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Eden Prairie, Minnesota, USA 55344  
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April 29, 2015

National Highway Traffic Safety Commission  
Department of Transportation  
Association Administrator for Enforcement  
Recall Management Division

To Whom It May Concern:

Re: 49 CFR Part 573 Defect Report

On behalf of Idle Free Systems, Inc. ("IFS") I have been authorized to submit this report of two defects witnessed in some of the IFS Auxiliary Power Units ("APU"). On Friday, April 24, 2015, IFS determined that two defects exist which relate to motor vehicle safety in an item of motor vehicle equipment listed below, and now furnish notification to the National Highway Traffic Safety Administration in accordance with 49 CFR Part 573 Defect and Noncompliance Reports.

**Date this report was prepared:** Wednesday, April 29, 2015.

**Furnish the manufacturer's identification code for this recall (if applicable):** N/A.

**1. Identify the full corporate name of the fabricating manufacturer/brand name/trademark owner of the recalled item of equipment.**

Idle Free Systems, Inc.  
1101 Industrial Drive  
Watertown, WI 53094  
Phone: 920-206-9333

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**Identify the corporate official, by name and title, whom the agency should contact with respect to this recall.**

Mr. Mark Hogleund, M.Sc.,  
Senior Reliability Engineer, Phillips & Temro Industries (Parent Co. of IFS)

**Telephone Number:** 952-918-8654

**Fax No.:** 952-941-2285

**I. Identify the Recalled Items of Equipment**

**2. Identify the Items of Equipment Involved In this Recall.**

**Generic Name of the item:** Frame Rail Mounting System

**Make:** IFS **Model:** Electric APU BA600

**Part Number:** N/A **Size:** 18" W x 22" D x 26" H

**Function:** The electric APU captures excess energy produced by a truck's alternator and stores it in an independent battery bank. The system then converts the 12 volt DC energy stored in the battery into 120 volt AC electricity. This electricity can be used to power A/C and heat systems in the truck's cab, provide electricity and keep the truck's engine warm. The frame rail system consists of a battery bank, A/C compressor, A/C condenser and water heater for the APU unit. These components are contained in a metal housing and mounted on the frame rail of a truck.

The following is a picture of the frame rail system:



**Other information which characterizes/distinguishes the items of equipment at issue:**

IFS manufactures the electric APU for the Class 8 commercial trucking industry. The defects potentially impact all customers that purchased the APU between October 2009 and April 2015.

**Identify the approximate percentage of the production of all the affected models manufactured by your company between the inclusive dates of manufacture provided above, that the affected model population represents.**

We believe that 100% of the production Model BA600, manufactured between October 2009 and April 2015 may be affected.

**II. Identifying the Affected Population**

**3. Furnish the total number of items of equipment potentially containing the defects.**

<b><u>Model</u></b>	<b><u>Year</u></b>	<b><u>Number of Items Potentially Involved</u></b>
Electric APU (Crack and Mount)	2009-2015	3167
Electric APU (Mount)	2009-2015	1604
<b>Total Number of Potentially Affected Units:</b>		<b>4771</b>

**4. Furnish the approximate percentage of the total number of items of equipment estimated to actually contain the defects:**

We believe that 100% of the production Model BA600, manufactured between October 2009 and April 2015 may be affected.

**Identify and describe how the affected population was determined – in particular how the affected models were selected and the basis for the beginning and final dates of manufacture of the affected items of equipment:**

After 3<sup>rd</sup> party analysis of units returned from the field, it was determined that the radius of the C-channel frame was improper. A history of the production was researched and it was determined that the units in question were all produced and shipped to dealers between October 2009 – May 2014. The C-channel frames in question (the “Venture” frame) were designed and manufactured by the Venture Manufacturing Group, Inc., 2020 N Spring St, Beaver Dam, WI, 53916. Further analysis also showed that the addition of a gusset at the top of the frame C-channel

reduced the amount of stress on the frame and reduced to zero the occurrence of C-channel failure. Beginning in February 2014, a new manufacturer, Argon Industries, 11500 W Brown Deer Rd, Milwaukee, WI, 53244 began manufacturing an improved C-channel (and overall frame) design. The Argon design incorporates four significant changes which have shown to be effective in the field. Those changes include:

1. A change to the forming radii of the C-channel. The radii were increased to ¼-inch. This change eliminated the potential for forming cracks (seams) as was witnessed in the Venture product. Venture used a smaller 1/8-inch forming radii. The 1/8-inch forming radii were determined to be inconsistent (and undersized) with standard industry practices for sheet metal forming radius selection.
2. Material grain direction (with the bend and not into it) was established to be significant for optimal C-channel forming and strength.
3. C-channel material was changed from low strength AISI 1018 (the Venture material) to High Strength Low Alloy (HSLA) steel grade 50. Grade 50 has additional advantages of improved corrosion resistance, a reasonable ductility response, wear resistance and a resistance to crack initiation when subjected to motion stresses.
4. Gusseted C-channel end caps, uniformly positioned using tab inserts, MIG welded and inspected prior to final frame fabrication, cleaning and paint.

