

# ERA EXCHANGE

YOUR GUIDE TO ELECTRICAL REBUILDING

November 2018 \$12.95

## **AUTO ELECTRIC CORNER**

### **New Denso Starter and Trailer Modules**

## **DENSO ALTERNATOR MELTDOWN**

### **The Importance of Failure Analysis**

**COMMON SENSE | EXCEED EXPECTATIONS**  
**Catch Your Customers By Surprise**



# A WORD FROM THE PRESIDENT

## Website Building Tips



**Y**our website is your business portal to the world. But it is also the best way to connect with your local customer base. Today, the vast majority of shoppers for any product or service turns to the internet first to find what they need or want to know, even if it's a local supplier of a specific service.

In this issue I'll explain some of the things that people expect to see when searching for a local business and I'll make some suggestions on specifically where you should place that information on your website, to make the best impression possible.

**Homepage** – This is without a doubt the most important page on your website and the photos that you use there are the most significant part. A viewer's eyes will always land on pictures first. Your introductory page must have two or three good clear photos showing the outside and the customer area inside your business. Too many photos on the homepage can become a distraction.

These photos are important because they will create a viewer's first impression of you and your business. People are attracted to neat, clean shops, not messy, dirty ones. If your building needs new paint or a cleanup, do it before taking the pictures. The same is true for inside. Take the time to make your business look attractive before you grab a camera.

The second most important part of your homepage is the wording that you use in your invitation to customers. Welcome them. Invite them to visit the business. Assure them that you can satisfy their needs. Use as few words as possible but get those points across. A photo of a smiling employee behind the

front counter or talking to a friend posing as a customer are worth a thousand words.

You should clearly show your physical address, phone number and hours of operation on your homepage. Many of your previous customers will go to the internet specifically looking for that information. Make it easy for them to find it.

The homepage should also be uncluttered and well organized with an easy to use menu leading to other web pages. Don't put a long glowing dissertation about your business on your homepage because nobody will read it there. Save that for the About Us page.

Navigation to other pages on your website should be easy to understand and not complicated. Look at lots of other websites to get ideas. The keys to a good homepage are great photos, a warm welcome, an assurance that your business can fulfill the viewers needs and an easy to follow navigation menu.

**About Us** – This is your chance to sell yourself. Savvy internet users always look here before buying because they want to know who they are dealing with beforehand. Sell yourself and your business by telling the history of your business. That could include your experience, number of years in business and other things you may do in the community. A photo or two that ties in on this page will help to keep a potential customer interested.

To get ideas about what other pages will work best for you, look at some of the websites of other ERA members. Next month I'll explain how to optimize your new website to make it easier for search engines to find you. All of your traffic will come from those search engines.

*Mike Dietrich*

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**Rebuilding is Recycling!**

### NEW ERA MEMBERS

Jessie Malave  
Kirk, Colorado

### ABOUT THE COVER

Denso stator lead repair.

# INDUSTRY NEWS

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## & ANNOUNCEMENTS

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### New ERA Website Developer

Those members who use the ERA's website regularly are well aware of the problems the site has experienced over the last year. "We came to a point where we could no longer ignore the problems and hope for improvement," stated ERA President Mike Dietrich. "We knew that a change had to be made."

Aptrak's programming manager, Dustin Baker initially began working behind the scenes on the website to create a working link to the Aptrak Plug Code database. More recently he was called in to sort out problems encountered during the transfer of the website to a newer, more secure server. On October 1 Aptrak officially assumed responsibility for management of the ERA website. "Dustin had been helping us with the website off and on for some time," added Dietrich, "so we know that he is capable of completing the task at hand."

"The ERA's Executive Board is confident that this change will allow us to move our website forward, correcting all of the problems that have cropped up over the last couple of years and improving the website in the future. We could not have made this change without the dedicated support of ERA member Dan Bell, owner of Whatcom Electric and Aptrak."

"Dustin is a very talented individual who is extremely knowledgeable in both the programming and creative sides of website design and function," Bell explained. "We hired him right out of college, where he earned a Bachelor Of Science Degree in Computer Information Systems at Eastern Washington University with a minor in Computer Science. He has been with us for three years, serving as Aptrak's programming manager. When you call Aptrak, Dustin answers the phone. He's the guy who keeps Aptrak running smoothly. I am confident that he will do the same for the ERA's website."

