U.S. Department of Transportation

National Highway Traffic Safety Administration

ODI RESUME

OFFICE OF DEFECTS INVESTIGATION

NHTSA

Authentic US Government Information
National Highway Traffic Safety Administration
uses a *digital certificate* to ensure
the content has remained unchanged

Investigation:	EA 18-001		
Prompted by:	PE17002, Consumer Complaints		
Date Opened:	04/18/2018	**Date Closed:**	01/17/2023
Investigator:	Robert Caple	**Reviewer:**	Bruce York-B
Approver:	Stephen Ridella		
Subject:	Extended Braking Distances		

MANUFACTURER & PRODUCT INFORMATION

Manufacturer:	Nissan North America, Inc.
Products:	MY 2009 Nissan Murano
Population:	86,265
Problem Description:	The brake pedal may lose pressure and require increased travel and pedal force by the driver, potentially resulting in extended stopping distances.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	163	766	875**
Crashes/Fires:	2	15	0
Injury Incidents:	1	0	0
Number of Injuries:	4	0	0
Fatality Incidents:	0	0	0

** Total eliminates duplicates received by ODI and manufacturer.

ACTION / SUMMARY INFORMATION

Action: This investigation is closed, see NHTSA Safety Recall 18V-916 for further details.

Summary:

On April 18, 2018, the Office of Defects Investigation (ODI) opened Engineering Analysis (EA) 18-001 to investigate reports of braking concerns in model year (MY) 2009 Nissan Murano vehicles. A failure of the hydraulic control unit (HCU) portion of the antilock brake system (ABS), which involves improper operation of an internal hydraulic control valve(s), can cause extended brake pedal travel and may result in a reduction in overall braking effectiveness. Tier-one supplier Continental manufactured the HCU for Nissan.

The corrosion-preventive, zinc coating used on the armatures of the normally closed (NC) valves within ABS HCU may react with brake fluids lacking sufficient corrosion-preventative additives. This reaction can cause the formation of a gelatinous material, which may cause the NC valves to close slowly. Over time, the gel can solidify to an extent such that the spring used to return the valve to the closed position may not be able to overcome the gel buildup, allowing the NC valve to remain open. If any of the four NC valves remains open, fluid will be diverted to one or two accumulator(s). This misdirected fluid has the net effect of causing brake pedal travel to increase, however enough stroke remains in the pedal to generate braking force. Although the hydraulic braking system remains intact and full braking force is maintained once the pedal travels the additional distance, when this condition occurs, the initial increase in brake pedal travel could result in increased stopping distance. An existing Nissan Service Campaign was launched for MY 2009 vehicles built prior to 11/1/2007. After consultation with ODI as part of EA18-001, Nissan decided to expand this population to the full range of MY2009 Murano vehicles. Later Murano vehicles exhibit significantly lower rates of malfunction.

During this investigation 156 complaints were identified that related to the braking concern. Within the complainants 2 allege crashes with 4 injuries. The Nissan reports from investigation Information Request letter responses, were similar in content and identified 870 reports with 16 crashes and no injuries.

On December 19, 2018, Nissan notified ODI it would conduct a safety recall (18V916) to remedy the ABS modules on certain MY 2009 Nissan Murano vehicles. The remedy procedure involves dealers flushing the brake system with DOT 4 fluid. The HCU will then be tested to detect a possible stuck valve condition. If necessary, the HCU will be replaced. The 2010-14 Murano SUVs outside the recall population and equipped with zinc-coated armatures will be inspected under a service campaign P0A08 using the same procedure as recall 18V916.

Continental HCUs with a redesigned armature coating were phased into new vehicle production after December 2014 and do not appear to be experiencing corrosion. The recall action initiated by the manufacturer appears to address the safety risks of concern to ODI. Accordingly, the investigation is closed.

The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exists on other model or MY vehicles outside of the recall scope. The agency reserves the right to take further action if warranted by the circumstances.

For a complete summary of this investigation and related consumer complaints, please see attached closing resume document.

EA18-001 Closing Resume

2009 Nissan Murano Extended Braking Distance

EA18-001

On April 18, 2018, the Office of Defects Investigation (ODI) opened Engineering Analysis (EA) 18-001 to investigate reports of braking concerns in model year 2009 Nissan Murano vehicles. The reports allege failure of the hydraulic control unit (HCU) portion of the antilock brake system (ABS), which involves improper operation of an internal hydraulic control valve(s), can cause extended brake pedal travel and may result in a reduction in overall braking effectiveness. Tier-one supplier Continental manufactured the HCU for Nissan.

During the investigation it was found that the corrosion preventive zinc coating used on the armatures of the normally closed (NC) valves within ABS HCU may react with brake fluids lacking sufficient corrosion preventative additives. This reaction can cause the formation of a gelatinous material, which may cause the NC valves to close slowly. Over time, the gel can solidify to an extent such that the spring used to return the valve to the closed position may not be able to overcome the gel buildup, allowing the NC valve to remain open. If any of the four NC valves remains open, fluid will be diverted to one or two accumulator(s). This misdirected fluid has the net effect of causing brake pedal travel to increase, however enough stroke remains in the pedal to generate sufficient braking force to stop the vehicle. Although the hydraulic braking system remains intact and full braking force is maintained once the pedal travels the additional distance, when this condition occurs, the initial increase in brake pedal travel could result in increased stopping distance. An existing Nissan Service Campaign was launched for MY2009 vehicles built prior to 11/1/2007. After consultation with ODI as part of EA18-001, Nissan decided to expand this population to the full range of MY2009 Murano vehicles. Later Murano vehicles exhibit significantly lower rates of malfunction.

