Selection and care of golf car batteries

Proper recharging is an important part of good battery care, and a well-designed golf car storage facility makes it easier to do it right. The one shown is at Brown's Run Country Club, Middletown, Ohio. Building by Armco.

About two-thirds of the nation's golf courses own or lease electric golf cars, and the number appears to be increasing every year. All 12 of the golf car manufacturers listed in the GOLF BUSINESS 1978 Golf Car Guide make electric vehicles; four make both gasoline- and electric-powered models; none manufacture only gas-powered golf cars. Even Harley-Davidson, probably the leading proponent of golf cars with gasoline engines, has introduced a brandnew electric car design, the Master Glide IV.

In short, electric golf cars are here to stay and actually will be seen on American golf courses in ever-increasing numbers. But the very thing that has created their popularity — the nonpolluting, non-fuel-burning power source — also creates some particular maintenance needs and problems. The power source, of course, is the electric storage battery.

Not the same as the one in your car

"As a generalization, the batteries are probably the most mistreated parts of the electric golf car. This may be due to the fact that previous exposure of most people to lead-acid batteries is limited to their automotive experience," says Don P. Wilson, president of Lester Equipment Mfg. Co., maker of battery chargers for golf cars and other applications.

John J. Zalecki, national service manager of The Prestolite Co., a battery manufacturer, adds, "Golf car batteries are similar to automobile batteries in only one respect. That is, they are both electrochemical devices that store energy in chemical form and release it as electrical energy. That is about where the similarity ends, because golf car batteries have a service requirement that is very different from that of your car battery."

Joe Pace, assistant to the vice president of engineering for another battery manufacturer, ESB Brands, Inc., concurs: "In a car, the battery's primary function is to start the engine. Once the engine is started, the battery's job is really over. Whatever electrical drain is used in the starting is quickly replaced by the alternator or generator.

"On the other hand," Pace explains, "the batteries in a golf car are the sole source of power. The batteries, providing *motive* power, are the engine. The average life of a golf car battery is probably half that of an automotive battery."

This fundamental difference in the purpose or use of the batteries has great effect on the design of the battery and the demands made on it. To understand this, it is necessary first to understand that the batteries are used in what is known as "cycle" service. According to Zalecki, "The action of supplying current (discharging) and then receiving current (recharging) is called a cycle."

"Car batteries," Zalecki says, "are subjected to shallow discharge cycles — 2 to 3 percent of their capacity. Also, they normally operate near full charge condition, in the 90 to 100 percent full charge range.

"Your car battery must deliver high cranking motor current (300 to 400 amperes) and maintain its voltage for the few seconds it takes to start your engine. Because of this type of service, your car battery is designed with maximum plate area and low internal resistance. This combination provides the cranking performance required to start your engine."

On the other hand, Zalecki says, "Golf car batteries must deliver all the power to the golf car motor. The power required varies with the type of service, load in the car, and type of terrain. The energy required can range from 40 to 350 amperes. Normally the discharge of energy in intermittent service is approximately 75 amperes."

Golf car batteries are discharged much more deeply than automobile batteries, as much as 60 to 70 percent of their capacity, because of the type of service they perform.

Joe Garvin, marketing manager of ESB Brands, points out, "The life of a golf car battery is determined both by the number of cycles and the depth of each cycle. Therefore, a lower capacity battery will discharge more deeply than one of higher capacity used the same number of holes. A battery which is cycled deeply each time will not last nearly as long as one which is not so deeply cycled."

What to look for when buying

When buying new golf car batteries, whether specifying what you want in new golf cars or replacing those in cars you already have, note the specified capacity of the batteries. According to Pace, "The only real rating applicable for golf car usage is the number of minutes of continuous running time. This is defined as the capacity at 80° F. for a 75-ampere discharge to 5.25 volts. The more minutes of running time, the more deeply the battery can be discharged without damage. Ratings incorporating the old 20-hour automotive rating are not meaningful with regard to golf car applications."

The rated capacity you need will depend on the length of your course and the type of terrain on it (specifically, how hilly it is) as well as the amount and length of service your cars will see (whether they normally will go 9 or 18 holes at a time, whether they will normally go out once or twice or even three times per day).

"In other words," Pace says, "if you are going to push the cars to 36 and possibly even 54 holes on a somewhat frequent basis, it is best to go with a higher rated battery. A very long course or very hilly terrain is also a factor to keep in mind. Again, the battery will be more deeply cycled on

a very hilly terrain over the same yardage than over level terrain."

Size of the battery can be an important factor. BCI (Battery Council International) has set up categories for batteries of specific physical sizes; golf car batteries are BCI group size GC2. Pace cautions, however, "to make sure that the height of the battery is such that it will fit in the golf car."