### 2019 ERA Expo in Springfield Update

A second plant tour has been added to the schedule for ERA Expo 2019 in Springfield, MO April 4 - 7. That second tour will be NorthStar Battery's newest manufacturing facility, taking place on Thursday afternoon, following the tour of Springfield Remanufacturing Corp. A complete show schedule can be found on page 12.

### Mike Reece with BPS Cores

It is with a sad and heavy heart we let you know that Mike Reece passed away last month after a long battle with cancer. Mike's head strong personality helped him keep a positive attitude during his courageous fight for over 4 years and he never stopped believing.

Mike was a 40-year well respected veteran of the Automotive Aftermarket Industry who had started his career as a teenager in a small 3 man shop in Atlanta, Georgia. Mike spent the last 20 years of his career with BPS Companies as the Manager of BPS' Reman Components Division.

Mike will always be remembered fondly by his many friends and BPS Family for his quick wit, contagious smile, and vast knowledge of Remanufacturing.

Rest in peace.

# AUTO ELECTRIC CORNER — New Denso Starter and Trailer Modules



BY MOHAMMAD SAMI

From time to time when answering the ERA Help-Line and discussing certain parts or equipment, the callers express interest in stopping by to visit us in our shop for some practical hands-on experience! This invitation is always open to my colleagues but occasionally some actually do stop by!

A frequent caller and occasional visitor is my friend Jay Fitzsimmons from Rexx Battery Co. Inc. in Decatur, Illinois, who is only 45 miles away. He had an issue testing a LIN alternator and found out that he cannot test it without an appropriate test box. So he stopped by the other day to experience our WAI1000 first hand by testing his alternator (see Figure 1). As the saying goes, he liked it so much he bought one!



Figure 1 – Jay’s visit to look at our WAI1000 test box

A high percentage of the Help-Line calls are in regards to testing issues of newer alternators that cannot be conducted without the appropriate test box. Due to the high number of such calls regarding testing issues, I am going to dedicate part of my 2019 ERA Show presentation to explaining various systems and testing alternators that require some sort of test box.

## A New Starter...!

We have witnessed gradual changes in rotating electrical component designs and features. A big transformation happens less often in this field when compared to other segments of the automotive industry.

Where the changes in design and features of fuel, ignition, transmission, and emission control as well as engine management devices are frequent and the existing systems are not recognizable from the systems of 10 or 15 years ago, a radical change in design of the newer starters and alternators are not that pronounced and are much more gradual.

Having said so, I share with you a newer starter that

I came across which showed radical differences in what we were used to for years. The unit in question is a small Denso TN438000-2410 starter (Lester# 10700) used in a lot of GM smaller engines with stop/start features such as late models of Chevrolet Impala and Buick Envision (see Figure 2).



Figure 2 – 438000-2410 Denso starter for GM stop/start

First you will notice that the plug-in solenoid terminal has 2 “S” terminal pins...a very unusual feature, much different from what we were used to. Where in a typical starter the “S” terminal is a junction where it ties pull-in and hold-in windings together, this starter has separated each coil and connects them further down, and activates them via two different relays, both operated by the Powertrain Control Module (PCM) (see Figure 3).

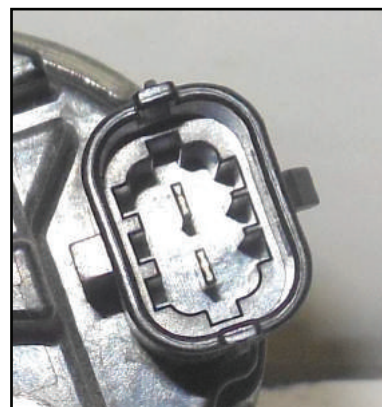


Figure 3 – 438000-2410 Solenoid’s “S” terminals

The starter has a soft start feature, thus the reasoning for separated coils (see Figure 4). Activating the “hold-in” coil starts to spin the starter, and then activating the “pull-in” coil will engage the slowly spinning drive forward for the engagement, insuring drive-to-flywheel engagement without any clashing with the flywheel. It should be noted that the terms *pull-in* and *hold-in* are used here because of our familiarity with them, while their actual functioning in this starter may be operating a little differently than what we think of as normal.

