126-DRI-10-007
SAFETY COMPLIANCE TESTING FOR FMVSS 126
Electronic Stability Control Systems

Mitsubishi Motors Corporation, Japan
2010 Mitsubishi Lancer
NHTSA No. CA5600

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

11 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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Approval Date: 11 November, 2010

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A test was conducted on a 2010 Mitsubishi Lancer, NHTSA No. CA5600, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-126-02 for the determination of FMVSS 126 compliance. Test failures identified were as follows: None  

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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this test is to determine if the test vehicle, a 2010 Mitsubishi Lancer, 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 Mitsubishi Lancer 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 (CONT'D)

Data Summary Sheet (Page 1 of 2)

Vehicle: 2010 Mitsubishi Lancer
NHTSA No. CA5600  VIN: JA32U1FU4AU007104
Vehicle Type: Passenger Car  Manufacture Date: 8/09
Laboratory: Dynamic Research, 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)  
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 Mitsubishi Lancer Passenger Car
NHTSA No. CA5600 Data Sheet Completion Date: 4/16/2010
VIN JA32U1FU4AU007104 Manufacture Date: 8/09
GVWR (kg): 1850.0 Front GAWR (kg): 1010.0 Rear GAWR (kg): 910.0
Seating Positions Front: 2 Mid: Rear: 3
Odometer reading at time of inspection: 13 miles (20.8 km)

DESIGNATED TIRE SIZE(S) FROM VEHICLE LABELING:

Front axle: P205/60 R16 Rear axle: P205/60 R16

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>Yokohama</td>
<td>Yokohama</td>
</tr>
<tr>
<td>Tire Model</td>
<td>Avid S34</td>
<td>Avid S34</td>
</tr>
<tr>
<td>Tire Size</td>
<td>P205/60 R16</td>
<td>P205/60 R16</td>
</tr>
</tbody>
</table>

TIN
Left Front: FDNO N2L 2409 Right Front: FDNO N2L 2409
Left Rear: FDNO N2L 2409 Right Rear: FDNO N2L 2409

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)

13 miles (20.8 km)
3.0 TEST DATA (CONTD)

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

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

Drive Configuration: Front Wheel Drive
Mode: Default- ESC on

Drive Configuration: Front Wheel Drive
Mode: Default- ESC off

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

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

REMARKS:

RECORDED BY: J Lenkeit
DATE RECORDED: 4/16/2010

APPROVED BY: B Kebschull
DATE APPROVED: 5/3/2010
ESC SYSTEM HARDWARE AND OPERATIONAL CHARACTERISTICS

Vehicle: *2010 Mitsubishi Lancer Passenger Car*

NHTSA No: **CA5600**  Data Sheet Completion Date: **4/19/2010**

ESC SYSTEM IDENTIFICATION

Manufacturer/Model: **Continental Automotive, MK60E1**

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: **ECUs include engine ECU and transmission ECU**

ESC OPERATIONAL CHARACTERISTICS

System is capable of generating brake torque at each wheel
List and describe Components: *Hydraulic control unit is able to adjust brake pressure at each wheel individually by switching valves and activation of the pump independent of driver’s brake actuation.*  

- [X] Yes (Pass)
- [___] No (Fail)

System is capable of determining yaw rate
List and describe Components: **Yaw rate sensor**

- [X] Yes (Pass)
- [___] No (Fail)

System is capable of monitoring driver steering input
List and describe Components: **Steering wheel angle sensor**

- [X] Yes (Pass)
- [___] No (Fail)

System is capable of estimating side slip or side slip derivative
List and describe Components: *Side slip derivative is estimated from yaw rate and lateral acceleration data.*

- [X] Yes (Pass)
- [___] No (Fail)
ESC OPERATIONAL CHARACTERISTICS (continued)

System is capable of modifying engine torque during ESC activation. [X] Yes (Pass)  
Method used to modify torque: **Torque reduction is achieved by means of throttle position control by the ECM.**

System is capable of activation at speeds of 20 km/h (12.4 mph) and higher [X] Yes (Pass)  
Speed system becomes active: **14.4 km/h**

System is capable of activation during the following driving phases: [X] Yes (Pass)  
- acceleration  
- braking  
- coasting  
- during activation of ABS or traction control

Driving phases during which ESC is capable of activation:  
*Acceleration, braking, coasting, and during activation of ABS or traction control*

Vehicle manufacturer submitted documentation explaining how the ESC mitigates understeer [X] Yes (Pass)  

DATA INDICATES COMPLIANCE: [X] Yes (Pass)  

REMARKS:

______________________________________________________________________________

RECORDED BY:  **Brian Kebschull**  DATE RECORDED:  **4/19/2010**
APPROVED BY:  **J lenkeit**  DATE APPROVED:  **5/3/2010**
Vehicle: 2010 Mitsubishi Lancer Passenger Car

NHTSA No. CA5600 Data Sheet completion date: 4/16/2010

ESC Malfunction Telltale

Vehicle is equipped with malfunction telltale? Yes

Telltale Location: Multi-information display between speedometer and tachometer

Telltale Color: Amber

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.

*In addition to the above symbol the message information center displays the abbreviation “ASC OFF”, an exclamation point to the right of the symbol, and the words, “SERVICE REQUIRED” below the symbol. Refer to figure 5.6 and p 3-142 in the owner’s manual.*

Is telltale part of a common space? Yes

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

If yes explain telltale operation during ESC activation:

Vehicle "slip" symbol in center of multi-information display blinks when ESC is operating, see p 3-142 in the owner’s manual.
3.0 TEST DATA (CONT'D)

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

"ESC OFF" Telltale (if provided)

Vehicle is equipped with "ESC OFF" telltale? Yes

Is "ESC Off" telltale combined with "ESC Malfuction" telltale utilizing a two part telltale? No

Telltale Location: Multi-information display between speedometer and tachometer

Telltale Color: Amber

Telltale symbol or abbreviation used

If different than identified above, make note of any message, symbol or abbreviation used. "ASC OFF" displayed in upper right of common display area. See figure 5.6 and p 3-141 of owner’s manual.

