	Regulatory Recall Report		RRR0023
	Contactors Excess Resistance May Cause Battery Shutdown		Rev: 0
Author: PZ, MM, RS	PO: Dir Regulatory	Appr: Dir Regulatory	Date: 03/09/2021

1 SUMMARY

In accordance with Part 573 of Title 49 of the Code of Federal Regulations, Arcimoto Inc. hereby reports a safety issue and intends to recall quantity one-hundred eighty-one (181) Arcimoto Deliverator-1 and FUVs produced between September 19, 2019 and December 31, 2020. Due to an improperly implemented remedy in both Service and Production using the new 003739 B- Return Harness and 004955 Littelfuse, the subject build dates and VIN range was increased. The electronic drivers in some HV contactors may malfunction, causing these contactors to have a higher contact resistance than intended, potentially resulting in overheating. If HV contactors overheat, this can lead to either a blown fuse or opening of the contactors by the BMS, including the traction contactor opening, both of which will lead to unexpected battery shutdown and immediate loss of traction-power, which would make the vehicle more difficult to control and increase the likelihood of a crash.

Note: Fields left blank will be marked "NR" meaning "Not Reported" in public view.


2 NHTSA MANUFACTURER RECALL PORTAL FIELDS

(c)1 IDENTIFICATION OF THE MANUFACTURER, IMPORTER, DISTRIBUTOR, OR BRAND NAME OWNER

Manufacturer:	Arcimoto, Inc.
Address:	2034 W. 2nd Ave., Eugene OR 97402
Contact:	Gerrit Hurenkamp, Director of Engineering

(c)2 VEHICLE INFORMATION

Model Year Start:	Type:
2019	MOTORCYCLES
Model Year End:	Body Style:
2020	OTHER
Make:	Powertrain:
Arcimoto	HYBRID ELECTRIC
Model:	Descriptive Information:
FUV, Deliverator-1	Affects all one-hundred eighty-one

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	MY2019 & MY2020 vehicles (fifty-seven MY2019 T-FUV, one-hundred eighteen MY2020 T-FUV, six MY2020 D-Deliverator-1) produced from 09/19/2019 through to 12/31/2020.
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Production Dates:	Begin: 09/19/2019	End: 12/31/2020
VIN Range(s): (T - FUV, tandem)	Begin: 7F7ATR312KER00000	End: 7F7ATR317KER00056
VIN Range(s): (D - Deliverator-1, single)	Begin: 7F7ADR316LER00001	End: 7F7ADR315LER00006
VIN Range(s): (T - FUV, tandem)	Begin: 7F7ATR312LER00001	End: 7F7ATR312LER00094
VIN Range(s): (T - FUV, tandem)	Begin: 7F7ATR316LER00096	End: 7F7ATR31XLER00117
VIN Range(s): (T - FUV, tandem)	Begin: 7F7ATR313LER00119	End: 7F7ATR31XLER00120


(c)3 TOTAL NUMBER POTENTIALLY INVOLVED, (c)4 ESTIMATED PREVALENCE OF DEFECT

Number potentially involved: 181	Estimated percentage of involved with defect: 25%
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(c)5 DEFECT / NONCOMPLIANCE DESCRIPTION

For this Defect/Noncompliance:


Describe the defect or noncompliance:	Describe the safety risk:
The electronic drivers in some HV contactors may malfunction, causing these contactors to have a higher contact resistance than intended, potentially resulting in overheating.	If HV contactors overheat, this can lead to either a blown fuse or opening of the contactors by the BMS, including the traction contactor opening, both of which will lead to unexpected battery shutdown and immediate loss of traction-power, which would make the vehicle more

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	difficult to control and increase the likelihood of a crash.
If a noncompliance, provide the applicable FMVSS:	Identify any warning which can precede or occur:
	None.
If applicable, provide any further FMVSS affected:	
Describe the cause:	
The electronic drivers for the economizer coil in some HV contactors may malfunction, producing out-of-tolerance contact resistance, audible ringing noise, and/or misformed economizer coil current PWM, causing these contactors to have a higher contact resistance than intended, potentially resulting in overheating.	
This Recall affects all vehicles.	