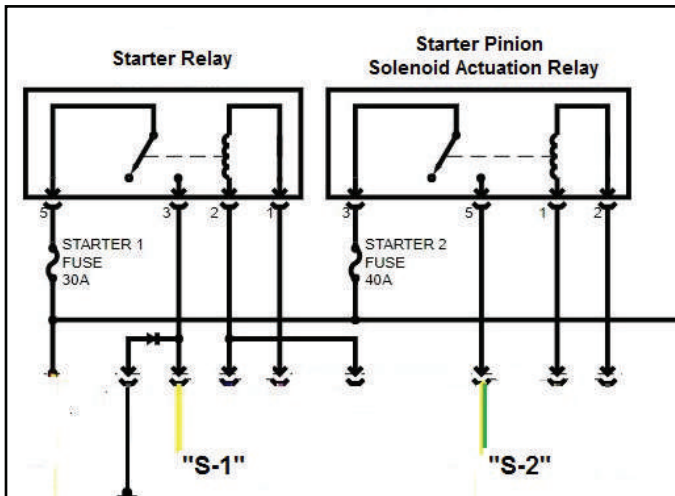


Figure 4 - PCM-operated sequential starter relays

What is also radically different is the commutator and brushes. They are both narrowly grooved to increase brush-to-commutator contact surface (see Figure 5), thus no machining and polishing of the commutator is required or necessary. It is a feature that distinctly separates this starter from what we have been used to during all of our careers. The brush springs are very strong and the positive brush leads are short enough to make loading the brushes a little difficult.

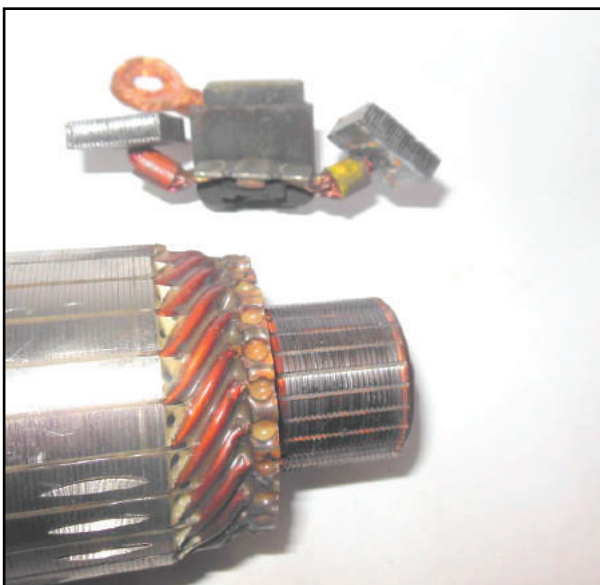


Figure 5 - Grooved armature commutator and brush

The higher reduction ratio (5.6:1) make the starter seem to be turning slower than usual, but the larger diameter drive gear (approximately 37mm in diameter) has 15 teeth that compensates and turns the engine at an appropriate speed.

As of yet there are no service parts that I am aware of but I am sure when the demand increases some service part might be available. The aftermarket is also looking into their version of the replacement unit but as of this

writing there are none on the market. So far the availability is through the dealership with pricing based on their location. They might charge as much as 400 to 600 dollars, but these vehicles are still under warranty and there is not much chance of starter or alternator work for the aftermarket rebuilder.

Rebuilding this unit might be a straight-forward process but a little more complex. The unusual grooves on the armature and brushes will certainly create challenges that need to be experienced and will be addressed in time. A detailed explanation of operation of this PCM activated starter with complete break-down and pictorial is planned to be presented at the 2019 ERA Show.

**Trailer Plug Module**

As an auto electric shop that repairs wiring, locates shorts, traces battery drains, and repairs lighting systems, it is routine and at times a considerable part of our business. Along the same lines, we also repair trailer wiring, a good portion of our wiring work that caters mainly to contractors of various sorts who have trailers to haul their various pieces of equipment. Their trailer-to-truck connector, either a 4-wire flat connector or a 7-wire round one that in some systems provides power for the electric trailer brakes has been a common item for decades. But due to some changes in vehicle lighting, we are now seeing changes which invariably result in some challenges.

