

FCA US LLC Chronology
Column Shifter BTSI Inoperative
Submitted on December 20, 2017

- On March 3, 2017, the FCA US Vehicle Safety and Regulatory Compliance (“VSRC”) organization opened an investigation as a result of CAIR #30364071 (VIN GG165379). The subject vehicle, a 2016 MY D2 truck, is equipped with a column shifter, and was involved in an alleged roll away incident resulting in an injury to the driver.
- During the months of March and April 2017, the FCA US VSRC reviewed warranty data for cables, shifters, transmissions, and the BTSI for RAM trucks.
- In May 2017, the FCA US VSRC searched for customer complaints (CAIRs) alleging that the column shifter in RAM truck vehicles could be shifted out of PARK without depressing the brake pedal or having the key in the ignition.
- In June 2017, the FCA US VSRC reviewed BTSI warranty part return data and suspected that “debris” or “foreign material” resulted in the BTSI solenoid pin in some vehicles was getting stuck down/open within the housing.
- On June 22, 2017, the FCA US VSRC was made aware of a fleet of RAM vehicles in which 72 of 240 trucks were able to move the shifter out of PARK without depressing the brake pedal or having the key in the ignition.
- On June 27, 2017, the FCA US VSRC and FCA US Interior Engineering visited the BTSI supplier to review the plant assembly process and a part returned with the BTSI solenoid pin stuck down/open. No issues with the assembly line were found during this visit. Analysis of the failed part identified an interaction between the bobbin housing and the pin.
- On June 29, 2017, the FCA US VSRC and FCA US Interior Engineering visited the Toledo Machining Plant where the BTSI bracket is assembled to the steering column and no issues were identified.
- In July and August 2017, the FCA US VSRC received parts through fleet repairs and warranty part retentions for inspection. A field survey found one of 32 employee vehicles to have a failed BTSI. Additional field surveys were initiated in California, Texas, Florida and Minnesota to determine the effect of different climates on the BTSI.
- On July 21, 2017, the FCA US VSRC was notified that a BTSI had failed during grade testing at the Arizona Proving Grounds.
- On July 21, 2017, the FCA US VSRC inspected BTSI parts returned from vehicle surveys. One BTSI part had corrosion on the solenoid pin and another had a damaged plastic gate wall. Subsequent analysis performed by FCA US Interior Engineering on a new part showed that after six pulls on the column shifter lever the gate wall broke. This low cycle failure indicated that customer abuse could cause the damaged plastic gate.
- In August 2017, FCA US Materials Engineering analyzed returned parts and confirmed the zinc plating on the BTSI solenoid pin exhibited corrosion.
- On August 17, 2017, the multi-state survey was completed and resulted in three failed BTSIs out of a test population of 100 vehicles.
- On September 7, 2017, the FCA US VSRC inspected additional returned fleet parts and identified three unique potential failure modes related to the BTSI: 1) damaged gate wall; 2) corroded solenoid pin; and 3) overheated solenoid coil that caused the grease to degrade and become sticky within the housing.
- On September 8, 2017, the FCA US Materials Engineering Corrosion Lab completed humidity testing and found the solenoid pin stuck down/open in the housing after 240 hours of testing.

- On September 11, 2017, the supplier reproduced the sticking solenoid pin by energizing the BTSI coil for 3.5 days. The temperature of the BTSI solenoid reached 300° F within 30 minutes by continuously energizing the coil.
- On September 15, 2017, the FCA US VSRC discovered that some fleet vehicles use an add-on module, which constantly energizes the BTSI solenoid when the vehicle is running. The BTSI design intent is to energize the BTSI solenoid only when the brake pedal is depressed and the vehicle turned on and in PARK.
- On September 21, 2017, the FCA US VSRC re-opened the multi-state survey to gather more data.
- On September 25, 2017, the FCA US VSRC and engineering notified the fleet manager that the add-on module installed on some of their vehicles was contrary to design intent of the vehicles.
- On September 28, 2017, the supplier completed the same 3.5 day constant energy test without grease added to the BTSI solenoid and the pin did not stick. The supplier of the current production grease, Rheogel 283, informed FCA US that the grease is not rated for this high of a temperature (300° F).
- In October 2017, the FCA US Materials Engineering Corrosion Lab conducted a 21-day humidity test for different part configurations of grease or no grease and pin plating combinations; all configurations resulted in BTSI failures. The test was re-started with a modified setup to simulate production intent in vehicle position.
- In October 2017, the FCA US VSRC conducted bake testing for different part configurations of grease or no grease; all configurations resulted in BTSI failures. The testing was repeated with bobbin housing measurements taken before and after the test, which revealed the housing swells causing the clearance gap to decrease and tighten around the pin at high temperatures.
- On November 3, 2017, the FCA US VSRC collected customer usage data through the FCA US Chelsea Proving Grounds monitoring department. The data indicated instances where customers actuate the BTSI in the vehicle for longer than five minutes and as long as 24 minutes.
- In November 2017, the FCA US Materials Engineering Corrosion Lab's second 21-day humidity test concluded resulting in corrosion failures only on parts without grease. The current production representative parts tested did not fail. These test results indicated that humidity would cause the corrosion seen in field failures if the grease was compromised.
- In November 2017, the FCA US VSRC conducted a 60-piece bake test of the bobbin housing, 30 with and 30 without grease, taking measurements before and after the test. The dimensions changed more rapidly with the grease but the parts without grease also changed or swelled. Both the grease and the plastic housing degrade when exposed to the high temperatures produced by the BTSI when energized beyond 5 minutes.
- During the week of November 20, 2017, the FCA US VSRC reviewed all other FCA US vehicle BTSI solenoid designs and discovered that the overheat issue is unique to the RAM Trucks equipped with a column shifter (2009-2018 DS, 2010-2018 DX, DJ, DP, D2, and DD and 2016-2018 DF) as the other BTSI designs are robust to the high temperatures produced by the solenoid.
- In December 2017, the ongoing multi-state survey resulted in 12 BTSI failures out of 377 vehicles surveyed.
- On December 18, 2017, FCA US determined, through the Vehicle Regulations Committee, to conduct a voluntary safety recall of the affected vehicles.