If applicable, identify the manufacturer of the defective or noncompliant component. If the manufacturer of the component is unknown, provide the information for the company that supplied the subject component.


Component Manufacturer:	
Company Information:	Company Contact Information:
<i>Company Name:</i>	<i>First Name:</i>
<i>[Short version]</i> Sensata Technologies (formerly Gigavac)	Derek
<i>[Long version]</i> Sensata Technologies Inc. (formerly Gigavac)	

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<i>Country:</i>	<i>Last Name:</i>
USA	Turner
<i>Address 1:</i>	<i>Position:</i>
529 Pleasant Street	Engineering Manager
<i>Address 2:</i>	<i>Email:</i>
Mail Station B-49	dturner@sensata.com
<i>City:</i>	<i>Phone:</i>
Attleboro	Office 805-684-8401 x150 Mobile 508-369-6288
<i>State:</i>	
MA	
<i>Zip / Postal Code:</i>	
02703	

(c)6 CHRONOLOGY OF DEFECT / (c)7 NONCOMPLIANCE DETERMINATION

<p>Provide the chronology of events leading up to the defect decision or test data for the noncompliance decision:</p>
<p><i>[Short version]</i></p> <p>On 5/19/20 a customer reported that while driving their FUV on the hwy, it suddenly coasted to a stop. Arcimoto immediately examined the vehicle, discovered a blown fuse & evidence of overheating involving the contactors. All fuses were immediately tested, but determined to be within acceptable limits & not the Root Cause. Analysis then focused on bus-bars, fasteners, & conductive graphite grease, which were all tested, but they were determined to be within acceptable limits & not the Root Cause. Resistance testing of the contactor closest to the blown fuse was measured to be 1.5 times the acceptable limit. On 7/1 a FUV with reduced speed/acceleration & evidence of overheating involving a contactor measured resistance 1.5 times the acceptable limit. On 7/2, a FUV with reduced speed/acceleration & evidence of overheating involving a contactor measured resistance 3.7 times the acceptable limit. On 7/3 Arcimoto notified NHTSA of SB-20-003 (20MC8034, 10176916), which sampled vehicles already in the field for evidence of overheating; this method revealed 3 vehicles</p>

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that each had 1 contactor that exhibited visual evidence of overheating. Upon these findings, vehicle sampling under SB-20-003 was discontinued.

From 7/19 to 10/9, more complex electronic testing on contactors was developed & detected new contactors with excessive contact resistance, audible ringing noise, &/or misformed economizer coil current PWM, each of which could result in overheating. This testing demonstrated the Root Cause of excessive contact resistance within the contactor led to overheating & validated safety concerns about the vehicle population.

Following Arcimoto's process starting on 5/26 & continuing through 10/12, research data, analysis, & developments were discussed across more than eight meetings. On 11/12, the Engineering & Q&RA Depts presented findings to Arcimoto executives, who decided on 11/17 to validate these findings & notify NHTSA of a Safety Defect.


[Cont'd in Mfr Comments below]

[Long version]

On May 19, 2020 a customer complaint reported that while driving at speed on the highway, an Arcimoto vehicle suddenly coasted to a stop. Arcimoto immediately examined the vehicle, which revealed a blown HV fuse and evidence of overheating involving the HV contactors. All HV fuses were immediately restricted and tested, but consequently determined to be within acceptable limits and not the Root Cause. Analysis was then focused on bus-bars, fasteners, conductive graphite grease, and contactors, which were all restricted and tested, but bus-bars, fasteners, and conductive graphite grease were determined to be within acceptable limits and not the Root Cause. Resistance testing of the contactor closest to the blown fuse was measured to be 1.5 times the acceptable limit. On July 1, 2020 a second Arcimoto vehicle with evidence of overheating involving a HV contactor was identified by visual inspection, was observed thermal-throttling vehicle speed, and similarly measured resistance 1.5 times the acceptable limit. At the same time, a third Arcimoto vehicle with evidence of overheating involving a HV contactor was identified by an overheated battery thermistor closest to the contactor, which had been repeatedly thermal-throttling vehicle speed, and measured resistance 3.7 times the acceptable limit.