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## AUTO ELECTRIC CORNER

The common type of set-up in a vehicle was (and still is in most) that the brake and turn signals share the same filament of the light bulb. So when a turn signal and brake light were both being used, the appropriate side stop-light would turn into a flashing turn signal. The typical trailers are also wired in the same manner, so connecting the trailer to the truck was simple, using adaptors, splicing the appropriate wires, or using T-connectors in the truck's wiring harnesses to make a connection point for the trailer connector.

Since the newer vehicles mostly use separate light bulbs for turn and stop lights independent of each other, then the connection of such vehicles to the ordinary trailer requires the addition of a converter to adapt the vehicle wiring (ones with separate stop and turn light) into the one with shared stop and brake light to feed the trailer.

These converters or modules that contain their own electronics may also have their own direct B+ feed from the battery that needs to be connected. These modules/adaptors can develop their own set of problems that can manifest itself by blowing fuses, draining batteries, causing unusual or no lighting or an assortment of other headaches.

We have seen many cases where these modules create a battery drain which goes away when the trailer-to-truck connector is disconnected, or sometimes develop visible damage that is a tell-tale sign of an internal failure (see Figure 6).

So this is a heads up for my colleagues who may encounter a battery drain or lighting issue that the source of is hard to determine. These modules may be hidden out of sight in the nooks and crannies under the frame or behind interior panels. They can be hard to see, so the existence of it could be completely overlooked unless you dig for it. Some newer trucks are wired from the factory and the modules are a part of optional trailer towing packages.

Until I see you again, keep up the good work.  
sammyselectric@sbcglobal.net

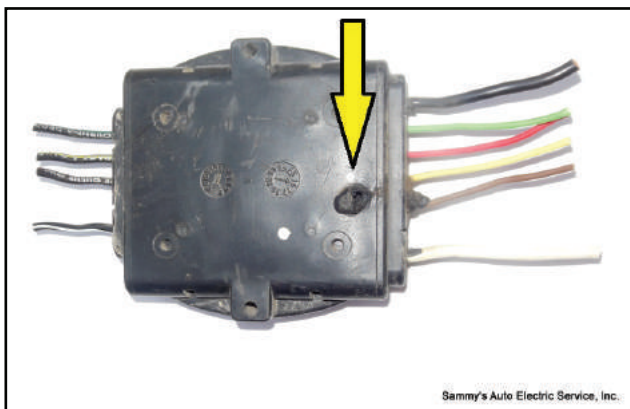


Figure 6 – A damaged (blown) lighting convertor

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# COMMON SENSE — Exceed Expectations Catch Your Customers By Surprise



BY BOB THOMAS

A few months ago I tried to explain why your customers have the upper hand in the buy-sell relationship. That is due largely to the vast amount of information that can be accessed today almost instantly from anywhere in the world by anyone with a PC or cell phone, thanks to the internet. We have all been affected by it in a variety of ways.

But competition from the internet is not the only thing working against you in our world marketplace today. Our industry, rebuilding electrical auto parts, once had a very bad reputation that still lingers to some degree. It has improved somewhat over the years thanks in part to efforts by the APRA and the ERA, although still today, most customers will opt for a new part over a remanufactured one, even if the price for the new one is higher.

You and I both know that a properly remanufactured original equipment alternator or starter should last just as long as any new one. But your customers do not know that because everyone has been telling them otherwise, even some within our own industry.

In the past, when we had that questionable reputation, the primary excuse was that rebuilt parts did not last as long as the original because: "As your vehicle ages it will always be harder on electrical parts." The reasoning behind that had to do with the degradation of wiring connections, age of the battery and the condition of ignition and fuel delivery parts on the vehicle that inhibited starting. In short, their age and declining performance stressed the charging system and made the engine harder to start. Frankly, few consumers bought that excuse then, and they would be even less likely to believe it today – even though it was and still is certainly true to some degree.

The biggest problem that consumer's face today, is not so much that their product purchases do not last long enough, but that when they do eventually begin to fail, they cannot be fixed economically. And many times they cannot be fixed at all. This applies to many different products from washing machines to transmissions. Electronic controllers certainly play a big part in that. But the mantra is always the same: "You are better off just buying a new one" - or "It is cheaper to buy a new one."

