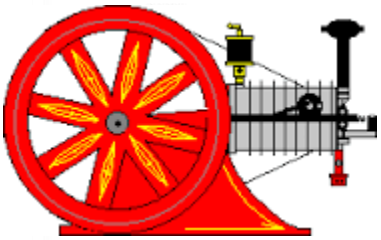
The Line Shaft

The Official Newsletter of the

NORTH JERSEY ANTIQUE ENGINE & MACHINE CLUB



April 2020

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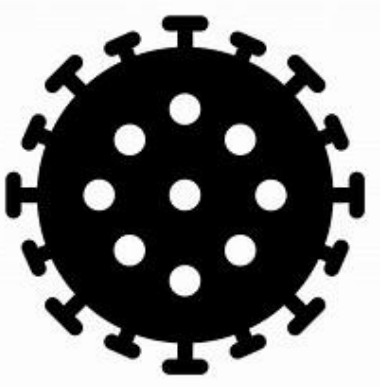
Founded on October 15th, 1979 by: Arthur Goble, Fred W. Westbrook, John Snook, Roy Bischoff & Lewis Quince



March 26th meeting CANCELED!

Coronavirus Pandemic

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Please patronize them and encourage your friends and family to do the same!

Our next meeting is on April 9th at the SHED!

Our Web Address: njaemc.org

67 Branchville Lawson Rd., Newton NJ 07860

Lead Acid Battery Info!

A battery is like a piggy bank: If you take out more than you put back, soon you will have nothing!

- The commercial use of the lead-acid battery is well over 100 years old. Ben Franklin coined the phrase "battery" in 1795 to describe a series of electrical sources coupled together and working in unison (from a battery of guns). Common usage has erroneously evolved the word to include a single cell battery. The same "chemical principal" is still being used to produce and store electrochemical energy as in Alessandro Volta's 1800 *Voltaic Pile*...the first "wet" concept battery. As with most products it would take 80 years and a multitude of people to produce the successive modifications and discoveries that would eventually lead to the end product as we know it. The Daniell Cell was developed by John F Daniell of Britain in 1820; using diluted sulfuric acid (electrolyte) and lead sheeting, was the first operational single cell battery and was used to power telegraph, telephone and door bells for well over 100 years. In 1859 Gaston Plante, a French scientist, discovered he could pass electrical current back into the battery and convert "electrical energy" into "chemical energy" and it could be "stored chemically" in the Voltic Pile (battery's cell) and "reconverted" back to electrical energy on demand by completing a circuit. Plante had "recharged" the battery. In 1880, a French chemical engineer, Camille Faure replaced Daniell's lead sheeting with cast lead and lead oxide paste and the modern "storage" battery arrived.

Batteries are classified into two broad categories...<u>primary</u> and <u>secondary</u> batteries. Primary batteries can "produce" electricity immediately upon assembly, however when the initial supply of energy is exhausted it can not be restored. They are called *disposable* batteries and include your basic flashlight battery. **Secondary or *rechargeable* batteries can be chemical restored by supplying electrical energy to the cell and restoring the original chemical composition. In fact, they are assembled with their active materials in a discharged condition and must be charged prior to usage. The lead acid battery falls in this category.**

- There are **two types of "modern" lead acid batteries** (along with 3 sub categories); The two main types are **SLI** (starting-lights-ignition) and **Deep Cycle** (marine/golf cart/emergency equipment etc.). The **SLI** is designed to deliver sporadic bursts of energy (for cranking) and has a greater plate count...and the plates are <u>thinner</u> and are composed of spongy lead. The **Deep Cycle Battery** has less instant energy, but greater long-term energy delivery. Deep cycle batteries have thicker solid lead plates and can survive a greater number of discharge cycles. Starting batteries should not be used for deep cycle applications because the thinner plates are more prone to warping, pitting and flake-off when discharged. The **Dual Purpose Hybrid Battery** is a compromise and (along with deep cycle batteries) are used when lights, DVDs, computers etc. are operated with the engine off.
- Gel cell batteries were developed in the late 50's and AGM (Absorbed Glass Mat) batteries were original designed for and used by the military in the early 1980's. AGM batteries were introduced into the private sector market in the 1990's.
- Batteries come in all different sizes. Many have "group" sizes, which are based upon *physical size* and terminal placement and are NOT in any way a measurement of battery capacity.
- Batteries are application specific...<u>the wrong battery</u>: SLI, Deep Cycle (Motive or Stationary), Hybrid, Wet cell, Gel Cell, AGM, Spiral Wound, Serviceable or Maintenance Free will give poor service life in the wrong application. Wet Cell (flooded), Gel Cell, and Absorbed Glass Mat (AGM) are versions of the lead acid battery.
- When multiple batteries are connected in series, parallel or series/parallel their age and usage levels "should" be the same as "companion" batteries. It is a "poor" practice to install "a" new battery within a multi-set of older batteries and will seriously "shorten-the-life" of both the new replacement battery and remaining older batteries. The recommended practice is to install a used battery or a complete set of new batteries...using the remaining good batteries in "other" single battery applications. A replacement battery "must" be the same (or very close) in size, type and capacity as the other batteries in a multi-set and a full replacement set should be equal to or higher than the OEM requirement.
- Inactivity can be extremely harmful to a battery. Average life has become shorter as energy requirements have increased. Battery life span depends on usage; and only <u>30%</u> of all batteries survive 48-months...the 5-

year (let alone the 6-year) battery in modern cars, trucks and off-road equipment is a rarity. As batteries age (like people) they require more maintenance, longer charge periods and their capacity decreases.

