

STATIC



May 2007

BATTERIES

Alan Applegate (K0BG)

There seems to be a lot of misunderstanding about batteries in general, which isn't surprising considering the myriad of types. Amateurs regularly use lead-acids, NiCads, Li-ions, Alkalines, and even the lowly carbon battery. Far too often, the type selected isn't the most apropos for the application in question.

To further narrow things down, there is just one type (electrolyte-wise) which will be discussed here, and that is the lead-acid. The main thrust is backup power, but with a dose of mobile radio tossed in for good measure. However, before we get too far into the subject, we need to know a few common battery terms.

COMMON TERMS

AGM: This stands for *Absorbent Glass Mat*. Almost by definition, an AGM battery incorporates spirally wound plates, rather than flat plates like those used in a nominal vehicle battery. The electrolyte is gel-like rather than a liquid, so mounting position is not critical. In fact, they can be used upside down! Under nominal use, the battery does not outgas (the gas is absorbed by the mat) so it can be used in enclosed areas such as a trunk or closet. They do not require any routine maintenance, and typically out-last a standard vehicle battery by two or three times.

BCI Group Size: This term comes from the Battery Council International which describes the internal size of a lead-acid battery. [Here](#) is a list of them.

BlueTop: This is a registered trademark of [Optima Batteries](#) for their line of AGM batteries designed for marine applications. [Exide Batteries](#) have a similar color scheme, as do other manufacturers.

CA: The term stands for *Cranking Amps*. It is a measure of the number of amperes a lead acid battery at 32 degrees F can deliver for 30 seconds, and maintain at least 1.2 volts per cell, or 7.2 volts for a nominal SLI vehicle battery. Repeatedly abusing a battery in this manner will drastically shorten its life.

CCA: The term stands for *Cold Cranking Amps*. It is an industry rating which measures the cranking power a battery has available to start a vehicle's engine at 0 degrees F, for 30 seconds, and maintain at least 1.2 volts per cell. Repeatedly abusing a battery in this manner will drastically shorten its life. (cont. pg 3)

LBARA MEETING SCHEDULE

MONTH	BOARD	REGULAR
MAY	NOTE: BOARD	5/17
SEPTEMBER	MEETINGS WILL NOW	9/20
OCTOBER	TAKE PLACE ONE	10/18
NOVEMBER	HOUR PRIOR TO THE	11/15
DECEMBER	REGULAR MEETING	12/20

EMERGENCY COMMUNICATIONS

(From The AZ Section News Summary - May 7th)

Well, we are almost at a milestone on the database. We took the system live in June last year, and we are still seeing a steady stream of new sign ups.

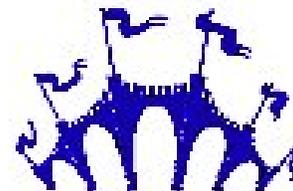
Our system is just under a year old, and we have about 350 registered operators. My goal for this year is to pass 500 registered operators. I would like to see more activity from the rural counties too. I have only 5 operators each in Yuma and Gila counties and 18 in Cochise which is my most active county for emergency operations. It's not a novelty anymore, it's a real, secure and robust system. Did you know that in the past year operators around the state have logged more than 3300 hours on Public Service Events, 1100+ hours on drills, and 150+ on actual emergencies? Pretty amazing statistics! Keep up the good work.

The wildfire season is knocking at the door. When traveling or camping, be careful and aware of your surroundings. Know more than one way in and OUT of remote areas. Keep your radios charged and go pack ready, you might get the call.

Rick Aldom - W7STS SEC Arizona natecf@gmail.com.

Monday Night Net (7 PM)

System	Location	Freq	Offset	PL
MCARS	Bullhead City	145.27	-	131.8
	Kingman	146.76	-	131.8
	Kingman	448.25	-	131.8
	Lake Havasu	146.62	-	131.8
	Willow Beach	147.12	-	131.8
CRRRA	Lake Havasu City	146.96	-	162.2
	Lake Havasu City	224.24	-	156.7
	Lake Havasu City	146.64	-	156.7
	Lake Havasu City	449.95	-	141.3
BARN	Lake Havasu City	447.54	-	136.5
	Las Vegas, NV	449.95		136.5
	Onyx(Palm Springs)	449.34	-	136.5
	Orange County, CA	447.54	-	100



Deep Cycle: No doubt the most misunderstood term with respect to lead-acid batteries. No matter the design or application, any nominal 12 volt lead-acid battery is considered discharged when the voltage under load drops below 10.5 volts. Discharging one below this point will drastically reduce its service life; deep-cycle-designs, notwithstanding!

