



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Memorandum

Subject: ACTION: PE12-028 Memo to Public File

Date: March 19, 2013

From: Stephen McHenry, Investigator
Office of Defects Investigation

In Reply Refer To: NVS-213

To: Ms. Rosa Howell,
Correspondence Research Division
Office of Defects Investigation

This memorandum describes certain data acquired by the Office of Defects Investigation in support of PE12-028 as described below and requests that it be added to the publicly accessible electronic data repository in Artemis. While every effort is made to disclose data related to the subject investigation, certain data contained in investigation files may be confidential, privileged, or otherwise contain data protected from public disclosure pursuant to “The Privacy Act of 1974” 5 U.S.C. § 552a, “The Freedom of Information Act” 5 U.S.C. § 552, and/or 49 C.F.R. Part 512.

On November 14, 2012, ODI held a meeting with representatives of Honda at the Vehicle Research and Testing Center (VRTC) in East Liberty, Ohio to discuss PE12-028. A redacted copy of the presentation by Honda is attached. Confidentiality for the redacted portions was requested by Honda.

Attendees:

Stephen McHenry, ODI
Jeffrey Quandt, ODI
Kareem Habib, ODI
Michael Packard, VRTC
Duane Stoltzfus, VRTC
Jay Joseph, Honda
Kazutoshi Nishizawa, Honda
Shinichi Yone, Honda
Nashiko Furukawa, Honda
Bill Kelley, Honda
Keith Lewis, Honda
Bradley Buchanan, Honda
David Thompson, Honda

NHTSA ODI Meeting: 05M PILOT VSA

VSA System Layout

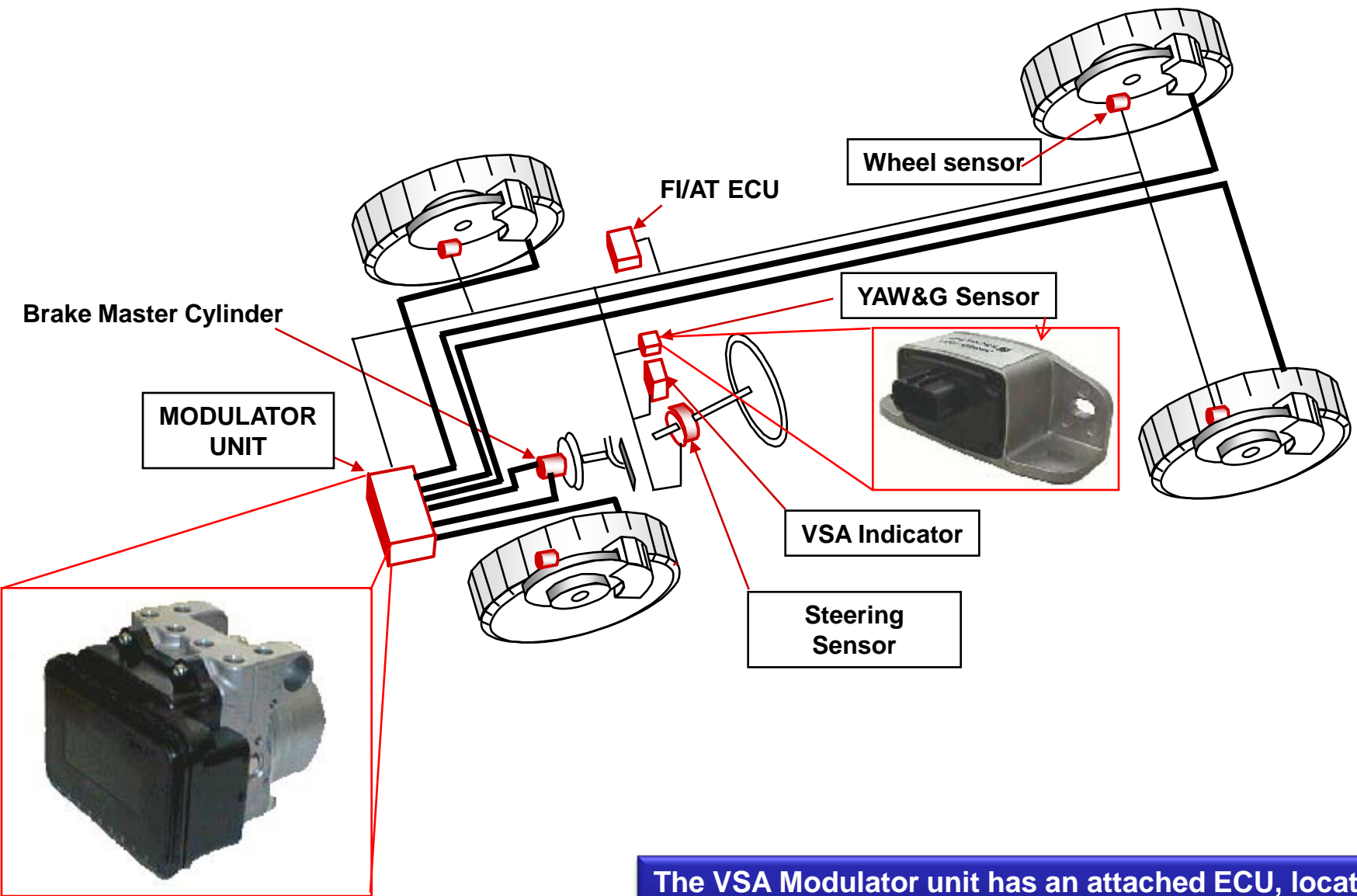
Summary of WTY/ACS/TL

Brake Assist functional issue

1. Investigation result for VOQ Unit
2. Suspect Parts investigation summary
3. Suspect cause
4. Suspect occurrence mechanism
5. Further activities
6. Vehicle confirmation result (Re-creation test)

YAW rate sensor issue

1. Suspect cause and occurrence mechanism
2. Vehicle confirmation result (Re-creation test)



The VSA Modulator unit has an attached ECU, located in the front left corner of the engine bay.