So we are all faced with what may seem like a losing battle – trying to win back consumer confidence that we never had to begin with against a stacked deck. But – it is only a lost battle if you submit to surrender. You can stack that deck in your favor.

If you want to win a customer's confidence you have to earn it. The internet is only your enemy if you give in to it. A proactive business today is making use of the internet to promote itself, inform the public of what it can do and draw in new customers. Mike Dietrich has been using his space on page two to convince you of that for several month's. If

you have missed those, go back several issues and read them.

But getting customers to your door is only the first phase. You have to win them over each and every one when they do show up. And to insure that, you must exceed their expectations. By that, I mean that you have to surprise every person that walks through your door by providing a level of service that is better than any they were expecting. Good enough is not really good enough anymore. You have to do better than good enough.

Having the lowest price may help some people to find you, but each one of those will be looking for the lowest price. The best customers are those looking to have their parts repaired or rebuilt by someone who knows what they are doing. In all likely hood, you have little to no competition in that area. So all that you have to do is stay current and up to date by using the ERA website's many resources, attend shows and seminars, and read this publication. Otherwise – you may not be prepared when something unusual comes in.

And when you interact with your customer, insure that you do not disappoint them. Instead, exceed their expectations. Go beyond what they ask for and expect. Your attitude, appearance, facial expressions, and every word that comes out of your mouth all play a part in that. This takes effort and time, but it is your ticket to survival in the very competitive world that we live in today.

I want to leave you with one example of something that I used effectively for many years. I kept an inventory of alternator repair harness plugs in a cabinet with drawers behind my front counter. When a new plug was introduced, I always bought a few so that they would be there when needed. This was an item that few other suppliers in my area could offer and auto parts stores often referred their customers to me for harness repair plugs. I sold quite a few of them with a really good mark up, but I gave more away to customers buying alternators.

Overall, that inventory of repair plugs probably just barely paid for itself in dollars and cents. On an accounting level, it was a loss, because money was invested and they took up space. One day, my bookkeeper, an accountant, was buying an alternator and we had reason to believe that he needed a new plug. When I gave him one, he was aghast that I was giving it away – as if breaking one of the Ten Commandments. He believed that I was giving him special treatment, but at the same time, acting as financial adviser, he felt obligated to pay for it. He felt special, which was my goal for each and every person that walked in the door.

Make each customer feel special in some way. Go out of your way to explain answers to their questions. Gain their trust and you will have their business.

# DENSO ALTERNATOR MELTDOWN

## The Importance of Failure Analysis



BY BOB THOMAS

An age old philosophical question that I first learned as a child was, “What came first, the chicken or the egg?” A small Denso internal fan alternator that was brought to me recently made me think of that question. The owner’s complaint was that it had been overcharging. I was told that this fresh-looking remanufactured alternator had fewer than 20 hours on it.

I could plainly see that the 50-amp unit had been severely overheated in one specific area, the far side of the rectifier away from the B+ terminal. My first impression was an exhaust leak of some kind, but that was quickly dispelled by the location of the alternator on the opposite side of the engine from the exhaust. On the bench, output was almost nonexistent with a scope pattern that looked like a two-year old’s scribbling.

Once the back cover was removed I could plainly see the damage (see Figure 1). As you can see in the photo, one stator connection had been overheated enough to melt the insulator while the other was completely gone. The other two stator connections looked OK at first. But while

removing the three screws that were still there, I discovered that none of them were even close to being tight. Under close inspection with the screws removed, you can see that they had all been hot (see Figure 2). Was all of this damage caused by simple overcharging?

When I removed the regulator I found that all of its screws were loose too. The regulator was original equipment Denso, part number 26000-0720. A close look at the regulator’s ground tab seemed to open the possibility that the loose mounting screw may have allowed a poor connection to develop between the housing and the regulator (see Figure 3). That could have caused the overcharging described by the owner. However, the regulator overcharged on the regulator tester too and further testing confirmed that the regulator was full fielded. The most probable cause of that would be transient voltage. More about that later.

