



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

ODI RESUME

Investigation: EA 15-004
Prompted by: RQ15-001
Date Opened: 08/31/2015
Investigator: Michael Lee
Approver: Stephen Ridella
Subject: Occupant Classification System Failure

Date Closed: 05/02/2017
Reviewer: Scott Yon

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: Nissan North America, Inc.
Products: 2013-2014 Various Nissan and Infiniti Models
Population: 986,826

Problem Description: The Occupant Classification System may misclassify adult front passengers of sufficient weight and suppress (turn off) the passenger's frontal air bag.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	279	2,669	2,948
Crashes/Fires:	1	5	5**
Injury Incidents:	1	3	3**
Number of Injuries:	1	3	3**
Fatality Incidents:	0	0	0
Other*:	0	7,494	7,494

*Description of Other: Warranty Claims

** Total eliminates duplicates received by ODI and manufacturer.

ACTION / SUMMARY INFORMATION

Action: Close this Engineering Analysis; NHTSA recall 16V-244, 16V-242 and 15V-681.

Summary:

In May 2016, Nissan North America issued a safety recall (16V-244) to address the problem of improper classification of adult front seat passengers in approximately 3.3 million vehicles, including those in the scope of this investigation when it was opened (almost one million vehicles) and additional vehicles, as shown below.

Nissan models: certain model year 2013-2016 Altima, 2013-2016 LEAF, 2016-2017 Maxima, 2015-016 Murano and Murano Hybrid, 2013-2016 Pathfinder, 2014-2015 Pathfinder Hybrid, 2014-2017 Rogue, 2013-2016 Sentra, 2013-2016 NV200, and 2014-2016 Taxi. Infiniti models: certain model year 2013 JX35, 2014-2017 Q50, 2014-2016 Q50 Hybrid, and 2014-2016 QX60 and QX60 Hybrid. Chevrolet model: certain model year 2015-2016 City Express.

Additional information on the above-referenced recalls is available online at NHTSA.gov. Also, the numbers shown in the above failure report summary are for the original vehicle population, as opposed to the entire recall population, and the ODI reports cited are as of May 31, 2016 when Nissan began to notify the affected owners of recall 16V-244.

Based on the recall actions taken by Nissan, this Engineering Analysis is closed. Additional information on this closing resume and the investigation are in the EA15-004 public file available online at NHTSA.gov.

The ODI reports cited above can be reviewed online at <https://www.nhtsa.gov/recalls#vehicle> under the following identification numbers: 10583283 10585264 10585349 10585379 10592434 10593399 10593501 10594329 10594614 10594755 10595161 10595645 10595946 10596128 10596459 10596952 10597037 10597452 10597518

10597719 10598537 10598869 10604755 10604834 10605188 10605251 10606565 10606828 10607038 10609649
10610519 10610991 10614467 10614609 10614745 10616905 10617008 10617507 10617903 10618099 10618202
10619059 10619563 10620719 10621840 10622214 10625808 10625981 10625998 10626006 10626023 10626335
10626458 10626732 10628355 10629382 10629460 10629606 10630441 10630502 10630990 10632251 10632588
10632934 10632997 10633714 10633810 10637994 10638591 10639040 10639147 10639324 10639473 10643046
10643843 10644203 10644333 10644341 10644690 10644891 10644985 10648834 10648997 10649414 10649772
10649874 10651360 10651564 10651924 10651982 10652024 10658665 10658844 10659484 10660294 10661195
10661358 10661541 10661795 10661855 10662901 10663033 10663338 10663860 10663978 10668054 10668768
10670538 10672807 10673088 10676471 10678478 10678997 10679512 10680748 10680769 10680975 10681656
10682235 10682902 10682993 10683391 10683689 10689672 10689809 10689981 10691626 10692137 10692558
10692625 10693168 10695312 10700614 10700960 10701008 10701011 10701014 10701018 10701023 10701027
10701031 10701032 10701035 10701045 10701055 10701064 10701074 10701146 10701196 10701228 10701237
10701254 10701301 10701306 10701326 10701367 10701370 10701384 10701415 10701453 10701526 10701558
10701656 10701670 10701946 10702003 10702667 10702798 10703032 10703657 10703766 10703813 10704196
10704988 10705530 10705919 10706621 10712543 10712568 10712575 10713335 10714316 10714330 10714536
10714980 10715132 10715945 10717336 10720918 10720971 10721331 10721746 10723424 10724568 10731167
10731868 10732012 10732065 10733877 10735438 10745948 10745982 10746399 10747660 10748077 10749091
10749110 10758979 10761398 10761433 10763320 10764590 10766486 10775946 10777923 10779712 10781422
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10788371 10788962 10789694 10790181 10790230 10790362 10794790 10806647 10806933 10807302 10807841
10810487 10810558 10811858 10811864 10816502 10816686 10818702 10820204 10821247 10821751 10822810
10824677 10825043 10825811 10836252 10838655 10838765 10838771 10840102 10845613 10845668 10850032
10850344 10852446 10853111 10854761 10860012 10860935 10861899 10862242 10862594 10863211 10863237
10863326 10863515 10863657 10864211 10865548 10869929 10870284

EA15-004 Additional Information

The Occupant Classification System (OCS) in various Nissan and Infiniti vehicles covered by this investigation primarily consists of two load sensors located on the inboard front passenger seat track, the OCS Electronic Control Unit (ECU) located under the front passenger seat, and the Passenger Air Bag Indicator (PABI) light located in center area of the instrument panel. Based on the load applied to the front passenger seat as measured by the two sensors, the ECU determines whether the front passenger air bag should be suppressed or kept active and determines the PABI light status – light ON indicates air bag is suppressed and light OFF indicates it is active. Nissan designed the system to turn on the PABI light when the passenger or object (e.g., child seat) in the seat is classified as a child and to turn off the light when the passenger seat is classified as empty, as well as when an adult of sufficient weight is in the seat.