	UNITS	Symptom	VOQ	TechLine		CRMS	
05 PILOT	87,083	Brake Assist	9 Maybe	101	6	Vehicle Stop	24
			8 Yes			Vehicle Slow	2
		YAW	4 Maybe	22		Brakes applied, no detail	41
			10 Yes			Steering	4
		Just Noise	5 Maybe	62		VSA light is on	24
			1 Yes			Replace VSA	1
Unclear	14 Yes	TOTAL	96				
TOTAL	51	191					

Warranty

Replace Parts		DTC code	
Modulator	249	66/68	20
	18		1
Yaw Sensor	225	25/26	38
	373		Unclear
Total	829	Total	829

1. The Brake Assist (BA) condition seems to have generated more complaints and claims than YAW sensor related concerns.
2. It is difficult to interpret customer (CRMS or VOQ) contentions accurately or confidently, due to vague and ambiguous references to braking, jerking, etc. (no specific mention of amplitude)

Brake Assist Function

1. Investigation for VOQ unit

VOQ# 10464695

VIN number : 2HKYF18685H508646

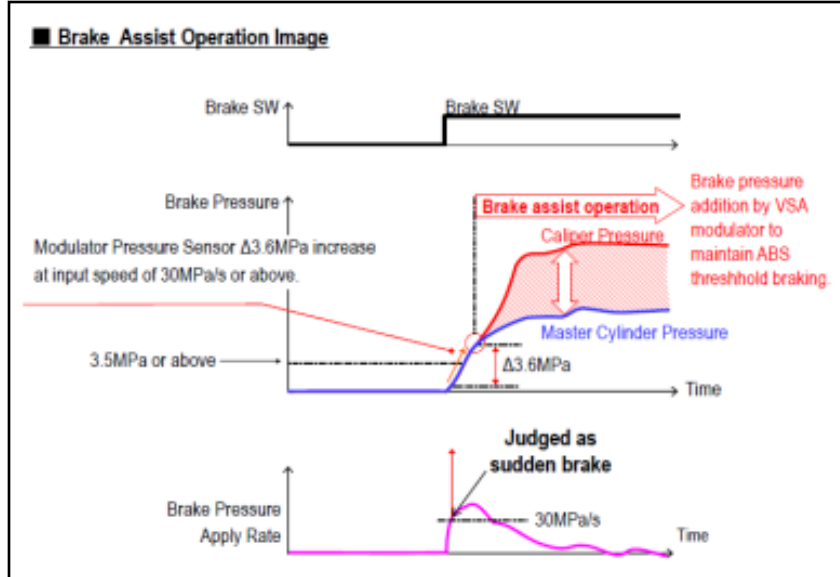
Customer contention

“ABOUT 300 YARDS DOWN THE ROAD AT APPROXIMATELY 25 MILES PER HOUR THE CAR BRAKED ON ITS OWN TWICE AND STOPPED THE CAR. IT HAPPENED ONCE WHILE I WAS BRAKING AND TWO TIMES WHILE I WAS AT A COAST.”

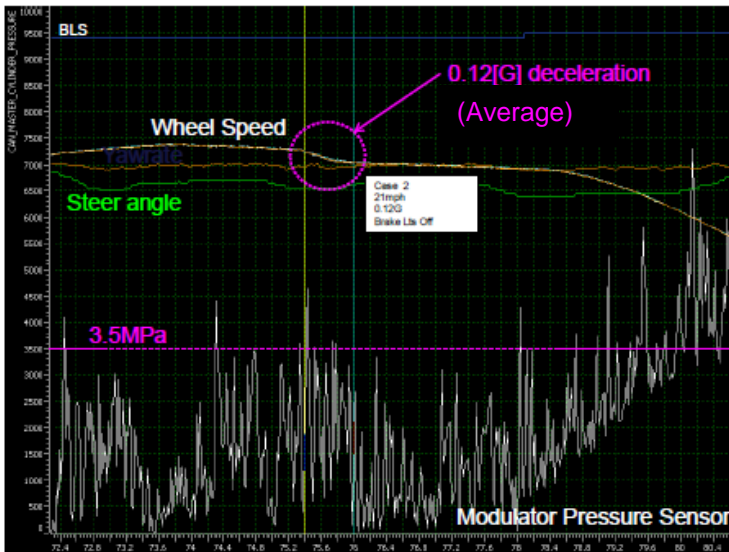
Vehicle Confirmation Result

- Customer contention of “Car braked on its own” is confirmed.
- Modulator pressure sensor has a high level of noise.
- Occurrence Rate and Severity
 - Sensor noise can occur at any time & speed, causing low G braking
 - This can occur with or without brake pedal application
 - High decelerations only occurs with braking and stops when the brake pedal is released (200 ms delay)

