Service Bulletins & Tips
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HAPPY NEW YEAR

We would like to wish all of our customers a very Happy New Year. Each year brings new challenges and opportunities and we hope that 2005 brings the best for all of you. Our service department works with hundreds of customers each year and we value every single customer that calls for assistance. If there are any technical questions you have about a Lester Electrical product, please do not hesitate to contact us by phone at (402) 477-8988 or by email at service@lesterelectrical.com. Also if there are any service topics or tips you would like to see in a future edition of this newsletter, just let us know.

COMMON SERVICE TOPICS

Too Hot to Touch?

Like all electrical devices, battery chargers are not 100% efficient. A portion of the electrical energy the charger consumes to create direct current is expended in the form of heat. This heat radiates from the components inside the charger to the surrounding free air.

The highest temperatures for certain components of a randomly chosen charger as actually measured by Underwriters Laboratories are listed below.

Transformer secondary coil	108°C (226°F)
Transformer core	96°C (205°F)
External case	42°C (108°F)
DC cord at strain relief bushing	51°C (124°F)
Ambient air	22°C (72°F)

The two components that people can actually touch are the external case and the DC cord. For most people, the threshold of pain depends mostly on the degree of skin callusing, but is typically between 41°C (105°F) and 52°C (125°F).

Note how this compares with the case and DC cord temperatures. For some people these parts may very well be perceived as “too hot to touch”. But is this a cause for concern?

Every single component in a charger must pass very demanding tests before it can be certified as approved by UL or other approval agencies. If the charger is used as intended, the heat perceived as excessive is normal and within its limits. Remember that the temperatures cited were the maximum reached.

A useful, if not exactly laboratory-accurate rule of thumb, is that if you can touch the component in question lightly and count to three, there is no cause for concern.

We suggest that the area of most concern for our customers would be to monitor the

critical DC plug connection for excess heat. The contact tips and blades here are subject to wear, particularly if the charger is old and/or used on a daily basis. A poor or loose connection here will create heat beyond design limits, scorched and burnt parts are not that uncommon.

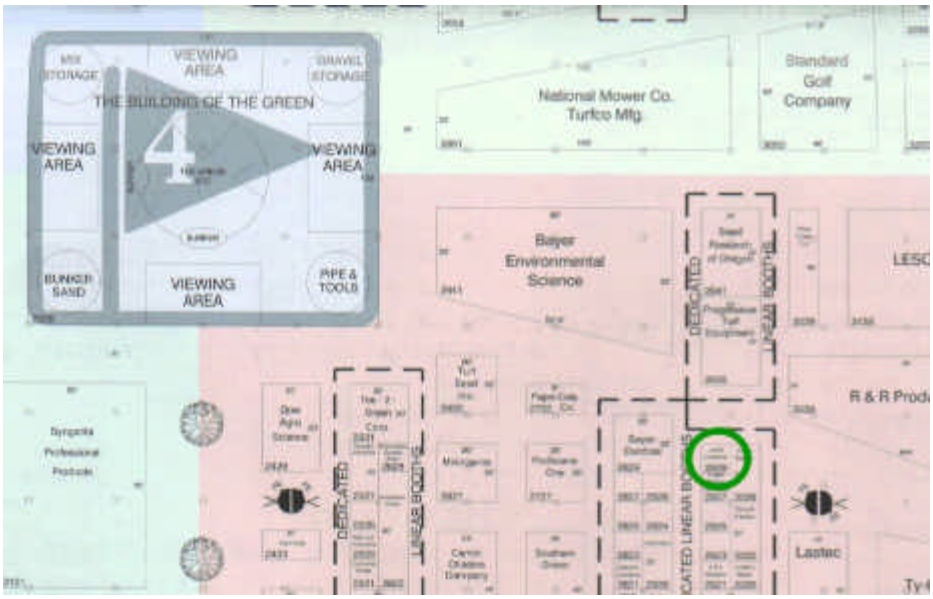
If there is any doubt as to the integrity of this connection, inspect and replace as needed.

VISIT US IN ORLANDO

The inaugural Golf Industry Show will be held in Orlando February 10-12, 2005. This year marks the combination of the Golf Course Superintendents Association of America (GCSAA) and National Golf Course Owners Association (NGCOA) trade shows. Several Solution Centers will be showcased at the exhibit. At the featured Solution Center, there will be a building of an actual golf course green. Other Solution Centers include the Water Solutions Center, the Agronomic Solution Center, Clubhouse Solutions, and Equipment & Maintenance Solutions.

