Niagara ARES

November 5, 2017

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Special points of interest:

- Niagara ARES Newsletter will be published periodically and emailed to ARES members in the Niagara Region. / Website: www.aresniagara.ca
- Niagara ARES CEC is Henry, VA3OV.
- Contact Henry at: va3ov@bell.net.
- Newsletter prepared by Geddie, VE3CJX.
- To unsubscribe from this newsletter, contact Geddie at ve3cjx@cogeco.ca
- Niagara ARES Net every Monday 8:00pm VE3RAF.

Contents

This weekend Eastern Ontario has seen larger amounts of rainfall than normal, flooding many localities. Also high winds and rain produced power outages in western Quebec. More than 50,000 people were affected. Yes, Mother Nature is knocking at our doorsteps.

The Niagara ARES group held their annual **SET Exercise on Saturday October 28**th. The following members participated in the exercise: VE3EQV,VE3KVE, VE3RNF, VE3NDW, VE3CJX, VE3WM, VE3OQP, VE3XC, VA3OV. The emphasis was on **digital message transmissions** from various locations throughout the region, including hospitals and shelters. Voice messages were shared between locations. We practiced sending messages using **Winlink Packet using P2P direct and via digipeater. IMS 213 forms on Outpost** were also used leaving messages on PBBS for later retrieval. It was a busy morning. Mission accomplished. By noon we packed up our gear and returned to our respective QTHs.

As usual, I have a tendency to accomplish too much with a limited amount of personnel. Proper communication procedures where left by the way side in the heated moment. The exercise demonstrated our weaknesses and strengths. A cross band **repeater at the Welland and Fort Erie Hospital** may have prevented some of the delayed communication between the field stations and the packet digipeater station. The net control station may need to concentrate on the proper flow of information and direction between each station.

I am proud of the members of the Niagara ARES Group, their dedication to the community. It will require constant dedication on our part to continue our learning process through training. NPARC and Niagara ARES members were involved in many public service events this year. These have been a great opportunity to demonstrate our communication skills to the event organizers and the participants. In the long distance events like the **Marathon**, **Ride for Roswell, Cycling for Kids**, participants are happy to see us at a road intersection, or along the road course among the corn and soya fields. They are not alone anymore. Help is not far away when needed.

During the **Cycling for Kids** event on the 160 Km and 245 Km, I had the opportunity to meet and talk to some of cyclists. They experience a lot of pain and exertion. These routes demand a lot of effort. They are not all crazy racers that dedicate their life to sports. Many were fathers, mothers, family members whose child was affected by cancer. **Many had a picture of a child attached to the handle bars.** In a moment of weakness, they would look and regain strength to continue to the finish line.

We have a small role to play when volunteering at these public service events but we are part of a bigger picture. We are getting involved in our community. We are mixing our hobby with volunteering in our community. Consider this, when we ask you for your participation in the future: **"WHAT I HAVE DONE TO HELP, TO GET INVOLVED?"**

On a lighter note: **Santa Claus is coming to Niagara Falls on November 18th. We need a few more volunteers for the parade.**

At the upcoming November 15th ARES meeting we will cover: IMS213 message form handling; **Winlink and Outpost** configurations; as well as a demonstration of Signalink as a TNC for VHF use.

If you would like to present on any topics at this meeting or any other meeting, please contact me with all pertinent information. We are always looking for new subjects to keep our meeting interesting and lively.

Meeting: November 15 at 1900H
Niagara Police Regional Headquarters, Community Room
5700 Valley Way and Stanley Ave.
Niagara Falls.