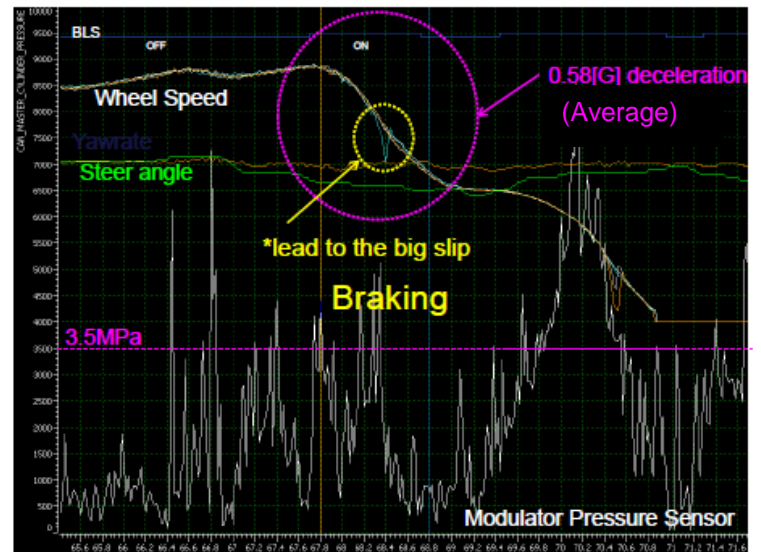
Brake Assist – Operational Description



【Without Brake Applied by Driver】



【With Brake Applied by Driver】

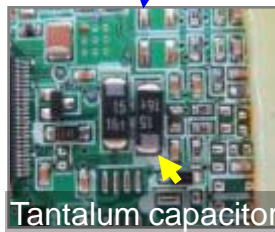
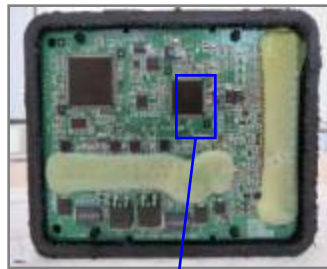


2. Parts analysis results

【Confirmation results of ECU PCB】



《 Internal condition 》



Tantalum capacitor

【ESR Tantalum capacitor (Standard : Below 1.2Ω)】

- We measured ESR of Tantalum capacitor on PSVCC. The results was 65.8Ω, exceeding upper limit of standard.



Abnormality was confirmed on ESR of Tantalum capacitor on PSVCC.

※ We confirmed ESR before / after removal of Tantalum capacitor (C53) from ECU

Before removal : 65.8Ω

After removal from PCB : 86.3Ω

【 Confirmation of electric characteristics 】

Our confirmation found that ESR exceeded standard (should be less than 1.2Ω).

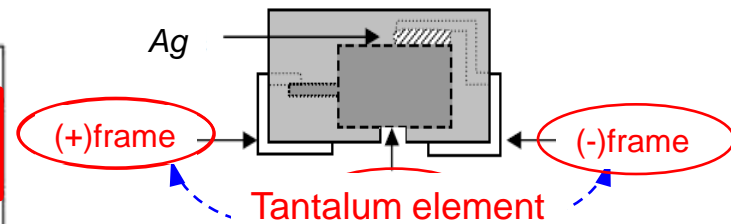
It was found that ESR rose between capacitor element (-) and capacitor frame.

From this, we determined that an abnormality is found between the capacitor element and negative pole frame.

< Investigation into ESR between frames >

No.	ESR (Ω) at 100kHz		
	Between positive / negative pole lead frame	Between positive pole lead frame and capacitor element	Between internal element and negative pole lead frame
114121	82.5	0.41	82.3

Abnormal resistance value inside tantalum capacitor are assumed to have caused the problem. We are continuing to study this phenomenon.

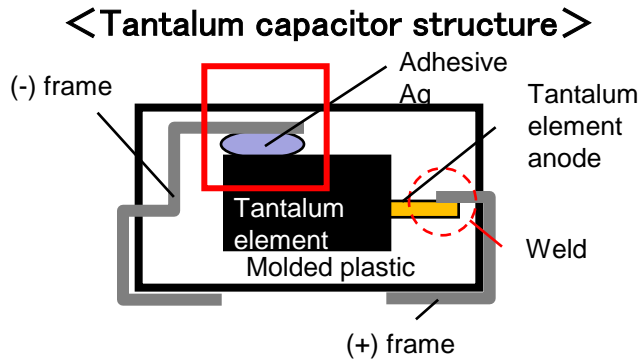


Measured internal resistance on (+) frame.

Measured internal resistance on (-) frame

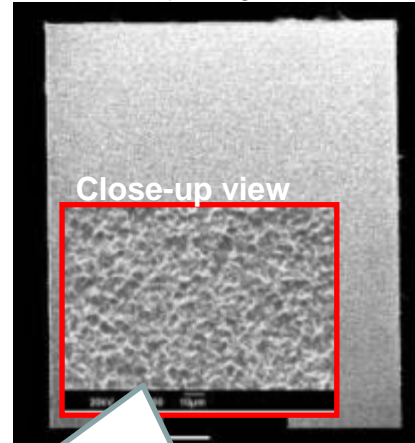
2. Parts analysis results

【 Analysis of peeled surface of negative pole lead frame 】



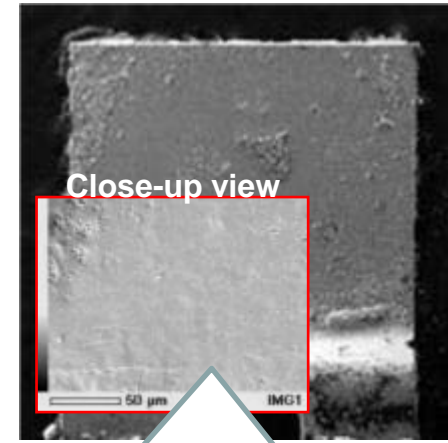
Melted Sn plating was found on peeled surface of negative pole frame.

