

Uniform Procedures For Collision Repair

ME01–Three- Dimensional Measuring

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v.2.3



1. Description

This procedure describes methods for making three-dimensional measurements of both **control** and **reference points** at underbody, upperbody, and underhood locations. This procedure can be used with all types of **three-dimensional measuring** equipment.



2. Purpose

The purpose of this procedure is to provide industry-accepted requirements for performing accurate measurements in order to assess damage and restore structures to their original shapes and locations. This procedure is intended for use by professionals who are qualified through training and experience.



3. Referenced Documents

The following documents are considered part of this procedure by reference.

3.1 Procedures

PS01 Personnel Safety

ST11 Structural Straightening

3.2 Other Information

Equipment-specific information

Vehicle-specific dimension specifications



4. Equipment And Material Requirements

4.1 Measuring Equipment

Use a measuring system that performs these functions:

- measures underbody, underhood, and upperbody control and reference points
- monitors pulling progress
- locates points in three dimensions
- measures with an accuracy of ± 1 mm ($1/32$ ")



5. Damage Analysis

5.1 Visual Inspection

To perform a visual inspection of the vehicle:

- Determine the location, severity, and pattern of the damage.
- Locate at least three undamaged underbody control points that may be used to establish a three-dimensional reference base.
- Refer to the dimension specifications to determine which control and reference points should be measured for damage assessment. Determine if measurements are to be made with mechanical parts attached to the vehicle and if the suspension is to be loaded or unloaded.
- Determine which parts must be loosened or removed for access to the selected control or reference points.
- Make sure the selected control or reference points are undamaged, clean, and accessible.



Indicators of possible damage include the following:

- broken **spot welds**, or split seams
- corrosion**
- flaking rust on suspension or structural parts
- visible **kinks** or **bends**
- visible cracks or tears
- previous damage or improper repairs
- misaligned panel gaps
- broken or cracked glass
- cracked paint and **seam sealers**

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5. Damage Analysis (cont'd)

- misaligned doors, hoods, deck lids, or other closure panels
- ripples in sheet metal parts
- obviously misaligned wheels

If any of these conditions are found, the vehicle should be measured using a three-dimensional measuring system.



6. Personnel Safety

6.1 General Safety

General safety information is in **PS01**.

6.2 Measuring Setup Safety

To prevent injury when using measuring equipment:

- Ensure that the vehicle is stable and secure before installing an underbody measuring system.
- Follow the equipment maker's safety requirements.



7. Environmental Safety

Does not apply.



8. Vehicle Protection

8.1 Brake And Fuel Lines

To move brake and fuel lines for access:

- Loosen or remove mounting brackets before trying to gain access to measuring points.
- Do not bend lines.
- Loosen mounting brackets or remove lines before installing anchoring or measuring system clamps.
- Depressurize the fuel and brake systems, if necessary.
- Ensure that the vehicle cannot be operated until brake or fuel systems have been restored, following the vehicle maker's recommendations.

8.2 Suspension Systems

Follow the vehicle maker's recommendations for disabling and reactivating electronically controlled or air-ride suspension systems.



9. Repair Procedure

Develop a repair plan, based on the extent of damage to the vehicle structure. Measure the underbody, upperbody, and underhood areas as necessary. Compare the measurements to the vehicle dimension specifications, and establish a logical sequence for repairing the body structure.

9.1 Underbody Measuring Procedure

To measure the underbody:

- 1. Determine which measuring system will be used and obtain the vehicle's dimension specifications.
- 2. Position the vehicle at the proper measuring and anchoring height. Follow the equipment maker's recommendations.
- 3. Identify at least three undamaged control points in the vehicle's center section that can be used to establish a measurement base.
- 4. Identify the control and reference points in and around the area of damage that will be used for measurements. Suspension mounting points must be identified and prepared for measuring. All reference and control points used must be clean and free of any debris that may affect measurements.



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9. Repair Procedure (cont'd)

- ❑ 5. Remove or loosen all parts that block access to the measuring points.
- ❑ 6. Set up the measuring system following the equipment maker's instructions, using the dimension specifications for the vehicle being repaired.
- ❑ 7. Make preliminary measurements to determine the condition of the vehicle's center section, using at least three undamaged control points. Make preliminary pulls to correct any damage in the vehicle's center section, if necessary.
- ❑ 8. Measure points away from the point of impact and evaluate them for **secondary damage**. If damage is located in the center section, both ends of the vehicle must be measured and evaluated.
- ❑ 9. Measure control and reference points in and around the damaged area. Evaluate the measurements to determine the amount and direction of pulling required. Front and rear sections may have to be measured, even if damage is not found in the center section.
- ❑ 10. Record the measurements and compare them to the vehicle dimension specifications.
- ❑ 11. Develop a repair plan based on the damage found. Underhood and upperbody measurements may be needed to fully evaluate the damage.



9.2 Underhood Measurements

To make underhood measurements:

- ❑ 1. Obtain underhood dimension specifications for the vehicle being measured.
- ❑ 2. Identify the control and reference points to be measured. Remove any fasteners or parts that block the setup of measuring equipment.
- ❑ 3. Set up the measuring equipment for underhood measurements.
- ❑ 4. Measure the locations of the strut towers, radiator core support, and other underhood control and reference points. Point-to-point measurements must be verified from more than one measurement point.
- ❑ 5. Record the measurements and compare them to the vehicle dimension specifications.
- ❑ 6. Develop a repair plan based on the damage found.



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9. Repair Procedure (cont'd)

9.3 Upperbody Measurements

To measure the upperbody:

- 1. Obtain upperbody dimension specifications for the vehicle being measured.
- 2. Measure glass, door, sunroof, deck lid, and rear hatch openings, along with the locations for door hinges, rear strut towers, and any other critical items.
- 3. Record the measurements and compare them to the vehicle's dimension specifications.
- 4. Develop a repair plan based on the damage found.



10. Use Of Recycled (Salvage) Parts

Does not apply.



11. Inspection And Testing

Does not apply.