

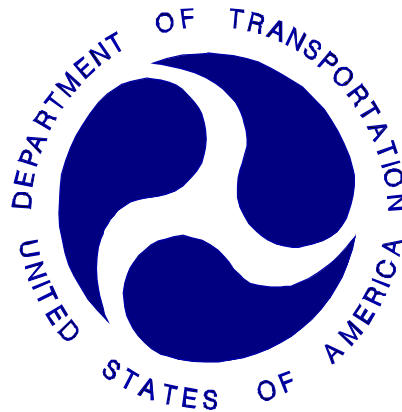
REPORT NUMBER: 305-CAL-07-05

**SAFETY COMPLIANCE TESTING FOR FMVSS 305  
ELECTRIC POWERED VEHICLES: ELECTROLYTE SPILLAGE  
AND ELECTRICAL SHOCK PROTECTION**

HONDA MOTOR COMPANY  
2007 HONDA ACCORD  
4-DOOR SEDAN

NHTSA NUMBER: C75304

CALSPAN  
TRANSPORTATION SCIENCES CENTER  
P.O. BOX 400  
BUFFALO, NEW YORK 14225



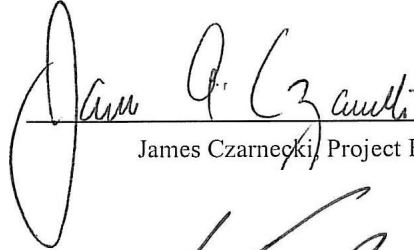
October 9, 2007

FINAL REPORT


U. S. DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration  
Enforcement  
Office of Vehicle Safety Compliance (NVS-224)  
1200 New Jersey Avenue, SE  
Washington, DC 20590

This Final Test Report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-02-D-01114. This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufactures' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

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1. Report No. 305-CAL-07-05		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS 305 Compliance Rear Impact Testing of a 2007 Honda Accord 4-door Sedan NHTSA No.: C75304				5. Report Date October 9, 2007	
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16. Abstract Compliance tests were conducted on the subject 2007 Honda Accord 4-door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-305-00 for the determination of FMVSS 305 compliance. Test failures identified were as follows:  The test vehicle appeared to comply with all requirements of FMVSS 305 "Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection."					
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## **SECTION 1**

### **PURPOSE AND TEST PROCEDURE**

This rear impact test is part of the FMVSS 305 Compliance Test Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. DTNH22-02-D-01114. The purpose of this test was to determine if the subject vehicle, a 2007 Honda Accord 4-door Sedan, meets the performance requirements of FMVSS No. 305 "Electric Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection." The test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure (TP-305D-00, dated December 29, 2005).

## SECTION 2

### COMPLIANCE TEST RESULTS SUMMARY

A 1822.5 kg 2007 Honda Accord 4-door Sedan was impacted from the rear by an 1797 kg moving barrier at a velocity of 47.5 kph (29.5 mph). The test was performed by Calspan Corporation on October 9, 2007.

The test vehicle was equipped with a 64.7 liter fuel tank which was filled to 92 percent capacity with stoddard fluid prior to impact. Additional ballast (42 kg) was secured in the vehicle cargo area. Two ballast Part 572E 50th percentile male Anthropomorphic Test Device (ATD) were placed in the front occupant seating positions.

The crash event was recorded by three high-speed cameras and one real-time camera. High-speed camera locations and other pertinent camera information are found on page 3-8 of this report. Pre- and post-test photographs of the vehicle can be found in Appendix A.

There was no fuel system fluid spillage following the impact or during any portion of the static rollover test. The average vehicle longitudinal crush was 331 millimeters. The vehicle appeared to comply with all the requirements of FMVSS No. 305 "Electrical Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection."

