

Golf Cart

Battery Maintenance Manual



EXIDE®

 **Start Positive. Stay Positive.®**



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EXIDE® GOLF CART



Day-In, Day-Out Durability And Performance

Ordinary golf carts and other electric vehicles require extraordinary batteries to keep them humming worry free. Since nothing ruins a day on the links like a dead golf cart, Exide makes an advanced line of golf cart and electric vehicle batteries designed for increased cycle life and reduced maintenance time. All this backed by Exide's strong nationwide warranty program means you can worry more about your swing and less about getting to the next hole.

Specifications

BCI GROUP SIZE	BATTERY TYPE	VOLTS	RC MINUTES @ 75A
GC2	GC-110	6	110— Avg. Perf. Min.
GC2	GC-110-Z	6	110 — Avg. Perf. Min.
GC2	GC-135	6	135 — Avg. Perf. Min.
GC2	GC-145	6	145 — Avg. Perf. Min.
GC8	GC8V-110	8	110* — Avg. Perf. Min.
GC8	GC8V8-118	8	118* — Avg. Perf. Min.

* Minutes @ 56 amps to 7.0 volts

Specifications

OVERALL DIMENSIONS (INCHES)**			
	L	W	H
GC-110	10-5/16	7-1/8	10-7/8
GC-110Z	10-5/16	7-1/8	10-5/16
GC-135	10-5/16	7-1/8	10-7/8
GC-145	10-5/16	7-1/8	11-5/8
GC8V-110	10-5/16	7-1/8	10-7/8
GC8V8-118	10-5/16	7-1/8	10-7/8

** Specifications are subject to change without notice.

Summary Of Golf Cart Battery Care

1. The battery carrier and hold-down should be free of corrosion and rust, and painted with a corrosion-resistant paint. Frayed or worn out cable connectors should be replaced. All connectors should be clean and tight, and a thin coating of non-metallic grease or protective spray should be applied to ward off future corrosion.
2. Batteries should be recharged after each day's use. Charging between rounds is acceptable if it is feasible to do so. Do not send out a cart unless the batteries are in a good state of charge.
3. When adding water, do not overfill; this can result in loss of electrolyte. Check tap water for impurity content. Do not use creek or well water due to the high iron and mineral content.
4. Keep golf cart batteries clean and free of acid spillage, dirt and grime. Clean batteries with a bristle brush using water and baking soda. Rinse with water.
5. Check batteries periodically to see that they are in a good state of charge. Acid specific gravity should not vary more than 50 points between cells.
6. Store batteries during off season in an unheated area. Fully charge batteries before storing. Check periodically and recharge if batteries go below 1.220 specific gravity. Do preventative maintenance before putting carts back in service.

Installing

Check Polarity

The first step to ensure proper installation of a new set of batteries in a golf cart is to observe how the old set of batteries was installed, and the position of the cable connectors. This will keep you from installing the new batteries in a reverse position.

Remove Corrosion

After removing the old set of batteries, clean the battery carrier and battery hold-down to remove all corrosion and rust. The clean parts should then be painted with a corrosion resistant paint.

Visual Inspection

Check batteries before installing to ensure that containers, covers and terminals were not broken or damaged in transit.

Cable Connectors

When old cable connectors are being reused, soak them in a bucket of water to which one cup of baking soda has been added. Wipe the cable connectors clean and dry, then wire brush the connector ends until the metal shines. If clamp-on terminals are used, use a post-type brush to clean the INSIDE of the terminal connectors. The battery terminals should be cleaned until the lead shines. Inspect cable connectors before reinstalling; replace those that have broken or frayed wires or loose terminal connectors.

Install Hold-Down

Install the battery hold-down making certain it is pulled snug enough to keep the batteries from bouncing in the carrier. Don't overtighten as this can crack the batteries.

Install Connectors

Install the cable connectors to the battery terminals (using a hand wrench, for a good tight connection). It is advisable to tape (plastic electrical tape) one end of the wrench to avoid a short if the wrench should hit an opposite terminal while installing connectors. Apply a coating of non-metallic grease or protective spray to all connectors to help minimize future corrosion.

