



FactSheet

Extension

Ohio State University Extension

Food, Agricultural and Biological Engineering

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Buggy Battery Safety

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The installation of safety lights and markings on a buggy can help avoid serious injury on the road. Unfortunately, the storage battery that powers these important safety devices can also be hazardous. Therefore, understanding how the battery works can prevent dangerous situations.

How Does My Battery Work?

Lead-acid storage batteries do not store electrical power. Instead, the battery is a chemical machine that produces power on demand. The typical battery has a number of individual cells containing layers of lead plates immersed in sulfuric acid, Figure 1. When sulfuric acid contacts the lead plate inside the cell, energy is produced. During charging, flammable hydrogen and oxygen gases are formed. Most of these gases eventually bond together to form water, which is then lost through the battery vents.

The main battery terminals are the positive and negative posts. The battery may also have vent caps on top of it. These caps serve two purposes: they permit the checking and maintenance of water and acid levels and provide a vent for the escape of gases formed when the battery is charging.

Manufacturers have also developed low-maintenance and maintenance-free batteries. These produce less explosive gas and effectively eliminate your exposure to chemical burns during maintenance.

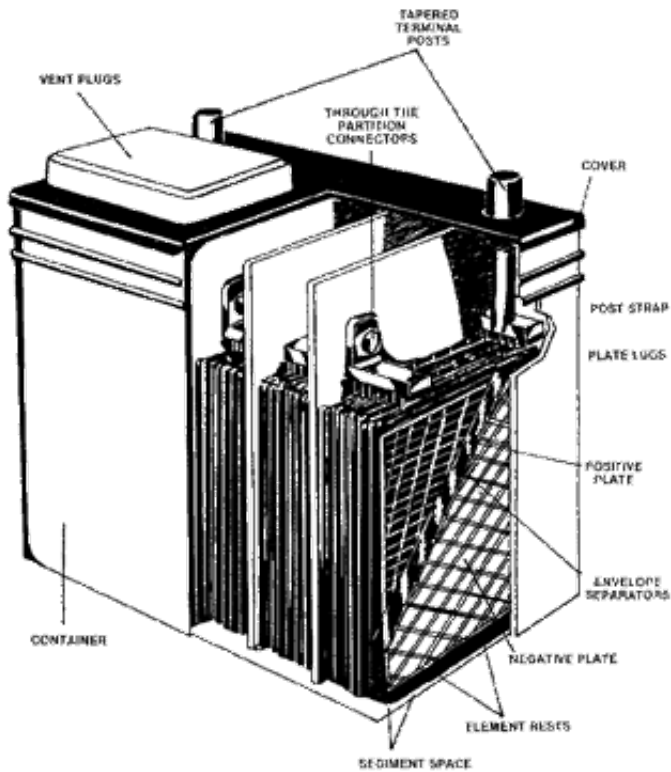


Figure 1. Battery Construction

What Kind Of Battery Do I Need?

Lead-acid batteries are common, rechargeable batteries available for home use. It is important to consider lighting needs, the interval between charging and budget when choosing a battery. The capabilities of these types vary. Pick the right battery for the job!

Car Starting Batteries (typical storage battery)

The car starting battery was developed for only one job -- starting cars and trucks! It is not designed for deep cycling and is quickly ruined by repeated discharge. Built to deliver quick starting at minimum weight, size and cost, these batteries have lead sponges rather than sturdy lead plates. These thin sponges are delicate and start to break down after less than 100 cycles (i.e., charging of a deeply discharged battery).

Deep Cycle Batteries

The deep cycle battery is designed to be compact, inexpensive, and last for 200 to 400 charge-discharge cycles. If you travel on long trips or neglect to charge until the battery is almost "dead" (i.e., 80 percent or more is cycled) they will last less than 200 cycles. These storage batteries are packaged in the same small automotive case and contain somewhat thicker plates of lead. Although these plates do add strength, these hybrid batteries share the same flaws of the car starting battery. They do not respond well to repeated deep cycling and will eventually breakdown. Avoid acid spills by mounting the battery in an upright, level position in the buggy.

Gel Cell

The gel cell battery, used in aircraft and designed for portability, are usually small and have gelled acid within a sealed case. This battery works in any position and is designed to be clean and usable in environments intolerant of acid vapors and spills. These cells are designed to be deep cycled over a long time, but since the cells are sealed, special care must be taken when charging. If charged or discharged too rapidly, gas will build up, causing the battery case to rupture. The lifetime of gel cells varies considerably. Besides possible rupture, storage at high temperatures (i.e., above 78 degrees F) accelerates self-discharge and shortens the battery's life. Although more expensive, the sealed gel cell battery can be a safer and cleaner alternative to the deep cycle type batteries.

Safety Tips: Protecting Yourself and Your Family

Storage batteries are easy to purchase and handle which might lead to careless or over-confident handling. Though the battery is small, it operates like the larger industrial batteries, and requires as much respect. When a battery is being charged, electrical power surges through the acid, generating hydrogen and oxygen. This explosive gas mixture seeps out of vents and can be ignited by a flame or spark. Here are a few safety tips recommended by battery manufacturers:

- **Keep sparks and flames away from the battery.** Inspect the battery in natural light. Remove wrist watches, which might make electrical contact and create sparks.
- **Protect eyes, face, and body from acid.** Eyes are vulnerable to exploding batteries so wear safety goggles or a face shield when inspecting or cleaning the battery. If acid does enter the eye, immediately flood with running water for at least 30 minutes. See a doctor as soon as possible. If acid contacts the skin, wash the affected area immediately with plenty of water. Avoid chemical burns by not rubbing eyes or skin while working with the battery. Wash hands immediately after completing the job. Clean up all acid spills and flush clothing with a water and baking soda solution.
- **Vent caps are tight and level.** Placing a damp cloth over vent caps when charging may act as a flame arrester. (Some maintenance-free batteries may not have vent caps). The vent caps on top of a battery are designed to help keep the acid electrolyte within the battery and to keep dirt out. The vent caps should always be kept firmly in place. When an electrolyte runs out of a battery it can cause corrosion of the terminals and cables, reducing battery function. Keep the top of a battery clean and free of corrosion by periodically washing the battery with a solution of one-quarter cup baking soda to a bucket of water. After washing or scraping off all corrosion deposits, coat the metal parts with thick terminal grease compound. Inspect the vent caps for proper functioning. Always wear acid-resistant gloves and long sleeves when cleaning batteries, avoiding any splashing of debris or acid into the face and eyes.
- **Keep batteries away from children.** Batteries are not toys. A child could be burnt or blinded while playing around a battery. Charged batteries can give off heat and harmful gases.
- **Ventilation is necessary in the battery area.** Vented batteries emit explosive gases when being charged. Ventilate the charging area. Never smoke or have open flames in a non-ventilated battery area.
- **Store your battery in a cool, dry place.** Storage temperature should be between 80 degrees F and 32 degrees F.
- **Don't make live connections directly to the battery.** Explosive gases can be set off by a match, incorrect connection of battery cables, and careless use of tools around the battery.

- **Use proper lifting techniques when moving batteries.** Batteries are small, but heavy and awkward to lift. Back, shoulder and arm injuries are avoidable by using a battery carrying strap. When removing the battery from the buggy, slide it to a convenient spot, grasp firmly and lift with the legs. Lifting, while reaching over the side of the buggy can cause injury. When picking up a battery from the floor or low shelf, keep the back straight and lift with the legs.
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