He adds that "the configuration of the terminal posts is also important to insure proper fit in the battery box and proper connection. Make sure that the battery cables are compatible with the terminal posts on the new batteries."

Both Pace and Zalecki consider warranty an important consideration in choosing golf car batteries, as well as the kind and quality of service available from the dealer. "Long-term warranties are worthless if the selling dealer will not adjust failed batteries," Zalecki says.

Pace adds another warning: "Watch out for verbal guarantees regarding the expected life of golf car batteries. Only a written warranty statement is an adequate safeguard."

Careful maintenance=long life

Even though manufacturers are attempting to develop maintenance-free golf car batteries, these are not yet available. Until that day arrives, golf course operators can get the most out of their electric golf cars by paying close and constant attention to the care of their batteries. Fortunately, the maintenance does not cost as much in cash as it does in diligence. Establishing and following a proper maintenance routine will insure that you get the longest possible life from your golf car batteries, no matter what brand or capacity you buy.

Also, be sure you and your employees follow safety precautions when working near or servicing the batteries. Batteries produce explosive gases, so keep sparks and open flames away. There should be NO SMOKING in the golf car storage and maintenance areas; this should be posted for the benefit of workers and visitors alike. Good ventilation is a must for the golf car work area.

Employees should always wear eye protection when working near the battteries. Remember, too, that batteries contain sulfuric acid, which can cause severe burns. Workers should avoid contact with skin, eyes, or clothing.

The first step to good battery maintenance is to keep the batteries filled. Most experts recommend checking the water level at least once a week. Water should be added as necessary — but after charging, unless the water level is below the plate separators. In that case, fill the batteries to cover the separators, then charge fully, then fill completely.

Be careful not to overfill, however, since this causes loss of electrolyte, not just water. Don Wilson notes, also, "When batteries are brand new they appear to need additional water very infrequently, but don't be misled by this initial experience. After they get cycled-in and start aging, water requirement increases steadily throughout their remaining useful life."

Robert Balfour, a veteran of the golf car/electric vehicle industry, admonishes, "Under no circumstances should batteries be watered with a pressure hose." It's just too easy to overfill a battery using a hose.

Also, use of distilled water in golf car batteries is preferred. You could, as Balfour suggests, call your local telephone company to see if they use the city's tap water in their standby batteries, then do as they do. Or you could have your tap water tested yourself. In any case, don't use water with high mineral content or other impurities. Never use creek or well water.

In general, the outside of the batteries and all cable and terminal connections should be kept as clean as possible. Wash them periodically with a brush and a solution of baking soda and water, then flush with clean water and wipe dry. If a coating of acid-soaked dirt is allowed to accumulate on top of the batteries, electrical current can leak across it and cut both efficiency and life expectancy.

Furthermore, ESB's Joe Garvin recommends, "The battery carrier and hold-down should be free of corrosion and rust, and should be painted with a corrosion-resistant paint. Frayed or wornout cable connectors should be replaced. All connections should be clean and tight, and a thin coating of nonmetallic grease or protective spray applied to ward off future corrosion."

Periodic use of a wire brush to clean battery terminals and cable connectors is recommended.

Charge it

Periodic maintenance of electric golf cars should also include checking the batteries to be sure they are in a good state of charge. Use a hydrometer to check specific gravity — in all batteries, not just one, and all three cells per battery. If the highest and lowest readings in any one battery show a difference of .050 or more, the battery is on the point of failing and should be replaced soon. Recharge and retest it before scrapping it, though.

Charge all of your golf cars' batteries at least every day after use — even more often if possible. Follow the battery manufacturers' directions for recharging. Put the batteries on the charger as early in the evening as possible, to insure a full recharging.

But on the other hand, be careful not to overcharge — for instance, by recharging every day the car is not used — because overcharging will also shorten battery life.

Don't send an electric car back out on the golf course unless the batteries are in a good state of charge.

If the batteries are cycled more deeply than they are recharged, they will soon be dead.

Wilson offers these final tips on charging: "The ampere-hours of power that batteries can deliver and receive from the charger varies directly with the electrolyte temperature. Hence, in periods of cool or cold nights, the cars should not be sent out for as many holes as they go in warm weather.

"In addition, the cars should be put on charge as soon as they come off of the last rental, while the electrolyte is warm." □

SPECIFIC GRAVITY (@ 80°F.) VS. STATE OF CHARGE

charged	initial full charge of 1.265
100%	1.265
75%	1.225
50%	1.190
25%	1.155
discharged	1.120

CATCH-UP CHARGE

State of Charge	Charge
1.260-1.280	none needed
1.240-1.260	4 hours
1.220-1.240	8 hours
below 1.220	12 hours

Charts above, from The Prestolite Co. (top) and ESB Brands, Inc., show the importance of taking specific gravity readings, as well as how to relate them to state of charge.