Is telltale part of a common space? Yes

DATA INDICATES COMPLIANCE Yes

(Vehicle is compliant if equipped with a malfunction telltale)

Remarks:

RECORDED BY: J Lenkeit DATE RECORDED: 4/16/2010
APPROVED BY: Brian Kebschull DATE APPROVED: 4/20/2010
3.0 TEST DATA (CONTD)

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

Vehicle: **2010 Mitsubishi Lancer Passenger Car**

NHTSA No. **CA5600**  
Data Sheet completion date: **4/16/2010**

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### “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?**

- [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>Labeling</th>
<th>Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Left knee bolster (Figure 5.7)</em></td>
<td><em>ASC OFF</em></td>
<td><em>ESC On/Off</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Control:</th>
<th>Location</th>
<th>Labeling</th>
<th>Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify standard or default drive configuration **FWD**

Verify standard or default drive configuration selected  

- 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?  

- 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

---
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>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td></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?

___ Yes  ___ No  ___ X  NA

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

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

___ Yes  ___ X  No

Ancillary Control: System None
Control Description ____________________________
Labeling ______________________________________

Ancillary Control: System ______________________
Control Description __________________________
Labeling ______________________________________

Ancillary Control: System ______________________
Control Description __________________________
Labeling ______________________________________

Ancillary Control: System ______________________
Control Description __________________________
Labeling ______________________________________
3.0 TEST DATA (CONTD)

Data Sheet 4 (Page 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 “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 ancillary 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.

Yes  No (Fail)  X  NA

DATA INDICATES COMPLIANCE:  PASS

Remarks: ESC off switch must be held down for 3 seconds or longer to turn ESC off. When ESC is turned off, traction control is also turned off. There is no way to turn off ESC and traction control separately.

RECORDED BY:  J Lenkeit  DATE RECORDED:  4/16/2010
APPROVED BY:  Brian Kebschull  DATE APPROVED:  4/20/2010
3.0 TEST DATA (CONTD)

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

Vehicle: 2010 Mitsubishi Lancer Passenger Car
NHTSA No. CA5600
Data Sheet completion date: 4/22/2010

Test Track Requirements:
- Test surface slope (0-1%): 0.5%
- Peak Friction Coefficient (at least 0.9) 0.97
Test track data meets requirements: Yes
If no, explain:

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

Tire Pressures:
- Required; Front Axle 240 KPA Rear Axle 240 KPA
- Actual; LF 240 KPA RF 240 KPA
- LR 240 KPA RR 240 KPA

Vehicle Dimensions:
- Front Track Width 153.0 cm
- Wheelbase 262.6 cm
- Rear Track Width 152.7 cm

Vehicle Weight Ratings:
- GAWR Front 1010.0 KG
- GAWR Rear 910.0 KG

Unloaded Vehicle Weight (UVW):
- Front Axle 820.1 KG
- Left Front 422.3 KG
- Right Front 397.8 KG
- Rear Axle 533.0 KG
- Left Rear 264.0 KG
- Right Rear 269.0 KG
- Total UVW 1353.1 KG

Baseline Weight and Outrigger Selection (only for MPVs, Trucks, Buses)
- Calculated baseline weight (UVW + 73kg) 1426.1 KG
- Outrigger size required ("Standard" or "Heavy") NA
- 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)

Front axle  NA  KG  Left front  NA  KG  Right front  NA  KG
Rear axle   NA  KG  Left rear  NA  KG  Right rear  NA  KG
Total UVW with outriggers  NA  KG

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

Front axle  907.7  KG  Left front  469.0  KG  Right front  438.7  KG
Rear axle   606.1  KG  Left rear  315.5  KG  Right rear  290.6  KG
Vehicle Weight  1513.8  KG

Ballast Required = 

<table>
<thead>
<tr>
<th>Total UVW with Outriggers (if applicable)</th>
<th>+168</th>
<th>- [Loaded Weight w/Driver and Instrumentation]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1353.1 KG</td>
<td></td>
<td>1513.8 KG</td>
</tr>
</tbody>
</table>

=  7.3 KG

Total Loaded Vehicle Weight w/Driver and Instrumentation and Ballast

Front axle  909.4  KG  Left front  470.1  KG  Right front  439.3  KG
Rear axle   611.9  KG  Left rear  317.2  KG  Right rear  294.7  KG
Total UVW  1521.3  KG
3.0 TEST DATA (CONTD)

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

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

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

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

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

Locations:

<table>
<thead>
<tr>
<th></th>
<th>Center of Gravity</th>
<th>Inertial Sensing System</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-distance</td>
<td>41.6 in 105.6 cm</td>
<td>65.5 in 166.3 cm</td>
</tr>
<tr>
<td>y-distance</td>
<td>-1.1 in -2.7 cm</td>
<td>0.4 in 1.0 cm</td>
</tr>
<tr>
<td>z-distance</td>
<td>22.3 in 56.6 cm</td>
<td>18.0 in 45.6 cm</td>
</tr>
<tr>
<td>Roof Height</td>
<td>58.6 in 148.8 cm</td>
<td></td>
</tr>
<tr>
<td>Distance between ultrasonic sensors</td>
<td>79.75 in 202.6 cm</td>
<td></td>
</tr>
</tbody>
</table>

Remarks:

______________________________________________________________________________

RECORDED BY:  Brian Kebschull  DATE RECORDED:  4/22/2010
APPROVED BY:  J Lenkeit  DATE APPROVED:  5/3/2010
3.0 TEST DATA (CONTD)

