Hydrometers:
A hydrometer is a specific gravity tester. It tests the electrolyte in each cell, and the readings should not vary more than .05 between cells. The reading will tell you the charge level of each cell. Do this test once a month, and keep a chart of each cells readings, and you will be able to track the health of your pack.

Prepare for Test:
You must first have the battery fully charged. The surface charge must be removed before testing. If the battery has been sitting at least several hours (I prefer at least 12 hours) you may begin testing. To remove surface charge the battery must experience a load of 20 amps (per battery) for 3 plus minutes. After turning off the load you are ready to test the battery.

Prepare Hydrometer for Use:
Carefully remove rubber bulb and plug from glass tube and remove foam protector from around float. Wet (distilled water) and reinsert float, plug and bulb. Extend rubber bulb to top of glass tube.

Instructions for Use:
Insert rubber tip into cell of battery. Hold instrument in vertical position. Squeeze bulb and draw enough liquid to float hydromet freely, watching to see that top of float stem does not touch rubber stopper at top of barrell. The mark on the hydrometer float which is inline with the surface of the liquid indicates the uncorrected specific gravity. Add or subtract specific gravity points to to float reading as indicated by the thermometer at the bottom. The result of the corrected float reading gives the precise specific gravity and indicates the condition of the battery.

Specific Gravity Readings:
1.260 = 100% Charged
1.225 = 75% Charged
1.190 = 50% Charged
1.155 = 25% Charged
1.120 = Fully Discharged

Return liquid to same battery cell from which it is taken.

Cell variation:
Variations of more than .020 indicates a weak or bad battery.

Note: A proper test cannot be made unless each battery cell has sufficient electrolyte (water and acid) to permit hydrometer float to rise freely .An accurate reading cannot be obtained immediately after water has been added to cells or at below freezing temperatures. Water must be allowed to mix with the electrolyte. A full charge cycle will accomplish this.

Cleaning:
Get a battery brush from your auto parts store. This has two ends, one for cleaning the posts, and the other for cleaning the lugs. Remove your cables, and clean till shiny. If you have studs and rings, instead of posts and lugs, use a wire brush. You can use a battery spray that comes out yellow, and turns red in the presence of acid. Rinse after a few minutes, but make sure it does not get into the batteries. Baking soda (2 Tbl. Spoons) and water (1 pint) can be used for cleaning as well.

Water Misers or Hydro Caps?
We prefer Water Misers over hydrocaps. Less maintenance, and they last longer. Pop the cap top open to refill. Hydrocaps have to be removed during equalization. Hydrocaps remobine the hydrogen and oxygen, almost eliminating water loss. Water Miser's do not recombine, but they trap water and acid and return it to the cell, and are about 60% effective. We sell Water Misers for $6 each. A 6 volt battery requires 3.

Watering the Batteries:
ONLY use distilled water, as minerals in tap, rain, or "purified" water will destroy the batteries. This can be found at the grocery store in 1 gallon containers for about the same price as filtered water. Use the bulb filler to fill the wells so that the plates are covered. Do not overfill, as water and acid will overflow during charging, corroding terminals and wires, and increasing self discharge across the top of the battery. There are more "automated" systems for wattering batteries, some with manual pumps, others with electric. See http://www.rvupgradestore.com/index.asp?PageAction=VIEWCATS&Category=439

Charging:
If your solar and wind are not sufficient to keep the batteries charged, a generator and a 3 stage charger will be needed to "top off" the batteries. Do not let the batteries sit for extended periods of

time in a discharged state, or they will sulfate, and have reduced capacity and die prematurely.

Extend the Life:
There are a few methods you can use to extend the life of your batteries. Crosstie - The free method is to cross tie the batteries when you have multiple parallel battery strings. Normally in parallel strings, the batteries on the end of each series string are cross tied , + to + on one end, - to - on the other. We make sure each negative on a battery is connected to the negative on it's coresponding twin in the next string. This balances the pack, and prevents uneven charging and discharging among strings.

See http://www.green-trust.org/wordpress/2008/09/09/getting-more-life-from-your-battery-bank/

Battery Balancer - This is a special unit that monitors the voltage of each battery in a series string, and balances the voltage among them. This prevents uneven charging and discharging within a series string. This complements crosstying, by not requiring a balancer on both strings.

Desulphator - This unit periodically hits the batteries with a pulse to prevent sulphation of the plates, and extends life and capacity. Crosstying distributes this affect across the pack, so only one unit is necessary for the whole pack.

See http://www.green-trust.org/wordpress/2008/09/27/battery-equalization-and-pulse-desulphating/