< New Sn plating frame >



Grained plating can be confirmed

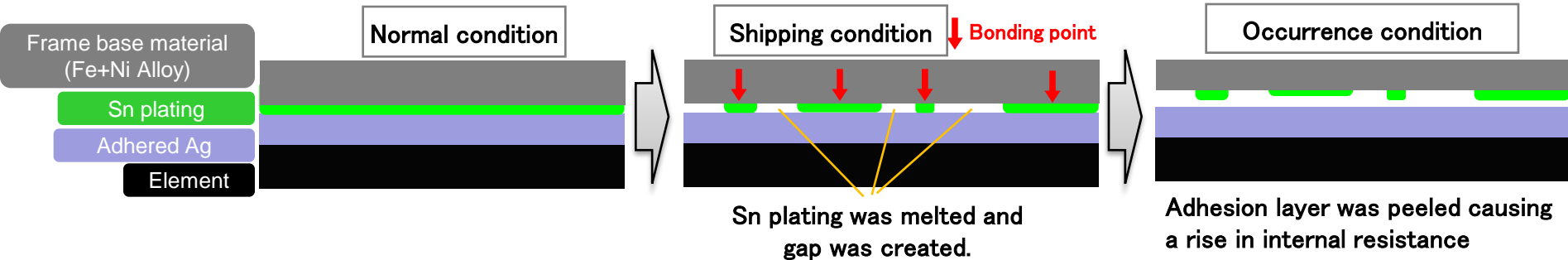
< Failed frame >



Grained plating can not be confirmed, and Sn plating is melted.

【 Tantalum capacitor analysis results summary 】

◇ Mechanism of increased internal resistance



Most of Sn plating on the adhesion surface of the negative pole frame was melted. This seems to have created a gap on the boundary surface. As a result, the adhesion area greatly reduced.

Therefore, adhesion between negative pole frame and capacitor element became unstable, rising ESR.

1) Claimed symptom

Claimed symptom
During driving, brakes come ON all by themselves

2) Occurrence figures

ODYSSEY...occurrence of 15 cases, occurrence rate: 0.023%
(According to the number of hinjoren) Pilot...occurrence of 1 case

3) Occurrence cause

As a result of false output from the pressure sensor due to poor adherence inside the tantalum capacitor on the VSA ECU circuit board, the Brake Assist Function activates, and the brakes come ON all by themselves during driving.

4) Countermeasure content

Change capacitor supplier, effective 06.08 -
Prevent Brake Assist activation due to false outputs by S/W change to require brake switch ON before BA: Applied to 06M

5) Action proposal

ODYSSEY: Recommend aggressive market action
Legend, Elyson, Step WGN: recommend market monitoring

6) Reason for recommendation

ODYSSEY: There is no safety concern, however, the level of trouble caused to customers at the time of occurrence is high; further, since we predict more occurrences in the future, we recommend action. For the Legend, Elyson, and Step WGN, we have no claims from the market; we do, however, think the possibility of occurrence exists.

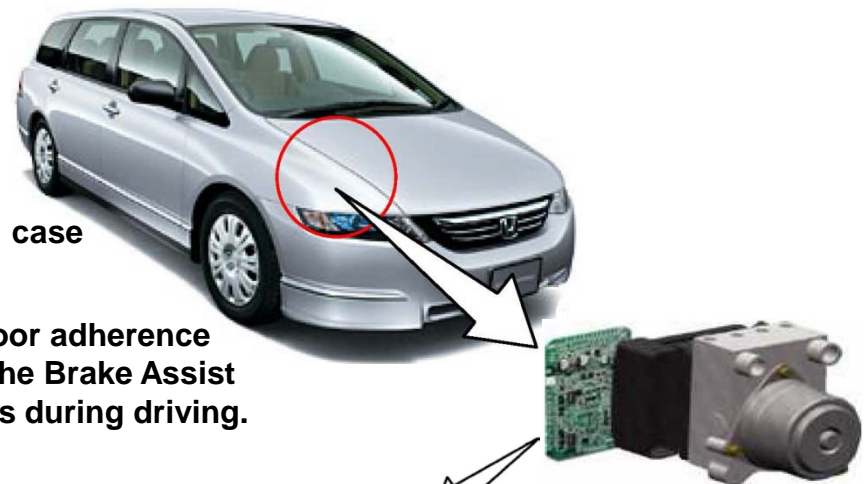
7) Content of measures

Addition of sub-capacitor to the body harness

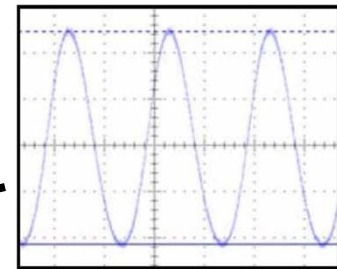
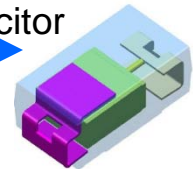
8) Affected range