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

Vehicle: 2010 Mitsubishi Lancer Passenger Car
NHTSA No. CA5600

Measured tire pressure: LF 247 KPA RF 247 KPA
LR 245 KPA RR 247 KPA

Wind Speed 1.6 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)) 10.8 °C

Brake Conditioning Time: 10:25:00 AM Date: 4/22/2010

56 km/h (35 mph) Brake Stops

Number of stops executed (10 required) 10 Stops
Observed deceleration rate range (.5g target) .45-.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 0.8-0.9 g

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

Duration of cool down period (5 minutes min.) 5 Minutes
## 3.0 TEST DATA (CONT'D)

### BRAKE AND TIRE CONDITIONING

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

<table>
<thead>
<tr>
<th>Tire Conditioning series No. 1</th>
<th>Time:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure cold tire pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF</td>
<td>258 KPA</td>
<td></td>
</tr>
<tr>
<td>RF</td>
<td>258 KPA</td>
<td></td>
</tr>
<tr>
<td>LR</td>
<td>250 KPA</td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>250 KPA</td>
<td></td>
</tr>
</tbody>
</table>

Wind Speed __2.2__ m/s

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

### 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>32 - 33.6</td>
</tr>
<tr>
<td>4-6</td>
<td>Counterclockwise</td>
<td>0.5 - 0.6</td>
<td>0.5-0.6</td>
<td>32 - 33.6</td>
</tr>
</tbody>
</table>

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

<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>0.42</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>56 ± 2 (35 ± 1)</td>
<td>80</td>
<td>0.5 - 0.6</td>
<td>0.54</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: 80 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>4-6</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>7</td>
<td>56 ± 2 (35 ± 1)</td>
<td>80 (cycles 1-9)</td>
<td>0.5 - 0.6</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>160 (cycle10)*</td>
<td>NA</td>
<td>0.82</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  Time: 12:31:00 PM  Date: 4/22/2010

Measured cold tire pressure  
| Tire Side | LF 254 KPA | RF 250 KPA | LR 249 KPA | RR 248 KPA |

Wind Speed 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)) 15.3°C

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

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

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

Remarks:

RECORDED BY: Brian Kebschull  DATE RECORDED: 4/22/2010
APPROVED BY: J Lenkeit  DATE APPROVED: 5/3/2010
3.0 TEST DATA (CONTD)

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

Vehicle: 2010 Mitsubishi Lancer Passenger Car
NHTSA No. CA5600

Measured tire pressure:

<table>
<thead>
<tr>
<th></th>
<th>LF 258 KPA</th>
<th>RF 256 KPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR</td>
<td>251 KPA</td>
<td>RR 250 KPA</td>
</tr>
</tbody>
</table>

Wind Speed 0.7 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)) 11.2 °C

Selected drive configuration FWD

Selected Mode: Default- ESC on

Preliminary Left Steer Maneuver:
Lateral Acceleration measured at 30 degrees steering wheel angle

\[ a_{y,30\text{degrees}} = 0.36 \text{ g} \]

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

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

\[ \delta_{\text{SIS}} = 45.8 \text{ degrees (@.55g)} \]

\[ \delta_{\text{SIS}} = 50 \text{ degrees (rounded)} \]

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>11:20:25 AM</td>
<td>-29.1</td>
<td>10</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Left</td>
<td>11:24:57 AM</td>
<td>-28.6</td>
<td>11</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Left</td>
<td>11:28:56 AM</td>
<td>-28.5</td>
<td>12</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Left</td>
<td>6:23:37 PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Left</td>
<td>11:32:36 AM</td>
<td>28.8</td>
<td>13</td>
<td>Good</td>
</tr>
<tr>
<td>1</td>
<td>Right</td>
<td>11:35:44 AM</td>
<td>27.9</td>
<td>14</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>Right</td>
<td>11:38:33 AM</td>
<td>28</td>
<td>15</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Right</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Right</td>
<td></td>
<td></td>
<td></td>
<td></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:

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

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

Remarks:

______________________________________________________________________________

RECORDED BY:  Brian Kebschull    DATE RECORDED:  4/22/2010
APPROVED BY:   J Lenkeit       DATE APPROVED:  5/3/2010
**3.0 TEST DATA (CONT'D)**

