

Service Bulletins & Tips

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Common Service Topics - This issue's service topic covers all the basics of diode testing.

Tips from the Experts - Difference between Model Number vs. Type Number.

New Website Launch – Lester Electrical has launched its new website with several new features and several service-related documents.

COMMON SERVICE TOPICS

This month's *Service Bulletins & Tips* will cover a popular topic handled by our technical service representatives on a frequent basis: Diodes.

We will start with the basics.

What is a Diode?

A diode is an electrical "one-way" check valve that allows current to flow in one direction only. Diodes convert the sine wave input of incoming alternating current (AC) into the direct current output (DC) needed to charge batteries.

What does a Diode look like?

Diodes vary in shape and size, but are always mounted to a "heat sink" to dissipate the heat created by current flowing through them. The illustration below (Image 1) is a typical diode/heat sink configuration. The diode and heat sink configuration in your charger may differ from this, but should look similar. The two transformer output wires attach to the outside leads and send AC current to the diodes. The diodes then "rectify" this AC current and send DC current through the middle lead out to the battery positive (+) wire.

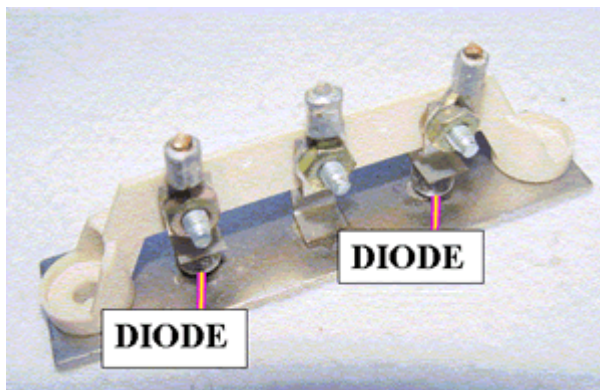


Image 1 - Picture of Diode

Why does a diode fail?

Below are some common causes of diode failure.

Voltage Transients – Voltage transients, also referred to as voltage spikes, are the most common cause of diode failures. Most transients originate from the AC line but can also enter the charger from the DC side. Lightning and large inductive loads, such as motors turning on, can cause AC transients. Using equipment while the charger is in operation can

produce transients on the DC side, which is a fairly common practice with scissor lifts.

Reversed polarity of the DC connection - In most DC battery systems the negative (-) wire is black and the positive (+) wire is white (or sometimes red in OEM applications). A mistake we see often is that people familiar with wiring AC circuits, but not DC, assume that the "hot" wire is black and wire the DC system based on their experience. The usual result is that both legs of the fuse blow. This stress may also cause one or both of the diodes to fail.

Before replacing the batteries or the male or female DC plug, or before you make any changes at all in the wiring of the battery pack, please ensure that you mark the connections and draw an accurate sketch of the circuitry. If you don't have a wiring diagram for your application, now is the time to obtain one from the manufacturer. If your machine is used, has been modified, or has an unknown history, make every effort to obtain an accurate wiring diagram.

Symptoms of a failed diode

A charger ammeter that only deflects to 10 to 20% of the charger's rated output when first turned on, regardless of the battery system voltage, most likely has a failed diode. Most diodes fail in the shorted mode, which will cause one of the fuse links to blow. However, a diode that fails in an open mode will not cause the fuse to blow. The length of the charge cycle for a Lestronic charger with an automatic timer depends on several factors, including depth of discharge, battery size, and charger size. While we cannot give you an exact time the charger should run, if you notice a significant increase in charging time and the charger does not turn off, a failed diode may be present. The majority of our calls that involve excessive charger run times are caused by battery problems. Since the charger is trying to increase the voltage to a specific level before turning off, any weaknesses in the batteries or an extremely low charge rate may cause the charger to run longer than normal.

So you are aware, following is a list of conditions that may also cause extended charger run times:

- a) The batteries sat idle for over a month without being charged (Batteries that have sat idle for extended periods may not accept a charge or cause the charger to shut off in a short period of time due to crystallized sulfation),
- b) The batteries are new and are being charged for the first time,
- c) The batteries are in a cool environment of 50° F or less,
- d) The batteries have been excessively discharged to the point that the machine is completely dead and has to be pushed to a wall outlet to be charged.

How do I test a diode?

Note meter settings (reading Ohms) in **Image 2**, the connections to the diode (red lead) and heat sink assembly (black lead), and the actual meter reading (146.7 Ohms). This check indicates some measurable resistance value, that is, we do not read ZERO or INFINITY.