Thanks 73

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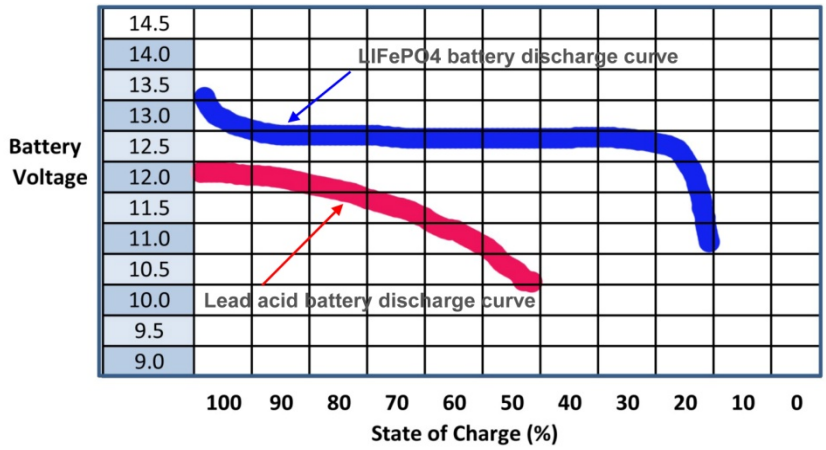
Read on: A better emergency/backup battery by Denis, VE3KVE

When we're looking for a suitable type battery for emergency or backup power for our radio equipment, we have generally stayed with the lead acid type battery because (a) reasonable cost and (b) they are readily available. However, they are large and heavy and carry a string of maintenance tasks. When using one as a power source for ARES use, transporting one and constantly keeping them ready for emergency service can be a real headache. My comments about regular lead acid batteries apply almost as much to the SLA (Sealed Lead Acid) type batteries. SLA batteries are also heavy, have critical maintenance requirements, but at least are completely sealed against acid leakage. We are now in a technological transformation with battery power - the latest lithium type batteries are far superior to any lead acid battery. I'm thinking in particular of the Lithium Ferrite Phosphate ($LIFePO_4$) battery. Here are some comparison points between lead acid batteries and $LIFePO_4$ batteries.

Lead acid	Big & heavy
$LIFePO_4$	50 to 70% smaller & lighter
Lead acid	Can use only 50% of available capacity before its voltage drops to an unsafe level. Discharge curve drops steadily.
$LIFePO_4$	Can use > 80% of available capacity. Discharge curve is constant until the maximum discharge point is reached. (This advantage all by itself could obviate any need for a Battery Booster dc to dc converter - saving approximately $200.00). Battery boosters take any voltage source between a pre-determined minimum (can be selected but should be at or above the safe level). A dc to dc converter converts the output voltage to 13.75 volts. I should mention though that the $LIFePO_4$ battery will maintain a close to constant voltage, but it will be around 12.4 volts, not the 13.75 volts that a battery booster would supply. The graph below shows how the voltage of a lead acid battery drops as it is discharging. On the same graph is the voltage discharge rate for a $LIFePO_4$ battery.

Discharge rates for lead acid batteries compared to $LIFePO_4$ batteries



Lead acid	Battery life is typically < 500 cycles and three years
$LIFePO_4$	Typically > 3,000 charge cycles and ten years, a shelf life that far exceeds the service life of other batteries.
Lead acid	Self discharge requires periodic recharging even without a load.
$LIFePO_4$	Virtually no self discharge.
Lead acid	Discarding old battery is environmentally toxic.
$LIFePO_4$	Chemicals are "green" and non-toxic.
Lead acid	Have acid that is subject to spills. Regular (non sealed lead acid type) must always be kept upright. Can generate hydrogen gas if over charged.
$LIFePO_4$	Are completely sealed, so can be stored and used in any position. They are inherently safe, and use stable chemical compounds. (Cell phones and other lithium battery powered devices use Lithium Cobalt Oxide ($LiCoO_2$) chemicals - a different animal entirely). $LIFePO_4$ batteries are thermally and chemically stable without the possibility of fire or explosion.

Lead acid batteries also require very careful attention to ensure (a) safe operation and (b) long life. The battery should be in a plastic box with a plastic lid (ventilated). Working around it with the top exposed and with metal tools is an accident waiting to happen. The typical lead acid battery can pump several hundred amps if the terminals are shorted. Keep wedding rings well away - a wayward screwdriver and a gold wedding ring accidentally touching the battery terminals could make that ring glow red hot in a fraction of a second!