**Data Sheet 8 (Page 1 of 3)**

**VEHICLE LATERAL STABILITY AND RESPONSIVENESS**

Vehicle: *2010 Mitsubishi Lancer Passenger Car*

NHTSA No. **CA5600**

Data sheet completion date: **4/22/2010**

<table>
<thead>
<tr>
<th>Maneuver #</th>
<th>Clock Time (1.5 – 5.0 min max between runs)</th>
<th>Commanded Steering Wheel Angle¹</th>
<th>Yaw Rates (degrees/sec)</th>
<th>YRR at 1.0 sec after COS [%]</th>
<th>YRR at 1.75 sec after COS [%]</th>
<th>Pass/Fail</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>13:00</td>
<td>1.5</td>
<td>43</td>
<td>12.74</td>
<td>-0.2</td>
<td>-0.19</td>
<td>-1.60</td>
</tr>
<tr>
<td>22</td>
<td>13:04</td>
<td>2.0</td>
<td>57</td>
<td>16.35</td>
<td>-0.13</td>
<td>-0.12</td>
<td>-0.82</td>
</tr>
<tr>
<td>23</td>
<td>13:07</td>
<td>2.5</td>
<td>71</td>
<td>20.28</td>
<td>-0.16</td>
<td>-0.17</td>
<td>-0.76</td>
</tr>
<tr>
<td>24</td>
<td>13:10</td>
<td>3.0</td>
<td>86</td>
<td>24.28</td>
<td>-0.27</td>
<td>-0.28</td>
<td>-1.09</td>
</tr>
<tr>
<td>26</td>
<td>13:16</td>
<td>3.5</td>
<td>100</td>
<td>27.49</td>
<td>-0.11</td>
<td>0.00</td>
<td>-0.39</td>
</tr>
<tr>
<td>27</td>
<td>13:19</td>
<td>4.0</td>
<td>114</td>
<td>31.52</td>
<td>-0.20</td>
<td>-0.14</td>
<td>-0.64</td>
</tr>
<tr>
<td>28</td>
<td>13:22</td>
<td>4.5</td>
<td>128</td>
<td>36.55</td>
<td>-0.18</td>
<td>-0.16</td>
<td>-0.48</td>
</tr>
<tr>
<td>29</td>
<td>13:26</td>
<td>5.0</td>
<td>142</td>
<td>39.66</td>
<td>-0.24</td>
<td>-0.25</td>
<td>-0.60</td>
</tr>
<tr>
<td>30</td>
<td>13:29</td>
<td>5.5</td>
<td>157</td>
<td>45.5</td>
<td>-0.18</td>
<td>-0.18</td>
<td>-0.39</td>
</tr>
<tr>
<td>31</td>
<td>13:32</td>
<td>6.0</td>
<td>171</td>
<td>49.19</td>
<td>-0.17</td>
<td>-0.04</td>
<td>-0.35</td>
</tr>
<tr>
<td>32</td>
<td>13:35</td>
<td>6.5</td>
<td>185</td>
<td>48.69</td>
<td>-0.19</td>
<td>-0.17</td>
<td>-0.39</td>
</tr>
<tr>
<td>33</td>
<td>13:38</td>
<td>7.0</td>
<td>200</td>
<td>52.24</td>
<td>-0.02</td>
<td>-0.05</td>
<td>-0.03</td>
</tr>
<tr>
<td>34</td>
<td>13:41</td>
<td>7.5</td>
<td>214</td>
<td>52.66</td>
<td>-0.15</td>
<td>-0.14</td>
<td>-0.28</td>
</tr>
<tr>
<td>35</td>
<td>13:44</td>
<td>8.0</td>
<td>228</td>
<td>55.18</td>
<td>-0.22</td>
<td>-0.06</td>
<td>-0.40</td>
</tr>
<tr>
<td>36</td>
<td>13:47</td>
<td>8.5</td>
<td>242</td>
<td>55.84</td>
<td>-0.17</td>
<td>-0.07</td>
<td>-0.30</td>
</tr>
<tr>
<td>37</td>
<td>13:50</td>
<td>9.0</td>
<td>256</td>
<td>62.72</td>
<td>-0.23</td>
<td>-0.07</td>
<td>-0.36</td>
</tr>
<tr>
<td>38</td>
<td>13:54</td>
<td>9.5</td>
<td>270</td>
<td>56.3</td>
<td>-0.05</td>
<td>0.07</td>
<td>-0.09</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.
### Data Sheet 8 (2 of 3)

**Vehicle Lateral Stability and Responsiveness**

**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 [&lt; 35%]</th>
<th>YRR at 1.75 sec after COS [&lt; 20%]</th>
<th>%</th>
<th>Pass/Fail</th>
<th>%</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>14:03</td>
<td>1.5 43</td>
<td>-12.5 0.02 -0.1</td>
<td>-0.19 Pass 0.81 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>14:06</td>
<td>2.0 57</td>
<td>-16.43 -0.10 -0.17</td>
<td>0.63 Pass 1.01 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>14:09</td>
<td>2.5 71</td>
<td>-20.35 0.09 0.21</td>
<td>-0.43 Pass -1.03 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>14:12</td>
<td>3.0 86</td>
<td>-26.01 -0.98 -1.04</td>
<td>3.78 Pass 4.00 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>14:15</td>
<td>3.5 100</td>
<td>-29.72 0.07 0.00</td>
<td>-0.22 Pass 0.01 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>14:19</td>
<td>4.0 114</td>
<td>-34.16 0.09 0.07</td>
<td>-0.26 Pass -0.19 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>14:22</td>
<td>4.5 128</td>
<td>-36.69 0.23 0.07</td>
<td>-0.62 Pass -0.20 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>14:29</td>
<td>5.0 143</td>
<td>-42.40 0.04 0.10</td>
<td>-0.09 Pass -0.24 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>14:31</td>
<td>5.5 157</td>
<td>-45.43 0.04 0.10</td>
<td>-0.08 Pass -0.21 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>14:35</td>
<td>6.0 171</td>
<td>-49.84 -0.11 0.02</td>
<td>0.22 Pass -0.05 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>14:37</td>
<td>6.5 185</td>
<td>-51.33 0.00 -0.01</td>
<td>0.01 Pass 0.03 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>14:41</td>
<td>7.0 200</td>
<td>-54.34 0.19 0.20</td>
<td>-0.34 Pass -0.36 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>14:44</td>
<td>7.5 214</td>
<td>-56.91 -0.06 0.01</td>
<td>0.11 Pass -0.03 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>14:46</td>
<td>8.0 228</td>
<td>-57.82 0.05 0.09</td>
<td>-0.08 Pass -0.16 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>14:55</td>
<td>8.5 242</td>
<td>-61.19 0.20 0.20</td>
<td>-0.33 Pass -0.33 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>15:02</td>
<td>9.0 257</td>
<td>-61.76 0.18 0.03</td>
<td>-0.29 Pass -0.05 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>16:27</td>
<td>9.5 270</td>
<td>-64.15 -0.89 -0.98</td>
<td>1.38 Pass 1.53 Pass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Maneuver execution should continue until a steering wheel angle magnitude factor of $6.5\times\delta_{0.3\ g,\ \text{overall}}$ or 270 degrees is utilized, whichever is greater provided the calculated $6.5\times\delta_{0.3\ g,\ \text{overall}}$ is less than or equal to 300 degrees. If $6.5\times\delta_{0.3\ g,\ \text{overall}}$ is less than 270 degrees maneuver execution should continue by increasing the steering wheel angle magnitude by multiples of $0.5\times\delta_{0.3\ g,\ \text{overall}}$ 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
- Tire debeading
- Loss of pavement contact of vehicle tires
- Did the test driver experience any vehicle loss of control or spinout?