Two new additions this year include the Indoor Driving Range, where attendees can test the latest ball and club equipment, and the Electric Vehicle Test Center, where visitors can test drive various brands of electric golf carts and utility vehicles on one of two tracks. For more information on the Golf Industry Show, please visit their web site at http://www.golfindustryshow.com.

Lester Electrical will be at Booth #2929 (circled in green below). This is on the diagonal aisle that connects the building of the green to the member solutions center. See this section in the image below for more details (click on image for larger view).



WEB SITE NAVIGATION

We have had some questions about navigating through the Lester Electrical website. While many of you who may have visited our previous site would agree that the current site is a tremendous improvement, there is still considerable room for additional improvement. We are working through some various revisions of the web site, including ideas for further enhancements. If you have suggestions or comments on the website, please send an email to marketing@lesterelectrical.com.

As for the current website, if you are having difficulty figuring out where on the website you are, there are a few methods of getting your bearings straight. The first is the column of buttons on the left side of the screen. Clicking on any of these buttons will take you to that section's main page. From each section's main page, there are several additional pages that you can access. These pages can be selected from the buttons located directly below the Lester Electrical logo.

Additionally, you can tell where you are in the Lester Electrical website by the text below the top row of navigation buttons. For instance, if you are at the Technical Service home

page, this text will read “Home > Technical Service”.

Finally, one of the easiest ways to get around the Lester Electrical website is to use the Site Map button on the left side of the screen. This will open a page that gives a general outline of the layout of the entire Lester Electrical website.

TIPS FROM THE EXPERTS

This information appeared in the November newsletter, but with the recent spell of cold weather across much of the United States, we felt it worthwhile to include it again in this issue.

Battery Storage and Care

The seasons are changing and for many owners of battery powered equipment that means a period of storage time and/or cold weather exposure is about to commence. Depending on your geographical location, not only do the affects of an extended storage time cause concern but also the potentially harmful affects of freezing temperatures. The improper storage or care of batteries can result in costly battery replacement in the future. Following a few battery storage and cold weather care guidelines can help ensure healthy batteries when the equipment is again placed in service.

Battery Storage

Extended storage of batteries without proper care can result in a condition known as sulfation. Sulfation is essentially an insulating layer that forms on the plates within the battery causing high resistance, which inhibits current flow while a battery is being charged or discharged. The symptoms are usually that of a battery that drops in voltage quickly and provides energy for only a very short amount of time when a load is applied. When charging a sulfated battery, the battery reaches the full output potential of the charger quickly with very minimal charge current accepted.

Sulfation is most often caused by the lack of maintaining a proper state of charge on a battery system for an extended period. Allowing a battery system to become excessively discharged for extended periods will almost always result in permanent irreversible damage to the batteries, which eventually results in costly battery replacement. Even though a battery in storage has no load, it will self-discharge as a result of local action within the battery. Storing batteries in cooler temperatures reduces the amount of local action within the battery but it doesn’t mean the batteries can be ignored for extended periods of time.

When the time comes to place equipment in storage, make sure the batteries receive a full charge and the electrolyte is at the proper level. It is recommended that the batteries receive a maintenance/refresh charge every week or at a very minimum of once a month. Maintaining the proper electrolyte level during the storage period is also very important. We advise that you contact your battery dealer or manufacturer and follow their recommendations first.

In early spring we receive many calls regarding charging problems, which are the result of improper maintenance of batteries that had been placed in storage. A large number of the calls are from private owners of golf cars that leave their summer homes during the winter months. While not as frequent, these calls are also received in the fall from those returning to their winter homes. Private golf car owners are often unaware of the maintenance requirements for batteries placed in storage. These owners also don’t realize that many battery and golf car dealers offer services to maintain these battery systems at a minimal cost. If you are a private owner, check with your local battery and equipment dealers for availability of this service.

Large fleets of battery powered equipment, such as golf courses and construction companies, will assign personnel to perform the maintenance tasks needed to protect their large investments. Regardless of the amount of equipment being placed in storage, it is very important that the storage location doesn’t allow the batteries to freeze. Once batteries have been frozen they will most likely require replacement.

