wind Speed: 2.5 m/s

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 25.4°C

<table>
<thead>
<tr>
<th>Test Run</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>0.5-0.6</td>
<td>30.4 - 32</td>
</tr>
<tr>
<td>4-6</td>
<td>Counterclockwise</td>
<td>0.5 – 0.6</td>
<td>0.5-0.6</td>
<td>30.4 - 32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Run</th>
<th>Data File</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>2</td>
<td>56 ± 2 (35 ± 1)</td>
<td>60</td>
<td>0.5 - 0.6</td>
<td>0.38</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>56 ± 2 (35 ± 1)</td>
<td>90</td>
<td>0.5 - 0.6</td>
<td>0.52</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>56 ± 2 (35 ± 1)</td>
<td></td>
<td>0.5 - 0.6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></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 0.5-0.6 g lateral acceleration: 90 degrees

<table>
<thead>
<tr>
<th>Test Run</th>
<th>Data File</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>1-3</td>
<td>4-6</td>
<td>56 ± 2 (35 ± 1)</td>
<td>90 (cycles 1-10)</td>
<td>0.5 - 0.6</td>
<td>0.52</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>56 ± 2 (35 ± 1)</td>
<td>90 (cycles 1-9)</td>
<td>0.5 - 0.6</td>
<td>0.52</td>
</tr>
</tbody>
</table>

* The steering wheel angle used for cycle 10 should be twice the angle used for cycles 1-9
3.0 TEST DATA (CONTD)

Data Sheet 6 (Page 3 of 3)
BRAKE AND TIRE CONDITIONING

Tire Conditioning series No. 2

<table>
<thead>
<tr>
<th>Measured cold tire pressure</th>
<th>Time: 1:30:00 PM</th>
<th>Date: 6/1/2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF 253 KPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RF 257 KPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR 252 KPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR 241 KPA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wind Speed 3.1 m/s

(10 m/sec (22 mph) max for passenger cars; 5m/sec (11 mph) max for MPVs and trucks)

Ambient Temperature (7°C (45°F) - 40°C (104°F)) 27.2°C

30 meter (100 ft) Diameter Circle Maneuver

<table>
<thead>
<tr>
<th>Test Run</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>0.5-0.6</td>
<td>30.4 - 32</td>
</tr>
<tr>
<td>4-6</td>
<td>Counterclockwise</td>
<td>0.5 - 0.6</td>
<td>0.5-0.6</td>
<td>30.4 - 32</td>
</tr>
</tbody>
</table>

Steering wheel angle that corresponds to a peak 0.5-0.6 g lateral acceleration: 90 degrees

10-1 Hz Cycle Sinusoidal Steering Maneuver

<table>
<thead>
<tr>
<th>Test Run</th>
<th>Data File</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>1-3</td>
<td>16-18</td>
<td>56 ± 2 (35 ± 1)</td>
<td>90 (cycles 1-10)</td>
<td>0.5 - 0.6</td>
<td>0.52</td>
</tr>
<tr>
<td>4</td>
<td>19</td>
<td>56 ± 2 (35 ± 1)</td>
<td>90 (cycles 1-9)</td>
<td>0.5 - 0.6</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>180 (cycle 10)*</td>
<td>NA</td>
<td>0.75</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: Brian Kebschull DATE RECORDED: 6/1/2010
APPROVED BY: J Lenkeit DATE APPROVED: 6/4/2010
3.0 TEST DATA (CONTD)

Data Sheet 7 (Page 1 of 2)
SLOWLY INCREASING STEER (SIS) MANEUVER

Vehicle: **2010 GMC Acadia MPV**
NHTSA No. **CA0111**

Measured tire pressure:

<table>
<thead>
<tr>
<th>Tire Location</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF</td>
<td>267 KPA</td>
</tr>
<tr>
<td>RF</td>
<td>261 KPA</td>
</tr>
<tr>
<td>LR</td>
<td>268 KPA</td>
</tr>
<tr>
<td>RR</td>
<td>254 KPA</td>
</tr>
</tbody>
</table>

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

Ambient Temperature (7°C (45°F) - 40°C (104°F)) **25.8** °C

Selected drive configuration **FWD**

Selected Mode: **Default- ESC on**

**Preliminary Left Steer Maneuver:**

Lateral Acceleration measured at 30 degrees steering wheel angle

\[
\ddot{a}_{y,30\text{deg}} = 0.29 \text{ g}
\]

Assuming a linear relationship the following ratio should be used to calculate the steering wheel angle at 0.55g:

\[
\frac{30 \text{ degrees}}{0.55 \text{ g}} = \frac{\delta_{\text{sis}}}{\delta_{\text{sis}}} = \frac{56.9 \text{ degrees} (@.55g)}{60 \text{ degrees} (rounded)}
\]

**Steering Wheel Angle at Corrected 0.3g 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° (degrees)</th>
<th>Data Run</th>
<th>Good/NG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Left</td>
<td>12:09:43 PM</td>
<td>-33.8</td>
<td>10</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Left</td>
<td>12:12:46 PM</td>
<td>-32.8</td>
<td>11</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Left</td>
<td>12:16:30 PM</td>
<td>-33.3</td>
<td>12</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Left</td>
<td>12:20:55 PM</td>
<td>32.1</td>
<td>13</td>
<td>Good</td>
</tr>
<tr>
<td>5</td>
<td>Left</td>
<td>12:24:27 PM</td>
<td>32.1</td>
<td>14</td>
<td>Good</td>
</tr>
<tr>
<td>1</td>
<td>Right</td>
<td>12:27:18 PM</td>
<td>31.7</td>
<td>15</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Right</td>
<td>12:27:18 PM</td>
<td>31.7</td>
<td>15</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Right</td>
<td>12:27:18 PM</td>
<td>31.7</td>
<td>15</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Right</td>
<td>12:27:18 PM</td>
<td>31.7</td>
<td>15</td>
<td>Good</td>
</tr>
<tr>
<td>5</td>
<td>Right</td>
<td>12:27:18 PM</td>
<td>31.7</td>
<td>15</td>
<td>Good</td>
</tr>
</tbody>
</table>
3.0 TEST DATA (CONTD)