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 $(5.0 \times \delta_{0.3g \text{ overall}} \text{ or greater})$</th>
<th>Calculated Lateral Displacement¹</th>
<th>Distance (m)</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scalar</td>
<td>Angle (degrees)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Counter Clockwise</td>
<td>5.0</td>
<td>142</td>
<td>-3.1</td>
<td>PASS</td>
</tr>
<tr>
<td>30</td>
<td>Counter Clockwise</td>
<td>5.5</td>
<td>157</td>
<td>-3.3</td>
<td>PASS</td>
</tr>
<tr>
<td>31</td>
<td>Counter Clockwise</td>
<td>6.0</td>
<td>171</td>
<td>-3.3</td>
<td>PASS</td>
</tr>
<tr>
<td>32</td>
<td>Counter Clockwise</td>
<td>6.5</td>
<td>185</td>
<td>-3.3</td>
<td>PASS</td>
</tr>
<tr>
<td>33</td>
<td>Counter Clockwise</td>
<td>7.0</td>
<td>200</td>
<td>-3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>34</td>
<td>Counter Clockwise</td>
<td>7.5</td>
<td>214</td>
<td>-3.3</td>
<td>PASS</td>
</tr>
<tr>
<td>35</td>
<td>Counter Clockwise</td>
<td>8.0</td>
<td>228</td>
<td>-3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>36</td>
<td>Counter Clockwise</td>
<td>8.5</td>
<td>242</td>
<td>-3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>37</td>
<td>Counter Clockwise</td>
<td>9.0</td>
<td>256</td>
<td>-3.5</td>
<td>PASS</td>
</tr>
<tr>
<td>38</td>
<td>Counter Clockwise</td>
<td>-</td>
<td>270</td>
<td>-3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>49</td>
<td>Clockwise</td>
<td>5.0</td>
<td>143</td>
<td>3.1</td>
<td>PASS</td>
</tr>
<tr>
<td>50</td>
<td>Clockwise</td>
<td>5.5</td>
<td>157</td>
<td>3.2</td>
<td>PASS</td>
</tr>
<tr>
<td>51</td>
<td>Clockwise</td>
<td>6.0</td>
<td>171</td>
<td>3.3</td>
<td>PASS</td>
</tr>
<tr>
<td>52</td>
<td>Clockwise</td>
<td>6.5</td>
<td>185</td>
<td>3.3</td>
<td>PASS</td>
</tr>
<tr>
<td>53</td>
<td>Clockwise</td>
<td>7.0</td>
<td>200</td>
<td>3.3</td>
<td>PASS</td>
</tr>
<tr>
<td>54</td>
<td>Clockwise</td>
<td>7.5</td>
<td>214</td>
<td>3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>55</td>
<td>Clockwise</td>
<td>8.0</td>
<td>228</td>
<td>3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>58</td>
<td>Clockwise</td>
<td>8.5</td>
<td>242</td>
<td>3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>60</td>
<td>Clockwise</td>
<td>9.0</td>
<td>257</td>
<td>3.4</td>
<td>PASS</td>
</tr>
<tr>
<td>63</td>
<td>Clockwise</td>
<td>-</td>
<td>270</td>
<td>3.5</td>
<td>PASS</td>
</tr>
</tbody>
</table>

1. Lateral displacement should be ≥ 1.83 m (6 ft) for vehicle with a GVWR of 3,500 kg (7,716 lb) or less; and ≥ 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:** B Kebschull  **DATE RECORDED:** 4/22/2010

**APPROVED BY:** J Lenkeit  **DATE APPROVED:** 5/3/2010
3.0 TEST DATA (CONTD)

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

Vehicle: 2010 Mitsubishi Lancer Passenger Car
NHTSA No. CA5600 Data Sheet Completion Date: 4/22/2010

TEST 1

MALFUNCTION SIMULATION: Describe method of malfunction simulation

Disconnect left rear 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.

X Yes  No

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

X Pass  Fail

0 Seconds (must be within 2 minutes)

ESC SYSTEM RESTORATION

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

X Yes  No

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

X Pass  Fail

0 Seconds (must be within 2 minutes)

TEST 1 DATA INDICATES COMPLIANCE: PASS

Remarks: The “slip” indicator and “ASC OFF” with exclamation point telltales illuminated immediately upon ignition after sensor was disconnected. The ABS telltale also illuminated. After ESC system was restored, all telltales extinguished immediately upon ignition (no driving required).

RECORDED BY: Brian Kebschull  DATE RECORDED: 4/22/2010
APPROVED BY: J Lenkeit  DATE APPROVED 5/3/2010
3.0 TEST DATA (CONTD)

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

Vehicle: 2010 Mitsubishi Lancer Passenger Car
NHTSA No. CA5600 Data Sheet Completion Date: 4/22/2010

TEST 2

MALFUNCTION SIMULATION: Describe method of malfunction simulation

Disconnected steering wheel angle 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.

X 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)  X Pass  Fail

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

X Yes  No

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

0 Seconds (must be within 2 minutes)  X Pass  Fail

TEST 2 DATA INDICATES COMPLIANCE: PASS

Remarks: The “slip” indicator and “ASC OFF” with exclamation point telltales illuminated immediately upon ignition after sensor was disconnected. After ESC system was restored, both telltales extinguished immediately upon ignition (no driving required).