A look at the bottom of the rectifier revealed a clear picture of why it most probably overheated in that area (see Figure 4). You can see that the two burned diodes are located in close proximity to one another which would concentrate more heat there. The stator lead on the end of the rectifier was literally burned off and the

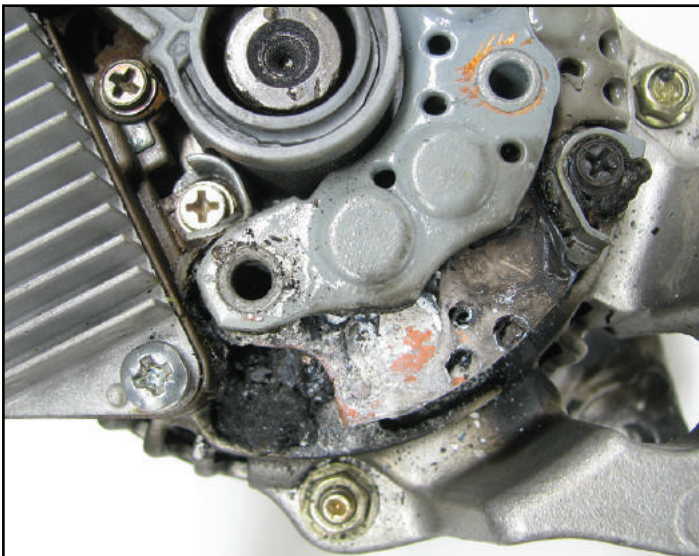


Figure 1 - This was the obvious damage from overheating.

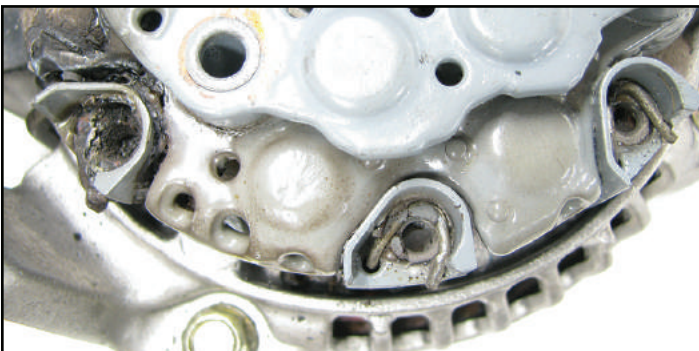


Figure 2 - Notice that all of the stator leads had been hot.

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## DENSO ALTERNATOR MELTDOWN

screw that was once holding it was gone and nowhere to be found. The largest chunk of burned plastic contained some copper, most likely what remained of the missing stator lead.

Of course, all of this damage was easily repairable. A new regulator and rectifier would be needed, about \$23 for both parts. The stator was wound with 17 gauge magnet wire. I happen to keep a spool of that size on hand for situations like this. The missing lead was easily

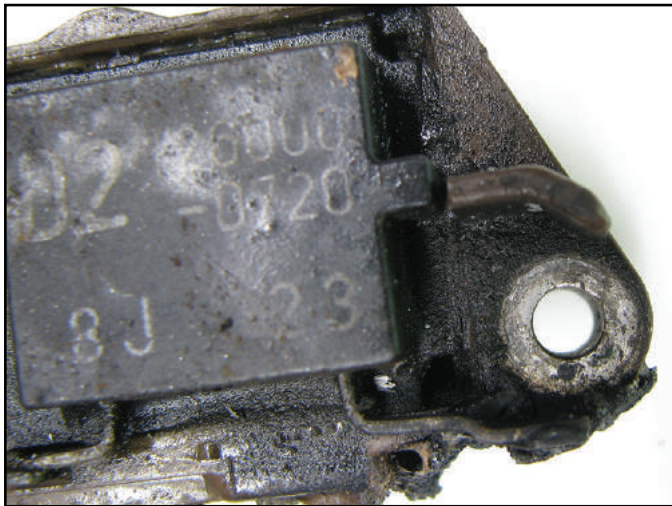


Figure 3 – The ground tab on the regulator may have signs here from a loose hold down screw.

repaired (see Figures 5 and 6), as the rest of the stator was otherwise undamaged.