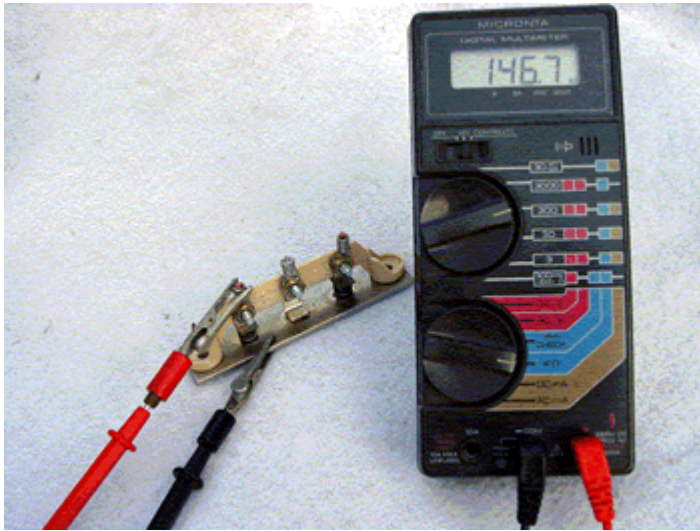


Image 2 - First step of checking Diode

In **Image 3** (below), we show the leads reversed (Red – Heat Sink and Black to Diode). The meter reading in the picture shows “00.0” but is actually reading INFINITY. On this particular model of multi-meter, the display flashes 00.0 indicating an open circuit. Because the diode is designed as a one-way electrical “check valve,” this process of checking indicates the diode is GOOD



Image 3 - Second step of checking diode.

NOTE: Don't forget to check the other diode in the same manner!

Diode Failure

In the case of a bad diode, you will have one of two situations. First, if the meter indicates ZERO (as it will if the probes are touched together) both ways, the diode has shorted. Or, second, the meter indicates INFINITY (as it will if the meter probes are not touched together) both ways, meaning the diode is open.

TIPS FROM THE EXPERTS

Model Number vs. Charger Type

The nameplate on most Lester branded chargers contains the information you need to have when you call the service department for assistance. Having this information will ensure that you receive the most efficient service we can offer. The first, and most important, piece of information is the Charger Model. This is a 5-digit number listed in a box under “MODEL”. Sometimes this will be a 4-digit number PLUS a leading zero (an example would be Model 09611). From the model number, our customer representatives will be able to

retrieve the necessary parts information and corresponding voltage and current capacities of your charger.

It is important to note that the "TYPE" is not the same as the model. The "TYPE" refers to the characteristics of the charging profile and usually takes on the form of "xxELxx-x" or "xxLCxx-x." The first two places refer to the DC voltage output of the charger (12, 24, 48, etc.). The next two letters will be either EL or LC. EL is used to identify SCR chargers and LC is used to identify ferroresonant chargers. The one or two digits following LC or EL is the starting DC charge current, and the number following the dash number is the finish current.

NEW LESTER ELECTRICAL WEBSITE

Lester Electrical is proud to announce the launch of their completely redesigned website at <http://www.lesterelectrical.com/>. The site, which was unveiled on June 1st, provides visitors with a comprehensive overview of Lester Electrical, including information on its product lines and manufacturing capabilities, as well as a brief history of the company. Visitors to the site will find improved navigation through the site that allows quick access to any page with just a couple of clicks.

Additional features include a listing of current Specials on select charger models, access to archived Technical Service Bulletins, and an opportunity to subscribe to one or both of Lester Electrical's free monthly newsletters. More features, including detailed product specifications and a product manual search engine, are planned in the near future. "Over the years, Lester Electrical has built a reputation of providing top-notch customer service," said Ken Jeffcoat, Lester Electrical's Director of Marketing & Sales. "This new website gives us another tool to build on our relationships with our customers by providing timely information and support to them."

The Tech Service section of the website contains a dedicated "Service Topics" page intended to provide technical details and answers to some commonly encountered situations. Documents are in Adobe Acrobat (PDF) format and require the free Adobe Acrobat reader, available at adobe.com. The following is the list of documents currently available:

[24-Volt Timer Kit Instructions](#) (82 kb PDF)

[36-Volt Timer Kit Instructions](#) (105 kb PDF)

[Charger Runs Too Long](#) (35 kb PDF)

[Dual Mode 24EL8 Wheelchair Battery Charger Troubleshooting Guide](#) (83 kb PDF)

[Electronic Timer Repair and Replacement Program](#) (30 kb PDF)

[Lestronic II Troubleshooting Guide](#) (63kb PDF)

[Open Circuit Voltage Transformer Test Procedure](#) (38 kb PDF)

[Portable SCR Regulated Battery Charger Troubleshooting Guide](#) (428 kb PDF)

[Transformer Hum](#) (36kb PDF)

[Warranty Claim Form](#) (73 kb Microsoft Word Document)