RECORDED BY: Brian Kebschull DATE RECORDED: 4/22/2010
APPROVED BY: J Lenkeit DATE APPROVED: 5/3/2010
### 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>
<th>By:</th>
<th>Date:</th>
<th>Due:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tire Pressure Gauge</td>
<td>Vehicle Tire Pressure</td>
<td>0-100 psi</td>
<td>1 psi</td>
<td>0.5 psi</td>
<td>Ashcroft D1005PS</td>
<td>1039350</td>
<td>By: DRI</td>
<td>Date: 2/25/10</td>
<td>Due: 2/25/11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0-690 kPa</td>
<td>6.89 kPa</td>
<td>3.45 kPa</td>
<td></td>
<td></td>
<td></td>
<td>American Scale</td>
<td>2/25/10</td>
<td>2/25/11</td>
</tr>
<tr>
<td>Platform Scales</td>
<td>Vehicle Total, Wheel, and Axle Load</td>
<td>8000 lb</td>
<td>0.5 lb</td>
<td>± 1.0% of applied load</td>
<td>Intercomp Model SWII</td>
<td>24032361</td>
<td>By: American Scale</td>
<td>Date: 2/25/10</td>
<td>Due: 2/25/11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>35.6 kN</td>
<td>2.2 N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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</td>
<td>Date: 2/25/10</td>
<td>Due: 2/25/11</td>
<td></td>
</tr>
<tr>
<td>Multi-Axis Inertial Sensing System</td>
<td>Longitudinal, Lateral, and Vertical Acceleration Roll, Yaw, and Pitch Rate</td>
<td>Accelerometer s: ±2 g Angular Rate Sensors: ±100 deg/s</td>
<td>Accelerometers: ±0.004 deg/s</td>
<td>Accelerometers: ±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</td>
<td>Date: 11/23/09</td>
<td>Due: 11/23/10</td>
<td></td>
</tr>
<tr>
<td>Radar Speed Sensor and Dashboard Display</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>1400.604</td>
<td>By: DRI</td>
<td>Date: 3/2/10</td>
<td>Due: 3/2/11</td>
<td></td>
</tr>
<tr>
<td>Ultrasonic Distance Measuring System</td>
<td>Left and Right Side Vehicle Height</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>DOT-NHTSA D2646</td>
<td>By: DRI</td>
<td>Date: 2/26/10</td>
<td>Due: 2/26/11</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>127-610 mm</td>
<td>.254 mm</td>
<td></td>
<td></td>
<td>DOT-NHTSA D3272</td>
<td>By: DRI</td>
<td>Date: 2/26/10</td>
<td>Due: 2/26/11</td>
<td></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 3663-300</td>
<td>767</td>
<td>Functionally verified by DRI prior to test</td>
</tr>
<tr>
<td>Coordinate Measurement Machine</td>
<td>Inertial Sensing System Coordinates</td>
<td>0-8 ft</td>
<td>±.0020 in.</td>
<td>±.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>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>DRI manufactured Aluminum meeting the weight and MOI specifications of Docket 2007-27662-11</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Figure 5.1. Front View of Test Vehicle
5.0 PHOTOGRAPHS (2 of 14)

Figure 5.2. Rear View of Test Vehicle

2010 Mitsubishi Lancer
FMVSS No. 126
NHTSA NO.: CA5600
April 2010
5.0 PHOTOGRAPHS (3 of 14)

Figure 5.3. Vehicle Certification Label
Figure 5.4. Vehicle Placard

<table>
<thead>
<tr>
<th>TIRE</th>
<th>SIZE</th>
<th>COLD TIRE PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT</td>
<td>P205/60R16</td>
<td>240 KPA, 35 PSI</td>
</tr>
<tr>
<td>REAR</td>
<td>P205/60R16</td>
<td>240 KPA, 35 PSI</td>
</tr>
<tr>
<td>SPARE</td>
<td>T125/70D16</td>
<td>420 KPA, 60 PSI</td>
</tr>
</tbody>
</table>

TIRE AND LOADING INFORMATION

SEATING CAPACITY TOTAL 5, FRONT 2, REAR 3

The combined weight of occupants and cargo should never exceed 375 kg or 827 lbs.

2010 Mitsubishi Lancer
FMVSS No. 126
NHTSA NO.: CA5600
April 2010
5.0 PHOTOGRAPHS (5 of 14)

Figure 5.5. Window Sticker (Monroney Label)
Figure 5.6. Telltale for ESC Malfunction and ESC Off
Figure 5.7. ESC Off Control Switch
Figure 5.8. Front View of Vehicle As-Tested
5.0 PHOTOGRAPHS (9 of 14)

Figure 5.9. Rear View of Vehicle As-Tested

2010 Mitsubishi Lancer
FMVSS No. 126
NHTSA NO.: CA5600
April 2010
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

2010 Mitsubishi Lancer
FMVSS No. 126
NHTSA NO.: CA5600
April 2010
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
7.1 OWNER'S MANUAL PAGES

Features and controls

Warning display

Warning light

ASC SYSTEM SERVICE REQUIRED

3 In the event of an abnormal condition in the system while driving, the warning display will be displayed.

⚠️ CAUTION

- If the warning is displayed, the hill start assist will not operate. Start off carefully.
- Park your vehicle in a safe place and stop the engine. Restart the engine and check whether the warning display went out, in which case the hill start assist is again working normally.
- If the warning remains displayed or reappears frequently, it is not necessary to stop the vehicle immediately, but the vehicle should be inspected by an authorized Mitsubishi Motors dealer or a repair facility of your choice as soon as possible.

Anti-lock braking system (if so equipped)

The anti-lock braking system helps prevent the wheels from locking up when braking. This helps you keep control of your vehicle and its direction.