Affected region: Japan Production Factory: C55
04M 05M VSA-spec Odyssey

9) No. of affected vehicles: 27,841 units

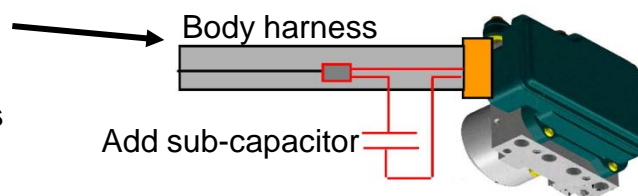
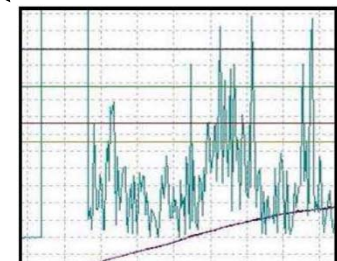


Tantalum capacitor



Internal pressure sensor

Abnormality



(Plan to make recommendation limited to the period of concentrated production, with JQC on MAR 28th)



American Honda Motor Co., Inc.
 1919 Torrance Boulevard
 Torrance, CA 90501-2746
 Phone (310) 783-2000

July 12, 2007

Mr. Daniel Smith,
 Associate Administrator for Enforcement
 NATIONAL HIGHWAY TRAFFIC SAFETY
 ADMINISTRATION
 Early Warning Division (NVS-217)
 1200 New Jersey Ave., S.E.
 Washington, DC 20590

Re: Foreign Recall Report

Dear Mr. Smith:

On July 5, 2007, Honda Motor Co., Ltd. (HMC) decided to conduct a safety recall of certain 2004 MY Odyssey vehicles in Japan. The following information is submitted pursuant to the requirements of 49 CFR 579.12.

573.6(c)(1)

Name of Manufacturer: Honda Motor Co.,Ltd.

Manufacturer's Agent: William R. Willen
 American Honda Motor Co., Inc. (AHM)
 1919 Torrance Blvd.
 Torrance, CA 90501-2746

573.6(c)(2)

Identification of Potentially Affected Vehicles:

<u>Make/Model</u>	<u>Description</u>	<u>Dates of Manufacture</u>
Honda Odyssey	Certain 2004 model year vehicles	Oct. 6, 2003 – Aug. 20, 2004

Description of the Basis for the Determination of the Recall Population:

The recall population was based on manufacturing records. The affected range listed above reflects vehicles that could have been affected.

573.6(c)(3)

Total Number of Vehicles Potentially Affected: 27,841

Mr. Daniel Smith
 Honda Foreign Recall Notification
 July 12, 2007
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573.6(c)(5)

Defect Description:

A capacitor on the VSA modulator ECU board was damaged due to an inappropriate manufacturing process. As a result the ECU may generate an erroneous signal and the brake assist may be activated momentarily (0.2 sec), but the brake light does not come on.

Japan regulation requires brake light activation during any instance of braking.

579.12(a)

Campaign Being Conducted in: Japan

Safety Recall or Other Safety Campaign: Non-compliance recall

Determination Made by: Honda Motor Co., Inc.

Date of Determination: July 5, 2007

Date Recall will Commence: July 6, 2007

Manufacturer's Program for Remediying the Noncompliance:
 Dealers in Japan will replace the VSA modulator board on all vehicles.

U.S. Motor Vehicles Identical or Similar to Vehicles Covered by this Foreign Recall:
 2004 Honda Pilot, Acura MDX, RL and TL

Reason U.S. Vehicles Not Affected

The U.S. version of the 2004 Pilot, MDX, RL and TL do not have brake assist.

The U.S. version of the 2004 Odyssey does not have VSA, therefore the brake assist function is not available.

Sincerely,

AMERICAN HONDA MOTOR CO., INC.

William R. Willen
 Managing Counsel
 Product Regulatory Office

WRW:nis

【 Production Process investigation for ECU PCB】

Entire Page Confidential Business Information

4. Occurrence mechanism

① If reflow furnace temperature setting exceeded target level during ECU manufacturing it could cause the capacitor frame Sn plating to melt

② Adhesion layer of Ag (silver solder) is reduced and bonding between cathode frame and element separates, resulting in high internal resistance.

