EAA Chapter 648

Longmont, Colorado 80503

Monday, May 10th at at 7PM at our usual venue.

Thanks to all of you for reading our newsletter and I will keep on working to increase our readership and don't forget to patronize our advertisers if an aviation purchase is in your future.

*Remember, **"Nothing happens until somebody sells something"***

Chuckle of the Month:
Aircraft Identification:
If it's ugly, it's British.
If it's weird, it's French.
If it's ugly and weird, it's Russian

Well, we had a very informative meeting again in April and it was good to see about a dozen members of EAA 648 attend. It was very encouraging to hear that about 15 young aviators are involved in building an RV12 at Longmont's Innovation Center, with the guidance of Dan Berry, Steve Kerchner and Paul Hollingshead.

Steve and Paul getting ready to start the program presented by Paul Hollingshead

Fly’em and Fix’em Tech Tip

by Dan Berry

I am not an A&P, rather an EAA Technical Counselor and I am simply sharing some information I use. Always research the needed resources for your brand of equipment.

Starter and Battery Relay Catch Diodes

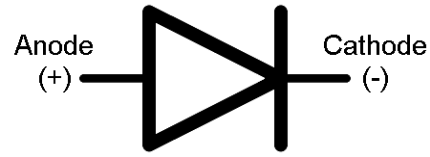
During two recent Tech Counselor visits, I was asked about testing diodes. One case was for the Light Speed Electronic Ignition Dual Power Supply Schottky Diode and the other use was for protecting our Battery and Starter Relays. Since I can never remember all the details, I decided to write this article combining my many cheat sheets into one.

Light Speed has a wonderful schematic on their website so I will not address LSE circuit here, rather focus on Diode Testing, including the slightly different Schottky Diode and the Battery/Starter circuit catch diodes.

Why we care
Every time our Master Relay and Starter Relay are exercised, there is a very large voltage spike applied to the internal contacts. This voltage spike creates pitting and burns on the contacts and will eventually lead to failure.

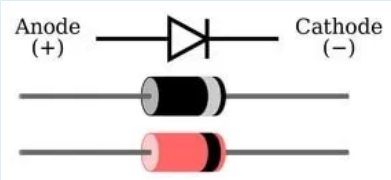
I had the distant past experience of having the voltage spike generate enough EMI near my ELT remote switch, that the ELT was activated. At least that is what I blamed it on - my landing was not that bad, the airplane was reusable. Never had the problem again after installing the catch diodes and haven't heard from the CAP since!

Understanding the diode
The diode is a two terminal semiconductor device which allows the current flow only in one direction.



Diode testing is done to know it is working properly in forward and reverse bias modes, and to make sure you did not short it or blow it during incorrect installation, as I have done several times.

Before testing of the diode, the terminals of the diode must be identified. That means which terminal is anode and which one is cathode. Most of the PN diodes have the silver-band on its body and this white-band side terminal is the cathode. And the remaining one is anode. Some diodes may have a different color band, but the color band side terminal is the cathode.

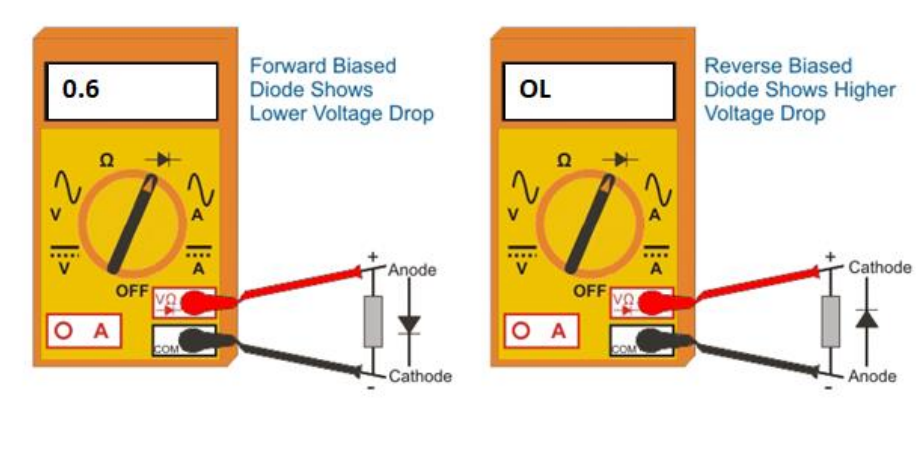


Using A Digital Multimeter is simple
Diode testing using a digital multimeter (DMM) can be accomplished in two ways.
1.Diode mode or 2. Ohmmeter mode.

