Donated Batteries

Inspection and Test of Donated Used Batteries for RACES

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- During a RACES activation or disaster response, reliable portable power can be a critical resource that makes all the difference in getting the job done.

- Power packs such as Quantum are excellent, but expensive. You can make your own using Yuasa NP2-12 or similar 12-V, 2-Ah gel cells obtained from local hospitals. These fit in a coat pocket and power an H-T all day. Two or more connected in parallel and taped together power a 25 W brick amp or laptop and TNC for several hours.

A Source of Free Gel Cells

- Sealed lead-acid (SLA) batteries (gel cells) used are used to power medical diagnostic instruments, alarm systems or UPS and are usually replaced on a fixed schedule before they are worn out. Because they require disposal as hazardous waste unless recycled or reused, a hospital's "donation" to your RACES group reduces their disposal cost. EROs may write to local hospitals, explain how gel batteries they discard are useful to provide power for emergency communications activity. It is likely you may obtain a quantity free for the asking, with no more trouble than signing a receipt to satisfy the environmental officer and writing a "thank you" to the hospital administrator.

- A suburban hospital discards from 50 to 100 pounds of SLA batteries monthly! Handling the logistics of collection, testing and distribution should be shared by group which you have trained for the job. After having made initial contact through the Safety, Security and Environmental Officer, the Engineering supervisor now calls whenever our shelf in Material Management is "full."

Inspecting and Recharging Donated Gel Cells

- Donated SLA batteries must be inspected, recharged if necessary and then tested before issue. We check open circuit voltage to expedite distribution by sorting out batteries which may be load tested immediately. Any 12-V batteries having an open circuit voltage (V_{oc}) of 12.8 V or greater are ready for load testing. Those with V_{oc} of less than 12.8 V are charged by connecting in parallel across a regulated 13.8-V power supply. Any that are not accepting charge after four hours are discarded. Total charging should not exceed 140% of capacity.

- Typical 12-V SLAs have an open circuit voltage of about 13 V when fully charged and 11 V when fully discharged. Most amp-hour ratings of batteries are based upon a discharge rate at 1/20 of capacity (expressed as C/20) for a specified rate of discharge, typically 25% for gel cells. More rapid rates of discharge, such as using a marginally sized battery for the load, reduce the available capacity and the number of charge- discharge cycles that a battery will provide.

- Because our communication equipment doesn't operate properly below about 11.5 V, you can't exceed the depth of discharge which at which the battery voltage under load decays below that figure.

- Batteries which accept charge to V_{oc} greater than or equal to 12.8 V must still be load tested after recharging. An easy quick check is to apply a load in amperes which approximates battery capacity in amp-hours, for 10 seconds, monitoring voltage drop. In a "good" battery the voltage drops, but quickly stabilizes after a few seconds, does not continue to fall and recovers within a few seconds after the load is removed. We have gotten reliable service from 12-V batteries that don't drop below 11.7 V at "C" load for 10 seconds.

- If you have a small number of batteries and time, a better test is to approximate a continuous work load for at least a full minute. We test 12-V batteries up to 2 Ah such as used to power H-Ts with an 8-W florescent light at 0.6-A load. Larger ones up to 10 Ah can use a 12-V, 50-W incandescent lamp at 4-A load. For larger batteries, connect the test battery to the intended transmitter and the transmitter to a nonradiating dummy load, monitoring voltage drop for a minute of full-power key-down. Accept for reissue batteries which no exhibit more than 0.5-V voltage drop at normal working load and duty cycle. In our experience one in ten donated batteries is rejected and recycled. When you subject a battery to a current load which exceeds C/5, or 1/5, of its amp-hour capacity, expect a 25-30% reduction in its delivered capacity. At lower temperatures available capacity is further reduced. Lead-acid batteries typically lose 50% of their capacity at 32° F!

- A rule of thumb for adequate battery capacity to approximate C/20 discharge is 1 Ah per watt PEP. This is adequate for 24 hours of SSB or 12 hours of FM carrier, CW or digital modes at a typical operating duty cycle.

- Lead-acid batteries at normal ambient temperature should be charged at a current of from 1/10 to 1/20 of capacity. Any sealed battery will vent if overcharged to the point of excessive gassing, because the valves are designed to purge extreme pressure building up inside the battery case. Marine or automotive chargers intended for flooded batteries ***must not be used*** to charge gel cells unless they are equipped with voltage- limiting circuitry to preclude their exceeding 14 V peak during charging.

Ed Harris, KE4SKY, is the Virginia RACES State Training & Safety Officer. In addition to the above article, Ed has been published in various national and regional magazines, newsletters, and web sites.