



Battery Care Kit

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Batteries are a reliable source of power for our radios. Everyone knows they need to keep their batteries charged as part of their EmComm readiness. We also use non-rechargeable batteries. A common scene when storm warnings or other threat is looming is people rushing out to buy more batteries. But batteries don't last forever, as we know.

In spite of all the warnings to remove batteries from equipment that isn't being used, many of us have found something in our inventory that was damaged by leaking batteries left in place too long.

As part of our emergency preparedness, we put together a Battery Care Kit. There are two basic types of batteries in our EmComm inventory: wet and dry. There are some battery care items that apply to both. And there are some battery care items specific to one type or the other.

General Battery Care Kit Items



General Battery Care Items

- Eye protection
- Rubber gloves
- Paper towels
- Brushes (nylon, brass, steel)
- VOM or battery tester
- Pocket calendar
- Baking soda
- Plastic cup (sturdy)
- Teaspoon (sturdy plastic)
- Toilet tissue or facial tissues
- Adhesive labels or masking tape and marker

Wet Battery Care Items

- Battery carrier
- Terminal puller
- Adjustable wrench
- Screw driver
- Slip Joint Pliers
- Terminal brush
- Petroleum jelly
- Battery hygrometer
- Distilled water



Wet Battery Care Items

Dry Battery Care Items

- Typing eraser (hard gray)
- Rubber eraser (pink)
- White plastic eraser
- Dental picks or large needles
- Cotton swabs
- Emery boards



Dry Battery Care Items

A good way to avoid being surprised by leaking batteries is to set a routine battery care maintenance schedule.

- Start by making an inventory of all the different batteries needed by all of your equipment. Keep records of the size/type and number of batteries needed for each unit. Do this for all equipment (e.g. radio and non-radio). What you want to do is to have a comprehensive list of all the types of batteries you need.
- Make a note if the battery is rechargeable or not.
- If it is rechargeable, indicate
 - what type of charger is required and the details of the power supply input(s) compatible with the unit.
 - How often charging is needed and about how long it takes to complete a charging cycle.

When I did this, I began to realize the great diversity of batteries sizes and types I needed for my equipment. Over the years, I made an effort to reduce this battery diversity. This helped to increase the reliability and interoperability of my equipment by allowing me to use/swap/share batteries from one type of device to another as the need and circumstances required. Battery compatibility also became a consideration for buying new equipment.

Routine maintenance:

This calls for periodically checking all battery powered equipment on a regular schedule. I use a 1 month cycle, but you should look at your particular use patterns to find what works for you. My routine goes something like this:

- Turn on the device and/or test the batteries.
- Visual inspect of the batteries for swelling or evidence of leakage.
- Cleaning the terminals:
 - Wet acid batteries: clean with baking soda solution ONLY if needed.
 - Dry batteries: remove and clean the battery terminals AND the battery contacts in the unit with soft (white plastic or red/pink rubber eraser).
 - Battery chargers: Don't forget to inspect and clean the contacts on your battery chargers, too.

Note: This routine inspection should help prevent being surprised by finding a leaking or encrusted battery in a device when you need it for an emergency.



Use a rubber eraser to clean battery terminals.



Then do the same for the battery contacts in the unit.

Oxidation can occur on battery terminals and contacts inside the unit or device. The layer of oxides can be so thin as to be invisible to your eye. The oxides prevent a good electrical contact which reduces battery performance that can adversely affect the performance of the device.

Busting the Crust:

Each case of a leaking battery and possible encrustation is unique to the device and battery. In general, you need to remember you are dealing with acidic materials. Eye protection is essential. It only takes one accident to radically alter your life and ruin an eye. Gloves are also recommended. Not only do they protect your hands/skin, but they remind you not to wipe your face or eyes with fingers that carry residues from the leaking battery.

The decision to use a baking soda solution to neutralize the acid must be made on a case by case basis. Many people have done this successfully with a car battery. But when dealing with electronic devices such as radios, cameras, cell phones, etc. the compact designs make it difficult to control the flow of liquids.



A leaking battery in an alarm clock before cleaning.



The battery compartment and terminals before cleaning



The battery compartment and terminals after cleaning

Obviously you need to remove the encrusted battery and any remaining residue. If you don't use baking soda solution, then mechanically picking or brushing are options. (And you are using eye protection, right?)

For the clock in the photos (on the left) came from a friend. After removing the battery, I used a baking soda solution applied lightly and slowly with a cotton swab. I also held the clock upside down over a waste basket so any excess liquid would NOT drain into the clock.

Once that is done, you need to clean the battery contacts thoroughly. This can be done with varying degrees of abrasive materials from emery boards (with a sandpaper-like texture) to different types of erasers or cotton swabs. I used a pink eraser. If the encrustation was very heavy, I would have started with the coarser and harder typing eraser.

Note: Please be sure to properly dispose of used batteries. Keep them together in a separate plastic bag. Check for the location of a hazardous waste disposal facility near you. Check to see if they will take used batteries. Do not toss used batteries into the trash or into a fire.