Diode Mode Testing Operations

1. Identify the diode terminals (anode and cathode).
2. Place the digital multimeter (DMM) in diode checking mode by rotating the central knob to the diode symbol. In this mode the multimeter supplies a current of ~ 2mA between the test leads.

3. Connect the red probe to the anode and black probe to the cathode. (This means diode is forward-biased.)
4. Observe the reading on the meter display. If the displayed voltage value is in between 0.6 to 0.7 (since it is silicon diode) then the diode is healthy and perfect. For germanium diodes this value is in between 0.25 to 0.3.
5. Now reverse the terminals of the meter - that means connect the red probe to cathode and black to anode. This is the reverse biased condition of the diode where no current flows through it. Hence, the meter should read OL (which is equivalent to open circuit) if the diode is healthy.
6. If the meter shows irrelevant values to the above two conditions, then the diode is defective.



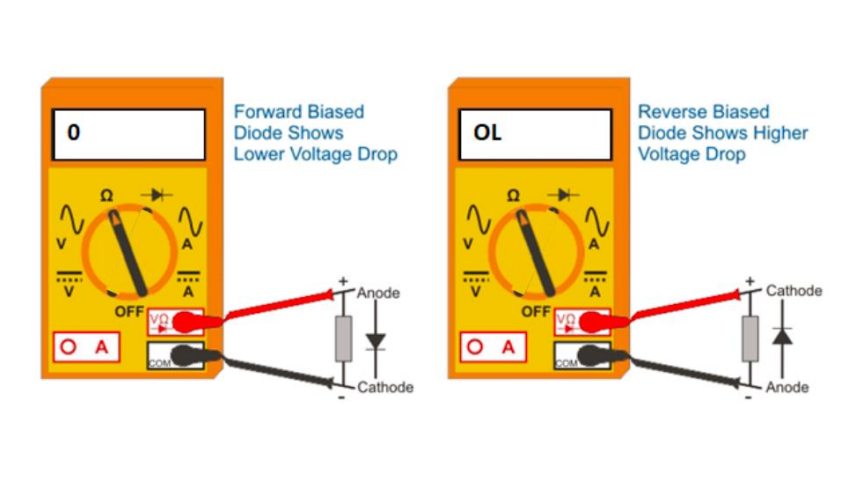
Diode defects can be either open or short. Open diode means diode behaves as an open switch in both reverse and forward-biased conditions. So, no current flows through the diode. Therefore, the meter will indicate OL in both reverse and forward-biased conditions.

Shorted diode means diode behaves as a closed switch so the current flows through it and the voltage drop across the diode will be zero. Therefore, the multimeter will indicate zero voltage value, but in some cases it will display very little voltage as the voltage drop across the diode.

Ohmmeter Test Mode (DMM or Analog Meter) Operations

1. Identify the terminals anode and cathode of the diode.
2. Place the digital multimeter (DMM) in resistance or ohmmeter mode by rotating the central knob or selector to the place where ohm symbol or resistor values are indicated. Keep the selector in low resistance (may be 1K ohm) mode for forward-bias.

3. Connect the red probe to the anode and black probe to the cathode. This means diode is forward-biased. When the diode is forward-biased, the resistance of the diode is so small.
4. If the meter displays a moderately low value on the meter display, which may be a few tens too few hundred ohms, then the diode is good and healthy.
5. Now reverse the terminals of the multimeter such that anode is connected to black probe and cathode to red probe. So the diode is reverse biased.
6. Keep the selector in high resistance mode (may be 100K ohm) for the reverse bias testing procedure.
7. If the meter shows a very high resistance value or OL on meter display, then the diode is good and functions properly. Since in reverse biased condition diode offers a very high resistance.