Also during the investigations 14 HCUs from 2009 model year complaint vehicles were recovered. The Vehicle Research and Test Center (VRTC) disassembled the HCUs, removed the four NC valves in each HCU, and confirmed all the valves had significant corrosion on the armatures and 24 of the 56 valves contained stuck armatures. Three of the 14 HCUs were found with both front wheel valve armatures stuck open, which would fill both accumulators and lead to the maximum brake pedal drop. Four of the 14 HCUs had three stuck open armatures. The stuck armature extraction forces from the NC Valve sleeve were measured to be 1.1 to 14.0 lb.

The VRTC also conducted ABS braking tests on a variety of test surfaces that indicated the HCU failures cause increases in pedal travel and braking distances. It was found that the driver could achieve high rates of deceleration with stuck valves, but since the valves stuck in the middle of an ABS event, the driver had to quickly transition from a normal 6-lb pedal force with 1.4-in travel for a 0.2-g decel to a 50-lb pedal force with a 5.2-in travel and 0.75-g decel. VRTC documented single and multiple wheels locking due to the ABS malfunction.

Investigations PE17-002 and EA18-001 identified 156 complaints that relate to this issue. Complainants allege 2 crashes with 4 injuries. The Nissan failure reports from PE17-002 and EA18-001 Information Request responses, were similar in content and identified 870 reports with 16 crashes and no injuries.

On December 19, 2018, Nissan notified ODI that it would conduct a safety recall (18V916) to remedy the ABS modules on certain MY 2009 Nissan Murano vehicles. For owners of vehicles previously subject to the Service Campaign that had not yet remedied their vehicles, Nissan issued a Part 577 letter to re-notify them. The remedy procedure is identical to the previous service campaign. Dealers

will flush the brake system with DOT 4 fluid. The HCU will then be tested to detect a possible stuck valve condition. If necessary, HCU will be replaced. The 2010-14 Murano SUVs equipped with zinc-coated armatures were found to have a substantially lower complaint rate than the 2009 vehicles and were not included in the recall. These vehicles will however be inspected under a new service campaign P0A08 using the same procedure as recall 18V916.

The Continental HCUs with a redesigned armature coating was phased into new vehicle production after December 2014 and do not appear to be experiencing corrosion. The recall action initiated by the manufacturer appears to address the safety risks of concern to ODI. Accordingly, the investigation is closed.

The ODI reports cited above can be reviewed at www-odi.nhtsa.dot.gov/owners/SearchNHTSAID under the identification (ODI) numbers found in the attached list.

10441563, 10567250, 10622526, 10732695, 10735802, 10785892, 10811908, 10824204, 10837139, 10850354, 10864775, 10873697, 10884073, 10893542, 10894785, 10907040, 10907346, 10909760, 10909850, 10913911, 10916005, 10918518, 10925681, 10926733, 10927763, 10928683, 10943704, 10943991, 10948997, 10950185, 10954587, 10956268, 10958510, 10958943, 10967958, 10968136, 10983808, 10984159, 10984164, 10984191, 10984197, 10984232, 10984755, 10984822, 10990724, 10993290, 10993779, 10994185, 10995126, 10995646, 10995884, 11002561, 11003607, 11005947, 11010474, 11011412, 11014081, 11014605, 11014933, 11018640, 11018786, 11019395, 11020726, 11021176, 11022806, 11024172, 11025053, 11025404, 11030682, 11032181, 11032601, 11032911, 11041621, 11044139, 11044658, 11046236, 11050945, 11051399, 11051626, 11052030, 11052222, 11052872, 11053377, 11053818, 11054094, 11054298, 11055250, 11055539, 11055633, 11055715, 11055823, 11056002, 11056029, 11056094, 11056233, 11056342, 11056349, 11056587, 11056651, 11056648, 11057210, 11057455, 11057720, 11058371, 11058609, 11061033, 11061580, 11061637, 11062216, 11062370, 11062726, 11062787, 11063007, 11063209, 11063954, 11064185, 11064606, 11065460, 11067398, 11071558, 11071749, 11072093, 11072367, 11072371, 11073378, 11073958, 11075349, 11075833, 11082097, 11082131, 11082590, 11084891, 11088670, 11089696, 11089952, 11090212, 11091271, 11097112, 11097222, 11097802, 11100628, 11102385, 11102699, 11103527, 11110610, 11113447, 11115230, 11120363, 11122738, 11129508, 11130395, 11139996, 11141789, 11143509, 11151700, 11152628, 11301479, 11308577, 11339921, 11445560, 11458109, 11472597, 11484339