February 2017 FVEAA Newsletter

Fox Valley Electric Auto Association

The FVEAA is a Not-For-Profit Illinois Corporation and the Chicago-area chapter of The Electric Auto Association

Next Meeting

February 17, 2017 7:00 p.m. to 9:30 p.m.

Community Christian Church
1635 Emerson Lane
Naperville, IL 60540
Google Map

Agenda

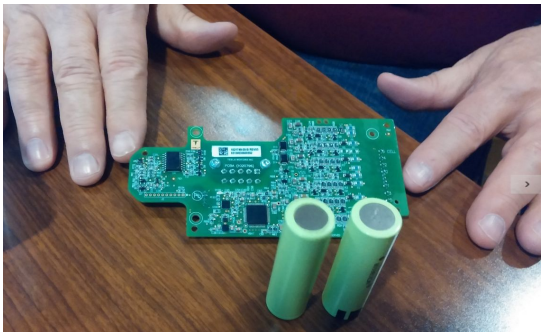
- 6:30 Doors open -> Sign-in Sheet
- 7:00 Call To Order, Welcome Introduction
- 7:15 Nissan Leaf Battery hack, Bruce Jones and Bob Baker
- 7:45 John Emde update on Insight Dragster
- Break
- 8:30 Club news and business.
- 8:45 World of EVs: What to look for in 2017
- 9:15 Close

President's Words

Michael Willuweit

I need another EV like I need another hole in my head. The unseasonably warm weather has been teasing me to wake the Porsche out of its winter hibernation and the I-MIEV has been a champ in its second winter, but here I am salivating over the prospect of buying a used electric SUV. The Kia Soul EV has been growing on me and if we have time Friday I have a great video review to share, but what is really been intriguing me is the Tesla built Rav4 EV and the Mercedes Benz electric B-class. Both of these cars' prices have been dropping precipitously low. The more recent B-class can be had just a tad north of 20k but the 3-5 year old Rav4 EVs are going for 12-15k at auction. These vehicles were only sold in California and some have well over 50,000 miles on them. I'll have more to share on them at the meeting Friday. I tried talking to John Emde about all the OEM EVs on the used market and he bluntly told me he wasn't all that interested in OEM stuff. Well, being an owner of a EV conversion I can surely appreciate his sentiments but the truth is that even OEM vehicles offer a lot to people who want to strip them down for parts and batteries, or ,as our own Bruce Jones's team has done, hack into an OEM battery pack. Bruce will presenting on the hack done in his Leaf with the help of Bob Baker and Michael Bodine. After their presentation our own Mr. EV John Emde will give us an update on the Honda Insight dragster. After the break I'll present on what to look for in the world of EVs in 2017. As always, should be an fun, educational, and electric meeting.
Hope to see you this Friday!

Photos of Last Meeting January 20, 2016 Bruce Jones

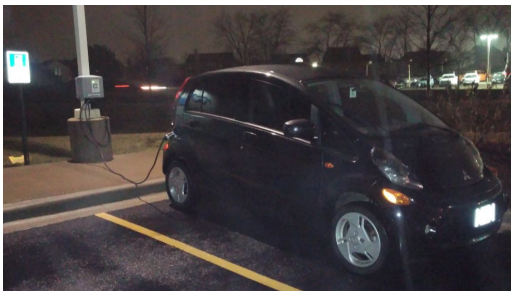


William McDaniel dives into Tesla Battery technology at the 1/21/2017 meeting.

He brought a 5.3KWh pack (below left) and some individual cells (above).

WIlliam explains the details of the Tesla battery to the group

Jeff Miller presents a plan to wire and install multiple charging stations at his house



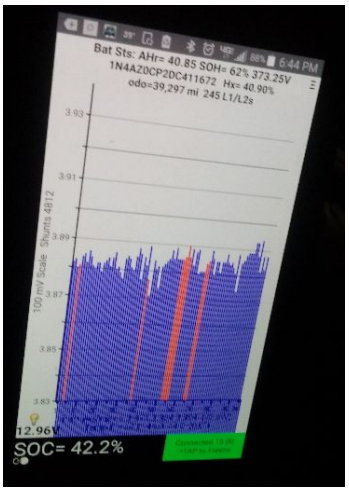
Mike Willuweit's i-Miev (above)

(Left Clockwise from bottom left)
Rich Carroll, Chris Sharp, Rich Hirschberg and Rob Schwartz engaged on EV talk.