**SECTION 3**

**SUMMARY OF TEST RESULTS**

**DATA SHEET 1**

**TEST VEHICLE SPECIFICATIONS**

**TEST VEHICLE INFORMATION:**

Year/Make/Model/Body Style: 2007 Honda Accord 4-door Sedan  
 Vehicle Body Color: Red NHTSA Number: C75304

**DEALER AND DELIVERY INFORMATION:**

Date Received: 7/27/07 ; Odometer Reading 253 km  
 Selling Dealer: Wilde Honda  
 Dealer Address: 1710 HWY. 164 Waukesha, WI 53186

**DATA FROM VEHICLE'S CERTIFICATION LABEL:**

Vehicle Manufacturer: Honda Motor Company  
 Vehicle Build Date: 09/06  
 VIN: JHMCN36457C001081  
 GVWR: 2070 kg; GAWR: 1120 kg FRONT; 970 kg REAR

**DATA FROM VEHICLE'S TIRE LABEL AND SIDEWALL:**

Location of Tire Placard: Door A-pillar side sill  
 Type of Spare Tire: Temporary

	<u>Front</u>	<u>Rear</u>
Maximum Tire Pressure (sidewall - kPa)	300	300
Cold Pressure (tire placard - kPa) – test pressure	220	220
Recommended Tire Size (tire placard)	P215/60R16	P215/60R16
Vehicle Tire Size with load index & speed symbol	P215/60R16 94V	P215/60R16 94V
Tire Manufacturer	Michelin	Michelin
Tire Name	Energy MXV4	Energy MXV4

**ELECTRIC VEHICLE PROPULSION SYSTEM:**

Electric Vehicle Type: - Electric; x Electric/Hybrid  
 Propulsion Battery Type: 7.2 V NiMH  
 Nominal Voltage: 144 V  
 Location of Automatic Propulsion Battery Disconnect N/A  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Auxiliary Battery Type: N/A



**DATA SHEET 2**

**PRE-TEST DATA**

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (with maximum fluids)= UDW:

	<b>Left Side (kg)</b>	<b>Right Side (kg)</b>	<b>Ratio (%)</b>	<b>Total (kg)</b>
<b>Front =</b>	494	317	49.5	811.0
<b>Rear =</b>	499	327	50.5	826.0
<b>Total Delivered Weight (UDW) =</b>				1637.0

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight (UDW) =	1637.0	kg
Rated Cargo/Luggage Weight (RCLW) =	44.8	kg
Weight of 2 p.572E Dummies @ 78 each =	148.8	kg
<b>TARGET TEST WEIGHT =</b>	<b>1830.6</b>	<b>kg</b>

WEIGHT OF TEST VEHICLE WITH TWO DUMMIES AND 36.7 KG OF CARGO WEIGHT:

	<b>Left Side (kg)</b>	<b>Right Side (kg)</b>	<b>Ratio (%)</b>	<b>Total (kg)</b>
<b>Front =</b>	547.5	356.5	49.6	904.0
<b>Rear =</b>	552.0	366.5	50.4	918.5
<b>Total Vehicle Test Weight (ATW) =</b>				1822.5

Weight of Ballast Secured in Vehicle<sup>1</sup> = 42 kg Ballast Type Lead shot bags

Method of securing Ballast: Compartment placement

Components Removed for Weight Reduction: None

<sup>1</sup>Ballast weight does not include the weight of instrumentation, on-board cameras and data acquisition system

<sup>2</sup>Rearward of the front axle centerline.

**DATA SHEET 2 (continued)**

**PRE-TEST DATA**

Vehicle: 2007 Honda Accord 4-door Sedan

NHTSA No. C75304

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED):

Electrolyte Fluid Type:	<u>KOH</u>
Electrolyte Fluid Specific Gravity:	<u>1.29</u>
Electrolyte Fluid Kinematic Viscosity:	<u>2.07</u>
Electrolyte Fluid Color	<u>Clear</u>
Propulsion Battery Coolant Type,	<u>Fan (Air cool)</u>
Color and Specific Gravity:	<u>N/A</u>
Location of Battery Modules:	<u>-</u> In Occupant Compartment <u>x</u> Outside Occupant Compartment

PROPULSION BATTERY STATE OF CHARGE

Maximum State of Charge:	<u>-</u>
Test Voltage ( $\geq 95\%$ of maximum)	<u>-</u>
OR	
Range of Normal Operating Voltage:	<u>4 or 5 segments if IMA battery level gauge</u>
Test Voltage (within range)	<u>157</u>

Details of Chassis Ground Points and Locations:

Left side of floor under rear seating cushion

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Details of Propulsion Battery Components:

Battery propulsion components are located behind rear seat back.

