

## Electrical Systems

treated by flushing the area quickly with water, then neutralizing the chemical with water and a 3% solution of acetic acid, vinegar, or lemon juice. A 10% solution of boric acid also may be used. Be very cautious about battery fumes. Work only in a well-ventilated area. An overcharged battery gives off hydrogen and oxygen gases, which together can be explosive. For that reason, make sure battery terminals are tight to prevent sparking.

The hydrometer, a useful tool in determining the state of charge in the lead-acid battery, is useless in testing the NiCd battery. NiCd electrolyte shows no density or composition change during the charge/discharge process, so it is impossible to use electrolyte-specific gravity, fluid level, or even battery voltage to determine the charge of the battery. The only reliable way to determine a state of charge is to discharge the battery at a constant rate, according to the manufacturer's instructions, accurately timing how long it takes. An experienced mechanic can determine state of charge based on that information.

Whenever the battery is removed from the aircraft, it should be discharged according to the procedure outlined in the manufacturer's manual and then serviced. Carefully check for general condition. A light powder deposit of potassium carbonate is not uncommon on the top of the cells; simply remove and clean the deposits. Do not use petroleum spirits, trichloroethylene, or any other type of solvent, as they are harmful to the battery. Brushes also are not a good idea because they tend to force particles between the cells. Use a clean cloth to wipe both the battery case and cover. If there is particulate matter inside the case, use filtered, compressed air to blow it out and wear safety goggles! During the visual inspection, check for cell-vent integrity. There should be no obstructions or damage to the vent.

When inspecting the battery, if the cell electrolyte level is low, you may add either distilled or demineralized water. Never use tap water because the minerals will cause shorting of the plates. Never add water unless the battery is fully charged because the electrolyte level lowers as it is absorbed during discharge. When the battery is brought up to full charge, the level will raise. Approximately three hours after a battery has been charged, the electrolyte level should be 1/8th inch above the visible insert in the cell. If not, fill to that level.

If a battery is partially discharged when removed from the aircraft, you should charge it. If it has been inactive for more than two weeks but less than two months, it should be charged before attempting to use it again. An NiCd battery that has been inactive for more than two months should be reconditioned. This consists of completely discharging and recharging the battery according to the manufacturer's recommended procedure. Often referred to as "deep cycle," it is a preventive maintenance procedure that assures all the cells of the battery are pulling together. In addition, most problems relating to the battery's state of charge are solved by this reconditioning process.

It is difficult to fix a specific number of flight hours for preventive reconditioning. There are many factors that affect the frequency. According to the Operating and Service Manual published by General Electric for its NiCd battery, all of the following are considerations: how well the battery and aircraft electrical system is matched, battery and electrical component maintenance, geographic location and season of the year, operator techniques for engine starting, frequency, and severity of engine starts, and battery operating temperatures.