LEAF Battery Work Session on 1/21/2017 Bruce Jones

Bruce Jones' 2011 Nissan Leaf being checked by Bob

Bob Baker doing some analysis on the batteries



Leaf Spy (free) and Leaf Spy Pro were used to check out the cells

Bob Baker (Bob's Hillview Auto in Lake Barrington) and Michael Bradley (Best Hybrid Batteries)

The Leaf was put up on the lift and undercarriage taken apart

Success! Car lifted off and Battery wheeled out from underneath

Smile kids! Uncle Ted is hoping you will be EVers some day, and commemorates the occasion

Let's see what Mike can do with this tired Leaf pack!

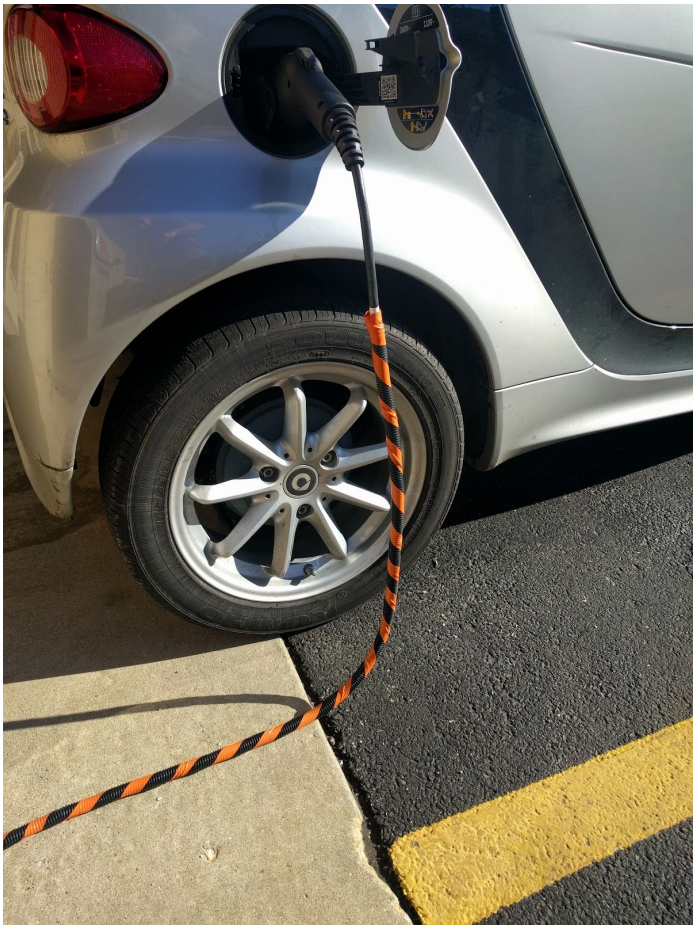
Bruce Jones' Leaf Battery Work Session on 1/21/2017 Ted Lowe

Background : Bruce Jones' used 2011 Leaf EV has range issues, so as as brainstormed at our Holiday party in December, this project was launched. I'm titling this project as: Investigation and repair of a range-limited Leaf EV battery pack.

It was AWESOME to be part of this work session! This is HISTORICAL for the FVEAA too… this is the first time to my knowledge that FVEAAers have "hacked" a modern OEM electric vehicle together!

Many thanks to all FVEAAers that attended and helped out, Bruce Jones the motivated owner of the "hacked" vehicle and and organizer of the worksession, Bob Baker for use of his shop space and his great knowledge and skills, Jeff Miller for being… well Jeff Miller and Michael Bradley for getting involved to take the Leaf pack to his business' shop to analyze, diagnosis and repair.

Fred Kitch in front of his Smart EV



Fred getting a charge with Bob Baker's innovative charge cable where he used black tape on the orange cable to show "warning: high voltage!".

Ted with his new used 2004 Prius in "work clothes" :)

Mike in his son's BWM i3 used for advertising, etc.

Bruce in front of his Leaf explaining how he happily made it to the work session with some range to spare. Thank goodness it was way warmer than average that day!

Bruce and Maureen pose in front of the “target” vehicle on a gorgeous January day!