When the storage period ends and it is time to place the equipment back into service it is common practice to “wake-up” the batteries. No, you don’t place an alarm clock next to the batteries or poor cold water on them. To “wake-up” batteries typically refers to the

practice of allowing a charger to complete four to five consecutive charge cycles before placing the equipment back into service. This practice will help to promote good battery performance and ultimately good equipment performance.

Cold Weather Care

As previously mentioned, never allow a battery to freeze. A battery that has been frozen will seldom produce any useful output. Care to avoid freezing of batteries not only applies to those placed in storage but also applies to equipment stored outside, such as found in rental yards.

The best defense against a battery freezing is to maintain a full charge on the batteries. A fully charged battery has a much lower freezing point than one in a state of discharge. Water has a freezing point of 32 degrees Fahrenheit, which corresponds to a specific gravity of 1.0. An average specific gravity of the electrolyte found in golf car batteries is approximately 1.265. The higher the specific gravity of the electrolyte, the lower the freezing point. Examples: electrolyte with a specific gravity of about 1.250 has a freezing point of -62 degrees Fahrenheit, while a specific gravity of about 1.100 has a freezing point of 19 degrees Fahrenheit. If extremely cold temperatures are expected, move the batteries into a warmer environment to avoid costly battery replacement.

Cold temperatures also affect the capacity of batteries. The capacity rating of batteries is usually measured at 77 degrees Fahrenheit. Battery capacity is reduced when batteries are used in colder temperatures. This is the result of the slower speed at which the acid in the electrolyte combines with the plate material. It is common practice to place the batteries on-charge in colder temperatures prior to usage. This will help to provide maximum performance from the batteries in colder ambient temperatures.

Proper Care of Deep Cycle Batteries

While we are on the subject of batteries, let's review of some basic battery maintenance practices that will help promote good battery, charger, and equipment performance and life.

Caution: When working with batteries, always wear protective eye shields and clothing. Batteries contain acids that can cause bodily harm. Never place wrenches or other metal objects on top of batteries or near battery terminals. Arcing or explosion of the battery can result.

- Always give new batteries a full charge before placing them into service. Keep in mind, new batteries require a number of cycles, usually about 20, before full capacity will be produced.

- Limit the use of new batteries for the first 20 cycles. It is recommended that new batteries not be discharged below 50% for the first five charge cycles. New batteries and older batteries that have been in storage are not capable of producing their rated output until they have been discharged and charged a number of times. Excessively discharging new batteries, over 60%, can cause polarity reversal of individual cells resulting in complete battery failure shortly thereafter.

- When temperatures fall below 65 degrees Fahrenheit, the batteries should be placed on charge as soon after use as possible. Cold batteries require more time to charge.

- Keep the tops of batteries and battery terminals clean and dry. This will prevent excessive self-discharge and the flow of current between battery posts and frame.

- Never allow a battery to freeze. This will cause permanent irreversible damage to the batteries.

- Sulfation results when batteries are left in a discharged state in as little as three days in warm temperatures. Batteries placed in storage without being maintained will also self-discharge and sulfate to various degrees, depending on the depth of discharge and length of time left in the discharged state. Minimal sulfation can usually be recovered

by repeated charging, although some permanent loss of battery capacity and life can be expected.

- Maintain proper electrolyte level in the batteries. Allowing the electrolyte level to drop below the top of the plates can reduce battery capacity and life. Paste material on the plates of a battery that is allowed to dry will permanently lose any ability to produce an electrical charge. DO NOT ADD WATER TO A DISCHARGED BATTERY and NEVER OVER-FILL A BATTERY. Water should only be added to a battery when the battery is at or near full charge. If the electrolyte level is below the top of the plates before starting a charge cycle, add water so the electrolyte level comes even with the top of the plates. Top off the electrolyte level after a full charge has been given.

  Electrolyte levels fall during discharge and rise during charge. Adding water to a battery when in a discharged state will cause the electrolyte to overflow from the batteries when being charged. Never add acid to a battery. It is recommended that only distilled water be used to top off batteries. Older batteries nearing the end of their life typically require more frequent watering.

- Follow all operating instructions, cautions and warnings on the charger, batteries and the equipment.