- A battery "cycle" is one complete discharge (to some "selected" DOD...depth-of-discharge...level) and a full re-charge. It is usually from 100% to a 20% discharge level and back to 100%...however there are other rating systems used that can be as low as 10% DOD and as deep as 50% DOD for deep cycle batteries. If doing comparisons...be sure it is apples-to-apples. Battery life is directly related to how deep the battery is cycled...its DOD and how often it is cycled. A quality battery will have many more "cycles" that a cheap battery...you get what you pay for. A battery that is continually deep-discharged below the 80% level or has very shallow cycles and stays above 5% will have the shortest life. A battery likes to be worked...but not overworked!
- Long term usage of a weak and tired (low voltage, low capacity) battery will effect the life of the alternator & starter motor.
- In cold climates, higher CCA ratings (cold-cranking-amps) are required for SLI batteries and should be based on the coldest climate the engine will be started in. The CCA is a measurement of the number of amps a battery can deliver at 0 ° F for 30 seconds and not drop below 7.2 volts. NOTE: **See page 4** for the definitions of **CCA, CA, RC, and AH STANDARDS** used to rate output, capacity and the "quality" of a battery!
- Deep Cycle batteries will typically last two to ten times as long as SLI batteries in a deep cycle application. Dual or multi-battery systems are often found in mobile applications such as RVs, emergency vehicles or maintenance (work-construction-farm) vehicles using electrically operated snow plows, air compressors, winches, booms, welders, pumps and night lighting systems. The recommendation is to use an SLI battery for the vehicle and to power the auxiliary work systems off of one or more deep cycle batteries. These batteries should be charged via dual charging systems...a dual out-put alternator or a battery isolator. A battery isolator acts as a check valve (thru two diode legs) and recharges "the" battery with the most depth-of-discharge, from a single alternator.
- Batteries come in maintenance free and maintenance accessible styles. Maintenance free batteries are sealed and are designed so you don't have to (and shouldn't try to) add water. They are "recombinant" and return the gases formed during charge to the electrolyte. Maintenance accessible batteries have plugs that allow you to check the electrolyte level and add water as needed.
- When mothballing or putting a truck or machine into short-term storage, the battery is a major consideration. All batteries gradually lose their charge when out-of-service. Of note, AMG batteries lose their charge much slower and should be a consideration for limited use equipment. The battery should be fully charged prior to storage and the negative wire removed to disconnect it from any parasitic drains (particularly important on newer vehicles and equipment). The battery should be topped off with a charge when returned to service...and "don't" leave it up to the alternator to do the job.
- The plates of all lead batteries are made from a lead alloy. Antimony, calcium, selenium and smaller quantities of tin and silver are alloyed with the lead to harden the grid, give the grid more strength, improve cyclability and reduce internal corrosion. The lead-antimony battery is older technology, corrodes more, consumes a lot of water, but is still the choice in many deep cycle batteries. The more severe the DOD application, the more antimony is required. Modern SLI lead-acid batteries are generally lead-calcium, tin, and silver alloyed, use little water, and have a lower self-discharge rate. All maintenance free batteries use calcium alloy grids. On the down side, they (calcium alloy) are more sensitive to over-charge and large DOD variations. The lead-selenium battery has characteristics that fall somewhere between Lead-antimony and lead-calcium.

- Lead-acid wet-cell batteries can be "dangerous" if frozen. To freeze, a battery must be discharged and...it is a winter problem. If you have any thoughts that a battery may be frozen, do not try to jump start the vehicle or recharge the battery...it may EXPLODE...damaging both YOU and the vehicle or equipment. Key indicators are: the vehicle will not crank or equipment will not work, it is below 32 degrees and/or there is visibly bulging or cracking of the battery case. If the battery looks OK, take it in-doors and thaw at "room temp" (do not "force" the thaw) and recharge with a SLOW-CHARGE and test!

NJAE&MC—Upcoming Events

Baring FUTURE CANCELATIONS!

Plow Day - Ideal Farms

Event coordinator: Chuck Klim 973/903-3583
April 4th in Lafayette NJ.

Sussex District Boy Scouts - Spring Event

Event coordinator: PauL Havens 973/222-7403
April 25th in Vernon NJ...Woodlands Trails Camp Grounds

The Military Show & Swap Meet—Fair Grounds

Event coordinator: Paul Havens 973/903-3583
April 25 & 26

OUR NORMAL 2ND THURSDAY IN THE MONTH SCHEDULE:

April 9th, 7 PM at the Shed

May 14th, 7PM at the Shed

June 11th, 7PM at the Shed

Cold cranking amps (CCA) is a measurement of the number of amps a battery can deliver at 0 ° F for 30 seconds and not drop below 7.2 volts. So a high CCA battery rating is especially important in starting battery applications, and in cold weather. This measurement is not particularly important in Deep cycle batteries, although it is the most common battery measurement. Batteries with an "extremely" high CCA may sacrifice reserve capacity to achieve high short term output.

CA is cranking amps measured at 32 degrees F. This rating is also called marine cranking amps **(MCA)**. Hot cranking **amps (HCA)** is seldom used any longer but is measured at 80 ° F. CA, MCA or HCA are no longer considered meaningful ratings.

Reserve Capacity (RC) is a very important rating. This is the number of minutes a fully charged battery at 80 ° F will discharge 25 amps until the battery drops below 10.5 volts. It is a measurement of a batteries staying power and how long the battery will continue to work after a charging system failure. It was developed for the trucking side of the industry.

Amp hour (AH) is a common rating. It is a measurement of the batteries volume of electricity or its capacity in amp-hours that can be drawn from a fully charged battery under specific conditions of discharge. If a battery is rated at 100 amp hours it should deliver 5 amps for 20 hours or 20 amps for 5 hours, etc.