Peaceful Sunny day for some EV “hacking” :)

Bob Baker showing his high-tech diagnostic tool with some EV-specific sections

Once Bob Baker got the Leaf up on the lift, Rich Rezny and Jeff Miller take a look at how the battery pack is attached.

Rich and Fred Kitch do some more reverse engineering.

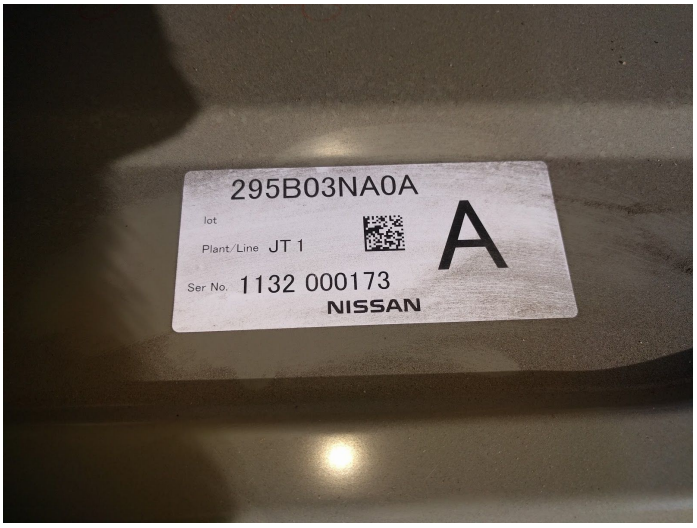
The primary ways the battery pack is electrically attached to the vehicle. The only other “connection” is a removable “safety plug” reachable from inside the vehicle which Bob had removed already before lifting up the vehicle.

More reverse engineering by Andy and Fred.

Bruce looks on as Bob's sturdy work cart holds the almost 800 pound battery pack. A series of bolts and ground-straps held the battery pack mechanically in place.

The cart was a great idea to hold and roll the battery pack from the lift into the vehicle for transport to the next location for analysis and repair. The white area in the top middle of the pack is where the previously mentioned "safety plug" mates.

Some more reverse engineering is possible with the battery pack out of place.



Battery pack identification tag for future reference as necessary.

Some discussion of whether to open the battery pack on site or wait until it arrives the “repair location”.

Battery pack warning label in two languages!

The high-voltage and control wiring that neatly runs between the vehicle and battery pack is exposed once the battery pack is removed.

More wire routing and cooling lines?

High-power and control wire connectors that were detached from the battery pack.

The battery pack and mini-van space were measured to make sure this LARGE HEAVY object would fit inside for transport to the “repair” location.

The battery pack fit with just inches to spare! Bob mounts a protective cushion to the electrical connection area for safe transport.

Michael Bradley uses his mini-van to transport the pack to his company (Best Hybrid Batteries) shop.

Bruce and Michael share a “work session accomplished” handshake of mutual gratitude!

One of the BIG reasons for EVs…. the Future of Humanity on Earth!

Jeff Miller noticed an “ominous” and kinda humorous warning light on the Leaf’s dash.

The light might as well say “WTF! My battery pack is missing!!!” :) Or “SOMETHING IS SERIOUSLY WRONG WITH ME!” :)

The FVEAA team safely rolled Bruce's powerless Leaf outside Bob's Hillview Auto for safe parking until its battery pack is repaired and reinstalled.

And of course the obliganal "group shot" of all FVEAAers that showed up to help out and learn.

The work session completed about 3:30pm, so it was about 2.5 hours in duration.

THANKS EVERYBODY for being part of this historical work session! i hope EVen more FVEAAers attend the next session. Please stay tuned for the announcement from Bruce.

Kind regards,
ted

https://www.facebook.com/FoxValleyElectricAutoAssociation

FVEAA Facebook Group - Join Us! — Ted Lowe

In October 2015, i created a Facebook group for the FVEAA and invited all the past and current FVEAA members i know that are on Facebook. There are 47 members so far. If you're on Facebook but not in the group, yet please join us! If you're not on Facebook yet, please consider joining so you can join our group there! This group will help to replace our forums because it is much easier to use, read, post pictures and videos and get notifications. Please let me know if you have any questions/comments/suggestions. Hope to see you there! https://www.facebook.com/groups/889497691136309/

Rich's Ramblings — Rich Carroll

It has been a while since we looked at how racing hardware has evolved and how this might start to translate to street driven transportation. Let me briefly look at some of the latest tech from the Formula 1 world, then go into current hardware from Formula E.