First Charge

Before sending the cart out on the course, give the batteries a full charge. This acts as an equalizing charge and ensures that all batteries in the cart are in a good state of charge. New batteries should be given a full charge before their first use because it is difficult to know how long the batteries have been in storage without a charge.

Limit use of new batteries between charges for the first five cycles. New batteries and old batteries that have been in storage are not capable of their rated output until they have been discharged and charged several times.

When temperatures are below 60°F, new batteries should be given an extra, full charge once a week. The ampere hours of energy that batteries can deliver and their charge acceptance varies directly with battery temperature.

Charging

Chargers

When charging golf cart batteries, follow the instructions provided by the manufacturer of the chargers you are using. Most golf cart battery chargers on the market today are designed to bring a normally discharged battery back to full or near full charge in a given time period. The state of charge depends on the type of play and the number of holes for which the golf cart was used.

Hard Use

Where golf carts are used “hard” for 36 holes every day, and possibly more than 36 holes some days, there is a good chance that the charger cannot keep up with the amount being discharged from the battery. In such a case, the batteries start falling into a low state of charge. A charger could be working perfectly, but if you do not get the carts on charge until 10:00 p.m. and off at 6:00 a.m., the chances are good that you did not get sufficient charge into the batteries. Hard use carts should be charged for at least 8 hours to keep up with the amount discharged.

Catch-Up Charge

In cases where carts are used hard and begin falling behind, it may be necessary to employ a catch-up charge. On a rainy day or off day, when carts do not go out, they should be checked for state of charge. Any batteries that are not in good state of charge should be recharged.

As long as the charger tapers down to the specified finish charge rate near the end of the charge cycle, the batteries should be at full charge. All cells in a set of batteries do not react identically to the same discharge and charge current. In a normal charge, the last one to three hours at the low finish charge rate equalize the cells for better battery life.

Catch-Up Charge Recommendation

State of Charge	Charge
1.260 to 1.280 sp.gr.*	none needed
1.240 to 1.260 sp.gr.*	4 hours
1.220 to 1.240 sp.gr.*	8 hours
below 1.220 sp.gr.*	12 hours

* Specific Gravity

Amount Of Charge

To avoid getting batteries into a low state of charge, golf carts should be put on charge early enough in the evening to allow for the full-time schedule of the charger. Do not charge batteries every day that the golf cart is not used. By so doing, you will overcharge the batteries shortening the battery life. Overcharging batteries corrodes the positive grids resulting in the disintegration of the positive grid structure.

For every day use, turn the charger on and check to see if the meter needle jumps upward and then tapers down to the finish rate area within 15 minutes. This will provide a very simple means of verifying that the batteries were charged.

AC Power

Available AC power has a direct effect on the initial output rate of the charger. Golf cart battery chargers are designed to give their rated output when connected to AC line voltage of 115 volts. If there is insufficient AC power available (too small a transformer installation to supply the power requirements when all chargers are operating at the same time), line voltage will drop significantly below 115 volts. The result could be undercharged batteries. It is suggested you contact your local power company for a survey of your installation.

Effects Of AC Line Voltage On The Average Golf Cart Battery Charger

AC Line Voltage (under load)	Starting Rate
115	25.0 amps
110	22.5 amps
105	19.0 amps
100	16.0 amps

Rotating Carts

It is important to remember that golf carts should be rotated so that the last carts put on charge at night are NOT the first out in the morning. Otherwise some carts could get an insufficient charge while others may become overcharged. Proper rotation of cars not only keeps the batteries in balance but keeps your fleet in balance.

Watering

Electrolyte

The electrolyte in lead-acid storage batteries is a solution of sulfuric acid and water. The sulfuric acid portion of the electrolyte does not evaporate, but the water portion must continually be replaced because of loss due to charging and evaporation.