Wet Lead Acid Batteries:

We use deep cycle batteries (both wet cell batteries and SLA---sealed lead acid batteries) in Sparky. Sam uses wet cell batteries. Our Wangwa station battery is

an SLA. The solar PV panel on the farm uses a wet cell storage battery.

When working with these batteries, you must be mindful of the sulfuric acid involved, and the potentially explosive gases the wet cell batteries give off. Make a habit to always wear eye protection, rubber gloves, keep the area well ventilated and cool, and have baking soda solution handy to help neutralize the acid,

The key to long life for a deep cycle battery is to never draw it down to below 80% of its fully charged state. A simple VOM reading seems obvious. But a truer measurement might be when there is a load on the battery.



Wet cell batteries in Sparky



Wet cell batteries in Sam



Sealed lead acid battery at Wang Wa QTH



Wet cell storage battery for the farm PV panel.

Due to the large amount of highly corrosive fluid in wet cell batteries, we advise extreme care when servicing and maintaining these batteries. In contrast to the eye protection and gloves suggested when working with encrusted dry cell batteries, consider a full face shield and long sleeve rubber gloves. Be sure to work in a well ventilated area. Confined spaces of equipment lockers / shelters could allow a buildup of explosive gases.

Routine Service / Maintenance: (Use the small labels to “date tag” the device.)

Do the following procedure when the batteries are cool to avoid heat related injuries.

- Visual inspection of the batteries and terminals: what you are looking for a white, ray, yellowish, greenish accumulations that indicate the presence of corrosive

matter. If these are detected, you need to clean the battery / terminals and possibly the metal battery supports. Visually inspect the battery cables of damaged / worn insulation.

- Physical inspection: Check all terminals for loose connections. If any are loose, remove them and inspect for corrosion.
- Check battery fluid levels; top off as needed with distilled water. **Never** use tap water.
- Do the same inspections of your battery charger.

Disconnecting / Connecting the battery:

- **ALWAYS** disconnect the Negative terminal first.
- Then disconnect the Positive terminal. Be sure these ends of those two cables do not touch.
- To re-connect the battery, reverse the disconnect sequence.
- For connecting a battery charger, refer to the manual for the charger.

Testing the Battery:

Testing wet cell batteries is best done after they are fully charged using a hygrometer and a voltmeter.. Let the battery sit for at least 12 hours. Apply a load to the battery for several minutes (e.g. a small lamp will do). Turn off the lamp and begin the test.

General Guidelines				
DC Volts		Specific Gravity	State of Charge	<ul style="list-style-type: none"> • Specific gravity should not vary more the 0.05 between cells. • Voltage readings in the 10.5 range usually means a shorted cell • When in doubt, refer to battery manufacturer specifications.
6 V	12 V			
6.3	12.7	1.265	100%	
6.2	12.4	1.225	75%*	
6.1	12.2	1.190	50%	
6.0	12.0	1.155	25%	
6.0	11.9	1.120	Discharged	

*Sulfation usually begins when specific gravity drops below 1.225 and voltage is less than 12.4 VDC or 6.2 VDC (for 12 and 6 volt batteries respectively).

Cleaning the terminals:

- clean with baking soda solution ONLY if needed. Various methods can be employed: 1) put 3 teaspoons of baking soda (powder) into a cup or bowl, and add 1 teaspoon of clean water; stir and mix into a paste. Apply paste to area needing cleaning; wet an old toothbrush and gently scrub the areas with the baking soda paste. Repeat until there is no more “fizzing”. 2) Some people make a solution of 2-3 teaspoons of baking soda to 1 cup of water (to as much as 6 tablespoons to 3 cups of water). Slowly drip or pour this solution on the areas you need to clean. Repeat until there is no more “fizzing”. **[Note:** Thoroughly rinse all surfaces and places this solution especially the battery holder / frame. Any residue can be a starting point for further corrosion.]
- Extreme encrustation may require the use of a battery terminal brush. After brushing, use baking soda for the final touch up,
- After things are thoroughly cleaned, wipe them dry and let them sit for additional air

drying for 15-20 minutes. [**Note:** any moisture left in place when you reconnect the battery will be the start of new corrosion. This defeats the whole purpose of cleaning the terminals in the first place. So be patient.)

- After things are thoroughly dry, we apply NoAlox (an anti-oxidant coating) to the contact surfaces of the batter terminal post and the connector of the cable. Reattach the battery cables in reverse order you disconnected them: Positive, then Negative. Once they are tightened, put a thin coating of petroleum jelly over all exposed surfaces of the battery posts and cable connectors. [**Note:** This puts a barrier between these contacts and corrosive battery vapors and should keep the corrosion at bay longer.]
- Battery chargers: Don't forget to inspect and clean the contacts on your battery chargers, too.

Battery care is a similar situation as your health: An ounce of prevention is worth a pound of cure. Make a routine battery maintenance schedule. Then stick to it. This will go a long way to assuring your batteries and equipment will be ready for an emergency. 🌐