Flooded: The term *flooded* refers to the fact the electrolyte is a liquid (nominal 12 volt vehicle battery). They outgas during charge and high current use, so they must be located in a well-ventilated area, and they must be kept upright. Incidentally, the outgas is primarily hydrogen, and is explosive in nature, so keep the open flames and lit cigarettes away. Flooded, lead-acid batteries may or may not be maintenance free. Abuse one, and even a maintenance free battery will require service.

Lead-Acid: The term lead-acid refers to the fact the plates are made from lead. The acid is sulfuric acid, and very corrosive. Splash some in your eyes, and you can receive permanent vision damage! Ingesting even a small amount will cause serious health problems. This is the reason shop rags are colored with a special dye which changes from red to blue when exposed to sulfuric acid.

Life Cycle: Every rechargeable battery has a finite number of times it can be charged. The number varies with the quality of the battery, plate design, how deep (voltage wise) the discharge, mean temperature, and about a dozen more factors. The supplied warranty (from 12 to as long as 84 months) takes these factors into account. It is a way of expressing MTBF (Mean Time Between Failure).

Marine: This term is here for a reason. Marine batteries have a very specific use, and are not the battery of choice for ANY amateur application. More on this later.

RedTop: This is a registered trademark of [Optima Batteries](#) for their line of AGM batteries designed for SLI applications. [Exide Batteries](#) have a similar color scheme, as do other manufacturers.

RC: The term stands for *Reserve Capacity*. It is the length of time (in minutes) a nominal 12 volt lead-acid battery can deliver 25 amps at 80 degrees F, and maintain a voltage of at least 10.5 volts. Typically used as a measure of how long the battery will last if your alternator fails, it is a good indicator for us amateurs. Once again, 10.5 volts, while under load, is considered a 100% discharged state!

SLI: This stands for *Starting, Lights and Ignition*. In other words, a nominal vehicle battery. It may be flooded or an AGM, and in most cases nowadays, maintenance free.

YellowTop: This is a registered trademark of [Optima Batteries](#) for their line of AGM batteries designed for RC applications. [Exide Batteries](#) have a similar color scheme, as do other manufacturers. They are a dual-purpose battery. They excel in RC applications, but can be used in SLI applications if sized appropriately.

Applications

Lead-acid batteries offer a lot of bang for the buck whether the application is vehicular, marine, backup power, or what have you. The problem arises when you purchase a battery for a perceived benefit, and that perceived benefit doesn't exist! As stated above, one of the most misunderstood terms is *Deep Cycle*. We have the batteries companies to thank for this misunderstanding.

Just in case you missed it, any nominal 12 volt, lead-acid battery is considered discharged when the voltage, under load, reaches 10.5 volts. Repeatedly discharging one below this level will reduce its life. How much depends on several factors. Let's take an average case. (cont. pg 4)

The SLI battery in your vehicle will usually last about 40 months (average *Life Cycle*). Less up north where it is cold, and less in the south where it's really hot. Discharge one to 10.0 volts each and every time you use it, and the Life Cycle drops to about 4 months, perhaps less. Discharge one to 9.0 volts each and every time, and the Life Cycle can be measured in days!

So what's the difference between an SLI and the mythical *Deep Cycle*? An SLI battery is designed to deliver the large amount of current needed to start your engine. The demand length is short; less than 30 seconds, and typically just 3 or 4 seconds. Once the engine starts, it is the alternator that is supplying the necessary current. The battery then acts as a buffer when the alternator's output is low; at idle for example. What it is not meant to do, is act as a long-term, reserve-capacity (*RC*) battery.

For some unknown reason, a lot of amateurs select a marine style of battery for their RC applications. Perhaps it's the fact that most models have both posts and screw terminals. However, the fact remains, marine batteries are not meant to be used in reserve-capacity applications; emergency station power for example.