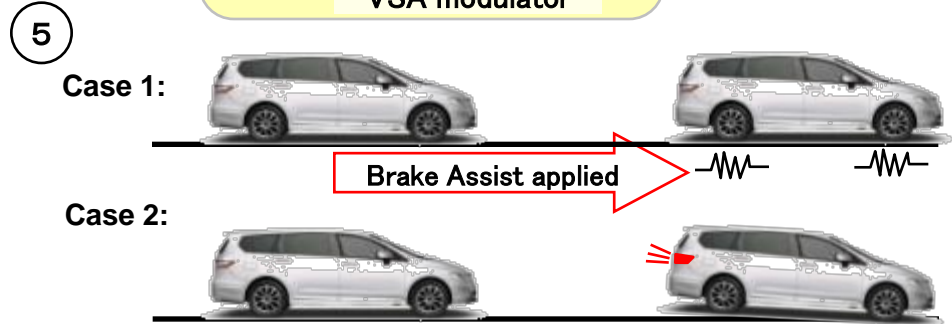
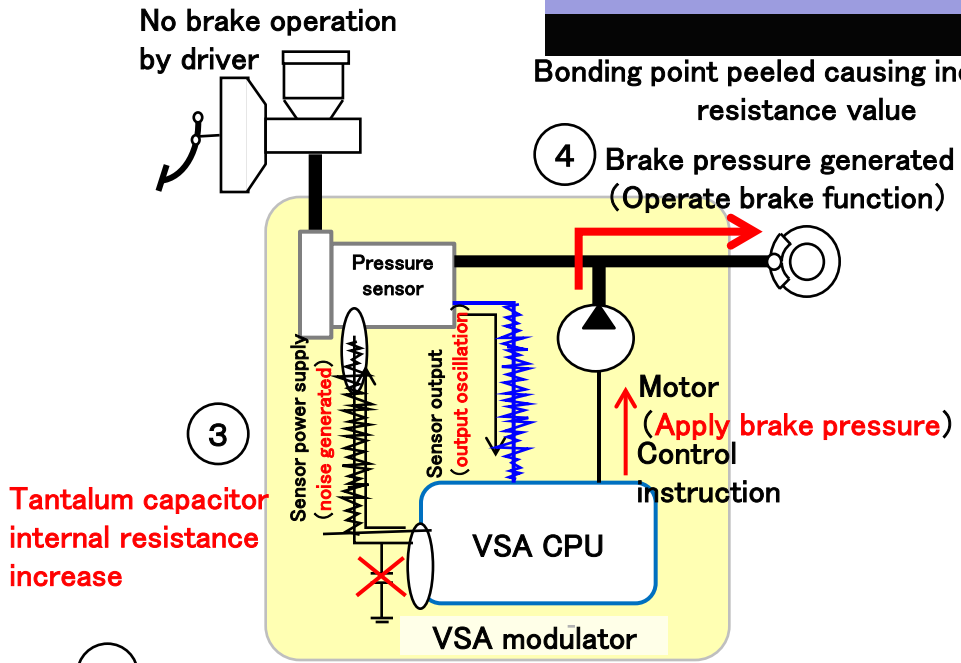
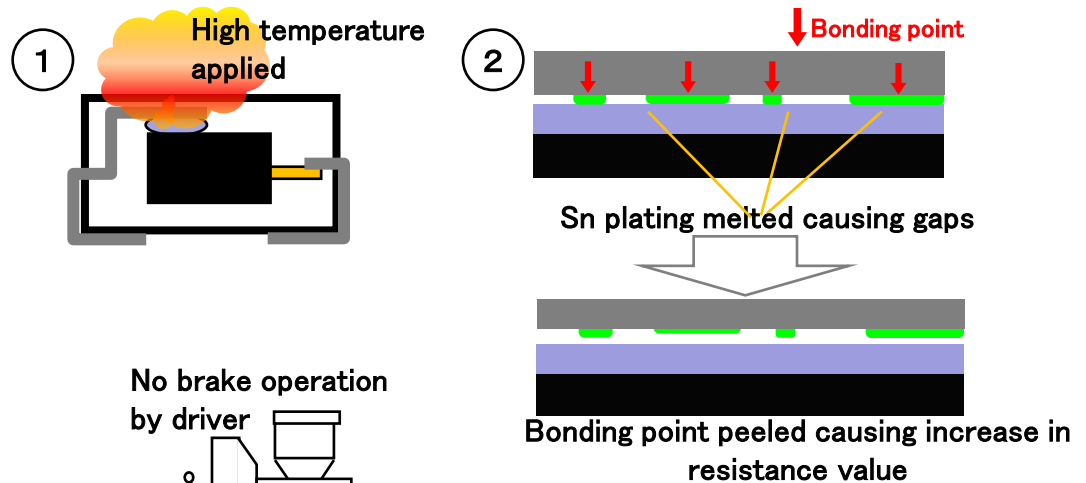
③ Power supply of pressure sensor cannot remove noise and oscillation.

④ ECU judges increase of pressure sensor output and activates brake assist function for 200 msec.

⑤ Light brake application occurs, if brake pedal is applied BA is engaged.

Case 1: Without brake pedal applied:
BA activation is for 200ms. After that, it will be cease until the next noise level peak.

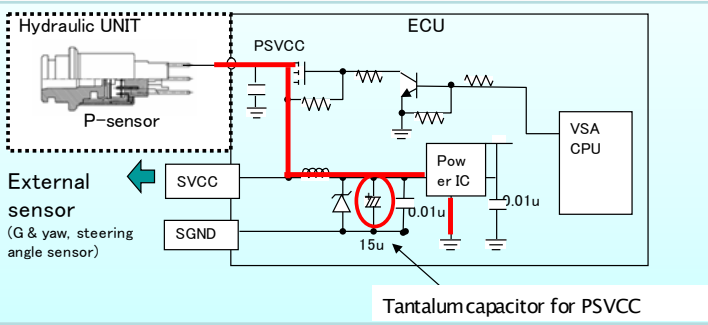
Case2: Brake pedal applied :
BA activation. (ABS activation). After brake pedal is released, BA activation does not continue.