Need a new gaming PC for your home? Plan to spend upwards of $4,000 to get a 4.2 GHz processor (overclocked) with 32 GB of ram. It has eight processor cores. Liquid cooling needs to be built in. Compare that with the TAG-320 controller used by McLaren (a controller for each car), which has 4 processing cores and a processor capable of 4000 MIPS. The TAG-320 has only 8 GB of available where most gaming machines have 32 or 64 GB of total ram with slightly less useable.

The output on the gaming machine is 4 video ports, 10 USB ports, plus audio, etc. The TAG-320 controller has

- One Wired Gigabit Ethernet interface
- One RS232 interface (1Mbps maximum)
- One ARCNET interface (10Mbps maximum)
- One dual-channel FlexRay interface (20Mbps)
- 11 CAN interfaces (1Mbps maximum)

When we look at inputs, things become even more gastly. The gaming PC has the 10 USB and a couple of slots where special cards could be inserted (although not commonly used for inputs on gaming machines.) The computer from the Formula 1 car has the following inputs.

- Up to 66 general-purpose 0 to 5V analogue inputs (12-bit, 10ksps, four of which are software configurable as general-purpose TTL outputs)
- 16 general-purpose configurable 0 to 5V or Pt1000 analogue inputs (12-bit, 10ksps)
- Eight general-purpose configurable 0 to 5V analogue inputs with optional strong pull-ups for use with digital switches (12-bit, 10ksps)
- Four high-speed 0 to 5V analogue inputs (12-bit, 100ksps)
- "Pits pedal" and "Ethernet IP address" analogue inputs (12-bit, 1ksps)
- Three inductive or DHE speed inputs (factory configured)
- Eight DHE speed inputs
- Two K-type thermocouple inputs (12-bit)
- Two wide-band lambda interfaces (12-bit)
- Lap trigger interface
- Ignition switch input

So the two computers are not really analogous, but the Formula 1 computer is much more complex for inputs and outputs than any gaming computer you can configure at NewEgg or Fry's. By the way, TAG stands for Techniques d'Avant Garde, a private investment group in England which has long been a supplier to McLaren. TAG acquired the Heuer line of watches, timers, chronographs and more in 1985, creating TAGHeuer. TAGHeuer is a regular supplier to Formula 1 and many Formula 1 teams. TAGHeuer is on of the most known names in racing, and has been for thirty years, and Heuer before that. TAGHeuer is a division of Richemont

which owns several upscale watch companies, namely Baume & Mercier, Cartier, Chloé, Dunhill, IWC Schaffhausen, Giampiero Bodino, Jaeger-LeCoultre, Lancel, Montblanc, Officine Panerai, Piaget, Peter Millar, Purdey, Roger Dubuis, Shanghai Tang, Vacheron Constantin, and Van Cleef & Arpels.

While advances in Formula 1 have been significant, advances in Formula E have been astronomical, and much more pertinent to EV's. Battery pack voltage has been climbing in Formula E, currently at 670 V and going to at least 800 V by 2018. Formula E cars use three phase AC, which allows the inverters to run cooler. Heat in inverters is viewed as a horrible waste of energy. Inverters are silicon carbide (SiC) in the current incantation, and switch power up to 40,000 times a second (Hz) to power the drive motors. These SiC semiconductors are less than a ¼ inch thick, but handle hundreds of amps at better than 95 percent efficiency. The cost of a chipset for one inverter is upwards of $18,000.

There is little information available on current battery packs. McLaren did announce they would double the size of their battery packs from 28 kWh to 54 kWh. Buried in their press release was the information that temperature control is vital, as temps of 144 degrees Fahrenheit would destroy the pack, and they (as do all Formula E teams) use liquid cooling. McLaren is already planning for much higher voltages, since at higher voltage, you have lower amperage for the same power, which allows thinner wires and lighter components. This also means heavier duty cycles and faster recharging.

