GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14764

Automatic Range Control Assembly
Ultimate Strength/High-Load Cyclic Durability

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. Determine the ultimate strength of the automatic transmission shift control assembly and evaluate fatigue characteristics during high load cycling for forward only loading, fore-aft loading, lateral loading and vertical loading.

1.2 Applicability. This test applies to all passenger cars and light duty trucks with automatic transmission floor shift.

1.3 Remarks. This test is an accelerated means of evaluating the performance criteria of the automatic shift control assembly.

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.

- Component Technical Specification (CTS)
- Subsystem Technical Specification (SSTS)

3 Resources

3.1 Facilities.

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.

3.1.3 GMNA Test Laboratory, Supplier/Vendor or American Association for Laboratory Accreditation (AALA) Accredited Test Facility, or other comparable facility.

3.2 Equipment.

3.2.1 Equipment specified is used by GM Test Laboratories. Substitution of other equipment is permitted.

3.2.1.1 Shifter actuator, linear air cylinder.

3.2.2 Instrumentation.

3.2.2.1 One (1) channel strip chart recorder.

3.3 Test Vehicle/Test Piece. Automatic transmission shifter assembly/core shifter mechanism.

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3.4 Test Time.

Calendar time:	10 days/test sample
Test hours:	80 hours/ test sample
Coordination hours:	16 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Basic laboratory skills and familiarity with GM test procedures and reports.

4 Procedure

4.1 Preparation.

4.1.1 Sample Inspection. Use a new shifter assembly for each load condition. Perform a functional check of each shifter to verify proper pawl travel/return, park lock/Brake Transmission Shift Interlock (BTSI) function, park switch function, Tap Up, Tap Down (TUTD) signal operation (if applicable) and general operations.

4.1.2 The fixture shall provide a 15 degree angle loading direction for the forward loading conditions only, reference Figure 1. The fixture angle shall not exceed 20 degrees at the end of the shift handle travel. The fixture shall provide a pure fore-aft load for the fore-aft loading condition. A shift handle should not be used, but instead replaced with a fixture handle to accurately direct the load and allow for easy access and adjustment of the detent rod/pawl position. The fixture handle should have the same interface to the shifter post as the intended handle.

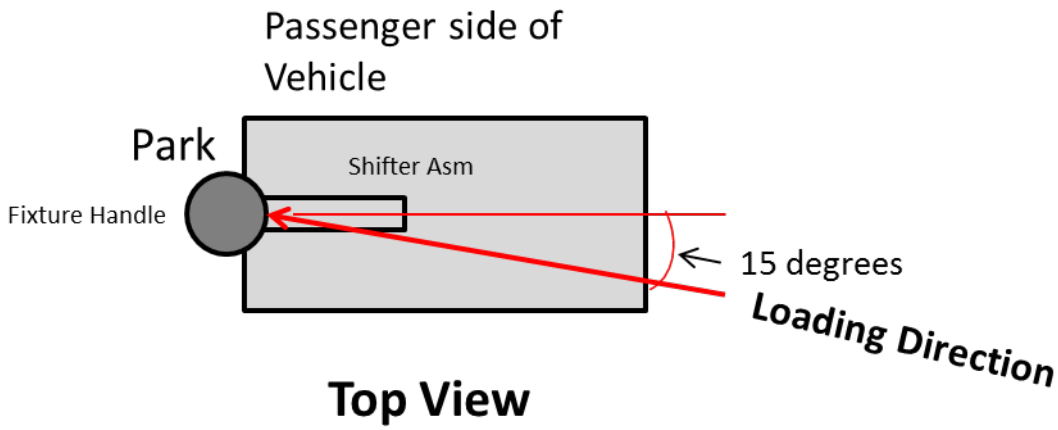

Figure 1: Top View of Shifter Assembly Loading Direction

The forward, fore-aft and lateral loads shall be applied at the Load Application Point (LAP) that is a point 15 mm below the top of the production shift handle (or 35 mm above the top of the lever tube, if a production handle is not known or a fixture handle is utilized). The vertical load is applied downward at the centerline of the lever tube. Reference Figure 2.

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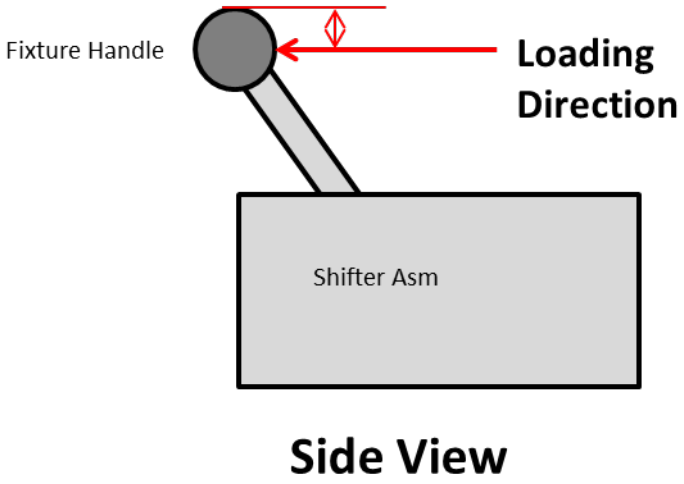

Figure 2: Side View of Shifter Assembly Loading Direction

4.1.3 Setup (Applies to the Forward Loading Test Only). Once the shifter is mounted, the pawl should be positioned at approximately 50% of travel during loading. This will be controlled by the fixture handle. If system uses a park lock cable, attach it to the shifter to assist the pawl travel/return. The stroke begins with the shifter against the park stop. Load is then applied, held and relaxed. Total shifter travel will only be shift assembly deflection.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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 Ultimate Strength.

4.3.1.1 Begin at 445 N (100 lb). The load is to be applied in the forward direction only. Desired load is to be an impulse and will be reached in 0.3 s. The desired load is held for approximately 2 s and then allowed to return to zero (0). Increase load at 22 N (5 lb) increments.

4.3.1.2 Check functional criteria per 4.3.6 after each load increase. Continue testing until the functional criteria is not met and note the failure mode and previous load.

4.3.2 High Load Cycling, Forward Loading.

4.3.2.1 Apply a 467 N (105 lb) load at the LAP in the forward direction. Cycle rate should not exceed 20 cycles/minute.

4.3.2.2 Cycle definition. The load is applied only in the forward direction. Desired load is to be an impulse and will be reached in 0.3 s. The desired load is held for approximately 2 s and then allowed to return to zero (0).

4.3.2.3 Check functional criteria every 100 cycles. Continue testing until the functional criteria is not met and note the failure mode and number of cycles. Discontinue testing after 5000 cycles.

4.3.3 High Load Cycling, Fore-Aft Loading.

4.3.3.1 Apply a 350 N cyclic load, forward or rearward at the LAP. This test shall be performed with the lever in all positions that cause the pawl or lever to be loaded against a gate. Use a new sample for each position.

4.3.3.2 Cycle rate should not exceed 6 cycles/minute. Each load application shall be held for 5 s.

4.3.3.3 Check functional criteria per 4.3.6 every 5 cycles. Continue testing until the functional criteria is not met and note the failure mode and number of cycles. Discontinue testing after 40 cycles.

4.3.4 High Load Cycling, Lateral Loading.

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