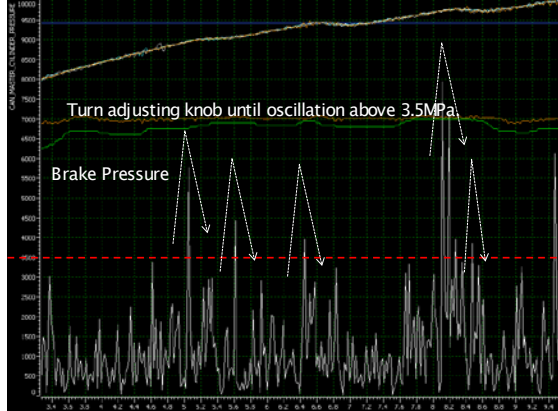
【 Production date for VOQ# 10464695 】

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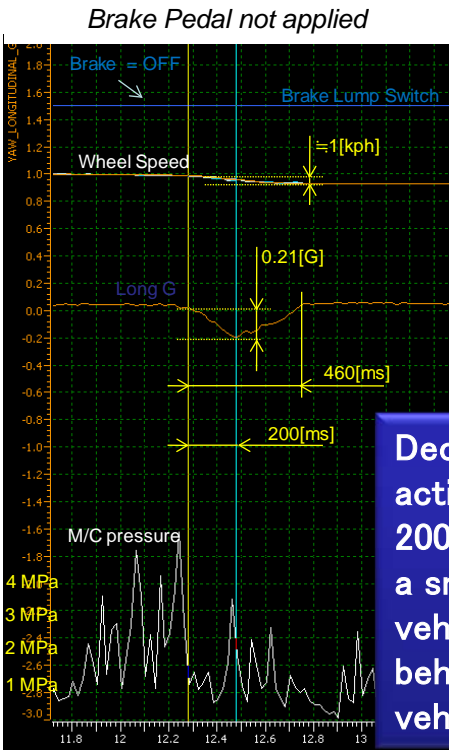
【 Re-Creation Method 】



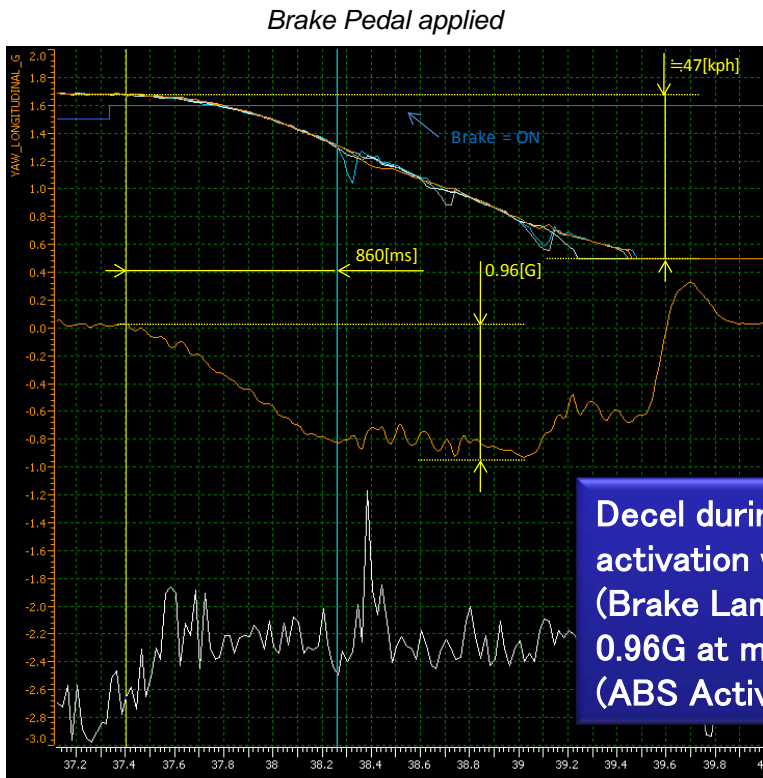
ESR adjusting knob for tantalum capacitor (PSVCC)



【 Re-Creation Confirmation Result 】



Decel during BA activation is 200ms, 0.21G. It has a small impact to vehicle behavior, depending on vehicle speed.



Decel during BA activation with braking (Brake Lamps ON) is 0.96G at max., 0.6 G ave. (ABS Activated)

VSA Function

-YAW Rate issues-

1. EEPROM Data Write Error
2. G302 Ground Fault

Problem Symptom

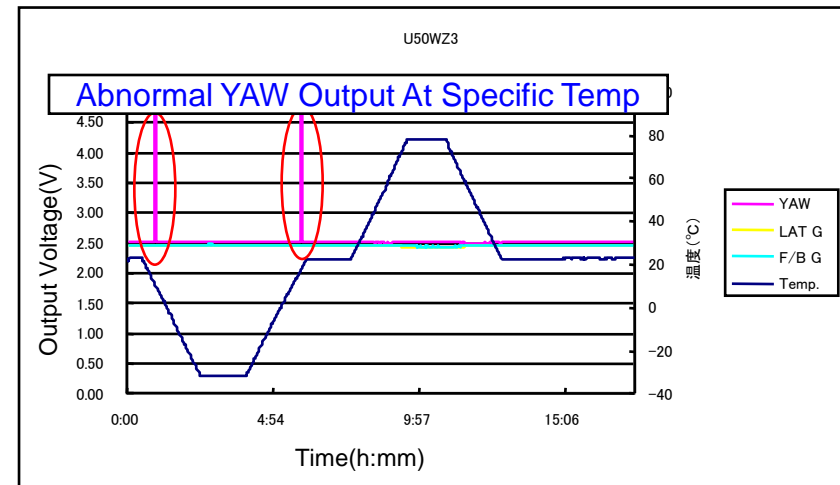
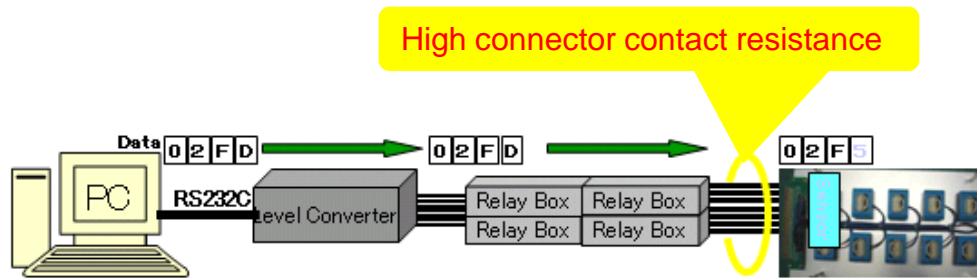
VSA Light On (DTC 25-1) and/or Inappropriate VSA Activation Occurs with Steering Pull