Data Sheet 7 (Page 2 of 2)
SLOWLY INCREASING STEER (SIS) MANEUVER

Average Overall Steering Wheel Angle:

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

\[
\delta_{0.3 \text{ g, overall}} = 32.7 \text{ degrees}
\]

[to nearest 0.1 degree]

Remarks:

_____________________________________________________________________

RECORDED BY:  
Brian Kebschull       DATE RECORDED:  6/1/2010
APPROVED BY:  
J Lenkeit           DATE APPROVED:  6/3/2010
3.0 TEST DATA (CONT'D)

Data Sheet 8 (Page 1 of 3)

VEHICLE LATERAL STABILITY AND RESPONSIVENESS

Vehicle: 2010 GMC Acadia MPV
NHTSA No. CA0111

Data sheet completion date: 6/1/2010

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

<table>
<thead>
<tr>
<th>Maneuver #</th>
<th>Clock Time (1.5 – 5.0 min max between runs)</th>
<th>Commanded Steering Wheel Angle (^*) ((\overline{\delta_{0.3g}},\text{overall}))</th>
<th>Yaw Rates (degrees/sec)</th>
<th>YRR at 1.0 sec after COS ([\leq 35%])</th>
<th>YRR at 1.75 sec after COS ([\leq 20%])</th>
<th>Pass/Fail</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>13:51</td>
<td>1.5</td>
<td>49</td>
<td>12.9</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-1.9</td>
</tr>
<tr>
<td>22</td>
<td>13:55</td>
<td>2.0</td>
<td>65</td>
<td>17.0</td>
<td>-0.2</td>
<td>-0.1</td>
<td>-0.9</td>
</tr>
<tr>
<td>23</td>
<td>13:59</td>
<td>2.5</td>
<td>82</td>
<td>21.5</td>
<td>-0.2</td>
<td>-0.4</td>
<td>-1.0</td>
</tr>
<tr>
<td>24</td>
<td>14:02</td>
<td>3.0</td>
<td>98</td>
<td>25.6</td>
<td>0.8</td>
<td>-0.1</td>
<td>3.3</td>
</tr>
<tr>
<td>25</td>
<td>14:05</td>
<td>3.5</td>
<td>114</td>
<td>30.1</td>
<td>0.4</td>
<td>-0.1</td>
<td>1.2</td>
</tr>
<tr>
<td>26</td>
<td>14:08</td>
<td>4.0</td>
<td>131</td>
<td>27.7</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.5</td>
</tr>
<tr>
<td>27</td>
<td>14:11</td>
<td>4.5</td>
<td>147</td>
<td>31.5</td>
<td>0.3</td>
<td>-0.3</td>
<td>1.0</td>
</tr>
<tr>
<td>28</td>
<td>14:14</td>
<td>5.0</td>
<td>164</td>
<td>34.8</td>
<td>-0.4</td>
<td>-0.4</td>
<td>-1.1</td>
</tr>
<tr>
<td>29</td>
<td>14:17</td>
<td>5.5</td>
<td>180</td>
<td>35.7</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.8</td>
</tr>
<tr>
<td>30</td>
<td>14:20</td>
<td>6.0</td>
<td>196</td>
<td>39.5</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.7</td>
</tr>
<tr>
<td>31</td>
<td>14:23</td>
<td>6.5</td>
<td>213</td>
<td>37.1</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.9</td>
</tr>
<tr>
<td>32</td>
<td>14:27</td>
<td>7.0</td>
<td>229</td>
<td>38.7</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-1.0</td>
</tr>
<tr>
<td>33</td>
<td>14:30</td>
<td>7.5</td>
<td>245</td>
<td>39.7</td>
<td>-0.5</td>
<td>-0.2</td>
<td>-1.1</td>
</tr>
<tr>
<td>34</td>
<td>14:33</td>
<td>8.0</td>
<td>262</td>
<td>39.8</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.5</td>
</tr>
<tr>
<td>35</td>
<td>14:36</td>
<td>8.5</td>
<td>270</td>
<td>39.3</td>
<td>-0.4</td>
<td>-0.4</td>
<td>-0.9</td>
</tr>
</tbody>
</table>

1. Maneuver execution should continue until a steering wheel angle magnitude factor of 6.5\(\overline{\delta_{0.3g}},\text{overall}\) or 270 degrees is utilized, whichever is greater provided the calculated magnitude of 6.5\(\overline{\delta_{0.3g}},\text{overall}\) is less than or equal to 300 degrees. If 6.5\(\overline{\delta_{0.3g}},\text{overall}\) is less than 270 degrees maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of 0.5\(\overline{\delta_{0.3g}},\text{overall}\) without exceeding the 270 degree steering wheel angle.
### LATERAL STABILITY TEST SERIES NO. 2 – Clockwise Initial Steer Direction