Some of the technical highlights of the current battery:

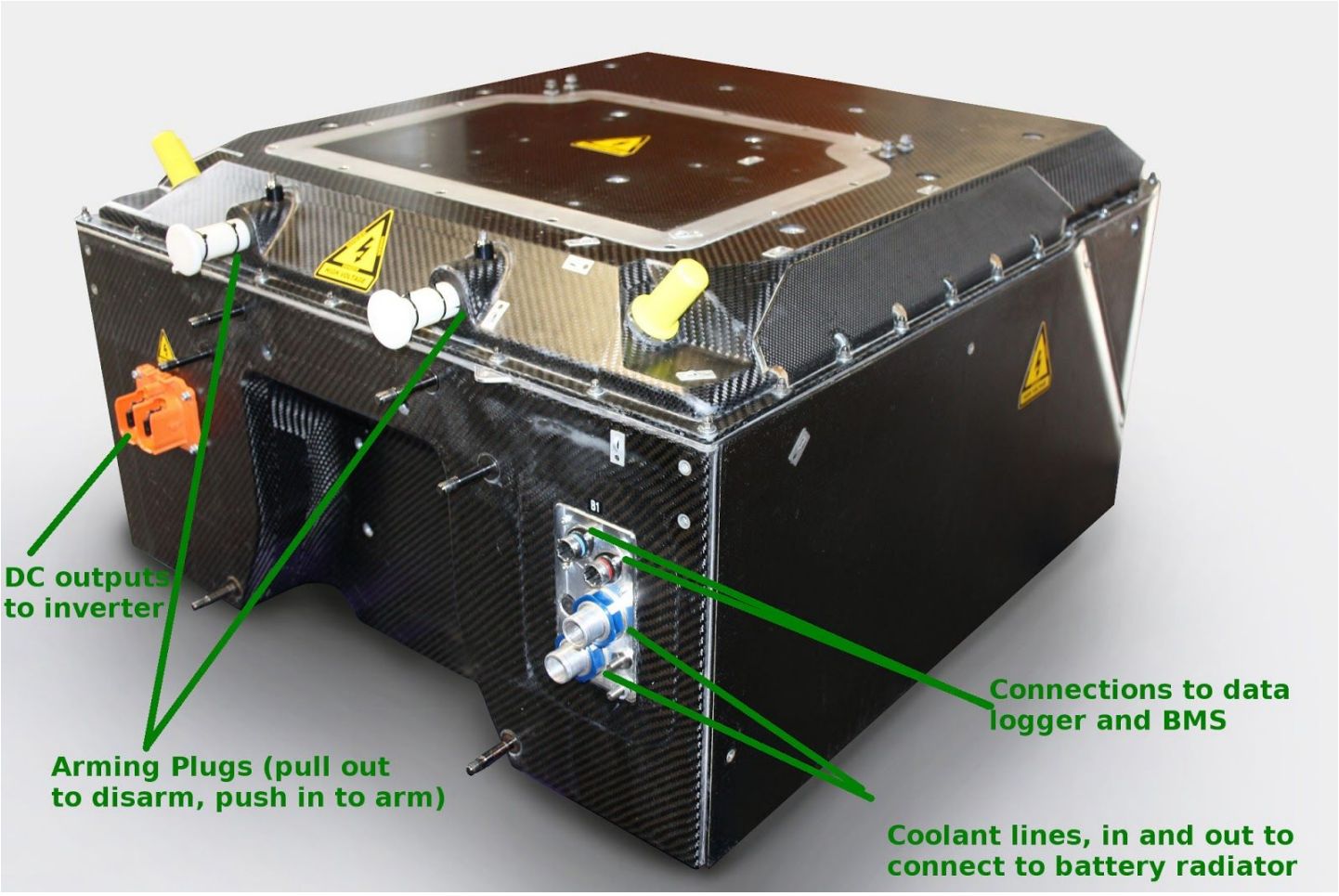
- 200 kg cell weight limit
- 1000 V max. bus
- 200 kW peak power limit
- 28 kWh maximum usable energy
- First battery to get an FIA crash test rating
- Need to get UN regulation 38.3 safe air transport for lithium-ion batteries certification. This is especially limiting to manufacturers wanting to do quick iterations on rechargeable battery pack designs. Any slight modification to the lithium battery pack design, or even just upgrading the individual cells requires a new license which takes time and costs upwards of $30,000.[1]

An interesting side note is the cost of a slight modification which means recertification for air transport exceeds the cost of the battery.