Our consulting metallurgist agreed that the current Argon choice of HSLA 50 material is an appropriate selection for the IFS APU frame application. No subsequent frame failures have been reported using the Argon design since its placement in field applications beginning in June 2014.

### **III. Describe the Defect**

#### **5. Describe the Defect. The description should address the nature and physical location of the defect.**

**A. Crack:** In certain APU units, the C-channels of the metal housing of the frame rail system have shown evidence of cracking and tearing. The following is a picture of a unit that shows signs of cracking:



**Describe the cause(s) of the defect condition.**

Improper radius design of C-channel corners and a lack of gusseted corners with end cap.

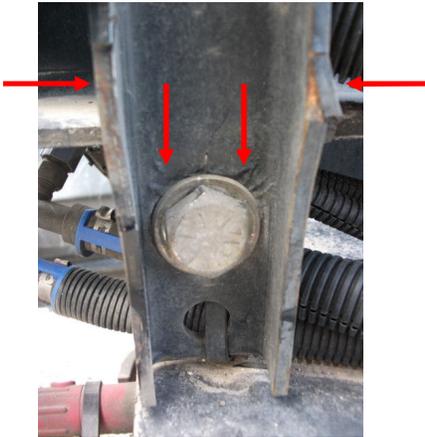
**Describe the consequence(s) of the defect condition.**

If left unchecked, the C-channel radius could crack, which could cause parts of the unit to dislodge from the vehicle frame rail. If an APU unit completely separated from a truck frame, it could create a safety hazard.

**B. Mounting:** In certain APU units, mounting bolts have become loose or in some cases failed. The following is a picture of a vehicle frame rail that showed signs of wear (rub marks) from incorrectly torqued bolts:



The following is a picture of a Venture frame backer C-channel that showed deformity at the lower bolted area and subsequent bolt loosening.



**Describe the cause(s) of the defect condition.**

Incorrectly torqued bolts may result from inadequate strength of the backer C-channel. Deformity along with a loss of torque tightness has been witnessed in some installations. It is believed that a bending moment is created which fatigues the channel. The defect condition is the result of the existing backer C-channel design and the variable tightening torque used during APU vehicle installation.

**Describe the consequence(s) of the defect conditions.**

Improperly torqued bolts could loosen over time. Once loosened, they can detach, wear or fracture. If an APU unit completely separated from a truck frame, it could create a safety hazard.

**Identify any warning which can (a) precede or (b) occur.**

On visual inspection, the C-channel of an affected APU unit may show signs of cracking or tearing.

Broken or missing bolts may be signs of improper torque.

**If the defect is in a component or assembly purchased from a supplier, identify the supplier by corporate name and address.**

The failing frame assemblies and deformed mounting backer C-channels were designed and manufactured for IFS by the Venture Manufacturing Group. The contact information for VMG is:

Venture Manufacturing Group, Inc.  
2020 N Spring St  
Beaver Dam, WI 53916  
Office Phone: 920-887-4395  
<http://www.venturemfgroup.com>

**Identify the name and title of the chief executive officer or knowledgeable representative of the supplier:**

Mr James J. Slattery, President & CEO

**IV. Provide the Chronology in Determining the Defect**

**6. With respect to a defect, furnish a chronological summary (including dates) of all the principle events that were the basis for the determination of the defects. The summary should include, but not be limited to, the number of reports, accidents, injuries, fatalities and warranty claims.**

The defect disclosures have been organized into the following three tables:

1. Table A: Venture Frame Timeline
2. Table B: Loosened Bolt Timeline
3. Table C: Warranty Timeline

As of this submission, there have been zero reports of accidents, injuries, fatalities with respect to the Venture equipment and observed defects. The following table data was compiled from the IFS CRM database on April 25, 2015 and is considered the complete record of historical events related to the subject defects.