Those repairs produced a perfectly working alternator. So now, how do I insure that this incident does not repeat itself? In other words, what happened exactly and can we prevent it from happening again? That required going over the facts with the customer a second time to insure there were no misunderstandings.

The customer stated and confirmed that he noticed

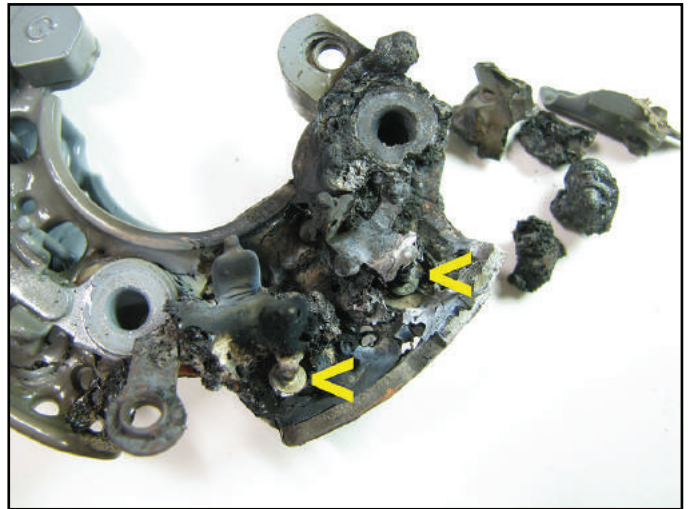


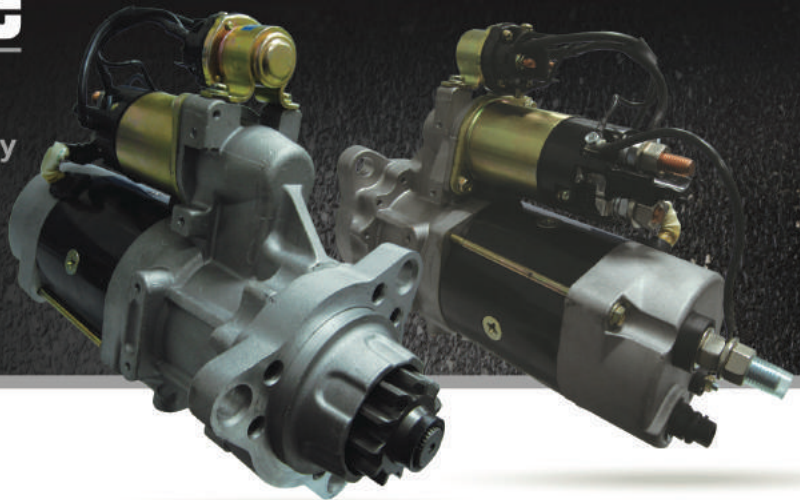
Figure 4 – The rectifier overheated where two positive diodes were closest together.

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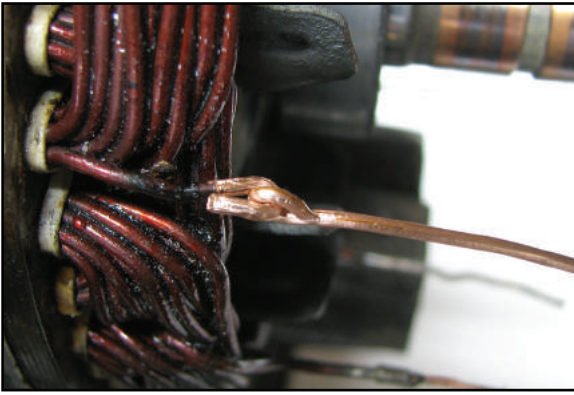


Figure 5 – The first step in repairing a broken stator lead is a good mechanical connection.



Figure 6 – The application of solder completes the repair.

it was overcharging first. Within minutes he smelled a burning odor. After a few minutes more it quit charging altogether and the burning smell went away. This would seem to indicate that the regulator overcharged first. The most probable cause of that is a shorted power transistor, damaged by exposure to transient voltage. Loose screws could have caused spiking voltage. But the application left open a nother possibility.

This alternator was installed on a home-built experimental airplane, and I know that all aircraft must have a battery switch to disconnect power in the event of an emergency landing. That same switch is also used to disconnect the battery when the plane is parked. If the owner had killed the engine and switched the battery off while the engine and alternator were still winding down, that could have also created a voltage spike and damaged the regulator to make it overcharge on the next flight.