There are negatives related to $LIFePO_4$ batteries, the biggest concerns are cost and availability. Cost is at least three times more than a deep cycle lead acid battery. (Note that total life cycle cost is approximately the same or even lower than a regular lead acid battery when you take into account that $LIFePO_4$ batteries will outlast lead acid batteries by at least a 4 to 1 ratio).

Also, try finding a source of $LIFePO_4$ batteries here in Canada. I recently searched for a Canadian supplier with no success. I finally bought one from Bioenna Power, based in California.

(https://www.bioennopower.com/collections/12v-series-lifepo4-batteries).

They have a terrific reputation for both starter and deep cycle $LIFePO_4$ batteries of all sizes. I bought a 12 volt, 15 Ah deep cycle version complete with special 4 Amp charger for $169.99 U.S. However, shipping costs amounted to $44.99 U.S. via UPS Ground. (The U.S. does not allow the transport of lithium batteries by air). I was also charged brokerage by UPS. The total cost was substantial.

This battery weighs only 4.3 lbs. (1.9 kg.) The size is 5.5 in. X 4.3 in. X 3.2 in. (137mm x 77mm x 78mm). It has a maximum continuous discharge current of 30 amps and comes with Anderson Powerpole connectors. Despite the upfront costs I'm really pleased with this battery. I have recently designed and built a Go-Kit and this new battery is firmly attached inside.

LIFePO$_4$ 12 volt 15Ah battery P/N BLF-1215A

This particular Bioenna 15Ah version is just one of a number of sizes in the deep cycle series (LFP) ranging from 3Ah up to 40Ah. A Google search will list many other LIFePO$_4$ battery sources (in the U.S.) and a range of sizes.

A very big factor with any battery, but especially with the lead acid type, is to ensure that when in use the discharge does not cause the battery voltage to drop below defined limits. e.g. for lead acid type this is around 10.5 volts. If the battery is allowed to continue supplying current and dropping the voltage below 10.5 volts, then the battery life could be much reduced. I recommend buying a digital voltmeter and checking the battery voltage accurately and regularly. Small, low cost (but accurate) digital voltmeters are readily available on the Internet. They cost less than ten dollars and could save you from damaging or shortening the life of your battery.

Also, with lead acid batteries the self discharge rate means that if the battery is not in use, it must be periodically charged. This can be accomplished with either a trickle charge, or by using a regular charger approximately once a month, making sure that you disconnect the charger once the voltage has risen into safe limits. (Over charging is also a good way to damage a battery).

In comparison, a LIFePO$_4$ battery can be safely stored for a year or more without any ill effects. However, the rule about ensuring that a LIFePO$_4$ battery does not drop its voltage too much also applies. Also, LIFePO$_4$ batteries require special consideration when charging. LiFePO$_4$ batteries need two steps to be fully charged: step 1 uses constant current (CC) to reach about 60% State of Charge (SOC); step 2 uses constant voltage (CV). This kicks in until each cell attains a voltage of 3.6 volts (14.4 volts for a nominal 4-cell 12 volt battery). The charging voltage should be maintained around 14.4 volts. Most LIFePO$_4$ battery suppliers sell suitable chargers as a special deal when buying the battery. In my case I paid $20.00 to get a 4 amp LIFePO$_4$ battery charger when I ordered the battery.

In conclusion I am positive that as Amateurs involved with ARES Emergency preparedness, we will in time switch away from lead acid and SLA batteries and use the LIFePO$_4$ deep cycle type instead. As this type of lithium ferrite phosphate battery matures, the costs will drop, making them more affordable. The dramatic move towards electric powered vehicles has triggered hugely expensive research into improved battery technology. I suspect that we'll see some amazing progress in battery design. This is all good news for us Amateurs looking for better emergency/backup power, Building and maintaining a reliable and long-life battery system for our shack or for emergency readiness requires some smart decision-making from the get go. The extra money invested upfront will be repaid many times over.

This is one of a series of articles I am writing on the subject of power sources for emergency readiness and backup purposes. I am not an expert in this; nor am I a professional engineer, so I present these thoughts on a strictly personal level. You'll need to verify for yourself that what I have written is useful to you. All the above is offered without any guarantees or promises. Just Enjoy! 73 Denis, VE3KVE, November 1st. 2017.