



Automatic Transmission Maneuvers to Verify Abuse Algorithm Robustness Neutral to Drive, Neutral to Reverse (Whammy Test)

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. To verify calibration robustness to abusive Neutral to Drive and Neutral to Reverse shift maneuvers.

1.2 Applicability. Automatic transmissions and transaxles.

1.3 Remarks. This verification procedure is typically completed after abuse algorithm is implemented, prior to Vehicle Testing Complete (VTC).

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.

- Transmission and/or transaxle normal operation sump temperature
- Transmission and/or transaxle oil level set procedure

3 Resources

3.1 Facilities. Smooth, flat, dry, clean asphalt or concrete pad with little or no grade of sufficient length to allow the test vehicle to accelerate from a stop at 100% throttle for 5 s and a run-off to allow for normal braking to a stop. Any grade angle which will cause the vehicle to roll in Neutral, foot off brake, is unacceptable.

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. Optional Data Acquisition System (DAS) capable of data collection of Park, Reverse, Neutral, Drive, Low (PRNDL) commanded and attained gear position, engine Revolutions per Minute (RPM), turbine speed rpm, engine torque, transmission sump temperature, and vehicle speed, e.g., portable computer capable of data acquisition. **Note:** This information is typically available on the vehicle communication bus but some physical sensors may need to be installed depending on vehicle configuration. Record calibration information on Data Sheet A1 in Appendix A, if not captured otherwise.

3.3 Test Vehicle/Test Piece. Representative development vehicle, i.e., powertrain and driveline hardware, including shift system, and software, has to include representative abuse protection algorithm.

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3.4 Test Time.

Calendar time: 1.5 days

Test hours: 4 hours

Coordination hours: 8 hours

3.5 Test Required Information. Transmission and/or transaxle should be set according to current oil level set procedure (nominal).

3.6 Personnel/Skills. Person with valid driver license and knowledge of the data acquisition system. If working at General Motors Milford Proving Ground (MPG), certification for using MPG road system is required.

4 Procedure

4.1 Preparation.

4.1.1 Record calibration and software level on Data Sheet B1 in Appendix B if not captured otherwise.

4.1.2 Verify the service brakes are operational.

4.1.3 Verify the transmission and/or transaxle oil level.

4.1.4 Verify tire pressures and record on Data Sheet B1 in Appendix B if not captured otherwise. Tire pressure can be found on the tire placard, typically on the driver door or door frame near the latch. If the tire placard is not found, consult the Requesting Engineer for set values.

4.1.5 Install the DAS (if applicable) and/or any required physical sensors and verify the required data is being captured. See 3.2.

4.2 Conditions.

4.2.1 Environmental Conditions. Record ambient conditions on Data Sheet B1 in Appendix B if not captured otherwise.

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 Break-in and/or Pretest.

4.3.1.1 For new transmissions and/or transaxles, i.e., less than 1600 km (1000 mi), of on-road use, break-in the transmission and/or transaxle clutches in by making 50 shifts from Neutral to Drive and Neutral to Reverse at 1000 RPM engine in Neutral.

4.3.1.2 If not achieved during break-in, drive normally at approximately 80 km/h (50 mph) for 24 km (15 mi) to achieve transmission and/or transaxle normal operation sump temperature. **Note:** Do not allow sump temperature to exceed 132 °C (280 °F) during test. If necessary, drive normally at approximately 80 km/h (50 mph), to reduce sump temperature to 104 °C (220 °F) maximum before restarting the test.

4.3.2 Test.

4.3.2.1 Start the DAS (if applicable).

4.3.2.2 Position the vehicle on the test pad as necessary, stop the vehicle, shift to Neutral and apply the service brake.

4.3.2.3 Open the throttle to 100%, allow the engine speed to stabilize at the governed speed limit (if any).

4.3.2.4 Release the brakes and shift to Drive, maintain 100% throttle for five (5) seconds. Make a normal stop.

4.3.2.5 Position the vehicle on the test pad as necessary, stop the vehicle, shift transmission to Neutral and apply the service brake.

4.3.2.6 Open the Throttle to 100%, allow the engine speed to stabilize at the governed speed limit (if any).

4.3.2.7 Release brakes and shift to Reverse, maintain 100% throttle for two (2) seconds. Make a normal stop.

4.3.2.8 Repeat 4.3.2.2 through 4.3.2.7 four (4) times for five (5) Neutral to Drive and Neutral to Reverse cycles total then stop the DAS (if applicable).

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