<table>
<thead>
<tr>
<th>Maneuver #</th>
<th>Clock Time</th>
<th>Commanded Steering Wheel Angle¹</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></td>
<td>Scalar (*δ₀.₃ g)</td>
<td>Angle (degrees)</td>
<td>ψ&lt;sub&gt;Peak&lt;/sub&gt;</td>
<td>ψ&lt;sub&gt;1.0 sec&lt;/sub&gt;</td>
</tr>
<tr>
<td>36</td>
<td>14:42</td>
<td>1.5</td>
<td>49</td>
<td>-13.5</td>
<td>0.1</td>
</tr>
<tr>
<td>37</td>
<td>14:47</td>
<td>2.0</td>
<td>65</td>
<td>-17.9</td>
<td>0.1</td>
</tr>
<tr>
<td>38</td>
<td>14:50</td>
<td>2.5</td>
<td>82</td>
<td>-23.2</td>
<td>-0.2</td>
</tr>
<tr>
<td>39</td>
<td>14:53</td>
<td>3.0</td>
<td>98</td>
<td>-27.4</td>
<td>0.1</td>
</tr>
<tr>
<td>40</td>
<td>14:56</td>
<td>3.5</td>
<td>114</td>
<td>-29.7</td>
<td>0.3</td>
</tr>
<tr>
<td>41</td>
<td>14:59</td>
<td>4.0</td>
<td>131</td>
<td>-33.9</td>
<td>0.3</td>
</tr>
<tr>
<td>42</td>
<td>15:03</td>
<td>4.5</td>
<td>147</td>
<td>-29.4</td>
<td>0.3</td>
</tr>
<tr>
<td>43</td>
<td>15:06</td>
<td>5.0</td>
<td>164</td>
<td>-35.7</td>
<td>0.0</td>
</tr>
<tr>
<td>44</td>
<td>15:09</td>
<td>5.5</td>
<td>180</td>
<td>-33.9</td>
<td>0.2</td>
</tr>
<tr>
<td>45</td>
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<td>6.0</td>
<td>196</td>
<td>-36.8</td>
<td>0.2</td>
</tr>
<tr>
<td>46</td>
<td>15:15</td>
<td>6.5</td>
<td>213</td>
<td>-38.1</td>
<td>0.3</td>
</tr>
<tr>
<td>47</td>
<td>15:18</td>
<td>7.0</td>
<td>229</td>
<td>-38.4</td>
<td>0.4</td>
</tr>
<tr>
<td>48</td>
<td>15:21</td>
<td>7.5</td>
<td>245</td>
<td>-41.7</td>
<td>0.2</td>
</tr>
<tr>
<td>49</td>
<td>15:24</td>
<td>8.0</td>
<td>262</td>
<td>-43.0</td>
<td>0.1</td>
</tr>
<tr>
<td>50</td>
<td>15:28</td>
<td>-</td>
<td>270</td>
<td>-44.1</td>
<td>0.2</td>
</tr>
</tbody>
</table>

1. Maneuver execution should continue until a steering wheel angle magnitude factor of 6.5<sup>*</sup>δ₀.₃ g, overall or 270 degrees is utilized, whichever is greater provided the calculated 6.5<sup>*</sup>δ₀.₃ g, overall is less than or equal to 300 degrees. If 6.5<sup>*</sup>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<sup>*</sup>δ₀.₃ 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  
  - No

- Tire debeading  
  - Yes  
  - No

- Loss of pavement contact of vehicle tires  
  - Yes  
  - No

- Did the test driver experience any vehicle loss of control or spinout?  
  - Yes  
  - No

If “Yes” explain the event and consult with the COTR.
Responsiveness – Lateral Displacement

<table>
<thead>
<tr>
<th>Maneuver #</th>
<th>Initial Steer Direction</th>
<th>Commanded Steering Wheel Angle ($5.0^*\delta_{0.3g}$ or greater)</th>
<th>Calculated Lateral Displacement¹</th>
<th>Distance (m)</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Scalar $^*\delta_{0.3g}$</td>
<td>Angle (degrees)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Counter Clockwise</td>
<td>5.0</td>
<td>164</td>
<td>-2.7</td>
<td>PASS</td>
</tr>
<tr>
<td>29</td>
<td>Counter Clockwise</td>
<td>5.5</td>
<td>180</td>
<td>-2.8</td>
<td>PASS</td>
</tr>
<tr>
<td>30</td>
<td>Counter Clockwise</td>
<td>6.0</td>
<td>196</td>
<td>-2.9</td>
<td>PASS</td>
</tr>
<tr>
<td>31</td>
<td>Counter Clockwise</td>
<td>6.5</td>
<td>213</td>
<td>-2.9</td>
<td>PASS</td>
</tr>
<tr>
<td>32</td>
<td>Counter Clockwise</td>
<td>7.0</td>
<td>229</td>
<td>-2.8</td>
<td>PASS</td>
</tr>
<tr>
<td>33</td>
<td>Counter Clockwise</td>
<td>7.5</td>
<td>245</td>
<td>-2.9</td>
<td>PASS</td>
</tr>
<tr>
<td>34</td>
<td>Counter Clockwise</td>
<td>8.0</td>
<td>262</td>
<td>-2.9</td>
<td>PASS</td>
</tr>
<tr>
<td>35</td>
<td>Counter Clockwise</td>
<td>-</td>
<td>270</td>
<td>-2.9</td>
<td>PASS</td>
</tr>
<tr>
<td>43</td>
<td>Clockwise</td>
<td>5.0</td>
<td>164</td>
<td>2.6</td>
<td>PASS</td>
</tr>
<tr>
<td>44</td>
<td>Clockwise</td>
<td>5.5</td>
<td>180</td>
<td>2.6</td>
<td>PASS</td>
</tr>
<tr>
<td>45</td>
<td>Clockwise</td>
<td>6.0</td>
<td>196</td>
<td>2.6</td>
<td>PASS</td>
</tr>
<tr>
<td>46</td>
<td>Clockwise</td>
<td>6.5</td>
<td>213</td>
<td>2.6</td>
<td>PASS</td>
</tr>
<tr>
<td>47</td>
<td>Clockwise</td>
<td>7.0</td>
<td>229</td>
<td>2.7</td>
<td>PASS</td>
</tr>
<tr>
<td>48</td>
<td>Clockwise</td>
<td>7.5</td>
<td>245</td>
<td>2.8</td>
<td>PASS</td>
</tr>
<tr>
<td>49</td>
<td>Clockwise</td>
<td>8.0</td>
<td>262</td>
<td>2.8</td>
<td>PASS</td>
</tr>
<tr>
<td>50</td>
<td>Clockwise</td>
<td>-</td>
<td>270</td>
<td>2.8</td>
<td>PASS</td>
</tr>
</tbody>
</table>

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

DATA INDICATES COMPLIANCE:  

☑ PASS  ☐ FAIL

Remarks:

RECORDED BY:  

Brian Kebschull

DATE RECORDED:  6/1/2010

APPROVED BY:  

J Lenkeit  

DATE APPROVED:  6/3/2010
3.0 TEST DATA (CONTD)

Data Sheet 9 (Page 1 of 2)
MALFUNCTION WARNING TESTS

Vehicle: 2010 GMC Acadia MPV
NHTSA No. CA0111 Data Sheet Completion Date: 6/1/2010

TEST 1

MALFUNCTION SIMULATION: Describe method of malfunction simulation

Disconnected EBCM (electronic brake control module).

