



Wide Open Throttle, Rock Cycle, GPS Anti-Abuse, Engine Torque Management Algorithm Check

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. The purpose of this standard is to determine the presence of and if an "Engine Torque Management Algorithm" will protect General Motors Global Propulsion Systems (GPS) and driveline components when subjected to Wide Open Throttle (WOT) Reverse to Drive shift maneuver, i.e., "Rock Cycle".

1.2 Applicability. This test applies to all passenger cars and light trucks equipped with an automatic transmission.

1.3 Remarks. It will be necessary to contact the GPS Calibration Specialist for the GPS control modules under test in this procedure to acquire the applicable calibration limit for the "Engine Torque Management Algorithm" and converter stall speed.

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

3 Resources

3.1 Facilities. Flat asphalt pad of sufficient size to permit safe operation of the Reverse to Drive shift maneuver in 4.3.1.

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. Laptop computer with serial data monitoring and plotting software.

3.3 Test Vehicle/Test Piece. The released combination of GPS components, i.e., engine and Engine Control Module (ECM) and automatic transmission and Transmission Control Module (TCM).

3.4 Test Time.

Calendar time: 1 d

Test time: 3 h

Coordination time: 4 h

3.5 Test Required Information.

3.5.1 Part number, Regular Production Option (RPO), and serial number/calibration level of GPS components, i.e., engine and ECM and automatic transmission and TCM. Record these on the Data Sheet A1 in Appendix A.

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3.5.2 Limit for the "Engine Torque Management Algorithm" from the GPS Calibration Specialist. **Note:** This will be used as the pass/fail criteria. Record this value on the Data Sheet A1 in Appendix A.

3.5.3 Converter stall speed from the GPS Calibration Specialist. Record this value on the Data Sheet A1 in Appendix A.

3.6 Personnel/Skills. One engineer, technician, and/or driver is required with the appropriate driver license/permit for the given test facility. The engineer, technician, and/or driver should be able to maneuver the vehicle according to the driving sequences listed herein and induce the behavior of the test vehicle for the purposes of evaluating the response. In addition, the engineer, technician, and/or driver shall have the ability to conduct end of test inspection of test parts if required.

4 Procedure

4.1 Preparation.

4.1.1 Acquire the laptop computer programmed to monitor, record and plot the following vehicle parameters from the Data Link Connector (DLC) found underneath the steering wheel:

- Vehicle Speed
- Engine Speed
- Engine Torque
- Transmission Gear State
- Transmission Sump Temperature
- Wheel Speed
- Brake Apply
- Accelerator Pedal Position
- Throttle Position

4.1.2 Record the vehicle test weight on Data Sheet A1 in Appendix A.

4.1.3 Inflate tires to recommended pressure for full rated load and record inflation pressure on Data Sheet A1 in Appendix A.

4.1.4 Tune engine to manufacturer specifications. Check engine performance by observing Wide Open Throttle (WOT) converter stall speed. The converter stall speed should be within 100 RPM of the stall speed from the GPS Calibration Specialist for the engine/transmission combination. Record the observed stall speed on Data Sheet A1 in Appendix A.

4.1.5 Install shift linkage stops to prevent shifting beyond Drive or Reverse. Include notification in the vehicle that the Park position is not available. **Note:** To "Park" vehicle, use Neutral and apply parking brake.

4.2 Conditions.

4.2.1 Environmental Conditions. This test can be run in any ambient condition if the vehicle is able to generate sufficient torque and tractive effort in order to trigger engine torque management.

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 Reverse to Drive Shift Maneuver.

Note: In the event this abuse cycle creates engine speed > 3000 RPM, STOP the test and do not allow any additional cycles to be performed. Write an incident report, using the Problem Reporting and Tracking System (PRTS), for the inability of the "Engine Torque Management Algorithm" to engage. Notify GPS Calibration Specialist.

4.3.1.1 Initiate data logging of parameters identified in 4.1.1.

4.3.1.2 Place the test vehicle on a dry asphalt test pad. **Note:** Transmission sump temperature at test start should be at least 66 °C and shall not to exceed 121 °C during test.

4.3.1.3 Apply service brakes.

4.3.1.4 Start test with transmission shift lever in Reverse.

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