<b>Table A: Venture Frame Timeline</b>		
<b>Tracking</b>	<b>Date</b>	<b>Event</b>
A-01	09/17/09	Confidential Disclosure Agreement
A-02	10/24/09	First Purchase Order issue for BA400
A-03	11/23/09	Delivery of first BA400 Parts
A-04	04/30/11	First Issue with BA400 in the field
A-05	05/09/11	Last BA400 shipped without Upgrade
A-06	06/03/11	First Purchase Order issued for BA600
A-07	06/24/11	First BA600 Delivered from Venture
A-08	05/04/13	Argon given PO for BA600 First Article
A-09	06/11/13	IFS first notification of cracked BA600 Frame
A-10	06/11/13	Argon completes drawing for BA600
A-11	07/15/13	First Article Requested for BA600 from Argon
A-12	08/14/13	First Article Delivered from Argon
A-13	10/16/13	Supplier Visit to Venture
A-14	10/29/13	RJ notes failures do not fall in previous SN
A-15	11/08/13	First production parts received from Argon
A-16	12/19/13	Venture receives pictures of cracked frames
A-17	01/02/14	Repair Gussets ordered from Venture
A-18	01/16/14	Follow up with Venture for RMA
A-19	01/21/14	Repair Gussets received from Venture
A-20	01/28/14	Gusset field repairs begin
A-21	02/04/14	Argon directed to add Gussets
A-22	02/28/14	Frames from Argon with Gussets implemented
A-23	03/05/14	10 Cracked Frames are returned to Venture
A-24	03/18/14	Follow up with Venture still reviewing
A-25	03/27/14	Follow up with Venture still reviewing
A-26	02/25/15	Notification Received of One Cracked Frame
A-27	02/26/15	Idle Free Visits Customer to Evaluate Cracked Frame
A-28	02/27/15	Cracked Frame Shipped to Eden Prairie
A-29	04/13/15	Notification Received of One Cracked Frame
A-30	04/24/15	Notification Received of One Cracked Frame

<b>Table B: Loosened Bolt Timeline</b>		
<b>Tracking</b>	<b>Date</b>	<b>Event</b>
B-1	11/23/09	BA400 Launched with 150 ft-lb torque
B-2	06/24/11	BA600 Launched with 150 ft-lb torque
B-3	11/08/13	BA600 First production parts from Argon
B-4	07/26/13	Customer notifies Idle Free the 150 ft-lb causes an issue
B-5	12/18/13	Kirk looks up the torque requirements
B-6	12/30/13	Torque study completed by Aaron/Kirk
B-7	01/06/14	RJ Requests Pat to Issue a TSB for 80 ft-lbs
B-8	04/07/14	Pat questioned torque on training material
B-9	04/08/14	TSB issued changing torque to 120 ft-lbs
B-10	08/14/14	Report of unit separation from truck
B-11	08/18/14	Installation Error was likely root cause
B-12	08/20/14	Concerned customer to inspect and replace all bolts
B-13	10/20/14	Report of unit separation from truck
B-14	04/01/15	Report of unit separation from truck
B-15	04/01/15	Unit reported with broken bolt
B-16	04/13/15	Separated unit is shipped to Eden Prairie
B-17	04/13/15	Investigation begins into failure

<b>Table C: Warranty Timeline</b>		
<b>Tracking</b>	<b>Date</b>	<b>Event</b>
C-01	06/11/13	Notification Received of One Cracked Frame
C-02	07/10/13	Notification Received of One Cracked Frame
C-03	07/15/13	Notification Received of One Cracked Frame
C-04	07/18/13	Notification Received of One Cracked Frame
C-05	07/19/13	Notification Received of One Cracked Frame
C-06	07/24/13	Notification Received of One Cracked Frame
C-07	07/26/13	Notification Received of Three Cracked Frames
C-08	09/01/13	Notification Received of One Cracked Frame
C-09	09/23/13	Notification Received of One Cracked Frame
C-10	10/07/13	Notification Received of One Cracked Frame
C-11	11/02/13	Notification Received of Three Cracked Frames
C-12	12/27/13	Notification Received of One Cracked Frame
C-13	05/01/14	Notification Received of One Cracked Frame
C-14	07/16/14	Notification Received of One Cracked Frame
C-15	10/14/14	Notification Received of One Cracked Frame
C-16	10/09/14	Notification Received of One Cracked Frame
C-17	10/21/14	Notification Received of One Cracked Frame
C-18	12/03/14	Notification Received of One Cracked Frame
C-19	01/08/15	Notification Received of One Cracked Frame
C-20	02/26/15	Notification Received of One Cracked Frame
C-21	04/13/15	Notification Received of One Cracked Frame
C-22	04/25/15	Notification Received of One Cracked Frame

**V. Identify the Remedy**

**8. Furnish a description of the manufacturer's remedy for the defect. Clearly describe the differences between the condition and the remedy.**

A frame rail support upgrade kit has been designed and is currently being validated for suitability for a final solution. It is intended that upgrade kits will be distributed to all dealers that purchased systems between October 2009 and April 2015. The upgrade kit will be provided and installed at no charge to the dealers or end customers. IFS will reimburse the labor costs associated with installing the upgrade kit.