Here is a current battery, with notations about external connections:[2]

[1] https://batterybro.com/blogs/18650-wholesale-battery-reviews/33015107-formula-e-new-timeline-for-electric-car-battery

[2] Modified from https://s3-eu-central-1.amazonaws.com/centaur-wp/theengineer/prod/content/uploads/2014/09/16104400/Formula-E-Battery.jpg



Formula (both Formula 1 and Formula E) are monstrous cash investments, but should significantly accelerate new developments which can translate to street use. We live in interesting times.

Membership Update

Ted Lowe

We currently have **68 active paid-up** members, **UP** 4 from last month! Please renew folks!

FVEAA Membership Report
as of 2017-02-13 04:58:04

Count of Members by Type

Membership Type	Count	Paid Up
BusinessStd	2	2
Family	7	7
Individual	57	56
LifetimeInd	3	3
Totals	69	68

Other Statistics

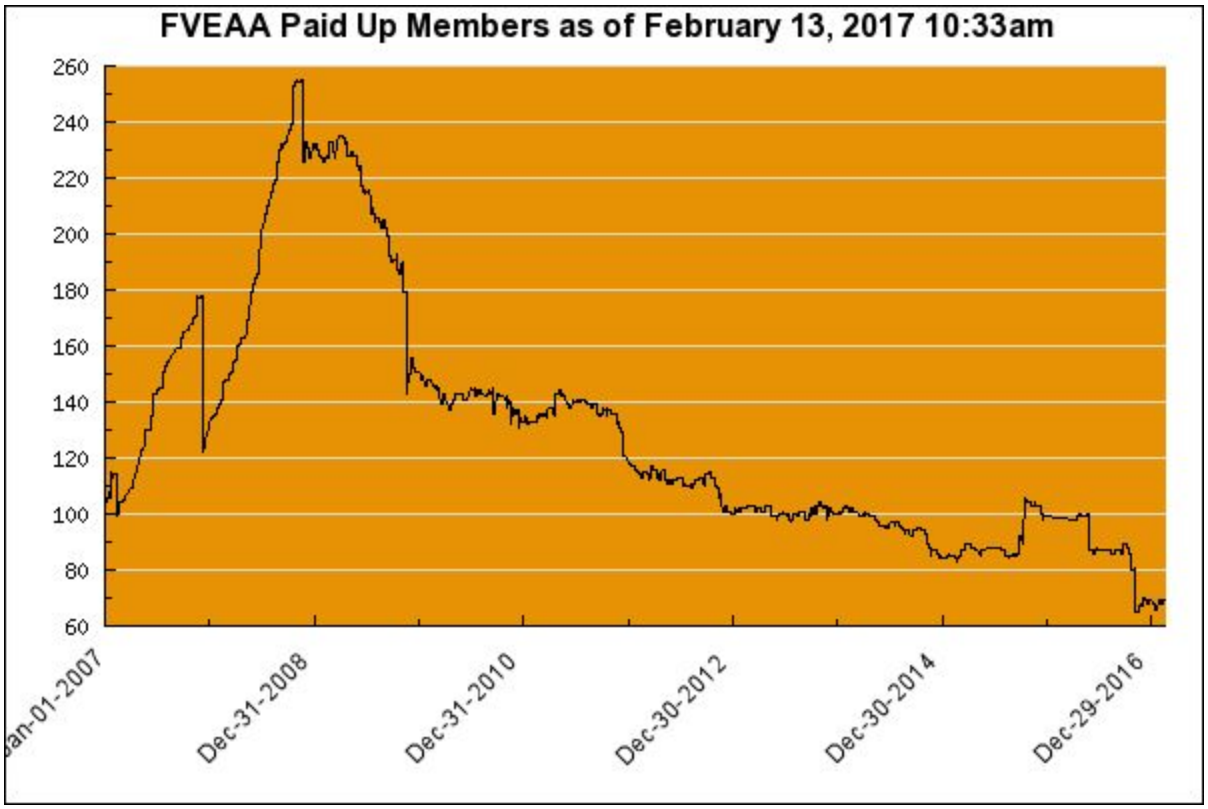
Statistic	Value
% Paid Up	98.6%
Avg. Paid Up Days	212.3 days
% With Email	94.2%

Encouraging Our Membership To Grow in 2017 and Some History

Ted Lowe

We live in a large metro area with 8 million people and EVs are the latest buzz so we should be able to grow the FVEAA! **Please invite your friends, neighbors, family, colleagues**, etc. to FVEAA meetings and EVents. Volunteer to attend EVents on behalf of the FVEAA (with or without an EV)! Your ideas on how to help grow the FVEAA are welcomed at anytime, thanks! Howard Hansen had a **great idea**… giving an FVEAA membership as a gift!