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 as specified in
section 13.12.B.

Yes No

Time for telltale to illuminate after ignition system is activated and vehicle speed of
48 ± 8 km/h (30 ± 5mph) is reached.

0 Seconds (must be within 2 minutes) Pass Fail

ESC SYSTEM RESTORATION
Telltale extinguishes after ignition locking system is activated and if necessary the
vehicle is driven at least 2 minutes as specified in section 13.12.B

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) Pass Fail

TEST 1 DATA INDICATES COMPLIANCE: PASS

Remarks: After malfunction was caused, the vehicle could not be started. However, when
the key was placed in the accessory position, the ESC malfunction telltale remained on.
After the system was restored, the vehicle was able to be started, and the telltale
extinguished without any driving required.

RECORDED BY: Brian Kebschull DATE RECORDED: 6/1/2010
APPROVED BY: J Lenkeit DATE APPROVED 6/8/2010
### 3.0 TEST DATA (CONT'D)

**Data Sheet 9 (Page 2 of 2)**

**MALFUNCTION WARNING TESTS**

---

Vehicle: *2010 GMC Acadia MPV*

NHTSA No. CA0111  
Data Sheet Completion Date: *6/1/2010*

---

#### TEST 2

**MALFUNCTION SIMULATION:** Describe method of malfunction simulation

*Disconnected RF wheel speed sensor.*

**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 as specified in section 13.12.B.

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

Time for telltale to illuminate after ignition system is activated and vehicle speed of 48 ± 8 km/h (30 ± 5mph) is reached.

0 Seconds (must be within 2 minutes)

[ ] Pass  [ ] Fail

**ESC SYSTEM RESTORATION**

Telltale extinguishes after ignition locking system is activated and if necessary the vehicle is driven at least 2 minutes as specified in section 13.12.B

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

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)

[ ] Pass  [ ] Fail

---

**TEST 2 DATA INDICATES COMPLIANCE:**  **PASS**

Remarks: Telltale illuminated immediately upon ignition, after the malfunction was caused. Also, in common area, various warning messages appeared, including, "Traction Control Off", "Service StabiliTrak", and "Service Traction Control". Telltale extinguished immediately upon ignition, after the system was restored. No driving was required.

---

**RECORDED BY:** Brian Kebschull  
**DATE RECORDED:** 6/1/2010

**APPROVED BY:** J Lenkeit  
**DATE APPROVED:** 6/8/2010
### 4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION (1 OF 2)

#### TABLE 1. TEST INSTRUMENTATION

<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>
</tr>
</thead>
<tbody>
<tr>
<td>Tire Pressure Gauge</td>
<td>Vehicle Tire Pressure</td>
<td>0-100 psi / 0-690 kPa</td>
<td>1 psi / 6.89 kPa</td>
<td>0.5 psi / 3.45 kPa</td>
<td>Ashcroft D1005PS</td>
<td>1039350</td>
<td>By: DRI Date:2/25/10 Due: 2/25/11</td>
</tr>
<tr>
<td>Platform Scales</td>
<td>Vehicle Total, Wheel, and Axle Load</td>
<td>8000 lb / 35.6 kN</td>
<td>0.5 lb / 2.2 N</td>
<td>±1.0% of applied load</td>
<td>Intercomp Model SWII</td>
<td>24032361</td>
<td>By: American Scale Date: 2/25/10 Due: 2/25/11</td>
</tr>
<tr>
<td>Automated Steering Machine with Steering Angle Encoder</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>60304</td>
<td>By: DRI Date: 2/25/10 Due: 2/25/11</td>
</tr>
<tr>
<td>Multi-Axis Inertial Sensing System</td>
<td>Longitudinal, Lateral, and Vertical Acceleration Roll, Yaw, and Pitch Rate</td>
<td>Accelerometers: ±2 g Angular Rate Sensors: ±100 deg/s</td>
<td>Accelerometers: ≤10 ug Angular Rate Sensors: ≤0.004 deg/s</td>
<td>Accelerometer s: ≤0.05% of full range Angular Rate Sensors: 0.05% of full range</td>
<td>BEI Technologies Model: MotionPAK MP-1</td>
<td>0767</td>
<td>By: Systron Donner Date:11/23/09 Due: 11/23/10</td>
</tr>
<tr>
<td>Radar Speed Sensor and Dashboard Display</td>
<td>Vehicle Speed</td>
<td>0-125 mph / 0-200 km/h</td>
<td>0.009 mph / 0.014 km/h</td>
<td>±0.25% of full scale</td>
<td>A-DAT Corp. Radar Model: DRS-6 Display Model: RD-2</td>
<td>1400.604</td>
<td>By: DRI Date:3/2/10 Due:3/2/11</td>
</tr>
<tr>
<td>Ultrasonic Distance Measuring System</td>
<td>Left and Right Side Vehicle Height</td>
<td>5-24 inches / 127-610 mm</td>
<td>0.01 inches / 0.254 mm</td>
<td>±0.25% of maximum distance</td>
<td>Massa Products Corporation Model: M-5000/220</td>
<td>DOT-NHTSA D2646</td>
<td>By: DRI Date:2/26/10 Due: 2/26/11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Massa Products Corporation Model: M-5000/220</td>
<td>DOT-NHTSA D3272</td>
<td>By: DRI Date:2/26/10 Due: 2/26/11</td>
</tr>
</tbody>
</table>
### 4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION (2 OF 2)