Add Only Water

It is not necessary during the normal life span of a battery to add sulfuric acid. If a battery is spilled, causing the loss of a quantity of the acid, then and only then should acid be added. This however should be done ONLY by an experienced battery technician.

Type Of Water To Use

Mineral Content

The average 6-volt golf cart battery contains approximately 6.8 quarts of electrolyte. During the normal life span of the battery, this original volume is added in water at about 2 1/2 times. This means that each battery in its normal life span has had about 16 quarts of water added. If you add water that has a high mineral content, there may be a cumulative adverse effect on battery performance. If you choose to use tap water, it is suggested that you contact your local water department requesting an analysis to see if the mineral content is within limits for use in lead-acid storage batteries.

Creek water and well water generally have a high impurity content and should not be used in storage batteries.

Recommended Allowable Impurities In Water

Impurity	Calculated as	Parts per Million
Color		Clear & White
Suspended		Trace
Total Solids		100
Calcium & Magnesium Oxides	CaO & MgO	40
Iron	Fe	4.0
Ammonia	NH ₃	5.0
Organic & Volatile Matter		50
Nitrates	NO ₃	10
Nitrates	NO ₂	5.0
Chloride	Cl	5.0

Level Indicator

Most golf cart batteries have an indicator ring inside the filling well showing the normal level for adding water. Add water to a level 1/4 to 1/8 inch below the indicator ring.

Electrolyte Level

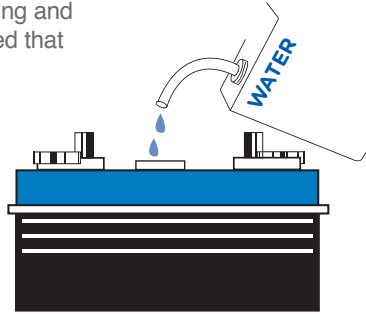
The level of electrolyte should NEVER be allowed to go below the top of the plates — this can cause permanent damage to the exposed portion of the plates. If you cannot see the electrolyte covering the separators before the batteries are put on charge, add enough water to cover the top of the separators. After the charge is completed, relevel with water to the normal level.

Avoid overfilling when adding water to the batteries. The problem with overfilling is that while charging, acid is pumped out and lost, reducing the capacity of the battery. This will also increase corrosion to metal parts of the battery.

When To Add Water

It is recommended that water be added to batteries near the end of the charge or after taking them to charge. Be certain to replace the vent caps after watering so electrolyte does not splash out while the golf cart is being used.

Generally, water must be added to golf cart batteries about every 30 days. This is governed greatly by the amount of use, charging and heat exposure. It is suggested that a few vent caps be removed at least every week to check and see if the batteries need water.



Cleaning

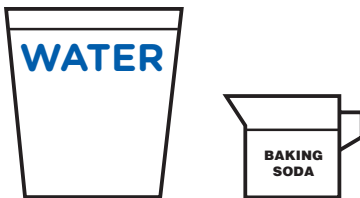
Current Leakage

If a coating of acid soaked dirt accumulates on the battery top, an electrical path will be created between the terminals. This in turn may cause a leakage of current, which reduces the operating efficiency and is detrimental to the life expectancy of the battery.

Washing

Batteries on golf carts should be kept clean and free of acid spillage, dirt and grease. This can be accomplished by washing the batteries with a water hose after water has been added to the batteries. Make certain all vent caps are securely in place before washing the batteries to prevent significant amounts of dirt or foreign matter from getting into the battery cells.

When batteries have an accumulation of grime that fails to wash off with a hose, the battery tops should be cleaned with a solution of water and baking soda (approximately one cup per bucket of water). After scrubbing the battery tops with a stiff bristle brush, rinse off with water.



Testing

What To Check

When a set of golf cart batteries is relatively new and the cart is not performing properly, check to see if they were fully charged before the cart was set out on the course. If the batteries were properly charged and trouble persists, do not discard the entire set of batteries. The chances are good that only ONE battery of the set needs to be replaced.

Using a battery hydrometer, test each battery individually, comparing the three cell readings of each battery.