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Comments:

None

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**DATA SHEET 3**

**PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS**

Vehicle: 2007 Honda Accord 4-door Sedan

NHTSA No. C75304

**VOLTMETER INFORMATION:**

<b>Make:</b>	<u>Fluke</u>	<b>Model:</b>	<u>8022A</u>	<b>S/N:</b>	<u>2180445</u>
<b>Internal Resistance Value:</b>	<u>250k</u>	<b>Ω</b>			
<b>Resolution:</b>	<u>-</u>	<b>V</b>			
<b>Last Calibration Date:</b>	<u>-</u>				

Propulsion Battery Voltage : (ready to drive position)	$V_b$	=	<u>157.1</u>	V
Propulsion Battery to Vehicle Chassis:	$V_1$	=	<u>74</u>	V
Propulsion Battery to Vehicle Chassis:	$V_2$	=	<u>68</u>	V
Propulsion Battery to Vehicle Chassis Across Known Resistor:	$R_o$	=	<u>118.5</u>	Ω
Propulsion Battery to Vehicle Chassis with $R_o$ installed:	$V_1'$	=	<u>.003</u>	V
Propulsion Battery to Vehicle Chassis: with $R_o$ installed:	$V_2'$	=	<u>.008</u>	V

**ELECTRICAL ISOLATION MEASUREMENTS:**

$R_{i1}$ :	<u>5.6K</u>	Ω	$R_{i1} = R_o * (1 + V_2/V_1) * [(V_1 - V_1')/V_1']$
$R_{i2}$ :	<u>2.3K</u>	Ω	$R_{i2} = R_o * (1 + V_1/V_2) * [(V_2 - V_2')/V_2']$
$R_i$	<u>2.3K</u>	Ω	Lesser value of $R_{i1}$ and $R_{i2}$
$R_i/V_b$	<u>14568</u>	V	Electrical Isolation Value

Is the Electrical Isolation Value  $\geq 500 \Omega/V$ ? Yes/No  
Yes

**If NO - Failure**

Comments:  
None

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**DATA SHEET 4**  
**POST-IMPACT DATA**

Vehicle: 2007 Honda Accord 4-door Sedan

NHTSA No. C75304

**ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS**

**VOLTMETER INFORMATION:**

Make: FLUKE Model: 8022A S/N: 2180445  
 Internal Impedance Value 250K MΩ  
 Normal Propulsion Battery Voltage (V<sub>b</sub>): 156.3 V

**ELECTICAL ISOLATION MEASUREMENTS**

V <sub>1</sub> = <u>69.1</u> V Impact	Time: <u>5</u> minutes <u>05</u> seconds	
V <sub>2</sub> = <u>74.4</u> V Impact	Time: <u>5</u> minutes <u>10</u> seconds	
V <sub>1</sub> ' = <u>0.06</u> V Impact	Time: <u>5</u> minutes <u>15</u> seconds	
V <sub>2</sub> ' = <u>0.06</u> V Impact	Time: <u>5</u> minutes <u>20</u> seconds	
R <sub>i1</sub> = <u>156.3</u> Ω Impact	R <sub>i1</sub> = R <sub>o</sub> *(1+V <sub>2</sub> /V <sub>1</sub> )*[(V <sub>1</sub> -V <sub>1</sub> ')/V <sub>1</sub> ']	Time: <u>5</u> minutes <u>25</u> seconds
R <sub>i2</sub> = <u>263679</u> Ω Impact	R <sub>i2</sub> = R <sub>o</sub> *(1+V <sub>1</sub> /V <sub>2</sub> )*[(V <sub>2</sub> -V <sub>2</sub> ')/V <sub>2</sub> ']	Time: <u>5</u> minutes <u>25</u> seconds
R <sub>i</sub> = <u>156.3</u> Ω Impact	Lesser value of R <sub>i1</sub> and R <sub>i2</sub>	Time: <u>5</u> minutes <u>25</u> seconds
R <sub>i</sub> /V <sub>b</sub> = <u>1687</u> Ω Impact		Time: <u>5</u> minutes <u>25</u> seconds