**TABLE 1. TEST INSTRUMENTATION (CONTD)**

<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>
</tr>
</thead>
<tbody>
<tr>
<td>Data Acquisition System</td>
<td>Record Time; Velocity; Distance; Lateral, Longitudinal, and Vertical Accelerations; Roll, Yaw, and Pitch Rates; Steering Wheel Angle.</td>
<td>Sufficient to meet or exceed individual sensors</td>
<td>200 Hz</td>
<td>Sufficient to meet or exceed individual sensors</td>
<td>SoMat eDaq ECPU processor</td>
<td>MSHLB.03-2476</td>
<td>By: DRI Date: 2/9/10 Due: 2/9/11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SoMat High level Board EHLS</td>
<td>MSHLS.03-3182</td>
<td>By: DRI Date: 2/9/10 Due: 2/9/11</td>
</tr>
<tr>
<td>Load Cell</td>
<td>Vehicle Brake Pedal Force</td>
<td>0-300 lb</td>
<td>1 lb</td>
<td>±0.05% of full scale</td>
<td>Lebow</td>
<td>3663-300</td>
<td>767 Verified by DRI prior to test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0-1.33 kN</td>
<td>4.44 N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordinate Measurement Machine</td>
<td>Inertial Sensing System Coordinates</td>
<td>0-8 ft</td>
<td>±0.0020 in.</td>
<td>±0.051 mm (Single point articulation accuracy)</td>
<td>Faro Arm Fusion</td>
<td>UO8-05-08-06636</td>
<td>By: Faro Date: 8/18/09 Due: 8/18/10</td>
</tr>
<tr>
<td>Outriggers</td>
<td>No output. Safety Item.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>DRI manufactured Aluminum meeting the weight and MOI specifications of Docket 2007-27662-11</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>


5.0 PHOTOGRAPHS (1 of 14)

Figure 5.1. Front View of Test Vehicle
Figure 5.2. Rear View of Test Vehicle
Figure 5.3. Vehicle Certification Label
Figure 5.4. Vehicle Placard
5.0 PHOTOGRAPHS (5 of 14)

**STANDARD EQUIPMENT**
- **ENGINE**: 3.6L V6
- **DUAL EXHAUST ALUMINUM TIPS**: 96
- **TRANSMISSION**: 6-SPEED AUTO
- **TIRE PRESSURE MONITORING SYSTEM**
- **SAFETY & SECURITY**: 
  - **ANTILOCK BRAKE SYSTEM**
  - **STABILITRACK-STABILITY CONTROL SYSTEM**: W/FRONT CONTROL
  - **AIR BAGS**: DUAL, FRONTAL, HEAD CURTAIN SIDE, FRONT SIDE IMPACT
  - **PASSENGER SENSING SYSTEM**
  - **CHILD SAFETY LATCH SYSTEM**: 1 (FRONT/RIGHT OR LEFT)

**CRASH RESPONSE & TURN-BY-TURN NAVIGATION**: (UK) DEALER PROFESSIONAL
- **REMOTE ACCESS ENTRY**: 97
- **THIRD ROW SEAT SYSTEM**
- **EXTERIOR**: 
  - **FRONT FOG LAMPS**
  - **CONTRAST ROOF RAILS**: BODY-UNCOLORED
  - **REAR VIEW MIRROR**: 3RD ROW SIDE VIEW
  - **Power Luggage Compartment**: 98
  - **POWER OUTSIDE MIRRORS**: BODY-UNCOLORED
  - **PASSIVE RESTRAINT SYSTEM**: REAR SPOILER
  - **18" PAINTED ALUMINUM WHEELS**
- **INTERIOR**: 
  - **CLOTH SEATS**
  - **SEATS**: FRONT BUCKET
  - **7 PASS SEATING W/3RD ROW CAPTAIN'S CHAIRS & 3RD ROW SPLIT BENCH SEAT**
  - **SMART SLIDE 3RD ROW FEATURE**
  - **PWR SEAT ADJUST-DRIVER, R-RIGHT**

**OPTIONS & PRICING**
- **MANUFACTURER'S SUGGESTED RETAIL PRICE**: $34,365.00

**EPA Fuel Economy Estimates**
- **CITY MPG**: 17
- **HIGHWAY MPG**: 24

**GOVERNMENT SAFETY RATINGS**
- **Frontal Crash**: 
  - **Driver**: ★★★★☆☆☆
  - **Passenger**: ★★★★☆☆☆

**PARTS CONTENT INFORMATION**
- **FOR THIS VEHICLE**: 
  - **FINAL ASSEMBLY POINT**: LANCASTER, PA
  - **COUNTRY OF ORIGIN**: UNITED STATES
  - **ENGINE**: GM
  - **UNITS PRODUCED**: 1,000

**2010 GMC Acadia**
**FMVSS No. 126**
**NHTSA NO.: CA0111**
**June 2010**

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Figure 5.5. Window Sticker (Monroney Label)
Figure 5.6. Telltale for ESC Malfunction
Figure 5.7. TCS Off Control Switch
Figure 5.8. Front View of Vehicle As-Tested
Figure 5.9. Rear View of Vehicle As-Tested
Figure 5.10. Ultrasonic Height Sensor Mounted on Left Side of Vehicle for Determining Body Roll Angle
Figure 5.11. Rear Outrigger, Mount and Speed Sensor
Figure 5.12. Steering Controller and Data Acquisition Computer
Figure 5.13. Inertial Measurement Unit Mounted in Vehicle
Figure 5.14. Brake Pedal Load Cell
Figure 6.1. Steering Wheel Angle, Yaw Rate and Lateral Displacement for L-R Series
Figure 6.2. Steering Wheel Angle, Yaw Rate and Lateral Displacement for R-L Series
Figure 6.3. Steering Wheel Angle, Lateral Acceleration and Longitudinal Acceleration for L-R Series
Figure 6.4. Steering Wheel Angle, Lateral Acceleration and Longitudinal Acceleration for R-L Series
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
Performance and Maintenance

StabiliTrak®
The traction control system limits wheel spin and the StabiliTrak system assists with directional control of the vehicle in difficult driving conditions. Both systems turn on automatically every time the vehicle is started.