Arcimoto immediately notified NHTSA on July 3, 2020 of intent to implement Arcimoto Service Bulletin SB-20-003, recorded by NHTSA as Manufacturing Communication 20MC8034 with NHTSA ID 10176916, which sampled a few customer and company vehicles already in the field and looked for evidence of overheating. On the first thirteen vehicles examined, this method revealed three vehicles that each had at least one HV contactor that exhibited visual evidence of overheating but no functional failures. Upon these findings, vehicle sampling under SB-20-003 was discontinued.

Immediately commencing on July 19 and continuing through October 9, extensive research on contactors with increasingly complex electronic testing was established and maintained, discovering new out-of-the-box contactors with out-of-tolerance contact resistance, audible ringing noise, and/or misformed economizer coil current PWM, each of which could result in overheating. This testing finally demonstrated the Root Cause to lie within the HV contactor, validated safety concerns about excessive contact resistance leading to overheating in the larger vehicle population, and confirmed there is no known

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advance warning to the vehicle operator of these failures.

Following Arcimoto's process starting on May 26, 2020 and continuing through October 12, 2020, Engineering and Q&RA Departments performed research and analysis, and internal Stakeholders discussed these latest data and developments across more than eight research meetings. On November 12, 2020, the Engineering and Q&RA Departments presented all documentation and findings to Arcimoto executives, who subsequently decided on November 17, 2020 to validate findings of a Safety issue and to notify NHTSA of a Safety Recall.

For vehicles already remedied under this recall prior to early February 2021, as well as those built after this original defect report but prior to early February 2021, the newly introduced 004955 Littelfuse was later found in some vehicles to be damaged during the installation of 003739B B- Return Harness. Consequently, (i) the subject build dates and VIN range was increased, and (ii) newly introduced parts (003739B B- Return Harness and 004955 Littelfuse) will be rescinded and replaced (with parts 003739C B- Return Harness and 002176 Mersen fuse).

(c)8 IDENTIFY THE REMEDY

Describe the defect/noncompliance remedy program, including the manufacturer's plan for reimbursement.


Owners will be notified by mail and instructed to contact Arcimoto to schedule a service appointment(s) to have their contactors and related components replaced. There will be no charge to vehicle owners for this service. To the best of our knowledge, no owners have incurred any costs resulting from this defect.

Describe what distinguishes the remedy component from the recalled component.

Using Arcimoto's new advanced electronic testing, all HV contactors in customers' vehicles will be extensively inspected and tested, and any identified as out-of-tolerance will be replaced with contactors tested to be within acceptable limits.

All HV electronics inside the compartment for the traction-power battery will be replaced with redesigned sub-assemblies, including (i) the bus-bars attached to the contactors have been enlarged for increased radiative capacity, (ii) a heat-sink has been added to a rear bus-bar, and (iii) a redundant second fuse for the traction-power battery has been eliminated.

Additionally, due to an improperly implemented remedy in both Service and Production, the subject build dates and VIN range was increased to reflect these additional vehicles. Specifically, for vehicles built after this original defect report as well as those remedied under this recall prior to early February 2021, newly introduced parts (003739B B- Return Harness and 004955 Littelfuse) will be rescinded and replaced (with parts 003739C B-

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Return Harness and 002176 Mersen fuse).

Identify and describe how and when the recall condition was corrected in production.

