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08/14/2007 09:29 AM

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cc

bcc

Subject Field Event Report for GMX001 - review

History:  This message has been forwarded.

We are meeting to go over this report (GMX001 field event) . This Thursday 08/16/07 at 11:30 here in VPC building.

I have conference room # 223-03 reserved for us .

Here is a copy of Siemens' report that was provided based on the SDM readout.



MY2CC5\_GMX001\_report.doc

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## SIEMENS VDO AUTOMOTIVE CORPORATION FIELD EVENT ANALYSIS REPORT

### I. Overview

**A. General Description** – General Motors Corporation has provided the following information to Siemens VDO Automotive Corporation:

Model Year	2005
Vehicle Type	GMX001 Chevrolet Cobalt
Description of Event	Side swipe impact (1) to right front quarter panel, followed by Frontal collision (2) with tree, followed by impact with another vehicle (3).
Legal action pending (Y or N)	No
Location of event	Iberia, LA
Date of event	November 17, 2005
Impacted object	Car and tree
VIN	1G1AL52F857579918
Mileage	Not provided

GM also provided the police report for this event and some photos.

### B. Module Description

#	Module Type	GM Part Number	MLFB Number	Serial Number	Algorithm Level	Calibration
1	GMX001 – 6 loop	15249432	5WY74090	001102125717	SFA – GM MY05	PFT3210A.par

## II. Analysis

### A. Multiple Event and Vehicle Data

The multiple event data provides additional information about the overall event:

#### **Event Information from Non Deployment Buffer**

S/N: 001102125717

Information	Status
Was Data Locked??	No
Was the Event a Deployment Event?	No
Was the Vehicle Information Associated with this Event?	No
Was the Event a Non-Deployment Event?	Yes
Did this Event have the Largest Delta V?	Yes
Was this a frontal event?	Yes
Was this a side event?	No
Was this a rollover event	No

**MY2005 GMX001**

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## A. Multiple Event and Vehicle Data (cont'd)

### Event Information from Deployment Buffer

Information	Status
Was Data Locked??	No
Was the Event a Deployment Event?	No
Was the Vehicle Information Associated with this Event?	No
Was the Event a Non-Deployment Event?	No
Did this Event have the Largest Delta V?	No
Was this a frontal event?	No
Was this a side event?	No
Was this a rollover event	No

### Multiple Event Status

Information	Status
Was there an event that preceded the recorded events?	Yes
Was there an event that was in between the recorded events?	No
Was there an event that followed the recorded events?	Yes
Was an event not recorded a deployment event?	No
Was an event not recorded a non-deployment event?	Yes
Multiple Event Counter	2
Time Between Multiple Events (mS)	0

There was a qualified Non-Deploy event (8 km/h or higher) that preceded the recorded event, within 5 seconds of the recorded event. There was also a qualified Non-Deploy event that followed the recorded event within 5 seconds of the first (not recorded) event. These other events had lower delta velocity than the recorded event. The Multiple Event Counter indicates the number of qualified Non-Deploy events (2) other than the event recorded. The Time Between Multiple Events does not apply since only one event was recorded. Only the non deploy event with the largest change in velocity was recorded per the GM specification.

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## A. Multiple Event and Vehicle Data (cont'd)

The vehicle data stored was associated with first (not recorded) Non-Deploy event:

