

Two Ways of Charging Golf Car Batteries

Here is a discussion of the difference between the TVR and ordinary time clock check . . . The former is far more reliable because it cuts back automatically on the amperage but a clock can be used with success by a skilled operator

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A battery works chemically to produce electricity. It has a discharge cycle and a charge cycle. During the discharge cycle, when the car is in use, the lead peroxide of the positive plate and the sponge lead of the negative plate are chemically converted to lead and sulphur plates by using the sulphur of the electrolyte solution. This makes the solution plain water. To state this more simply: The sulphur of the solution goes into the plates; the solution becomes water and the plates become lead sulphate plates.

In the charge cycle, or when the batteries are being charged, the sulphur is driven out of the plates into the solution, creating sulphuric acid in the solution. The positive plate converts to a lead peroxide positive, and the negative plate, a sponge lead plate goes back to the original charged state of the battery.

Never In One State

A battery is in a certain state of charge or discharge at all times. The battery never is completely discharged or charged in that all the plates are either lead peroxide or sponge lead. There are many variable factors in the charging of golf car batteries. These factors make it impossible to simply present a procedure that is always applicable without variation as to length of time and rate of charge that a battery should receive. Some of these variables involve course terrain, weight that the car is carrying (whether it is a 24- or 36-volt car), the size of the tires and their air pressure, the score of the user of the car, the age of the batteries, the cleanliness of the batteries, condition of the connections, temperature, the number of months the car is used, and even the characteristics of different cars of the same age and make.

Average Running Time

It has been found by stop watch tests that the average time a car is used in 18 holes is from 60 to 63 minutes. It has also been found that the average discharge is from 60 to 90 amperes with an average discharge of 72 amps.

A battery can only be charged with direct current which must be produced from an alternating current line at a golf course.

The type of car charger should be a silicone diode or selenium plate type converter, both of which produce DC current from AC. The length of time a charger is used is most important. If a charger is not used at high enough rate for a long

enough time, the batteries are undercharged. If the batteries are over charged, the charger, of course, is feeding current at a rate that is too high. In undercharged batteries the sulphate is not converted in the plates; if the batteries are overcharged the parts deteriorate very readily and the lead peroxide of the positive plate quickly becomes very soft. The grid wire of the positive plate corrodes very rapidly, ruining the batteries in a short period of time.

Controlling The Charge

The method of controlling the charge is the most important step in determining the length of life expectancy.

There are two types of controls. One of the most popular and most inexpensive is an ordinary time clock. The time clock can be set for eight or twelve hours, and the charge made accordingly. This is a very crude method of control. If this type of charge is used, some person who is skilled in the knowledge of batteries and charging should be given the responsibility of maintaining the batteries.

The only satisfactory way to determine if a set of batteries is charged via the time clock charger is by taking a hydrometer reading. This merely weighs the amount of sulphur in the electrolyte. At the end of the charge, if there is no change for three consecutive hourly hydrometer readings, the batteries are considered as charged. This has been confirmed by W. K. Pinkerton of Holderfield & Pinkerton who has had many years of experience in golf car batteries. It would be a simple matter if an exact standard could be stated in determining if batteries are completely charged at a certain hydrometer reading. But car batteries increase in gravity as they get older and gravity readings vary with different battery ages and thus are difficult to determine.

Should Know Cars

Due to the difficulty of determining the exact length of charging necessary when the ordinary clock is used, it is important that the person maintaining the car fleet should know his cars, chargers, batteries and players. After having used the hydrometers several times, he should be able to determine the proper length of charge for each car. The check to determine this calculation is through the three consecutive hourly hydrometer readings. If no rise in gravity is noted, the battery is determined as being charged.

Likewise, it should not be overcharged by staying on the charger for too long a period of time. Some cars have a scale showing the length of time of charge, according to gravity readings. This is only a guide but is much better than if there were no guide.

Second Type of Charger

The second type of charger is more expensive (costing approximately \$50.00 more) and is equipped with a TVR relay. TVR stands for Temperature Voltage Relay. This is a fancy name for a device that cuts back the charging output amperage as the voltage rises. It is practically perfect for checking batteries.

With TVR equipment you eliminate the possibility of sending a car out on rainy days only to have it come back in 15 or 20 minutes to be put back on the charger for an additional eight or ten hour charge. The TVR brings the batteries back up to voltage and cuts back to a small trickle rate without damaging them in any way.

Don't Mix Old and New

In using a TVR charger, make sure that all batteries used in the circuit are good. When one battery in a set of TVR batteries fails, the entire set should be replaced. If a combination of new and old batteries are used in the same series and one or more of the older units fails, the new batteries can be ruined by overcharge.

When cars are used in fleets, all old batteries should be used in the same sets. This applies, too, to new batteries. It is strongly recommended that a TVR charger should be used to eliminate the use of the hydrometer and take the human factor out of the charging operation.

It should be remembered that the starting rate of most chargers is 20 to 25 amperes. The rate drops back as the charge is completed. There is approximately a 20 per cent loss in the efficiency of the battery in accepting the current.

The life expectancy of car batteries varies considerably, as has been mentioned previously. The length of the playing season is very important. In the North battery life is greatly extended if the units are properly maintained in the winter. They should be kept charged at all times and stored in a cool or cold place. Keep in mind that batteries will freeze if discharged during severe winter months. If they are set up in a discharged condition in the winter they must be replaced at the outset of the following season.