Selection and care of golf car batteries

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 hours. 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 yar-
dage than over level terrain.”

Size of the battery can be an im-
portant 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 bat-
tery 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 at-
tempting 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
maintenance of their electric golf cars.
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 em-
ployees 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 mainte-
nance 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
batteries. Remember, too, that bat-
teries 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 bat-
teries 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 through-
out their remaining useful life.”

Robert Balfour, a veteran of the
golf car/electric vehicle industry,
admonishes, “Under no circum-
stances 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 your-
self. In any case, don’t use water with
high mineral content or other im-
purities. Never use creek or well
water.

In general, the outside of the bat-
teries 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 cur-
cent 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 cor-
rosion and rust, and should be
painted with a corrosion-resistant
paint. Frayed or wornout cable con-
nectors 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 con-
nectors 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 bat-
teries, 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’ bat-
teries 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
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 amper-hour capacity of
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
hours 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.”

<table>
<thead>
<tr>
<th>SPECIFIC GRAVITY (@ 80°F.)</th>
<th>VS. STATE OF CHARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>charged</td>
<td>initial full charge of 1.265</td>
</tr>
<tr>
<td>100%</td>
<td>1.265</td>
</tr>
<tr>
<td>75%</td>
<td>1.225</td>
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<tr>
<td>50%</td>
<td>1.190</td>
</tr>
<tr>
<td>25%</td>
<td>1.155</td>
</tr>
<tr>
<td>discharged</td>
<td>1.120</td>
</tr>
</tbody>
</table>

| 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.