**Clearly describe the distinguishing characteristics of the remedy component/assembly versus the affected component/assembly.**

As indicated, an upgrade kit (as reviewed and approved by NHTSA) will be sent to all affected IFS dealers. The APU frame rail upgrade kit consists of two gusset plates, two backer brackets, mounting hardware and instructions. The gusset plates are to be welded to the top of the APU frame C-channel to prevent cracks from propagating along the channel radius. The backer brackets are installed on the back side of the vehicle frame rail by means of four bolts which attach directly to the APU frame. The upgrade will provide additional structural support alleviating the stresses on the APU that may be associated with backer bracket deformity and/or broken bolts. A decision tree such as found in attached Appendix One will help to guide the field inspection and corrections as required.

**Identify and describe how and when the condition was corrected in production. If the production remedy was identical to the remedy in the field, so state. If the product was discontinued, so state.**

Production and further shipments of the product from IFS have been placed on hold pending the final determination of the backer bracket re-design and required bolt installation procedure and torquing value. The bracket re-design and torquing are being supported through the use of engineering metallurgical and FEA techniques, static load measurement, dynamic load vibration testing and instrumented field testing (accelerometers) of re-designed APUs installed on commercial vehicles driven cross-country. The field testing data dump is expected to be extensive and descriptive of multiple real world scenarios.

**VI. Identify the Recall Schedule**

**Furnish a schedule or agenda (with specific dates) for notification to other manufacturers, dealers/retailers and purchasers. Please identify any foreseeable problems with implementing the recall.**

IFS intends to begin notifying authorized dealers (consistent with NHSTA recall notification guidelines) the week of May 4, 2015, to inform them in writing and by spoken means of the identified potential APU hazards. IFS will instruct dealers to cease the sale and installation of the IFS APU BA600 product. These communications

will also advise that checks be made to evaluate the current security status of installed APUs. The advisements will include instructions to address any immediate safety hazard. The advisement will include instruction to remove the unit from the vehicle should the interim measures prove impractical or ineffective as determined by the attending technician.

An NHTSA approved customer notification letter will be sent by certified mail and/or reply-back email to all affected customers as soon as NHTSA approves the document for release. IFS expects to prepare and submit to NHTSA a draft of the recall text during the week of May 4, 2015.

The upgrade kit, as reviewed and approved by the NHTSA, will be sent to all affected dealers, and will include the necessary materials and instructions about how to accomplish the upgrade. IFS expects to receive materials for the upgrade kits on or about week May 18, 2015. IFS anticipates the kits will be packaged and ready for shipment to dealers by week May 26, 2015.

IFS will place follow up telephone calls to the dealers to confirm receipt of the recall notification letter, confirm the receiving of upgrade kits and answer their questions. Dealers will be instructed to invoice IFS for the labor costs upon completion of the upgrade.