Is the measured Electrical Isolation Value ≥ 500 Ω/V?  x  Yes  -  No (Fail)

**PROPULSION BATTERY SYSTEM COMPONENTS**

Describe Propulsion Battery Module movement within occupant compartment:

None

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Has the Propulsion Battery Module moved within the occupant compartment?  -  Yes(Fail)  x  No

Describe intrusion of an outside Propulsion Battery Component into the occupant compartment:

None

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Has an outside Propulsion Battery Component intruded into the occupant compartment?  -  Yes(Fail)  x  No

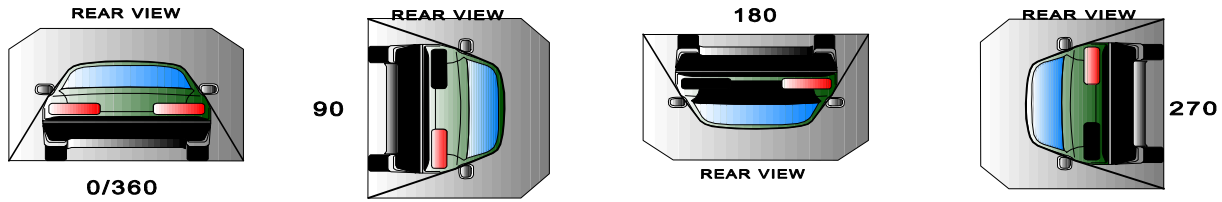
Is Propulsion Battery electrolyte spillage visible in the occupant compartment?  -  Yes(Fail)  x  No

**DATA SHEET 5**

**STATIC ROLLOVER TEST DATA**

Vehicle: 2007 Honda Accord 4-door Sedan

NHTSA No.: C75304



**I. DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD:**

Rollover Stage	Rotation Time (spec. 1 -3 min)				FMVSS 301 Hold Time		Total Time				Next Whole Minute Interval	
	minutes	seconds	minutes	seconds	minutes	seconds	minutes	seconds	minutes	seconds	minutes	seconds
0° - 90°	1	06	5	06	6	06	6	06	6	06	7	00
90° - 180°	0	59	5	59	5	59	5	59	5	59	6	00
180°-270°	0	59	5	59	5	59	5	59	5	59	6	00
270°-360°	1	02	6	02	6	02	6	02	2	00	7	00

**II. ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE :**

Rollover Stage	Propulsion Battery Electrolyte Spillage (L)	Spillage Location
0-90°	0	None
90-180°	0	None
180-270°	0	None
270-360°	0	None

Total Spillage:  0  L

**FMVSS 305 permits 5 L maximum**

Is the total spillage of Propulsion Battery electrolyte greater than 5.0 liters?       -  YES (Fail)     x  NO

Is Propulsion Battery electrolyte spillage visible in the occupant compartment?     -  YES (Fail)     x  NO

**DATA SHEET 5**

**STATIC ROLLOVER TEST DATA (CONTINUED)**

Vehicle: 2007 Honda Accord 4-door Sedan

NHTSA No.: C75304

**III. ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS:**

**VOLTMETER INFORMATION:**

Make: Fluke Model: 8022A S/N: 2180445  
 Internal Resistance Value (R<sub>o</sub>) 118.5 MΩ  
 Normal Propulsion Battery Voltage (V<sub>b</sub>): 156.8 V

$R_{i1} = R_o * (1 + V_2/V_1) * [(V_1 - V_1')/V_1']$        $R_{i2} = R_o * (1 + V_1/V_2) * [(V_2 - V_2')/V_2']$       Lesser value of R<sub>i1</sub> and R<sub>i2</sub>

