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HYDROMETER AND H²SO⁴

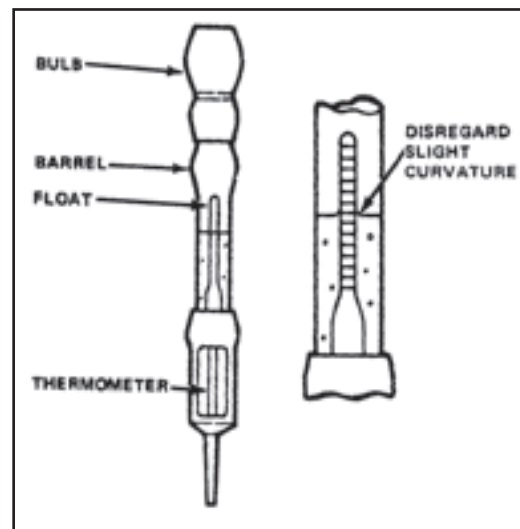
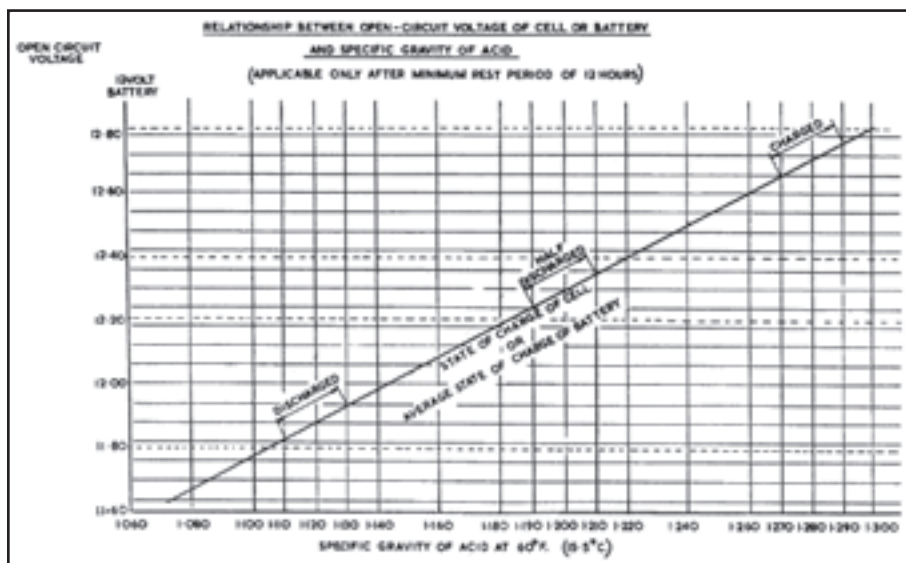
The lead-acid battery is not a storage tank for electricity. It is an electrochemical device for converting chemical energy into electrical energy.

There are several methods used to test the condition of a battery. We will only cover the "open circuit voltage test" and the use of the hydrometer to determine the state of the sulfuric acid (H²SO⁴) used as the electrolyte in the battery.

A hydrometer will measure the specific gravity of the liquid in the battery. "Specific gravity" is the weight of a given volume of a liquid divided by the weight of an equal volume of water at a temperature of 39.1 degrees F. When the electrolyte has a specific gravity of 1.290, it is 1.290 times heavier than water. To read the hydrometer, the float must not touch the tube, and the reading must be taken at the surface level of the electrolyte.

The open circuit voltage of a 12-volt battery will be 12.8 volts with a specific gravity reading of approximately 1.280 at 60 degrees F (15.5 degrees C). When your battery has been on charge, as in driving your car or by an external charge, the lights should be turned on for three to four minutes, or let the battery stand, off-charge, for about 12 hours. This is only necessary when checking the battery by voltage. The hydrometer can be used at any time.

If your battery specific gravity will *not* come up to 1.280 after being on a slow charge for 12 hours, the battery needs replacing now. The battery could still start your car, but the problem is that the generator will try to fully charge the battery. The extra output from the generator will overload the generator. The acid in the battery will corrode the terminals, and white sulfur deposits will begin to creep along the wires.



Left: The relationship between open circuit voltage (vertical axis) and specific gravity (horizontal axis) is shown in the above graph. Note battery is fully charged (12.65 to 12.80 volts) when specific gravity is between 1.270 and 1.290. As specific gravity drops, voltage drops. Specific gravities as low as 1.110 to 1.130 indicate battery is discharged (under 12 volts). **Right:** Checking a battery using a hydrometer is fairly straightforward. Make sure, however, that the float is not touching the tube and that the reading is taken at the surface of the electrolyte.