So what are they designed for? A marine battery is designed to sit for long periods of time without being periodically charged, and still maintain enough reserve to start the boat's engine. Due in part to their low internal resistance, some marine batteries will maintain 80% of their charge after sitting 12 months or more (assuming the storage temperatures aren't extreme). While a lot of them are used as long-term, reserve-capacity (*RC*) batteries, it isn't the battery of choice for this application.

So what type of battery should I use for standby power? The simple answer is, one designed for long-term, reserve-capacity use. As stated above, the term *Deep Cycle* (sometimes referred to as *Deep Discharge*) is a misnomer. It doesn't make any difference what lead-acid design we're speaking of, none of them can be discharged below 10.5 volts if we expect a decent Life Cycle (several years, say).

The YellowTop (and similar batteries from other manufacturers) are specifically designed for long-term, reserve-capacity (*RC*) use. The best way to explain this is to compare a similarly sized (in this case a BCI 24), and grade (Life Cycle) of a Marine, an SLI, and a RC battery in an amateur application. Assuming a continuous draw of 25 amps, a marine battery will reach its 10.5 volt level in approximately 80 minutes. An SLI in about 100 minutes. An RC takes about 120 minutes.

Let's look at the other end of the equation. Assuming the same batteries as above, an SLI will deliver about 1,000 amps for 30 seconds, a marine for about 20 seconds, and an RC battery for only about 15 seconds.

It should be apparent there are batteries designed for each of these specific applications. While ampere hour ratings for any given BCI size are similar, their performance in any one application is, well, specific.

Charging

Contrary to popular belief, there isn't one correct way to charge a lead-acid battery. Here is what [Exide](#) recommends. For more specific information, check their web site.

Constant Voltage Recharge: Appropriate for infrequent cycling use. Voltage set-point: 14.6 volts. Current limit: 20% of nominal capacity (15 amps for most Orbital sizes). Recharge time: 8-18 hours or when current reaches < 2% of capacity (1.5 amps)

Float Charging: Appropriate for back-up power and UPS applications. Current limit: 20% of nominal capacity (15 amps for most Orbital sizes). Voltage set point: 13.8 volts (2.30 volts per cell)

(cont. pg 5)

UPCOMING ACTIVITIES AND HAMFESTS

June 2 - 2007 White Mountain Hamfest, Show Low, AZ

June 2—2007 Yavapai Amateur Radio Club Swap Meet, Granite Mountain Middle School, Prescott, AZ, http://www.w7yrc.org/swap_meet.htm

Jul 6-8 - 2007 Arizona State Convention, ARCA, Williams, AZ, <http://arca-az.org/ARCA>

IUI or Constant Voltage/Constant Current/Constant Voltage Recharge: Appropriate for more continuous cyclic discharge/recharge applications. Step 1: Maximum current limit of 20% of nominal capacity (approx: 15 amps), and voltage limit of 14.4 volts. Step 2: Hold at 14.4 volts until recharge current reaches 2% of nominal capacity (1.5 amps for most Orbital sizes). Step 3: Hold current at 2% of nominal capacity (1.5 amps) for 2 hours. Discontinue charge if battery reaches 50 C (122 F)

Fast Charging: Appropriate for emergency boosting only. Maximum Current limit: 30 amps. Maximum time: 1 hour. Limitation: Not recommended for deeply discharged batteries. Use Constant Voltage Recharge instead.

Trickle Charge (Maintenance Charge): Appropriate for charge maintenance during periods of extended storage. Current limit: 2.% of nominal capacity (1.5 amps for most Orbital sizes). Charge voltage on point: 13.08 volts. Charge voltage off point: 14.4 volts.

A great web site to learn about charging methods <http://www.mpoweruk.com/chargers.htm> is www.mpoweruk.com/chargers.htm. It's from M Power in Australia, and it explains the charging processes in a great detail. The site also has information on other types of batteries like Li-ions and NiCads.