- To turn off the traction control part of StabiliTrak, press and release located on the instrument panel below the climate controls. illuminates and the appropriate DIC message is displayed. See Vehicle Messages on page 5-36.
- The StabiliTrak system remains on.

For more information, see StabiliTrak System on page 9-30.

Tire Pressure Monitor
This vehicle may have a Tire Pressure Monitor System (TPMS).

The Tire Pressure Monitor System alerts you when a significant reduction in pressure occurs in one or more of your vehicle’s tires by illuminating the low tire pressure warning light on the instrument cluster. If the warning light comes on, stop as soon as possible and inflate the tires to the recommended pressure shown on the tire loading information label located on the driver side center pillar (B pillar). See Vehicle Load Limits on page 9-12. The warning light will remain on until the tire pressure is corrected.

You may notice during cooler conditions that the low tire pressure warning light will appear when the vehicle is first started and then turn off as you drive. This may be an early indicator that your tire pressures are getting low and the tires need to be inflated to the proper pressure.

Note: The Tire Pressure Monitor System can alert you about low tire pressure, but it does not replace normal monthly tire maintenance. It is the driver’s responsibility to maintain correct tire pressures.


Tire Sealant and Compressor Kit
This vehicle may come with a jack and spare tire or a tire sealant and compressor kit. The kit can be used to seal small punctures in the tread area of the tire.
StabiliTrak® Indicator Light

This light comes on briefly while starting the engine. If it does not, have the vehicle serviced by your dealer/retailer. If the system is working normally the indicator light goes off.

If it stays on, or comes on while driving, there could be a problem with the StabiliTrak system and the vehicle might need service. When this warning light is on, the system is off and will not limit wheel spin.

This light flashes when the StabiliTrak system is active.

See StabiliTrak System on page 9-30 for more information.

Engine Coolant Temperature Warning Light

The engine coolant temperature warning light comes on briefly when the engine is started.

If it does not, have the vehicle serviced by your dealer/retailer. If the system is working normally the indicator light then goes off.

If the light comes on and stays on while driving, the vehicle may have a problem with the cooling system.

Tire Pressure Light

For vehicles with a tire pressure monitoring system, this light comes on briefly when the engine is started. It provides information about tire pressures and the Tire Pressure Monitoring System.

Stop the vehicle and turn off the engine to avoid damage to the engine. A warning chime sounds when this light is on.

See Engine Overheating on page 10-18 for more information.
HUD Display on the Vehicle Windshield

The HUD information appears as an image focused out toward the front of the vehicle.

When the ignition key is turned to ON/RUN, the HUD will display an introductory message for a short time, until the HUD is ready.

The following indicator lights come on the instrument panel when activated and also appear on the HUD:

- Turn Signal Indicators
- High-Beam Indicator Symbol

The HUD temporarily displays CHECK GAGES and ICE POSSIBLE when these messages are on the DIC trip computer.

The HUD also displays the following messages on vehicles with these systems, when they are active:

- TRACTION CONTROL ACTIVE
- STABILITRAK ACTIVE

Notice: If you try to use the HUD image as a parking aid, you may misjudge the distance and damage your vehicle. Do not use the HUD image as a parking aid.

When the HUD is on, the speedometer reading is continually displayed. The current radio station or CD track number will display for a short period of time after the radio or CD track status changes. This happens whenever radio information is changed. The speedometer size is reduced when radio, CD information, warnings, or turn-by-turn navigation information are displayed on the HUD.

The HUD control is located to the right of the steering wheel.
Press the set/reset button or the trip odometer reset stem to acknowledge this message and clear it from the DIC display. For more information see Ultrasonic Parking Assist on page 9-35.

**SERVICE PARK ASSIST**

If your vehicle has the Ultrasonic Rear Parking Assist (URPA) system, this message displays if there is a problem with the URPA system. Do not use this system to help you park. See Ultrasonic Parking Assist on page 9-35 for more information. See your dealer/retailer for service.

**Ride Control System Messages**

**SERVICE STABILITRAK**

This message displays if there is a problem with the StabiliTrak® system. If this message appears, try to reset the system. Stop; turn off the engine for at least 15 seconds; then start the engine again.

If this message still comes on, it means there is a problem. See your dealer/retailer for service. The vehicle is safe to drive, however, you do not have the benefit of StabiliTrak, so reduce your speed and drive accordingly.

**SERVICE TRACTION CONTROL**

This message displays when there is a problem with the Traction Control System (TCS). When this message is displayed, the system will not limit wheel spin. Adjust your driving accordingly. See StabiliTrak System on page 9-30 for more information.

**TRACTION CONTROL OFF**

This message displays when the Traction Control System (TCS) is turned off. Adjust your driving accordingly. See StabiliTrak System on page 9-30 for more information. This message clears itself after 10 seconds.

**Airbag System Messages**

**SERVICE AIR BAG**

This message displays if there is a problem with the airbag system. Have your dealer/retailer inspect the system for problems. See Airbag Readiness Light on page 5-15 and Airbag System on page 3-32 for more information.