The above figure illustrates a proper working diode, DMM in Resistance (Ohm Mode) shows a very low resistance in the forward-biased condition and a very high resistance or OL in reverse-biased condition.

If the meter indicates a very high resistance or OL in both forward and reverse-biased conditions, then the diode is blown open.

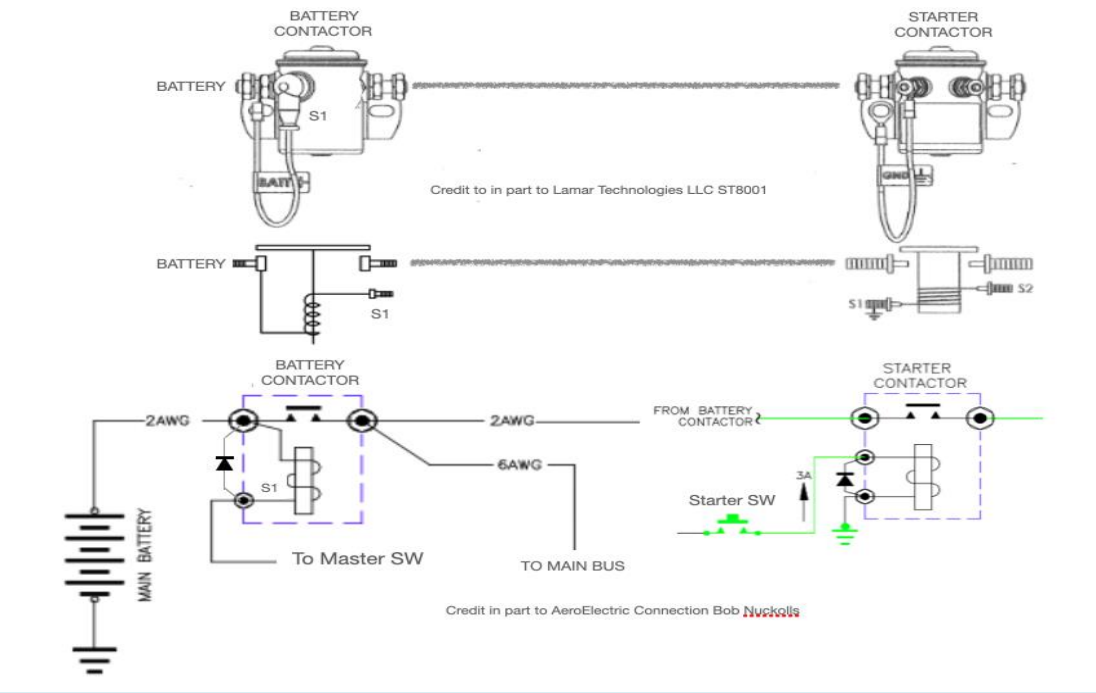
Or if the meter reads a very low resistance in both directions, then the diode is shorted.

Testing Schottky diodes, used in the LightSpeed Electronic Ignition Dual Power Supply is a little different.

1. Identify the terminals anode and cathode of the diode.
2. Place the digital multimeter (DMM) in resistance or ohmmeter mode by rotating the central knob or selector to the place where

ohm symbol or resistor values are indicated. Set the meter to times 10k ohm range,

3. Place the red probe to the cathode and the black probe to the anode.
4. You should see the meter read OL or very large value.
5. Reverse the probe and you will get some leakage reading.
   In other words, the meter will show a small resistance. This is the good characteristic of a Schottky diode when you get this type of reading.

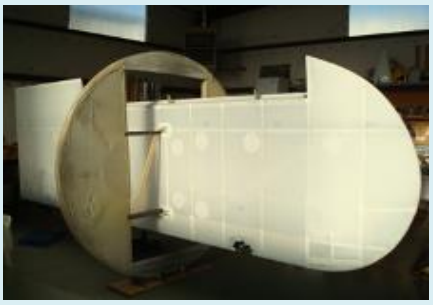


Installation of Catch Diodes on the Battery and Starter Contactor

Good references for other configurations:
https://verticalpower.com/media/attachments/2017/07/20/contactor_wiring.pdf

https://bandc.com

Keep your circuits protected.
Dan



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