Here is a time-varying graph of our membership size from 2007 to now. Note that we peaked at about 255 members in the Summer of 2008 when gas was nearing $5 per gallon. We were also attending lots more invitational EVents with our EVs. **Let's get out there and grow the FVEAA in 2017!!!**



Membership Renewals

Ted Lowe

Our membership system sends out "renewal reminder emails" before your membership is due. You will receive up to 3 before being marked "not renewed" (inactive). The sooner you renew, the fewer emails you will receive :)

So please pay attention to your email from the FVEAA and renew online using this link (for the easiest approach for all of us):

http://www.fveaa.org/renew

THANK YOU for your continued support of the FVEAA!

Meeting Minutes - Jan. 20, 2017

Bruce Jones

Here are the minutes from our January meeting

6:30 Doors open
7:05 Welcome Introductions from Mike Willuweit
7:15 William McDaniel presented on his BMW EV conversion with Tesla battery pack cells

- William discussed many facets of Tesla batteries, boards,
- He has a blog on the BMW 325i EV Bimmer
- http://evbimmer325i.blogspot.com/
- Brought to the meeting a Tesla 5.3KW battery pack that costs around $1100
- An entire pack is available at around $18k
- He went through many component features, Chips, manufacturers and part numbers
- EV Bimmer is the shell LLC to sel adapter plates for warp 9
- Provided Rough formula for determining Watt hours per mile is divide the car weight by 10

Break
8:15 Club news and business.

- Mike Willuweit discussed leased electric Rav4 EVs
- Rich Hirschberg talked a few minutes about outreach events for this year

8:40 Jeff Miller presented his high power plans to install four EV home charging stations

- Charging is most efficient at full power if possible, though there may be a trade off in terms of battery life.
- Have you lost your mind? He wants 75 + 75 + 35 + 35 = 220 amps continuous
- May use OpenEVSE charging station and use their API application programming interface
- Juicebox units can talk to themselves and Internet but open EVSE provides additional flexibility
  His presentation included
- Plan, how do I wire this up
- Circuit breaker boxes – looking for 400 amp but hard to find so will have 2 x 200 amp circuit breaker boxes
- Main breakers have to be close to the meter
- Manage 2 pairs of charging stations 400 amp split to two 200amp connections
- Plan - what materials do I need (big stuff
- He has acquired a large amount of wire, conduit, circuit breaker boxes, tools, disconnects
- And will have some heavy gauge wire left over

  Bob Baker is having a Leaf battery working session tomorrow 1/22/2017 at his auto shop to analyze Bruce Jones' 2011 Nissan Leaf and take the battery out for analysis by Michael Bradley.

Meeting Adjourned at 9:30 p.m.

Membership Form *Ted Lowe*

FVEAA Membership Application Form - Version 2014-01-01

Name:_____
Address:_____
City, State Zipcode:_____
Phone:_____ Phone Type: Home ___ Work ___ Cell ___
Email:_____
Please check one: New Member _____ Renewal _____

How did you hear about the FVEAA ? _____

Membership Types and Annual Dues (please circle one):

Individual	$20
Business	$100
Premier Business	$250
Charter Business	$500

Newsletter Delivery Type (please circle one): No Newsletter Electronic

Please make checks payable to "FVEAA" and postal mail it with this membership application form to:
FVEAA
PO Box 214
Wheaton, IL 60187-0214
Attn: Membership

FVEAA Business Members

Elevate Energy
Mary Jo Warskow
300 S Green St, Suite 300
Chicago, IL 60607
Phone: 773-922-3018
Web: hourlypricing.comed.com

NetGain Motors, Inc.

Exclusive worldwide distributor of WarP™, ImPulse™, and TransWarP™ electric motors for use in electric vehicles and electric vehicle conversions.

WWW.GO-EV.COM

800 S State St. Suite 4
Lockport, IL 60441
630.243.9100

Best Hybrid Batteries
Only The Best

Michael Bradley
18600 IL-59
Shorewood, IL 60404
Phone: 708-669-9402
Email: besthybridbatteries@gmail.com
Web: www.besthybridbatteries.com