



Ultrasonic Park Assist (UPA) for General Motors Local Area Network (GMLAN) Systems

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 document establishes a centralized set of electrical and mechanical performance tests for Ultrasonic Park Assist Components and Subsystems. The use of the defined Analytical, Developmental and Validation (A/D/V) procedures is intended to be cumulative in nature, with the intent of generating as many learning cycles as possible during the vehicle development process. Performance requirements shall be established in accordance to the Subsystem Technical Specification (SSTS), and Component Technical Specification (CTS) or each appropriate level.

1.2 Applicability. This document is the GM World Standard for Ultrasonic Park Assist component performance testing procedures for automotive and light/heavy duty truck applications. All vehicles equipped with both a rear and a front Park Assist Subsystem need to complete both the rear and front testing sections. Vehicles equipped with only the rear Park Assist Subsystems may exclude all front park assist testing sections. Vehicles equipped with Side Distance Guard (SDG) need to complete the side testing sections.

1.3 Remarks. The CTS and SSTS shall take precedence over this document. The supplier is required to support and participate in subsystem or vehicle level A/D/V tasks as specified in the electronic Statement of Requirements (eSOR), CTS, or by GM Engineering. This procedure provides established common Ultrasonic Park Assist performance tests or methods for GM that will be delegated to be performed either on the vehicle, buck, subsystem, component, and/or bench. This procedure covers only Park Assist Subsystem functions. Other functional software tests like lighting, ECU specific functions etc. are separately specified in single test procedures and are not covered here. Glossary, Acronyms, Abbreviations and Symbols listed in 7.1 and 7.2 apply to this procedure CG2307 and CG4640. CG2307 references ISO 17386, GMW3091, GMW3103, GMW3110, GMW3172, and GMW3431.

2 References

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

2.1 External Standards/Specifications.

ISO 17386

2.2 GM Standards/Specifications.

GMW3091	GMW3110	GMW3431
GMW3103	GMW3172	

2.3 Additional References.

- CG2307 Functional Diagnostic and Performance Test Procedure
- CG4640 Side Distance Guard (SDG) Test Procedure
- CTS
- eSOR
- SSTS

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3 Resources

3.1 Facilities. Dynamic Vehicle Test (DVT) System, proving grounds, and public roads.

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 Control Area Network Analyze Tool (CAT), laptop computer tester, serial data analysis tool with tester simulation, etc.

3.2.2 Communication simulation.

3.2.3 Communication analyzer.

3.2.4 Voltmeter.

3.2.5 Oscilloscope.

3.2.6 Metric tape measure (to measure distances in millimeters).

3.2.7 Power booster for vehicle battery for static tests.

3.2.8 A vehicle hoist is needed in order to test certain dynamic tests. Within this procedure, objects such as a trailer can be replaced by a Polyvinyl Chloride (PVC) pole on a stand when the vehicle is on a hoist and there is vehicle speed. This applies to:

- A wall for wall detect.
- A trailer or test equivalent to attach to the vehicle to test the customer-attached object induced disable function (if equipped with trailer hitch).
- A front of the vehicle mounted bike rack to test front attached object detect.

3.2.9 Large PVC pole on stand: Diameter of roughly 70 mm to 80 mm, length of 925 mm to 1000 mm.

3.2.10 Plywood boxes, 1 m long by 30 cm, painted with weather-resistant primer (not sanded), heights between 20 cm and 40 cm in 5 cm increments. One upper longitudinal edge shall have a radius of 10 mm.

3.3 Test Vehicle/Test Piece. Test(s) may be performed on vehicle, buck, subsystem, component, and/or bench dependent on procedures.

3.3.1 Electrical Test Bench (for static tests which doesn't require a vehicle).

3.3.2 Electrical/Electronic Integration Vehicle Engineering Release (IVER) vehicle with target electric/electronic (for all tests which don't require the real body-style).

3.3.3 A vehicle that is retrofitted with the most up-to-date parts. An additional vehicle is needed to perform Mutual Interference.

3.3.4 Test components include:

- Park Assist Subsystem module.
- Bracket for Ultrasonic Park Assist Subsystem module (may be required due to packaging).
- Park Assist Subsystem sensors.
- Sensor bezel/holder (may not apply to all vehicles). Each vehicle may require a different bezel set and each may require different bezels due to physical location on the bumper and field of view, some vehicles may have molded in sensor attachments, and some vehicles may have ultrasonically welded in sensor attachments.
- Rear Park Assist Subsystem display.
- Front Park Assist Subsystem display (for vehicles with front Park Assist Subsystem systems).
- Side Distance Guard Subsystem display (for vehicles with Side Distance Guard Subsystem systems).
- Park Assist Subsystem external speaker (optional).
- Park Assist Subsystem chime via vehicle audio system.
- Enable/Disable switch visual Light Emitting Diode (LED) indicator (optional).
- Park Assist Subsystem telltale located in the cluster (optional).

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3.4 Test Time.

Calendar time:	Rear: 2 to 3 days Front/Rear: 4 to 6 days Front/Rear/Side: 6 to 8 days
Test hours:	Rear: 14 to 21 hours Front/Rear: 28 to 42 hours Front/Rear/Side: 42 to 56 hours
Coordination hours:	24 hours

3.5 Test Required Information. This is a vehicle level test procedure that is to be used when testing the Park Assist Subsystem. The components within this subsystem should have completed component level testing and subsystem level functional and diagnostics bench testing (see CG2307 and CG4640) prior to this test procedure and passed.

The increased complexity of the body electronic system and their project specific architecture drive the need to define the standard work package for the distributed functionality of the Park Assist Subsystem (distributed over more than one Electronic Control Unit (ECU)). It enables the GM development and validation organization to perform the tests and measurements on functional and distributed architecture view.

The Development/Evaluation tasks are to be performed on first samples to provide the earliest opportunity to qualitatively evaluate and improve the system performance, especially the software controlled functions. A robust system performance has to be ensured.

The Validation tasks are to be performed with the final software and hardware samples. These tests ensure the correct implementation and the right performance of the system in the vehicle.

The procedures herein and methods are intended for electrical and electronic modules which execute parts of the Park Assist Subsystem function for use on passenger vehicles and crossover vehicles.

The included process flow and test flow charts must be used to ensure the effectiveness of this specification and improvement opportunity.

The latest Park Assist Subsystem software and hardware on the vehicle must be verified.

3.6 Personnel/Skills. Certain parts of this procedure will require two (2) people to complete. The persons must have the ability to use computer equipment, electronic measuring, and diagnostics tools.

4 Procedure

4.1 Preparation. CG2307 and CG4640 describe the complete integration test areas which are needed to integrate a tested body electronic component into a vehicle environment.

It is the responsibility of the validation engineer to perform the needed test steps within the different areas for the different test categories to ensure a validated Body Electronic system in the series vehicle.

The Park Assist Subsystem must give warning about nearby objects of interest to the driver under any circumstances to avoid damage to the vehicle. In case the system is inoperable for any reason (damage or malfunction) this must be indicated to the driver.

During the development, particular emphasis must be put on the avoidance of unnecessary warnings.

4.2 Conditions.

4.2.1 Environmental Conditions. Testing should be performed during relatively clear atmospheric conditions. Refer to the affected SSTs and CTS documents for limiting weather conditions of Park Assist Subsystem.

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. Complete all sections of CG2307 and CG4640 as applicable. For CG2307, see 4.3.1 through 4.3.15 for the 15 uses of this test procedure.

4.3.1 Test Park Assist Subsystem functionality on vehicle or on subsystem level.

4.3.2 Validate Park Assist Subsystem functionality on vehicle level.

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