	<b>Isolation Measurement (Volts)</b>	<b>Stage</b>	<b>R<sub>i1</sub> Ω</b>	<b>R<sub>i2</sub> Ω</b>	<b>R<sub>i</sub> Ω</b>	<b>R<sub>i</sub>/V<sub>b</sub> Ω/V</b>	<b>Time (min)</b>	<b>Time (s)</b>
V <sub>1</sub> =	74	90°	280222	304848	280222	1944.8	1	06
V <sub>2</sub> =	68							
V <sub>1</sub> ' =	0.06							
V <sub>2</sub> ' =	0.06							
V <sub>1</sub> =	74	180°	280222	304848	280222	1944.8	0	59
V <sub>2</sub> =	68							
V <sub>1</sub> ' =	0.06							
V <sub>2</sub> ' =	0.06							
V <sub>1</sub> =	74	270°	280222	304848	280222	1944.8	0	59
V <sub>2</sub> =	68							
V <sub>1</sub> ' =	0.06							
V <sub>2</sub> ' =	0.06							
V <sub>1</sub> =	74	360°	280222	304848	280222	1944.8	1	02
V <sub>2</sub> =	68							
V <sub>1</sub> ' =	0.06							
V <sub>2</sub> ' =	0.06							

Is the measured Electrical Isolation Value ≥ 500 Ω/V?        x   YES        -   NO (Fail)

**COMMENTS:**

None

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**APPENDIX A**

**PHOTOGRAPHS**

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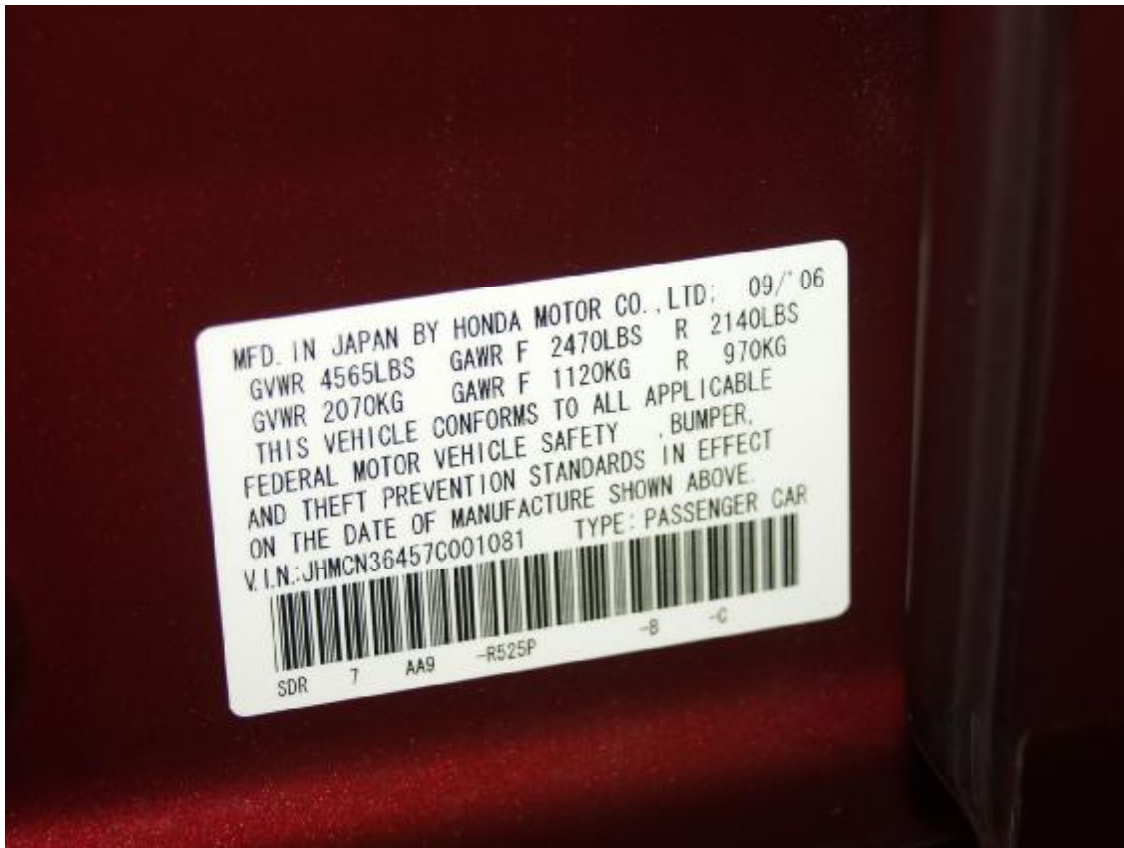


