GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14186

Frame Interface Attachments - Drive Point Dynamic Stiffness and Mobility Level Evaluation Procedure

1 Introduction

The Hand Held Force Input Frequency Response Function (FRF) Acquisition Master Test Procedure, GMW14181 and the Transducer Calibration Master Test Procedure, GMW14172, shall be referenced for more detailed information corresponding to the following procedure.

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. Define the process for obtaining the drive point dynamic stiffness/mobility level on the frame at interfaces to the suspension, steering rack, body, exhaust and powertrain. These measurements are used to compare frame drive point dynamic stiffness/mobility to the specifications.

1.2 Applicability. This test procedure is appropriate to use for all car and truck frame systems.

1.3 Remarks. The drive point dynamic stiffness/mobility level of the frame at the suspension, steering rack, body, exhaust and powertrain interfaces is a factor in isolation performance.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14172 GMW14181

2.3 Additional References.

Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities. A test room or an area which is free of extraneous vibration per GMW14181.

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 Test Equipment.

3.2.1.1 Data Acquisition System (DAS).

3.2.1.2 Accelerometer (weight less than 0.006 kg) accelerometer.

3.2.1.3 Small or medium impact hammer with tip capable of providing uniform force input out to 800 Hz or hand held shaker and force transducer.

3.2.1.4 Transducer cabling.

3.2.1.5 Signal conditioning. See GMW14181, Appendix A, Table A2 for transducer key characteristics.

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3.2.2 Test Fixtures.

3.2.2.1 Suspension Links with Bushings. An aluminum cylinder can be bolted inside the bushing outer sleeve so that it clamps tightly to the outer sleeve.

3.2.2.2 Powertrain Mounts. Remove powertrain mount rubber and bolt bracket metal to test piece.

Note: Only half of the mount metal will be used.

3.3 Test Vehicle/Test Piece. The complete frame system including all components (not isolated to the frame) with designed attachments.

3.4 Test Time.

Calendar time:	1.25 days
Test time:	8 hours
Coordination time:	2 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. To complete this test, at least one (1) technician and/or one (1) engineer skilled in vibration data acquisition, analysis, equipment use, and test setup is required.

4 Procedure

4.1 Preparation.

4.1.1 Attach test bushings and mount interface hardware at appropriate interface attachments.

4.1.2 Mount the frame on elastic cords for free-free mounting boundary condition.

4.1.3 Manipulate the elastic compliance to achieve less than a 0.5 Hz rigid bounce frequency.

4.2 Conditions.

4.2.1 Environmental Conditions. See GMW14181.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Set up a DAS to acquire accelerance FRF in the units of meters per second squared per Newton [$(m/s^2)/N$] from 0 Hz to 1024 Hz with a maximum resolution of at least 1 Hz.

4.3.2 Instrument frame attachment with an accelerometer Using an impact hammer or hand held shaker, apply a force at the frame attachment in the same direction.

4.3.3 Continue measuring driving point FRFs in three (3) orthogonal directions at all of the frame attachment points.

4.3.4 See GMW14181 for GM standard vehicle coordinate directions and appropriate accelerometer mounting adhesives.

4.3.5 For each FRF measurement, measure accelerance, check coherence and verify levels. Upon measurement completion store accelerance FRF, coherence and force autopower spectrum.

5 Data

Data may be presented in four (4) ways:

- One-Third (⅓) octave drive point dynamic stiffness spectrum
- One-Third (⅓) octave mobility spectrum
- Narrow band mobility spectrum
- Narrow band drive point dynamic stiffness spectrum

5.1 Calculations.

5.1.1 One-Third (⅓) Octave Drive Point Dynamic Stiffness Spectrum.

5.1.1.1 Integrate the narrow band accelerance to obtain mobility.

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