So first, I double checked that all of the screws were tightened properly. Secondly, I explained the danger of switching off the battery prematurely to the owner. He didn't believe that he had done that, but appreciated the explanation and heeded the advice.

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## DENSO ALTERNATOR MELTDOWN

I could not help to wonder how many of us would have opted for a new unit instead of the repair, providing a quick profit and seemingly tidy solution to the immediate problem at hand. A new unit was available for about \$76, just \$50 more than the parts. But the alternator that he brought to me was pretty much made of original Denso parts. Rebuilding it allowed me to reuse most of them and discover the loose screws that could have caused the failure.

I could have easily sold him a new replacement alternator and not spent any time on it. After all, once I could see that the rectifier was burned through the cover and it failed to produce any output on the test bench, I knew that it would require time and parts.

But our customer's trust and expect us to provide them with the solution that is best for them – not necessarily easiest for us. Don't be fooled into thinking that your customers don't expect that. When you betray that trust, you will lose some of those customers – forever. So ask yourself, what would you have done?

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# Springfield, MO Trade Show Tentative Schedule\* April 4-7, 2010

\*This schedule is tentative and subject to change as show planning continues.

## Thursday, April 4, 2010

8 AM to 12:00 PM	SRC Plant Tour	
12:00 PM to 1:00 PM	Lunch	
1:00 PM to 5:00 PM	Tour of the NorthStar Battery	
5:30 PM to 6:30 PM	Dinner break	
6:30 to 8:30 PM	Group Meeting & Roundtable Discussion	Ken Plourde

## Friday, April 5, 2010

8:00 AM to 12:00 PM	Wonders of the Wildlife Tour	
12:00 PM to 1:00 PM	Lunch	
1:00 PM to 2:00 PM	Starter Drives & Solenoids	Dan Smith
2:00 PM to 3:00 PM	Apptrak, Plug codes...ETC.	Dan Bell
3:00 PM to 3:15 PM	Afternoon Break	
3:15 PM to 4:00 PM	Regitar Presentations	
4:00 PM to 5:00 PM	Generator Testing & mechanical Regulators	Joe Davis
5:00 PM to 8:00 PM	2019 ERA Expo	

## Saturday, April 6, 2010

8:00 AM to 9:00 PM	Shop Practices (Lathes, cutting bits...etc.)	Mike Dietrich
9:00 AM to 10:00	Partref & Youtech Group	Dennis Jacinto
10:00 AM to 10:15AM	Break	
10:45 AM to 12:00 PM	New Units and Systems Updates	Mohammad Samii
12:00 PM to 1:30 PM	Lunch	
1:30 PM to 4:30 PM	2019 ERA Expo	
4:30 PM to 5:30 PM	Rebuilding issue, Slip-rings, Case Studies	Mohammad Samii
5:30 to 6:30 PM	Break	
6:30 PM to .....	2019 ERA Gala	

## Sunday, April 7, 2010

7:00 AM to 8:00 AM	Breakfast	
8:00 AM to 10:00 AM	Annual Association Meeting	

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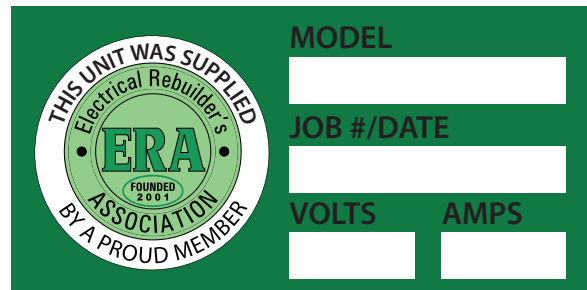
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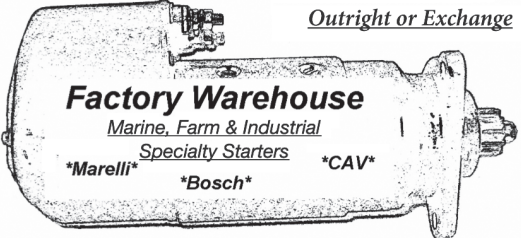







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