Figure A-1: Vehicle Certification Placard



Figure A-2: Vehicle Tire Placard



**Figure A-3: Vehicle Electric Propulsion System Label**



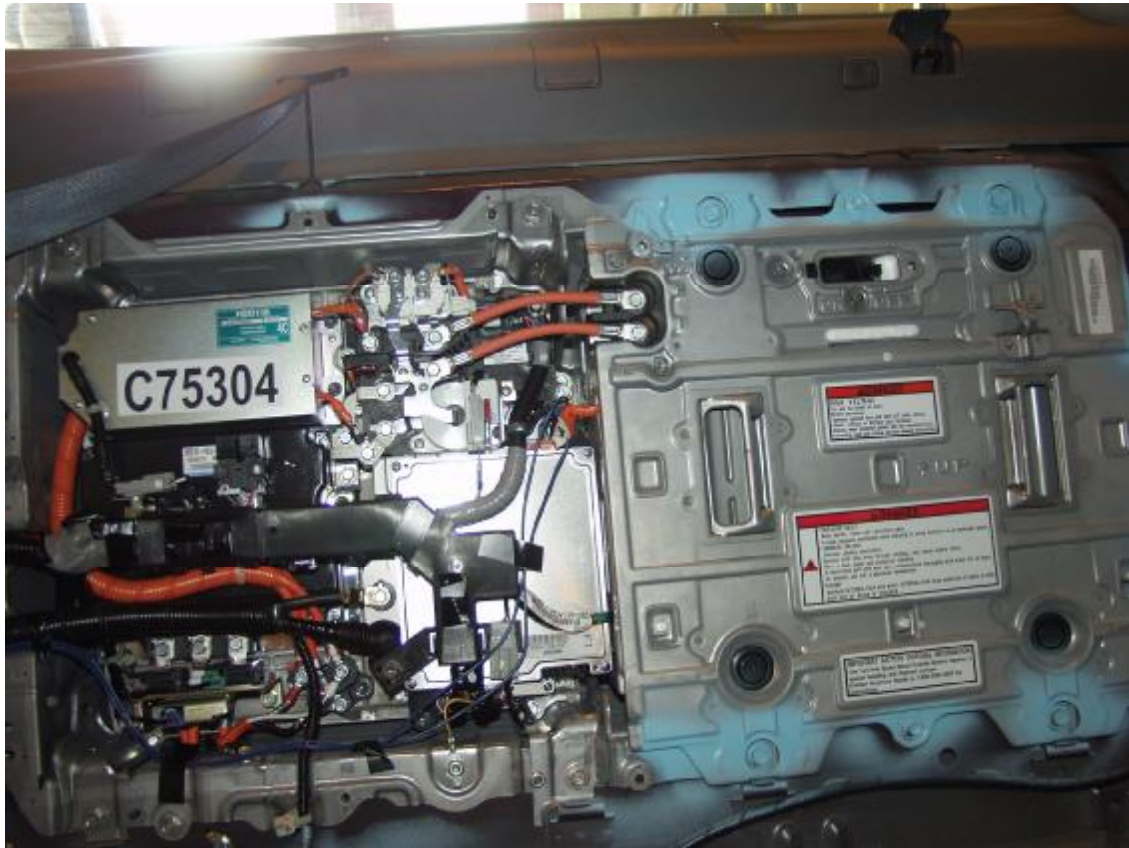
**Figure A-4: Pre-Test Test Port Interface Port Installation View**