**Anti-Theft Alarm System Messages**

**SERVICE THEFT DETERRENT SYSTEM**

This message displays when there is a problem with the theft-deterrent system. The vehicle may or may not restart so you may want to take the vehicle to your dealer/retailer before turning off the engine. See Immobilizer Operation on page 2-14 for more information.
Medical research shows that alcohol in a person's system can make crash injuries worse, especially injuries to the brain, spinal cord, or heart. This means that when anyone who has been drinking — driver or passenger — is in a crash, that person's chance of being killed or permanently disabled is higher than if the person had not been drinking.

**Control of a Vehicle**

The following three systems help to control the vehicle while driving — brakes, steering, and accelerator. At times, as when driving on snow or ice, it is easy to ask more of those control systems than the tires and road can provide. Meaning, you can lose control of the vehicle. See *StabiliTrak System* on page 9-30.

Adding non-dealer/non-retailer accessories can affect vehicle performance. See *Accessories and Modifications* on page 10-3.

**Braking**

See *Brake System Warning Light* on page 5-19.

Braking action involves perception time and reaction time. Deciding to push the brake pedal is perception time. Actually doing it is reaction time.

Average reaction time is about three-fourths of a second. But that is only an average. It might be less with one driver and as long as two or three seconds or more with another. Age, physical condition, alertness, coordination, and eyesight all play a part. So do alcohol, drugs, and frustration. But even in three-fourths of a second, a vehicle moving at 100 km/h (60 mph) travels 20 m (66 ft). That could be a lot of distance in an emergency, so keeping enough space between the vehicle and others is important.

And, of course, actual stopping distances vary greatly with the surface of the road, whether it is pavement or gravel; the condition of the road, whether it is wet, dry, or icy; tire tread; the condition of the brakes; the weight of the vehicle; and the amount of brake force applied.

Avoid needless heavy braking. Some people drive in spurts — heavy acceleration followed by heavy braking — rather than keeping pace with traffic. This is a mistake. The brakes might not have time to cool between hard stops. The brakes will wear out much faster with a lot of heavy braking. Keeping pace with the traffic and allowing realistic following distances eliminates a lot of unnecessary braking. That means better braking and longer brake life.
Brake Assist

This vehicle has a brake assist feature designed to assist the driver in stopping or decreasing vehicle speed in emergency driving conditions. This feature uses the stability system hydraulic brake control module to supplement the power brake system under conditions where the driver has quickly and forcefully applied the brake pedal in an attempt to quickly stop or slow down the vehicle.

The stability system hydraulic brake control module increases brake pressure at each corner of the vehicle until the ABS activates. Minor brake pedal pulsations or pedal movement during this time is normal and the driver should continue to apply the brake pedal as the driving situation dictates. The brake assist feature will automatically disengage when the brake pedal is released or brake pedal pressure is quickly decreased.

Ride Control Systems

StabiliTrak System

The vehicle has the StabiliTrak system which combines antilock brake, traction and stability control systems and helps the driver maintain directional control of the vehicle in most driving conditions.

When you first start the vehicle and begin to drive away, the system performs several diagnostic checks to ensure there are no problems. The system may be heard or felt while it is working. This is normal and does not mean there is a problem with the vehicle. The system should initialize before the vehicle reaches 32 km/h (20 mph). In some cases, it may take approximately 3.2 km (2 miles) of driving before the system initializes.

If the system fails to turn on or activate, the StabiliTrak light along with one of the following messages will be displayed on the Driver Information Center (DIC): TRACTION CONTROL OFF, SERVICE TRACTION CONTROL, SERVICE STABILITRAK. If these conditions are observed, turn the vehicle off, wait 15 seconds, and then turn it back on again to reset the system. If any of these messages still appear on the Driver Information Center (DIC), the vehicle should be taken in for service. For more information on the DIC messages, see Driver Information Center (DIC) (With DIC Buttons) on page 5-24 or Driver Information Center (DIC) (Without DIC Buttons) on page 5-29.
Traction control can be turned on by pressing and releasing the traction control disable button if not automatically shut off for any other reason.

When the traction control system is turned off, the StabiliTrak light and the appropriate traction control off message will be displayed on the DIC to warn the driver. The vehicle will still have brake-traction control when traction control is off, but will not be able to use the engine speed management system. See “Traction Control Operation” next for more information.

When the traction control system has been turned off, system noises may be heard and felt as a result of the brake-traction control working.

It is recommended to leave the system on for normal driving conditions, but it may be necessary to turn the system off if the vehicle is stuck in sand, mud, ice or snow, and you want to “rock” the vehicle to attempt to free it. It may also be necessary to turn off the system when driving in extreme off-road conditions when high wheel spin is required. See If the Vehicle is Stuck on page 9-11.

Traction Control Operation

The traction control system is part of the StabiliTrak system. Traction control limits wheel spin by reducing engine power to the wheels (engine speed management) and by applying brakes to each individual wheel (brake-traction control) as necessary.

The traction control system is enabled automatically when the vehicle is started. It will activate and the StabiliTrak light will flash if it senses that any of the wheels are spinning or beginning to lose traction while driving.
If traction control is turned off, only the brake-traction control portion of traction control will work. The engine speed management will be disabled. In this mode, engine power is not reduced automatically and the driven wheels can spin more freely. This can cause the brake-traction control to activate constantly.

Notice: If the wheel(s) of one axle is allowed to spin excessively while the StabiliTrak, ABS and brake warning lights and any relevant DIC messages are displayed, the transfer case could be damaged. The repairs would not be covered by the vehicle warranty. Reduce engine power and do not spin the wheel(s) excessively while these lights and messages are displayed.

The traction control system may activate on dry or rough roads or under conditions such as heavy acceleration while turning or abrupt upshifts/downshifts of the transmission. When this happens, a reduction in acceleration may be noticed, or a noise or vibration may be heard. This is normal.

If cruise control is being used when the system activates, the StabiliTrak light will flash and cruise control will automatically disengage. Cruise control may be reengaged when road conditions allow. See Cruise Control on page 9-32.

