



Haptic Seat Vibration Performance Procedure

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This test procedure provides a means for measuring alert vibrations for crash avoidance seats, referred to as haptic devices, and evaluates the performance of the haptic system installed in a seat complete.

1.2 Applicability. This test shall be applied to seats which utilize a vibration alert system in the seat for crash avoidance, otherwise known as haptic feedback.

1.3 Remarks. This test procedure utilizes accelerometers, a control module and a Controller Area Network (CAN) controller to activate and measure the output of the haptic system within a complete seat.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- Component Technical Specification (CTS).
- Haptic location drawing.
- Subsystem Technical Specification (SSTS).

3 Resources

3.1 Facilities. An approved GM certified test lab with an adequate bedplate or equivalent work surface necessary for mounting of the test sample and associated test fixtures.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Mounting Blocks. Rigid mounting blocks to simulate the floor attachment points to mount the seat system in design position on a bedplate or other equivalent work surface.

3.2.2 Tri-axial Accelerometers. Two accelerometers which are capable of accurately evaluating frequencies within the 100 Hz range. Sensitivity of the accelerometers must be 10 mV/g or finer. The weight of the accelerometer must be 1.13 g or less.

3.2.3 Multi-Channel Data Acquisition (DAQ) System. A data acquisition system capable of storing multiple tri-axial frequencies.

3.2.4 Controller Area Network (CAN) Vehicle Bus Controller. A CAN controller capable of interfacing with and sending commands to GM Local Area Network (LAN) vehicle systems (NeoVI, CANoe, etc.)

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3.2.5 Vehicle Spy Software. Vehicle spy software with a test setup file capable of sending the signals defined in this procedure to the haptic motors.

3.2.6 Adhesive. The adhesive must be capable of adhering the accelerometers to a taped surface for measurement purposes. Preferred adhesive application is hot-melt glue.

3.2.7 Haptic Location Drawing. An overhead drawing of the seat cushion which includes H-point, haptic motor locations, and physical characteristics of the seat cushion (bolster and center insert outlines, trenches, etc.)

3.2.8 Module Connector. Be able to power the haptic motors through either the Memory Seat Module (MSM) – (Global A) or Body Control Module (BCM) - (Global B) by using the appropriate connector (between the module itself and the CAN controller) and an appropriate power supply.

3.2.9 Power Supply. A Direct Current (DC) power supply capable of supplying a constant 13.5 V into the appropriate module. **Note:** For Global A, it is acceptable to power the seat assembly through the wire harness as this will subsequently power the MSM.

3.2.10 Filtering Software. Need software (LMS Tecware or similar software) to filter out accelerometer drift.

3.3 Test Vehicle/Test Piece. Complete trimmed seat subsystem with production intent foam and trim. An appropriate seat subsystem consisting of all components necessary to qualify as complete for the model and trim level specified by the Design Release Engineer (DRE). The foam is to be of production quality and tools.

3.3.1 Body Control Module (BCM). For seat assemblies on the Global B electrical architecture without an MSM, a Global B BCM is required for this test. In this instance, the signals to the haptic motors must be controlled and regulated through a Global B BCM.

3.4 Test Time.

Calendar time: 1.5 days

Test hours: 4 h

Coordination hours: 8 h

3.5 Test Required Information. The part number of the seat as well as the level of the part should be provided with the seat. The seat should have either been H-pointed before usage or assured that it is of production intent H-point. Obtain from the seating arrangement drawing or from the DRE, the design position of the seat (seat back angle, cushion frame angle, H-point location, track position, and height adjust position). Also obtain a drawing including the location of the eccentric weight within the haptic motor housing in relation to physical characteristics on the seat cushion (see 3.2.7) and the seat wire harness pinout.

3.6 Personnel/Skills. The following individuals are necessary to complete this test procedure:

- General Motors Seat Subsystem Validation Engineer (SVE).
- General Motors Seat DRE.
- Test Engineer.
- Test Technician.

4 Procedure

4.1 Preparation.

4.1.1 Determining the Accelerometer Placement. Utilizing a haptic location drawing (see 3.2.7) place accelerometers within the zones shown in Figure 1. This is the haptic location zone, which is no less than 50 mm, and no greater than 130 mm forward of H-point in the fore-aft direction; greater than 30 mm outward of the center insert, and 30 mm inward of the bolster side-edge in the lateral direction. Accelerometers must be placed in the location (within the haptic location zone) that produces the highest acceleration output when the haptic motors are activated (typically directly above the eccentric weight within the motor housing).

4.1.2 Accelerometer Attachment. Place tape over the accelerometer location determined in 4.1.2. Orient the accelerometers normal to the bolster angle with the x-axis being the fore-aft direction, y-axis being the lateral direction and z-axis being the vertical direction. Adhere the accelerometers to the taped surface using a suitable adhesive. To ensure no effect from the accelerometer cable, use tape to provide strain relief for the accelerometer. See Figure 2.

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