Cause

- Yaw Sensor EEPROM internal temp compensation data written with error.
- Sensor behavior: When NG temp is reached the YAW output sticks at 5V

▪ When interruption (incl. high resistance) occurs during data writing to the EEPROM, communication V level fluctuates, resulting in writing of abnormal value.

【 EEPROM Production Process 】



Countermeasure

- **YAW Sensor C/M** : Added EEPROM data inspection process after temperature compensation (Jan 18, 2005@ supplier, HM Factory Apr 2005)
- **VSA Modulator Failsafe Software C/M** : Control specification added to prevent activation from YAW output If input is over 4.7V or under 0.3V for 60msec continuous, VSA operation is stopped. (06M Software C/M)



Entire Page Confidential Business Information

2. Summary of YAW Sensor: G302

Problem Symptom

VSA Light On (DTC 25-1) and/or Inappropriate VSA Activation Occurs with Steering Pull

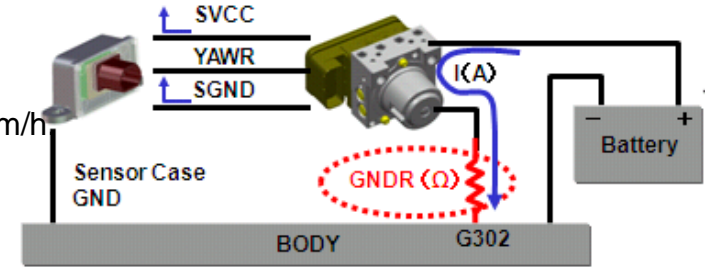
- After initial startup (IG-ON), VSA will activate during diagnostic check at 15 Km/h VSA MIL illuminates, L/Fr brake (Loose G302).

Cause

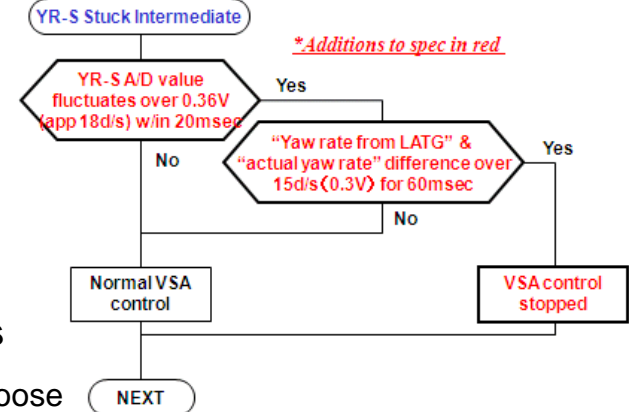
- When G302 GND resistance is high (due to a loose G302), VSA modulator activates (initial check, control etc) and current flows, sending up SGND electric potential.

Countermeasure

- HM – Addition of 2nd torque check & marker check for G302 (HMA: March 7, 2005, HCM: Feb 5,2004)
- VSA Modulator Failsafe Software C/M : Control specification added to prevent activation if YAWR-S change is over 18deg/s in 20msec, if there is output over 15deg/s for 60msec continuous, VSA operation is stopped. (06M Software C/M)

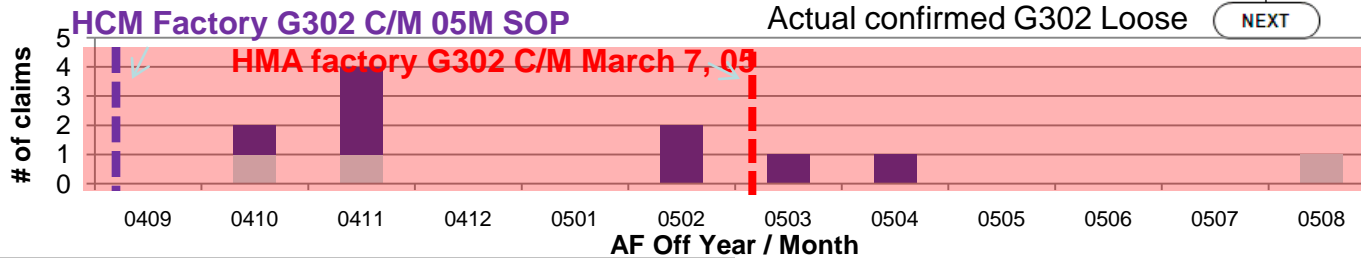


C/M Spec: Logic for confirming yaw sensor output value within normal voltage range (under 4.7V, Over 0.3V)



Affected Range

05M Pilot - G302 Dealer Contentions



Honda Judgment (June 21, 2005)

YAW output error is triggered by system activation, meaning it occurs upon the activation of initial diagnosis (15km/h), which always follows IG ON. Behavior is the same as EEPROM defect. Warning is possible and the defect occurs at low speed; therefore it is not considered dangerous in nature.

END