In April 2014, Nissan issued a safety recall (14V-138) of almost one million model year (MY) 2013-2014 Nissan and Infiniti vehicles built before February 2014 (except for NV200/Taxi and Q50 the cutoff dates were December 2013 and January 2014, respectively), herein referred to as the subject vehicles and as follows: MY 2013-2014 Nissan Altima, LEAF, Pathfinder and Sentra; MY 2013 Nissan NV 200/Taxi and Infiniti JX35; and MY 2014 Infiniti Q50 and QX60. This recall was intended to address the OCS algorithm that can misclassify an adult passenger in the front seat as an empty seat, which will suppress the passenger air bag and will not turn on the PABI light (incorrectly indicating air bag is active). The remedy was to reprogram the OCS algorithm to improve the sensitivity to high vehicle vibration at idle in order to reduce the potential for this problem occurring.

In March 2015, based on consumer complaints of ineffective remedy of recall 14V-138, ODI opened a Recall Query (RQ15-001). Numerous complaints to both NHTSA and Nissan generally alleged that after the recall remedy was performed, the PABI light comes on intermittently with an adult of sufficient weight sitting in the passenger seat. Majority of the complaints allege the dealers were unable to duplicate and/or correct the problem. Also, ODI is aware of several reported incidents of non-deployment of the front passenger air bags in subject vehicles involved in crashes where an adult occupant was in the front passenger seat. According to the Event Data Recorder data obtained from most of these vehicles, the passenger occupant classification was either a child or empty seat.

In August 2015, ODI upgraded the Recall Query to an Engineering Analysis (EA15-004) for further investigation. During EA15-004, Nissan and its OCS supplier (Calsonic Kansei), as well as NHTSA's Vehicle Research and Test Center, conducted testing and evaluation of the recall-remedied OCS system. The results indicated that the updated OCS system in the subject vehicles, as well as in other Nissan models and model years equipped with similar OCS systems, can misclassify an adult as a child or empty seat, especially for small adults (weighing about 105 to 135 pounds) under certain vehicle ingress scenarios. As a result, in May 2016, Nissan issued another safety recall (16V-244) of approximately 3.3 million vehicles as follows: Nissan models: MY 2013-2016 Altima, 2013-2016 LEAF, 2016-2017 Maxima, 2015-2016 Murano and Murano Hybrid, 2013-2016 Pathfinder, 2014-2015 Pathfinder Hybrid, 2014-2017 Rogue, 2013-2016

Sentra, 2013-2016 NV200, and 2014-2016 Taxi. Infiniti models: MY 2013 JX35, 2014-2017 Q50, 2014-2016 Q50 Hybrid, and 2014-2016 QX60 and QX60 Hybrid. Chevrolet model: MY 2015-2016 City Express. It should be noted that some model year 2016 and 2017 vehicles built after March or April 2016 (depending on model) are not included in the recall because OCS related production changes were made during this time period.

Nissan's remedy program for recall 16V-244 includes a change in the PABI light logic for all of the recall population via reprogramming the air bag control module or replacing the OCS ECU. Unlike the original logic, this remedy will turn on the PABI light for the empty classification (as well as the child classification), thus providing an indication whenever the passenger air bag is suppressed. In addition to the PABI light logic change, due to a system design difference among the recalled vehicles, two different recall remedies associated with OCS algorithm improvements are being used. For the following vehicles, the OCS algorithm will be reprogrammed to increase the frequency of occupant classifications made by the ECU: Altima, Maxima, Murano, Rogue and Sentra. For the following vehicles, the ECU will be replaced with one that contains updated algorithms: LEAF, Pathfinder, NV200/Taxi, JX35, Q50 and QX60. The updated algorithms include the increased classification frequency mentioned above as well as additional improvements. In addition to the recall remedy program, Nissan has issued an extended warranty program (15 years and unlimited mileage), which Nissan is referring to as a "Customer Service Initiative," for the entire recall population to address OCS issues that may not be resolved by the recall program. ODI will monitor any post-recall issues and take further action if necessary.

Finally, Nissan has issued two other recalls during this investigation. Recall 15V-681 addresses use of incorrect OCS ECU service parts on a small number of subject vehicles (919 vehicles). Recall 16V-242 addresses a seat belt buckle bracket for the front passenger seat which can deform and allow the OCS to misclassify a child seat and fail to suppress the passenger air bag. This recall involves only the Nissan Sentra vehicles (622,110 vehicles) that are also covered by the above OCS recall, 16V-244.