**Figure A-5: Pre-Test Test Device Installation Views**



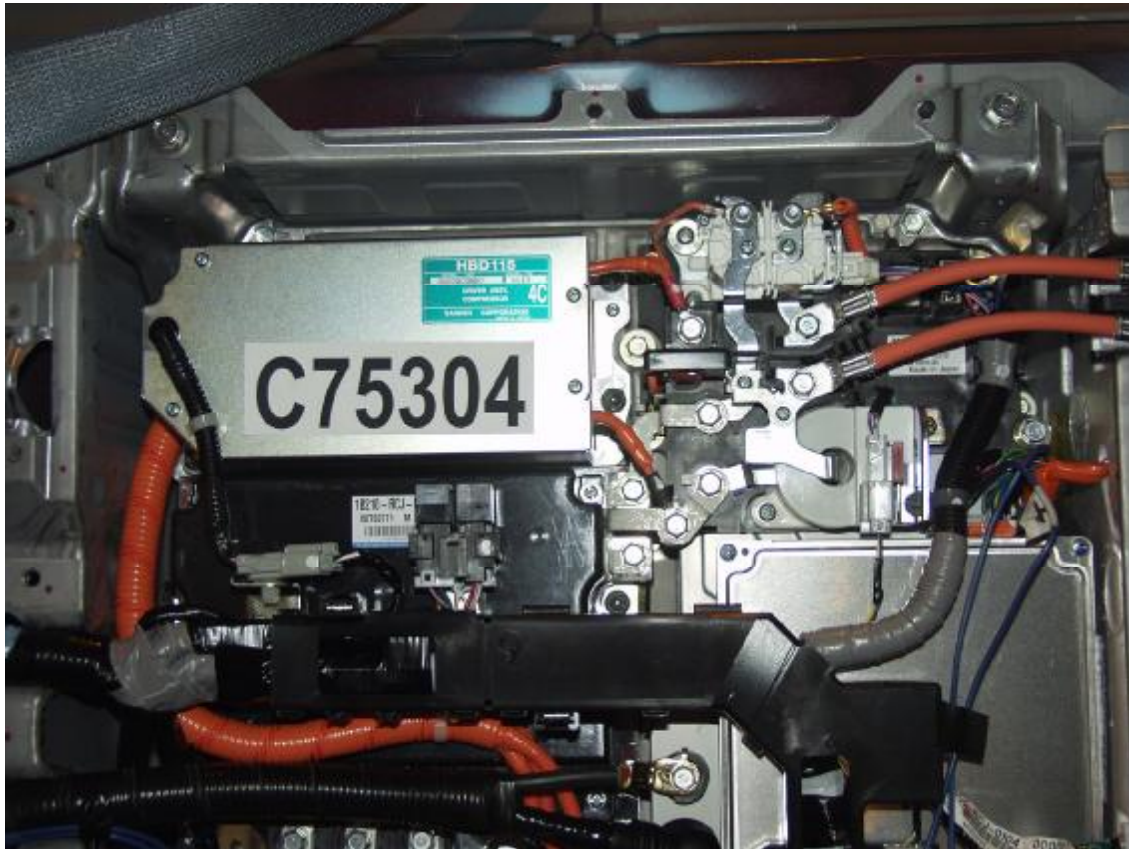
**Figure A-6: Pre-Test Chassis Ground Point View**



