

Positives And Negatives Of Battery Care

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GOLF CARS, turf vehicles, maintenance equipment can be operated on noiseless, low-polluting battery power efficiently and economically if the power source is purchased and maintained properly.

There is never any excuse for a battery-powered vehicle breaking down because of battery failure. Few caddy masters would send a gas-powered golf car out without a full tank of fuel; yet, there are some who, for some reason or other, permit the fuel supplies in these individual vehicles to run low.

The same parallel may be drawn for the battery-powered vehicles. On one hand, there are many who swear by the battery-powered golf car while many others swear at them. Who's to blame? The battery maker? The pro? The caddymaster? The maintenance crew?

In truth, probably all of us are partially to blame because we have not effectively communicated the simple maintenance steps through to the people who have the responsibility to keep up battery charges and electrolyte level. Perhaps, the wrong capacity battery is installed and incapable of meeting the specific course terrain.

SELECTING THE RIGHT BATTERY

Let's start off with choosing the right battery that is compatible with the course.

Generally, there are two sizes of electric vehicle batteries available. However, General Battery Corp. will soon offer three sizes. Individual battery construction varies the same as in batteries used in the automotive industry. In effect, you get what you pay for and, you may not need the top of the line battery to meet your course demands. Although then, again, you may, depending upon terrain, length of season, age of cars, etc.

For instance, our high performance battery offers direct point-to-point energy to offer maximum power and extra life and a 107-minute rating. Although this is the biggest, it offers the lowest cost per round because it is engineered for more payload and greater distance.

Our medium range battery offers 90 minutes of performance reliability. Both batteries with polypropylene container and cover are available with either the wing-nut or nut and bolt connector. GBC is currently experiencing a demand for a "Super" electric vehicle (E.V.) battery with even more performance than the top of the line. It will be introduced soon. This is an indication of more sophistication and knowledge on the part of the E. V. buyer.

The batteries are all tested in accordance with standards established by the American Golf Car Manufacturers' Association. Carefully analyse your course requirements to make the proper selection.

NEW BATTERY CARE

Incoming shipments of batteries should always be inspected for damage incurred in shipping. Look for any damage to the battery cases — wet spots on the carton may indicate a cracked or broken battery. If any breaks are found, get acknowledgment from the shipper and file a claim against the transportation company — and be sure to contact your supplier for replacement batteries.

Batteries are normally shipped in a wet charge state. If you receive wet charge batteries that are not immediately put into service, they must be charged at regular intervals as follows:

Storage temperature	Charge
Below 40°F.	None needed
40°F. to 60°F.	Every two months
60°F. and above	Every month

Storage—Never stack one battery atop another. If they must be stored, place supporting boards between layers and **never** stack more than three high. Be sure to rotate stock to use the oldest batteries received first.

Installation — Follow the vehicle manufacturer's instructions. Connections should be tight to assure good contact and always charge sets of batteries immediately after installation.

MAINTENANCE: KEY TO LONG LIFE

The biggest mistake that can be made in operating a fleet of battery-powered vehicles is to neglect proper maintenance. Maintenance, too frequently is simply thought of as "adding water and a charge", and the job is handed to the low man on the totem pole.

No problems will be encountered, even using the "low man", if certain basic steps are outlined — and frequently checked by the individual responsible for fleet maintenance.

Water batteries at least once each week — preferably on a fixed schedule. Water with high mineral content can shorten battery life. Therefore, certain areas may require distilled water. Check with your battery supplier if in doubt.

Before charging, be sure that the electrolyte level is above the top of the plates (but do not overfill).

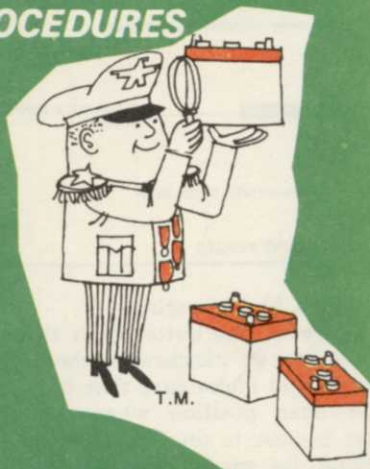
After charging, fill all cells to their proper level. Do not overfill and do not take a shortcut often seen on golf courses by using a high pressure watering hose. This method floods the cells, dilutes the electrolyte and affects performance. Check periodically, in between charges, to make sure that water level doesn't drop drastically.