Driving hints

- When using the anti-lock brakes (sudden braking), steering is slightly different from normal driving conditions. Use the steering wheel carefully.
- Always keep a safe distance from the vehicle in front of you. Even if your vehicle is equipped with the anti-lock braking system, leave a greater braking distance when:
  - Driving on gravel or snow-covered roads.
  - Driving on uneven road surfaces.
- Operation of anti-lock braking system is not restricted to situations where brakes are applied suddenly. This system may also prevent the wheels from locking when you drive over manholes, steel roadwork plates, road markings, or any uneven road surface.
- When the anti-lock braking system is in use, you may feel the brake pedal vibrating and hear a unique sound. You may also feel as if the pedal resists being pressed.
  In this situation, simply hold the brake pedal down firmly. Do not pump the brake, which will result in reduced braking performance.
CAUTION

- The anti-lock braking system cannot prevent accidents. It is your responsibility to take safety precautions and to drive carefully.
- To prevent failure of the anti-lock braking system, be sure all four wheels and tires are the same size and the same type.
- Never install a limited slip differential as the ABS may not function normally.
Please consult an authorized Mitsubishi Motors dealer.

NOTE
- After your vehicle is driven a short distance after starting the engine, you will hear the sound coming from the engine compartment. These are the normal sounds the anti-lock braking system makes when performing a self-check. It does not indicate a malfunction.
- The anti-lock braking system can be used after the vehicle has reached a speed over approximately 6 mph (10 km/h). It stops working when the vehicle slows below approximately 3 mph (5 km/h).

Anti-lock braking system warning light / display

Warning light

![ABS]

Warning display type 1

![ABS SERVICE REQUIRED]

Warning display type 2

If there is a malfunction in the system, the anti-lock braking system warning light will come on and the warning display will appear on the information screen in the multi-information display.
Under normal conditions, the anti-lock braking system warning light only comes on when the ignition switch is turned to the “ON” position and goes off a few seconds later.
7.1 OWNER'S MANUAL PAGES

Features and controls

⚠️ CAUTION

- Any of the following warning light/display behavior indicates that the anti-lock braking system is not functioning and only the standard brake system is working. (The standard brake system will still work properly.) If this happens, take your vehicle to an authorized Mitsubishi Motors dealer or a repair facility of your choice as soon as possible.
  - When the ignition switch is in the “ON” position, the warning light does not come on or it remains on and does not go off
  - The warning light comes on while driving
  - The warning display appears while driving

If the warning light / display comes on while driving

If only the anti-lock braking system warning light / display comes on

- Avoid hard braking and high-speed driving. Stop the vehicle in a safe place.
  - Test the system by restarting the engine and driving at a speed of about 12 mph (20 km/h) or higher.
  - If the warning light / display then remain off during driving, there is no problem.
  - However, if the warning light / display do not disappear, or if they come on again when the vehicle is driven, have the vehicle checked by an authorized Mitsubishi Motors dealer or repair facility of your choice as soon as possible.
If the anti-lock braking system warning light / display and brake warning light / display come on at the same time

Warning light

[ABS] BRAKE [!]

Warning display type 1

[ABS] SERVICE REQUIRED [!] CHECK

Warning display type 2

[ABS] SERVICE REQUIRED [!] BRAKE SYSTEM SERVICE REQUIRED

The anti-lock braking system and brake force distribution function may not work, so hard braking could make the vehicle unstable.
Avoid hard braking and high-speed driving. Stop the vehicle in a safe place and contact an authorized Mitsubishi Motors dealer or repair facility of your choice.

NOTE
- The anti-lock braking system warning light and brake warning light illuminate at the same time and the warning displays appear alternately on the information screen in the multi-information display.

After driving on icy roads

After driving on snow or icy roads, remove any snow and ice which may have been left around the wheels. On vehicles that have an anti-lock braking system, be careful not to damage the wheel speed sensors (A) or the cables located at each wheel.

Front

A

Features and controls

3-137
Active Stability Control (ASC) (if so equipped)

The Active Stability Control (ASC) takes overall control of the anti-lock braking system, traction control function and skid control function to help maintain the vehicle's control and traction. Please read this section in conjunction with the page on the anti-lock braking system, traction control function and skid control function.

Anti-lock braking system (ABS) → P.3-134
Traction control function → P.3-139
Skid control function → P.3-139

⚠️ CAUTION ⚠️

- Do not over-rely on the ASC. Even the ASC cannot prevent the natural laws of physics from acting on the vehicle. This system, like any other system, has limits and cannot help you to maintain traction and control of the vehicle in all circumstances. Reckless driving can lead to accidents. It is the driver's responsibility to drive carefully. This means taking into account the traffic, road and environmental conditions.

- Be sure to use the same specified type and size of tire on all four wheels. Otherwise, the ASC may not work properly.

- Do not install any aftermarket limited slip differential (LSD) on your vehicle. The ASC may stop functioning properly.
NOTE

- An operation noise may be emitted from the engine compartment in the following situations. The sound is associated with checking the operations of the ASC. At this time, you may feel a shock from the brake pedal if you depress it. These do not indicate a malfunction.
  - When the ignition switch is set to the "ON" position.
  - When the vehicle is driven for a while after the engine is turned on.
- When the ASC is activated, you may feel a vibration in the vehicle body or hear a whining sound from the engine compartment. This indicates that the system is operating normally. It does not indicate a malfunction.
- When the anti-lock braking system warning light is illuminated, the ASC is not active.

Traction control function

On slippery surfaces, the traction control function prevents the drive wheels from spinning excessive, thus helping the vehicle to start moving from a stopped condition. It also provides sufficient driving force and steering performance as the vehicle turns while pressing the acceleration pedal.

⚠️ CAUTION

- When driving a vehicle on a snowy or icy road, be sure to install snow tires and drive the vehicle at moderate speeds.

Skid control function

The skid control function is designed to help the driver maintain control of the vehicle on slippery roads or during rapid steering maneuvers. It works by controlling the engine output and the brake on each wheel.