Event Data		S/N: 001102125717			Mask No.: 0F01021104		
Item	1 Second Prior	2 Seconds Prior	3 Seconds Prior	4 Seconds Prior	5 Seconds Prior	Unit	Validity
<b>Vehicle Settings-</b>							
Accelerator Actual Position	0	16.47058824	0	71.37254902	75.29411765	%	Valid
Brake Pedal Status	Off	Off	Off	Off	Off	-	Valid
Throttle Position	16.07843137	41.96078431	19.60784314	70.19607843	72.94117647	%	Valid
Steering Wheel Angle	0	0	0	0	0	Deg	Valid
Transmission Actual Gear Status	Fourth Gear					-	Valid
Transmission Gear Selector Position Status	Fourth Gear					-	Valid
Engine Speed	1856	2496	2368	3776	3712	RPM	Valid
Vehicle Speed	87	104	105	104	99	km/h	Valid
<b>Cruise Control Settings-</b>							
Cruise Control Active	Off	Off				-	Valid
Cruise Control Resume Switch Active	Off	Off				-	Valid
Cruise Control Set Switch Active	Off	Off				-	Valid
Engine Limp Home Mode Active	Off	Off				-	Valid
<b>Vehicle Stability-</b>							
ABS Status	Active	Not Active	Not Active	Not Active	Not Active	-	-
Traction Control System Status	Not Active					-	Valid
Vehicle Dynamics Control Status	Not Active	Not Active	Not Active	Not Active	Not Active	-	Invalid
Vehicle Dynamics Lateral Acceleration	0	0	0	0	0	m/s <sup>2</sup>	Invalid
Vehicle Dynamics Yaw Rate	0	0	0	0	0	deg/sec	Invalid
<b>Temperature-</b>							
Outside Air Temperature Corrected Value	14					Deg C	Valid
<b>Lighting-</b>							
High Beam Active	Off					-	Valid
Low Beam Active	Off					-	Valid
<b>Door Status-</b>							
Driver Door Status	Closed					-	Valid
Passenger Door Status	Closed					-	Valid
Left Rear Door Status	Unused					-	Valid
Right Rear Door Status	Unused					-	Valid
Rear Closure	Closed					-	Valid
<b>Time-</b>							
Calendar Year	2003					-	-
Calendar Month	June					-	-
Calendar Day	12					-	-
Time of Day -Hour	0					-	-
Time of Day- Minute	0					-	-
<b>Positioning Status-</b>							
Positioning System Latitude	0					ms arc	Invalid
Positioning System Longitude	0					ms arc	Invalid
<b>Driver Indicators</b>							
Indicator	Status	Validity					
Service Engine Soon (Non Emmission Related)	Off	Valid					
Service Vehicle Soon	Off	Valid					
Brake Warning Lamp	Off	Valid					
Tire Pressure Low	Off	Valid					
ABS System Failure	Off	-					
<b>Vehicle Identificaiton Number - VIN</b>							
VIN Digit 3	1						
VIN Digit 4	A						
VIN Digit 5	L						
VIN Digit 6	5						
VIN Digit 7	2						
VIN Digit 8	F						
VIN Digit 10	5						
VIN Digit 12	5						
VIN Digit 13	7						
VIN Digit 14	9						
VIN Digit 15	9						
VIN Digit 16	1						
VIN Digit 17	8						

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## B. Restraints Buffers

Per the Multiple Event data, the second event was recorded in the Non-Deploy Restraints EEPROM buffer. There was no event stored in the Deploy Restraints EEPROM buffer since no deployment occurred.

In the Non-Deploy Restraints buffer, there were no faults at the time the second event started:

<b>Active Faults at Time of Event</b>		S/N: 001102125717	Mask No.: 0F01021104
Code	Definition	Sub-Type	Definition
N O Codes	None	00	no additional information
N O Codes	None	00	no additional information
N O Codes	None	00	no additional information
N O Codes	None	00	no additional information
N O Codes	None	00	no additional information
N O Codes	None	00	no additional information

Lamp status also shows no faults for 10920 minutes of SDM operation:

<b>Lamp Status(Event Enable)</b>		
<b>State of Lamp at Event Enable</b>		
Setting in EE	Indication	
0	Lamp Off	
<b>Time for Warning Lamp Continuously On/Off at Event Enable</b>		
Hex Value	Time (sec.)	Time (minutes)
FFF0	655200	10920

Ignition cycle counters recorded at start of the second event:

<b>Ignition Cycle Counters</b>	
<b>Ignition Cycles with Warning Lamp Continuously On/Off</b>	
Hex Value	# of Cycles
0F16	3862
<b>Ignition Cycles Since Fault Codes were Cleared</b>	
Hex Value	# of Cycles
FE	254
<b>Ignition Cycles at Event Enable</b>	
Hex Value	# of Cycles
0F17	3863

Driver and Passenger Buckle status at start of second event:

<b>Seat Belt and Position Switch Data</b>		
Type	Definition	Setting in EE
Driver Seatbelt	unbuckled	0
	monitored	1
Passenger Seatbelt	buckled	1
	monitored	1

At the start of the second event, all deployment loops were enabled:

<b>Loop Suppression</b>		S/N: 001102125717	Mask No.: 0F01021104	
Loop	Driver EE Bit	Driver Status	Pass EE Bit	Passenger Status
Frontal S1	0	Enabled	0	Enabled
Frontal S2	0	Enabled	0	Enabled
Pretentioner	0	Enabled	0	Enabled
Side Curtain	0	Enabled	0	Enabled
Side Thorax-F	0	Enabled	0	Enabled
Side Thorax-R	0	Enabled	0	Enabled

## B. Restraints Buffers (cont'd)

No deployment was commanded for any loops:

**Deployment Commanded** S/N: 001102125717 Mask No.: 0F01021104

Loop	Driver EE Bit	Driver Status	Pass EE Bit	Passenger Status
Frontal S1	0	No	0	No
Frontal S2	0	No	0	No
Prentioner	0	No	0	No
Side Curtain	0	No	0	No
Side Thorax-F	0	No	0	No