If a battery seems to be using excessive water, check for one of the
(continued on page RR)

1. NEW BATTERY RECEIVING AND INSTALLATION



2. MAINTENANCE-INSPECTION PROCEDURES



3. CHARGING PROCEDURE



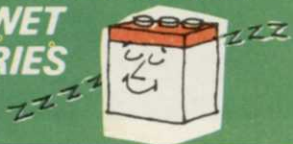
4. TROUBLE SHOOTING FOR WEAK OR BAD BATTERIES



5. BATTERY REPLACEMENT



6. WINTER STORAGE OF WET BATTERIES



POSITIVES AND NEGATIVES (from page NN)

following:

- overcharging;
- high temperature operation;
- battery nearing end of service life.

Inspect batteries and cables to assure that good connections are maintained. Check for the following:

- corrosion — if any exists, clean connections with a solution of bicarbonate of soda and water;
- loose connections — be sure all connections are tight and good contact is made with terminals. A loose connection can cause electrical arcing, which could result in a battery explosion.
- broken or frayed cables should be replaced immediately;
- grease and dirt on top of batteries should be cleaned off, as this may act as a current path and could cause discharge.

Check specific gravity of electrolyte periodically — following charge, be certain that two or more pilot cells in different batteries read between 1.250 and 1.280. If readings are low, check the charger to insure that proper charge is being returned to the batteries; check connections; check to see if batteries are nearing end of service life.

Check car operation periodically to assure that the vehicle is functioning properly. Any of the following conditions are detrimental to car operation and will shorten the life of the batteries: Brake drag — low tire pressure — improper alignment — improper lubrication — high resistance electrical connections — drive and transmission system operating improperly — poor condition of charger plug and receptacle in car.

RECHARGING HINTS

The instructions that come with your chargers have been prepared to offer you maximum benefit from the equipment. Familiarize your staff with the proper use of the chargers.

Batteries should be charged after each day's use as soon as the vehicle has finished its job. You may charge between rounds if time permits. Be certain cars are not released unless the batteries are fully charged.

Even though most vehicles are operated out in the open, it is important to remember that batteries produce explosive gases and sparks and flames must be kept away from

them. Every battery should have this warning on it. "Batteries produce explosive gases. Keep sparks, flame, cigarettes away. Ventilate when charging or using in enclosed space. If sulfuric acid from battery contacts eyes, skin or clothing, flush well with water. For contact with eyes get medical attention. **KEEP AWAY FROM CHILDREN.**" A further step to prevent accidents would be to only charge the vehicles in well ventilated areas.

TROUBLESHOOTING YOUR PROBLEMS

If you've maintained your batteries properly and still find that a vehicle performs less than a complete round of golf, don't give up. Recheck terminal connections for corrosion or loose connectors, broken or frayed cables. If these are okay, then test each cell of each battery for specific gravity. A variance of .030 between cells may spell trouble. Recharge the battery and retest for specific gravity of between 1.250 and 1.280. If a variance still exists, you should use a load tester to determine remaining life in the battery.

If the load tester indicates that batteries are no longer serviceable, replace them with new batteries. Should only one in the series of batteries be the weak link, it may be replaced with another battery of comparable age. This assures a relatively balanced electrical system.

REPLACING BATTERIES

Worn out batteries should be removed and battery trays, cables and holddown bars should be cleaned and reconditioned. Replacement batteries should be fully charged and checked for defects — broken cases or covers — and electrolyte level before installation.

Be certain that holddowns are firm, but not too tight. Replace cables, in series (positive to negative), after cleaning connectors and posts to assure the connection is tight.

WINTER STORAGE

In the winter all batteries not used should be cleaned, fully charged and electrolyte properly leveled. The same storage/charge cycle as for new-stored batteries applies. When put back into service, the same procedures as for startup of new batteries should be applied and batteries should be fully charged before use.

With this proper attention to battery maintenance detail, there's no reason for problems with your electric car fleet.