If the variation between the highest and lowest cell readings in any one battery is .050 (50 gravity points) or greater, there is reason to suspect a weak or failing cell. This test is best accomplished with the batteries in a full state of charge and all cells equal in electrolyte level.

Load Test

Connect a 75-amp load tester to the fully charged set of batteries and test each battery in the set with a 6-volt voltmeter while under load. A weak or failed battery in the set will show up on the voltmeter. Let the set discharge to an overall voltage of 31.5 volts. At this point, if they discharged less than 40 minutes to 31.5 volts, test each battery individually with a voltmeter, because chances are there is a bad battery in the system. If a failed battery cannot be found and the fully charged set of batteries discharged only 40 minutes to a voltage of 31.5 volts, the golf cart probably will not make 18 holes of golf and the entire set of six batteries should be replaced.

When it is necessary to replace one or two batteries in a cart, it is advisable to replace with batteries comparable in age with those presently in the cart. By so doing, you keep a better balance of age and remaining capacity of the batteries in each cart.

Off-Season Storage

Clean Tops

Golf cart batteries are generally stored connected in the golf cart. Before putting cars up for off-season storage, be certain the tops of the batteries are washed clean—this will help to reduce the amount of self-discharge on the batteries.

Self-Discharge

Fully charge the batteries, then store in an unheated area. Heat increases the amount of self-discharge while cold reduces the stand loss characteristics of the storage battery. Physically sound, fully charged batteries, stored at 0°F, self-discharge very little over a four-month period. On the other hand, if the same batteries were stored at 80°F, they would need to be charged about once a month.

Batteries in storage should be checked periodically and when the gravity drops to 1.220 specific gravity. by hydrometer reading, they should be brought back to full charge.

Where a load tester (75 amp) is available, recharge the batteries to full charge then proceed with the 75 amp discharge, recording the minutes run to 31.5 volts. The carts should now be classified by the number of minutes they deliver on the 75 amp test. Batteries that will give approximately 70 minutes or more are in good condition. Where a set of batteries will deliver only 40 minutes or less and there is not a failed battery in the set, the set should be replaced. After checking all batteries and classifying according to minutes delivered, the batteries should be removed from the cart and the maintenance procedure outlined under installing in this manual should be followed.

Cautions

Explosive Gases

The gases generated within a storage battery cell on charge, a combination of oxygen and hydrogen, may be ignited by an open flame or spark in the vicinity of the battery.

A match should not be used to provide light for checking the level of electrolyte. Care should be exercised while working in the vicinity of the battery test because a short circuit produced by a tool could ignite the battery gases. Another possible danger is a spark produced by static electricity.

ALWAYS WEAR EYE PROTECTION WHEN WORKING NEAR BATTERIES AND SKIN PROTECTION WHEN HANDLING BATTERIES OR ELECTROLYTE.



Poison/Danger

Sulfuric Acid

Batteries contain sulfuric acid and can cause severe burns. Avoid contact with skin, eyes and clothing.

If battery acid is spilled, immediate action is required to check or eliminate its corrosive effects:

External: Flush with cold water.

Eyes: Flush with cold water for 15 minutes, then get medical attention immediately. Remove contaminated clothing immediately, including shoes.

Internal: Drink large quantities of water. Do not induce vomiting. Call physician immediately.

Car or Clothing: Wash immediately with cold water and neutralize the area with a baking soda or household ammonia solution. Bleaching or other damage can result.





Exide uses a comprehensive business approach to recycling called Total Battery Management (TBM)[™]. TBM includes manufacturing and distribution of lead-acid batteries, collection of spent batteries, reclamation of battery materials and use of those materials in new batteries.

Exide Technologies recycles sufficient lead tonnage to make the Company one of the largest secondary lead recyclers in the world, returning the materials to new product and diverting them from the waste stream. Exide Technologies batteries are recyclable.

EXIDE[®]



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For more information and nationwide warranty terms visit us at StartPositiveStayPositive.com or call 1-800-START-IT

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