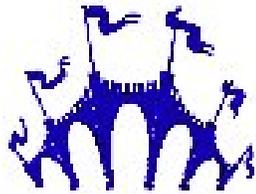
This M Power [page](#) includes a discharge voltage chart comparing the various, commonly used batteries. Makes you wonder why SLI batteries aren't Lithium Ions. However, if you read further down the page, you'll discover why they aren't used in SLI applications. The point being, each and every application has a specific type best suited to it; a point worth repeating and remembering!

Stay Tuned For The Next Issue

Mobile Applications, Battery Boosters and More

FOR SALE/TRADE

ALINCO DX70 MOBILE TRANSCEIVER - 100 w, 166-6m, CW filter, Removable Face Plate, Jim Varner, AE6N, 680.7259



The new Arizona ham radio callsign plates are now available. Check out the website at:

<http://www.azdot.gov/mvd/vehicle/mvdplate.asp>

VE TEAM BUSY AGAIN

Ed Gillespie, AB7EM, and his VE Team are proud to announce two more new Technicians. Jim Faulkner and Carl Shiller passed their tests on April 27th. Jim already has his application for membership in LBARA and Carl will try to make the May meeting (he takes off for the summer).

If you know of anyone interested in taking their exams, give Ed a call: paradice@rraz.net

LBARA MEMBER HELPS RESTORE A LAKE HAVASU LANDMARK



Lee St Clair, W7AZ, and regulars from the forum, WWW.HAVASUTALK.COM, recently got together with their time and money to help restore the giant flag located on Industrial Avenue. Next time you look up at that flag, thank Lee and this group for their patriotism and hard work.



LBARA AUCTION A HUGE SUCCESS

The auction of donated equipment held during the April meeting was very successful. A total of \$448.25 was generated. Additionally, the Japan Radio transceiver was sold on eBay, bringing in another \$1,200 to our treasury.

We all owe a great big thank you to Lee St. Clair, W7AZ, for his auctioneering expertise. Watching him in action you could see that he could sell anything to anyone. (Hummmm...wonder if I could get him to sell insurance for my business?....editor)

You Might Be A Ham If.....?

You've looked at the cordless phone and wondered if you could tweak it over to a ham band.

Your call sign shows up on your business cards.

You ever loaded up something strange like your bedsprings or gutters.

Your teenager refuses to ride in your car because it looks like a porcupine

Your teenager thinks all your friends are weird.

Your XYL refuses to ride in your car because all the radios give her a headache.

You have taken a radio to work just to see how you get out or to use during a lunch hour.

You've ever figured out how long a slinky really is.

LBARA OFFICERS AND DIRECTORS

Cliff Baril	President
Bob Gilbertson	Vice-President
Reiner Schick	Treasurer
Sharon Fisher/Lyle Sibbald	Secretary
Dick Jernigan	Director (1 YR)
Mike Burson	Director (1 YR)
Jim Gould	Director (2 YR)
Jerry France	Director (2 YR)
Russ Nyblom	Sgt-at-Arms
Dave Holm	Web Master
Jerry France	Static Editor

VISIT OUR WEBSITE

www.lbara.net

FROM THE EDITOR

If you have anything you would like to see included in these issues, please let me know. I'm always looking for articles, news items, construction articles, or anything that might be of interest to our readers. You can contact me at 928.855.7941 or email at grf@unedspeed.net or francej@ajsinsurance.com.

L.B.A.R.A

P.O. BOX 984

LAKE HAVASU CITY

ARIZONA 86405

STATIC

ATTENTION READERS

Please note that this issue represents a “work-in-progress” and there are a number of changes to be made in subsequent issues. I would greatly appreciate your comments, both good and bad, as well as any suggestions for future issues. This issue also begins our first attempt to deliver the **STATIC** to your doorstep electronically. Please keep me abreast of any email address changes you may have and I promise to have this delivered promptly and accurately. Also, I still have a number of articles awaiting publication and will do so in the future. This is your newsletter, so keep the articles, letters, and pictures coming. I can be reached at home (855.7941), at work (855.3081) or via email at grf@uneedspeed.net .

EQUIPMENT FOR SALE

EDITOR'S NOTE: List your items for sale here. Ham radio related only, please. Include a picture if you like (please use a jpg format). Email all to me at grf@uneedspeed.net along with your name and phone number.