No algorithm deployment decisions were reached:

**Algorithm Timing and Max Delta V**

Time from Event Enable to Deployment				
Loop	Dr Hex Value	Driver Time(mS)	Pass Hex Value	Pass Time (mS)
Frontal S1	00	0	00	0
Frontal S2	00	0	00	0
Side Cur/Thor	00	0	00	0

The maximum delta velocity recorded in the recorded event:

**Max Delta V=** 54.54340541 kph

Time to max delta velocity:

**Time from Event Enable to Max Delta V**

Hex Value	Time (mS)
0B	110

Internal algorithm data, indicating no decisions reached:

**Algorithm Start Time**

Hex Value	Time (mS)
00	0

**Algorithm Duration**

Hex Value	Time (mS)
00	0

**Time from Event Enable to Predicted Displacement Reached**

Hex Value	Time (mS)
00	0

**Time Trigger Switch Closed**

Hex Value	Time (mS)
0000	0

**Algorithm Decision for Deployment**

Loop	Hex Value	Time (mS)
No Belt S1	0000	0
No Belt S2	0000	0
With Belt S1	0000	0
With Belt S2	0000	0

At the start of the second event, both the front and side algorithms were disabled:

**Algorithm Enable**

Algorithm	Setting in EE	Functionality
Front	1	Disabled
Side	1	Disabled

The Sensing and Diagnostic Module (SDM) did not deploy because the algorithms were disabled at the start of the second (recorded) event.





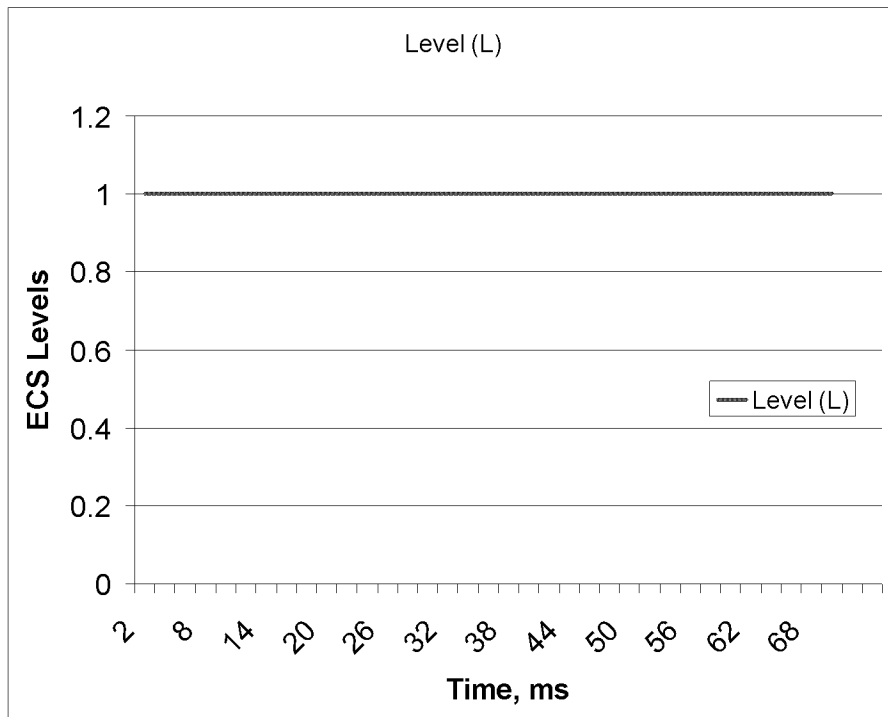


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### C. EDR graphs (cont'd)

Electronic Crash Sensor (ECS) Acceleration Levels from start of second event to 70ms:



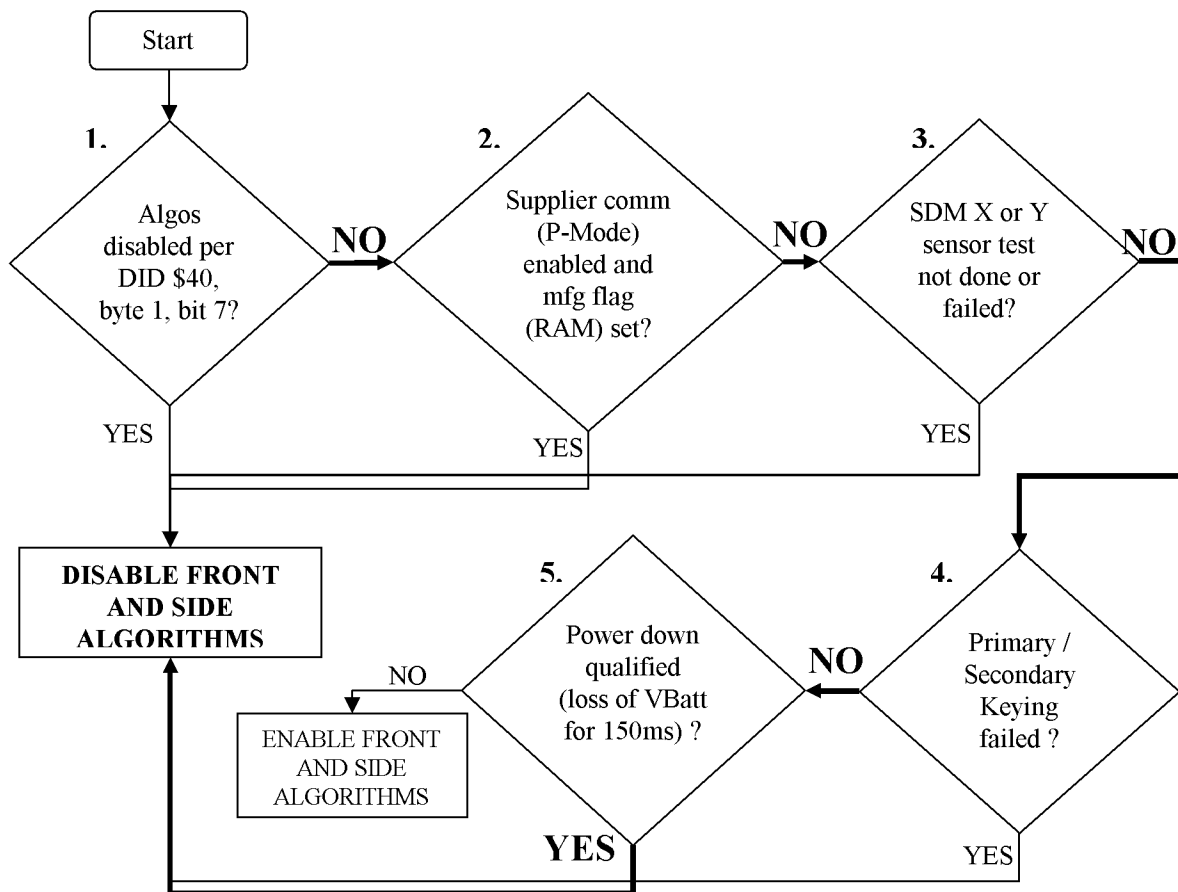
Every ECS level is equal to approximately 8 g's of deceleration.

The flat ECS signal shown above is consistent with an ECS that has been shut down due to a loss of battery.

### D. Algorithm Disable Evaluation

As stated in Section B, Restraints Buffers, the front and side algorithms were disabled when the recorded event began. This was the second event of three events according to the multiple event data. Also, there were no qualified faults when the recorded event began. This section will proceed through the software code to determine under what conditions the front and side algorithm disable condition can occur.

Software logic for algorithm disable:



1. Per the stored EEPROM configuration, DID \$40, byte 1, bit 7, was set to 0, which means algorithms were NOT disabled by configuration.
2. The module was locked and installed in the vehicle, operating without faults. The manufacturing flag is enabled with test equipment at Siemens' manufacturing facility.
3. No faults recorded at time of event, so sensors did not fail sensor test. SDM X and Y acceleration and velocity recorded, consistent with physical event.
4. Primary/Secondary key mismatch detected at SDM power up and would result in a fault code. There were no faults recorded at time of event.
5. 150ms after the SDM qualifies loss of battery, the front and side algorithms are disabled.

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#### **D. Algorithm Disable Evaluation (cont'd)**

The Sensing and Diagnostic Module (SDM) constantly monitors the battery voltage while powered up. If the SDM detects loss of battery, it performs qualification. Thus, momentary drops of battery voltage do not result in loss of battery qualification. When loss of battery is qualified, the SDM enters energy reserve mode. At this time, the SDM shuts down the side satellites. The Electronic Crash Sensors (ECS's) are shut down after a minimum of 60ms in energy reserve mode. After 150ms in energy reserve mode, the SDM sets the power down qualified flag, which then sets the front and side algorithm disabled flags.

When the front algorithm disable flag is set, the SDM immediately resets the front algorithm and prevents future calls to the front algorithm.

#### **E. Conclusions**

Based on the recorded data as depicted in the above graphs, the Siemens VDO electronic crash sensor performed in accordance with specification. The SDM experienced loss of battery at some point prior to the recorded Non-Deploy event; the loss of battery was qualified and the front and side algorithms were disabled until the SDM eventually depleted its energy reserve and shut down. The SDM had sufficient energy reserve to record the Non-Deploy event and detect and qualify a third Non-Deploy event.