NOTE

- The skid control function operates at speeds of about 9 mph (15 km/h) or higher.
Features and controls

"ASC OFF" switch

The ASC is automatically activated when the ignition switch is turned to the "ON" position. You can deactivate the system by pressing down the "ASC OFF" switch for 3 seconds or longer. When the ASC is deactivated, the ASC indicator will be illuminated in the multi-information display. To reactivate the ASC, momentarily press the "ASC OFF" switch; the ASC display is turned off.

NOTE
- Using the "ASC OFF" switch turns off both the skid control function and the traction control function.
- When moving out of mud, sand or fresh snow, pressing the accelerator pedal may not allow the engine speed to increase. In such situations, temporarily turning off ASC with the "ASC OFF" switch will make it easier to move out your vehicle.
- If you continue to press the "ASC OFF" switch after the ASC is turned off, the "mistaken operation protection function" will activate and the ASC will turn back on.

⚠️ CAUTION
- For safety reasons, the "ASC OFF" switch should be operated when your vehicle is stopped.
- Be sure to keep the ASC on while driving in normal circumstances.
ASC operation display, ASC OFF display or ASC indicator (if so equipped)

- **Indicator (if so equipped)**

![Display type 1](image1)

![Display type 2](image2)

- **ASC operation display**
  - When the ASC is operating, the information screen in the multi-information display will change and the ASC operation display will blink.

- **ASC OFF display**
  - The ASC OFF display is displayed when the ASC has been deactivated with the "ASC OFF" switch.

- **ASC indicator (if so equipped)**
  - Indicator blinks when the ASC is operating.

---

**CAUTION**

- When display blinks, ASC is operating, which means that the road is slippery or that your vehicle's wheels are beginning to slip. If this happens, drive slower.
- If the temperature in the braking system continues to increase due to continuous brake control on a slippery road surface, the ASC display will blink. To prevent the brake system from overheating, the brake control of the traction control function will be temporarily suspended. The engine control of the traction control function and normal brake operation will not be affected. Park your vehicle in a safe place. When the temperature in the braking system has come down, the ASC display will be turned off and the traction control function will start operating again.

**NOTE**

- The ASC display may come on when you start the engine. This means that the battery voltage momentarily dropped when the engine was started. It does not indicate a malfunction, provided that the display goes out immediately.
- When a spare tire has been put on your vehicle, the gripping ability of the tire will be lower, making it more likely that the ASC display will blink.
Features and controls

ASC warning display

Indicator (if so equipped)

![Warning display type 1](image)

Warning display type 2

![Warning display type 2](image)

If an abnormal condition occurs in the system while driving, the warning display will be displayed at the same time.

⚠️ CAUTION

- The system may be malfunctioning. Park your vehicle in a safe place and stop the engine. Restart the engine again and check whether the ⚠️ warning display and the ⚠️ display go out. If the warning display goes out, there is no abnormal condition. If the warning display does not go out or appears frequently, it is not necessary to stop the vehicle immediately, but you should have your vehicle inspected by an authorized Mitsubishi Motors dealer or a repair facility of your choice as soon as possible.

Towing

⚠️ CAUTION

- When towing the vehicle with only the front wheels or only the rear wheels raised off the ground, do not place the ignition switch in the “ON” position. Placing the ignition switch in the “ON” position could cause the ASC to operate, resulting in an accident. Note that the correct towing method depends on the transmission type and the vehicle’s drive configuration.

For details, refer to “Towing” on page 6-22.
7.2 VEHICLE ARRIVAL CONDITION REPORT

CONTRACT NO.: DTNH22-08-D-00098
DATE: 4/13/2010

From: Automotive Allies Purpose Initial Receipt
Received via Transfer

To: Dynamic Research, Inc Present Vehicle Condition

Vehicle VIN: JA32U1FU4AU007104 NHTSA NO.: CA5600
Model Year: 2010 Odometer Reading: 13 Miles
Make Mitsubishi Body Style: Passenger Car
Model: Lancer Body Color: Silver
Manufacture Date: 8/09 Dealer: Automotive Allies
GVWR (kg/lb) 1850/4079 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: 4/13/2010
APPROVED BY: P Broen DATE APPROVED: 4/13/2010
### 7.3 VEHICLE COMPLETION CONDITION REPORT

**CONTRACT NO.:** DTNH22-08-D-00098  
**DATE:** 5/6/2010

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**LIST OF FMVSS TESTS PERFORMED BY THIS LAB:** 126

- ☑ THERE ARE NO DENTS OR OTHER INTERIOR OR EXTERIOR FLAWS
- ☑ THE VEHICLE HAS BEEN PROPERLY MAINTAINED 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

**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 new*

**RECORDED BY:** J Lenkeit  
**DATE RECORDED:** 5/6/2010

**APPROVED BY:** P Broen  
**DATE APPROVED:** 5/6/2010
## Lateral Stability Test Series No. 1 – Counterclockwise Initial Steer Direction

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# SINE WITH DWELL TEST RESULTS

2010 Mitsubishi Lancer Passenger Car

NHTSA No.: CA5600

Date of Test: **4/22/2010**

Date Created: **4/22/2010**

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

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### 7.5 SLOWLY INCREASING STEER TEST RESULTS

2010 Mitsubishi Lancer Passenger Car

NHTSA No.: CA5600

Date of Test: 4/22/2010

Date Created: 4/22/2010

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Averages  

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7.6 INERTIAL SENSING SYSTEM LOCATION COORDINATES

Vehicle: 2010 Mitsubishi Lancer Passenger Car
Wheelbase: 103.375 Inches
Measurement date: 4/15/2010

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>
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<th>Ref Z</th>
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</thead>
<tbody>
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<td>M_Point_IMU_side</td>
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<td>M_Point_ROOF</td>
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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>
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</thead>
<tbody>
<tr>
<td>9.473</td>
<td>48.393</td>
<td>-17.970</td>
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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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</table>

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).