StabiliTrak may also turn off automatically if it determines that a problem exists with the system. If the problem does not clear itself after restarting the vehicle, see your dealer/retailer for service.

Cruise Control

With cruise control, a speed of about 40 km/h (25 mph) or more can be maintained without keeping your foot on the accelerator. Cruise control does not work at speeds below about 40 km/h (25 mph).

When the brakes are applied, the cruise control is disengaged.

⚠️ WARNING

Cruise control can be dangerous where you cannot drive safely at a steady speed. So, do not use the cruise control on winding roads or in heavy traffic.

Cruise control can be dangerous on slippery roads. On such roads, fast changes in tire traction can cause excessive wheel slip, and you could lose control. Do not use cruise control on slippery roads.
7.2 VEHICLE ARRIVAL CONDITION REPORT

CONTRACT NO.: DTNH22-08-D-00098
DATE: 5/5/2010

From: Automotive Allies
Purpose ☑ Initial Receipt Received via Transfer

To: Dynamic Research, Inc
Present Vehicle Condition

Vehicle VIN: 1GKLRLED2AJ180906 NHTSA NO.: CA0111
Model Year: 2010 Odometer Reading: 27 Miles
Make GMC Body Style: MPV
Model: Acadia Body Color: Silver
Manufacture Date: 01/10 Dealer: Automotive Allies
GVWR (kg/lb) 2908/6411 Price: Leased

☑ All options listed on the "Window Sticker" are present on the test vehicle
☑ Tires and wheel rims are new and the same as listed
☑ There are no dents or other interior or exterior flaws
☑ The vehicle has been properly prepared and is in running condition
☑ The glove box contains an owner’s manual, warranty document, consumer information, and extra set of keys

☑ Proper fuel filler cap is supplied on the test vehicle
☑ Place vehicle in storage area

☑ 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.

NOTES:

RECORDED BY: J Lenkeit DATE RECORDED: 5/5/2010
APPROVED BY: B Broen DATE APPROVED: 5/6/2010
### 7.3 VEHICLE COMPLETION CONDITION REPORT

**Contract No.:** DTNH22-08-D-00098  
**Date:** 6/8/2010

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**List of FMVSS Tests Performed by This Lab:** 126

- [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:

Explanation for equipment removal:

Test Vehicle Condition: *As delivered except that steering wheel has slight damage, to be repaired at DRI expense*

**Recorded By:** J Lenkeit  
**Date Recorded:** 6/8/2010

**Approved By:** P Broen  
**Date Approved:** 6/9/2010
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### 7.5 SLOWLY INCREASING STEER TEST RESULTS

2010 GMC Acadia MPV  
NHTSA No.: CA0111  
Date of Test: 6/1/2010  
Date Created: 6/1/2010

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<th>AYCG_CD2_3 (g)</th>
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**Averages**

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7.6 INERTIAL SENSING SYSTEM LOCATION COORDINATES

Vehicle: 2010 GMC Acadia MPV  NHTSA No.: CA0111
Wheelbase: 119.1 Inches  Faro Arm S/N: U08-05-08-06636
Measurement date: 5/17/2010  Certification date: 8/18/2009

CMM Measurements

Coordinate system: SAE (X,Y,Z positive forward, to the right, and downward, respectively)
Origin defined at 48" point on lateral arm of measurement fixture, projected onto the ground plane

<table>
<thead>
<tr>
<th>Ref X</th>
<th>Ref Y</th>
<th>Ref Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>M_PLANE001_Ground_Plane</td>
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<tr>
<td>M_Line_Y_Axis</td>
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<td>M_Point_IMU_side</td>
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<td>M_Point_ROOF</td>
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</tbody>
</table>

Motion Pak reference point taken from mid height of unit left side
Motion Pak Width = 3.05"  ==>    1/2 W = 1.525
Motion_PAK_Location

<table>
<thead>
<tr>
<th>Ref X</th>
<th>Ref Y</th>
<th>Ref Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.763</td>
<td>47.313</td>
<td>22.734</td>
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</table>

Measurement Notes

1. The Faro arm is positioned just to the left of the vehicle, near the rear door.
2. A "centerline jig" is used in the Faro arm measurement. The jig consists of a long beam with a 4 ft lateral arm that is perpendicular to the beam. The jig is placed on the ground underneath the vehicle with the long beam positioned along the centerline of the vehicle, such that the lateral arm extends to the left, slightly forward of the left rear tire. The lateral arm has a marked indentation point which is located 48.00" from the edge of the centerline beam.
3. The Faro arm is used to make the following measurements:
   - Three points on the ground, which establishes the ground plane.
   - Two points along the lateral arm, and projected onto the ground plane. This establishes the y axis.
   - One point at the 48 inch reference point on the lateral arm. This establishes the origin.
   - Three points on the left rear wheel or wheel cover. The Faro arm then computes the center point of the wheel.
   - One point to establish the height of the highest point on the roof of the vehicle.

Coordinate Measurements Calculated for S7D (Matlab Program)

Coordinate system: X,Y,Z positive rearward, to the right, and upward, respectively
Origin defined as follows: X axis: front axle, Y axis: vehicle centerline, Z axis: ground plane

<table>
<thead>
<tr>
<th>Ref X</th>
<th>Ref Y</th>
<th>Ref Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion_PAK_Location in S7D (Matlab program) coordinate system</td>
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Calculation Notes:

1. X axis value is the difference between the wheelbase and the calculated distance from the rear axle centerline to the IMU (the value must be positive and less than the wheelbase).
2. Y axis value is -48.00 (the Y axis offset of the measurement origin in the S7D coordinate system) plus the measured Y axis value (a negative value indicates the IMU is to the left of the vehicle centerline, and a positive value indicates it is to the right)
3. Z axis value is from the ground plane up to the center of the IMU (value must be positive).