## **VII. Furnish Recall Communications**

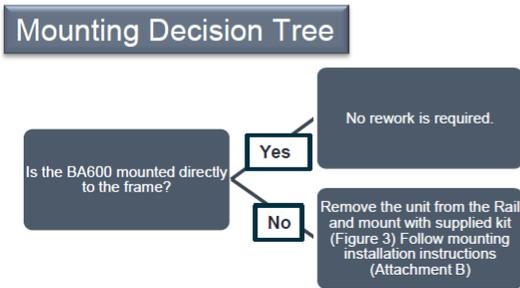
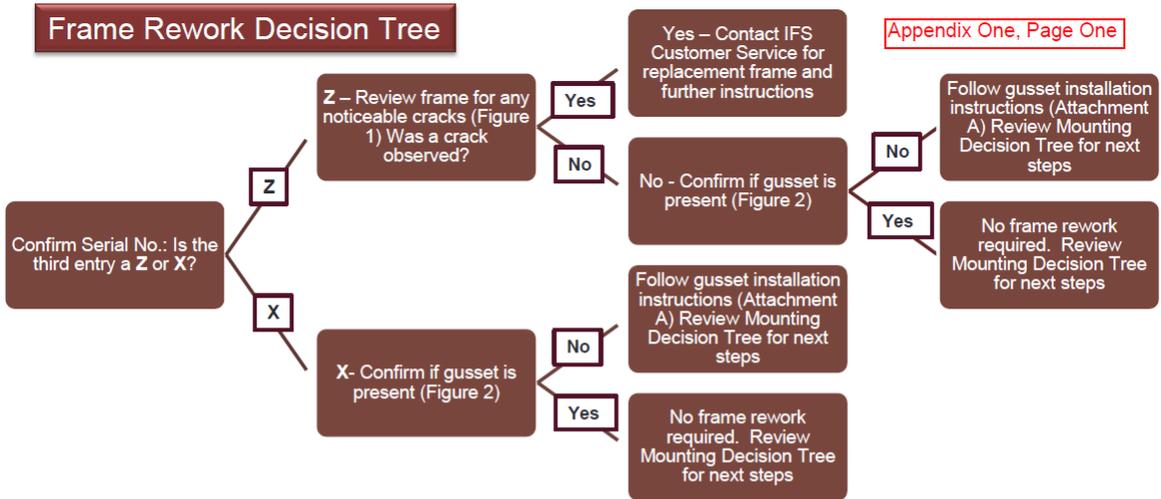
**Furnish a final copy of all notices, bulletins, and other communications that relate directly to the defect and which are sent to more than one manufacturer, distributor or purchaser. This includes all communications (including both original and follow-up) concerning this upgrade from the time your company determines the defect condition on, not just the initial notification.**

IFS anticipates preparing the following supporting documentation:

1. NHTSA approved letter advising dealers and customers of the recall action. The letter will contain sufficient detail to identify affected APU serial number(s), installed VIN number(s) where known, explicit detail as to the nature of the defects, known cause(s) and potential outcome should the defect(s) initiate a hazardous or failure result.
2. Instructional literature covering interim action steps which can address any immediate safety hazard.

3. Instructional literature (Appendix One, Decision Tree) outlining the necessary inspections and permanent corrections according to the identified frame C-channel and mounting hardware variables.
4. Instructional literature providing information regarding obtaining upgrade kits, where to have the inspections and corrections completed, reimbursement for out-of-pocket expenses and a IFS help-line phone number.

**Appendix One, Page 1 of 2**



Confidential



Appendix One, Page 2 of 2

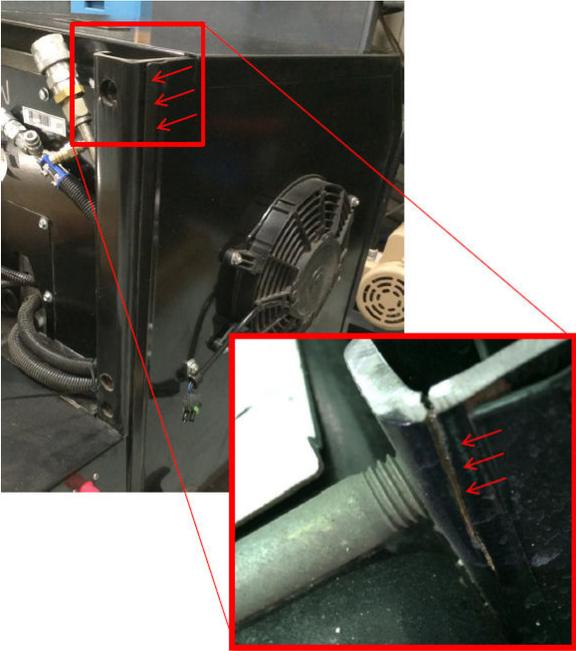


Figure 1 - Area to review

Appendix One, Page Two

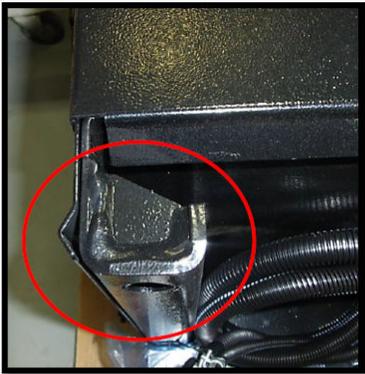


Figure 2 - Frame gusset in place

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**Name and Title of Person who prepared this report.**

Mr. Mark Hoglund, M.Sc., Senior Reliability Engineer

**Signed:**

*Mark Hoglund*