Using Arcimoto's new advanced electronic testing, all HV contactors received from Component Manufacturer will be extensively inspected and tested, to ensure all product is within acceptable limits.

For vehicles in-process or already produced prior to November 18, 2020:

All HV contactors already in vehicles will be re-tested, and any identified as out-of-tolerance will be replaced with contactors tested to be within acceptable limits.


All HV electronics inside the compartment for the traction-power battery will be reworked with redesigned sub-assemblies, including (i) the bus-bars attached to the contactors have been enlarged for increased radiative capacity, (ii) a heat-sink has been added to a rear bus-bar, (iii) a redundant second fuse has been eliminated, and (iv) only for vehicles already remedied under this recall prior to early February 2021, newly introduced harness and fuse will be rescinded and replaced with originally-designed harness and fuse.

For vehicles produced on or after November 18, 2020:

All HV electronics inside the compartment for the traction-power battery will have redesigned sub-assemblies, including (i) the bus-bars attached to the contactors have been enlarged for increased radiative capacity, (ii) a heat-sink has been added to a rear bus-bar, (iii) a redundant second fuse has been eliminated, (iv) only for vehicles built after this original defect report but prior to early February 2021, newly introduced harness and fuse will be rescinded and replaced with originally-designed harness and fuse, and (v) the rear access-hole of the compartment for the traction-power battery has been enlarged.

IDENTIFY THE RECALL SCHEDULE

Describe the recall schedule for notifications:	Planned Dealer Notification Begin Date:
Arcimoto does not intend to send any dealer or distributor notifications, as it has neither dealers nor distributors at this time.	N/A
	Planned Dealer Notification End Date:
	N/A
	Planned Owner Notification Begin Date:
	03/22/2021

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	Planned Owner Notification End Date:
	04/09/2021
Manufacturer's identification code for this recall (if applicable):	

Please be reminded that owner notification letters must be mailed no more than 60 days from submission of this report.

MANUFACTURER COMMENTS TO NHTSA STAFF


Arcimoto does not intend to send any dealer or distributor notifications, as it has neither dealers nor distributors at this time.

[Continuation of Chronology of Events:]

For vehicles already remedied under this recall prior to early February 2021, as well as those built after this original defect report but prior to early February 2021, the newly introduced 004955 Littelfuse was later found in some vehicles to be damaged during the installation of 003739B B- Return Harness. Consequently, (i) the subject build dates and VIN range was increased, and (ii) newly introduced parts (003739B B- Return Harness and 004955 Littelfuse) will be rescinded and replaced (with parts 003739C B- Return Harness and 002176 Mersen fuse).

DOCUMENT UPLOAD

- 1.1 (c)10 A representative copy of all notices, bulletins, and other communications that relate directly to the defect or noncompliance and are sent to more than one manufacturer, distributor, dealer or purchaser. These copies shall be submitted to NHTSA's Recall Management Division (NVS-215)

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3 REVISION HISTORY

Function	Role	Name	Signature	Date
Author	Dir Regulatory	Pete Z	<insert name>	03/09/2021
Author	RA-RCP	Matt M	<insert name>	03/09/2021
Author	RA-RCA	Raymond S	<insert name>	03/09/2021
Author	Dir Engineering	Gerrit H	<insert name>	03/09/2021
PO	Dir Regulatory	Pete Z	<insert name>	03/09/2021
Approver	Dir Regulatory	Pete Z	<insert name>	03/09/2021

Revision		Reason for change;
#	Date Issued	Summary of change from prior Revision
0	11/18/2020	Initial Issue Internal Outline of Defect and Noncompliance Report Format pursuant to §573.6. (Incorrect online portal submission resulted in original submission & Amendment 1 submission using this same R0.)
1	11/19/2020	Clarification Added details. Equivalent to Amendment 2.
2	03/09/2021	Corrections Changed remedy descriptions per to-date PCM meeting agreements & ECO-401. Equivalent for new recall campaign.