**Figure A-7: Pre-Test Battery Propulsion Module(S) View**



**Figure A-8: Post-Test Battery Propulsion Module(S) View**



**Figure A-9: Pre-Test Propulsion Battery View**

Photo Not Available

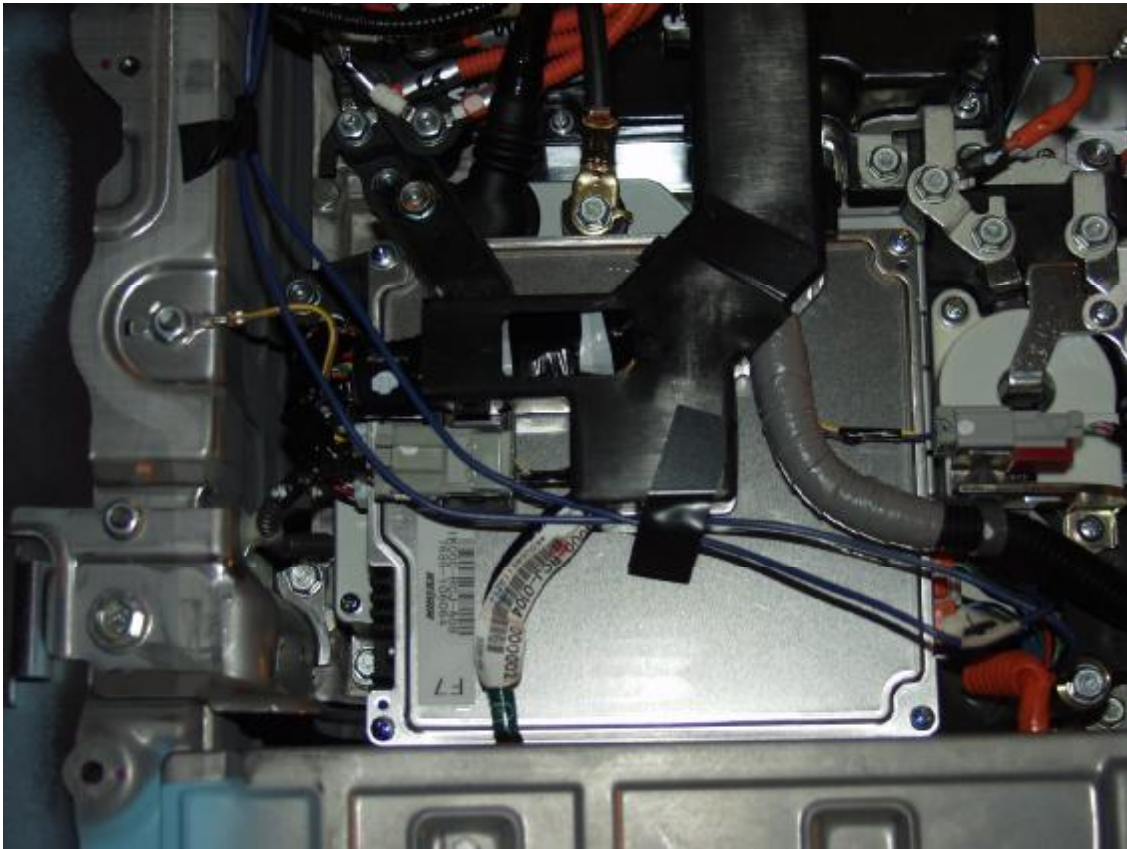
**Figure A-10: Post-Test Propulsion Battery View**



**Figure A-11: Pre-Test High Voltage Interconnect View**

Photo Not Available

**Figure A-12: Post-Test High Voltage Interconnect View**



**Figure A-13: Pre-Test Battery Compartment View**

Photo not available : due to trunk not being able to opened

**Figure A-14: Post-Test Battery Compartment View**



**Figure A-15: Pre-Test Battery Venting System View**

Photo not available : due to trunk not being able to opened

**Figure A-16: Post-Test Battery Venting System View**





**Figure A-17: Pre-Test Electric Propulsion Component(S) View**



**Figure A-18: Post-Test Electric Propulsion Component(S) View**



**Figure A-19: Pre-Test Electric Propulsion Drive View**



**Figure A-20: Post-Test Electric Propulsion Drive View**



**Figure A-21: Pre-Test Vehicle Passenger Compartment View**



**Figure A-22: Post-Test Vehicle Passenger Compartment View**

None

**Figure A-23: Post-Test Propulsion Battery Electrolyte Spillage Location View**



**Figure A-24: Rollover View - 90° Highlighting Propulsion Battery Location**



**Figure A-25: Rollover View - 180° Highlighting Propulsion Battery Location**



**Figure A-26: Rollover View - 270° Highlighting Propulsion Battery Location**



**Figure A-27: Rollover View - 360° Highlighting Propulsion Battery Location**