

ERA EXCHANGE

YOUR GUIDE TO ELECTRICAL REBUILDING

November 2017 \$12.95

AUTO ELECTRIC CORNER

Rotor Specs and Nissan Inhibitor Relays

EDDY CURRENTS

Energy Loss and More Heat

SWITCHES, SOLENOIDS AND RELAYS PT. 3

How Loads Affect Contacts

2018 ERA TRADE SHOW SCHEDULE

**PLAIN
TALK**

FOR A MATURE AUDIENCE ONLY
Aim Towards the Light



A WORD FROM THE PRESIDENT

Promises To Be the Best Show Ever



As we near the winter season, I find myself thinking about spring and the ERA's next trade show. As has already been announced, it will be held in Montgomery, AL to celebrate Regitar-USA's 30th anniversary. You need to know that Regitar has committed to help us make this the best ERA show ever. Mark the date now, April 12-15, 2018. It is not as far away as you might think.

For starters, the host hotel is the Embassy Suites by Hilton Conference Center in downtown Montgomery. It is probably the nicest facility that we have ever used before, with many amenities. Every room is a spacious two-room suite. The rate is a little more than we are used to but it includes a full breakfast buffet with omelet bar every morning and a manager's reception from 5:30 to 7:30 each evening with complimentary beer, wine and appetizers.

Your show registration will include the Saturday luncheon buffet and the Friday buffet luncheon is included with each seminar registration. You should not have to buy many meals at this show.

We have a record number of seminars scheduled – nine altogether with most of them not any longer than 90 minutes. Topics include: Understanding PCM – Alternator Communications, Rebuilding DC Motors, Surviving in Today's Marketplace, Challenges of Cataloging, Navigating the ERA Website and more.

You will notice on the show schedule (found on page 12 of this issue) that events begin this year on Thursday afternoon with a Free VIP Tour of Hyundai Motor Manufacturing –

courtesy of the Montgomery Chamber of Commerce and conclude on Saturday evening with a Dinner Cruise, courtesy of Regitar-USA. Both of those events are free, but space for each is limited. Be sure to register early to attend them.

A tour of Regitar's Headquarters is planned for Friday which will include two seminars, one including a live-feed view of Mobiltron's manufacturing facility in Taiwan and another on PCM- alternator communications.

Of course the ERA Expo itself will open on both Friday evening and Saturday afternoon as we have in the past. It is a great opportunity to meet with your suppliers in person and perhaps find one or two new ones. It is also a good time chat with other rebuilders from around the country who are in the same business as you. From my perspective, that is where I learn the most at these events – sharing information with other ERA members. Those interactions take place all weekend, over meals or drinks, on the tour bus rides, in the hotel lobby or even standing in a line.

On Saturday evening, Regitar will host a complementary Riverboat Dinner Cruise on the Alabama River aboard the Harriot II for the first 120 who register. The cruise will depart from the city dock which is only a one block walk from the host hotel.

For those members who stay over to Sunday, you are both invited and encouraged to attend the ERA Annual Meeting held early enough to get you on the road home by mid-morning. This meeting is an opportunity to learn more about your association and get involved in some small way. For any group like ours to continue far into the future, we need members who are interested in helping the ERA succeed in its mission. That is in all of our best interests.

I would like you to know that planning for this event has been a joint effort with Regitar playing a major role. It promises to be an exceptional opportunity to have a good time and learn a lot. You do not want to miss it. I hope to see you there.

Mike Dietrich

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Rebuilding is Recycling!

NEW ERA MEMBERS

Hilltop Automotive
Rancho Palos Verdes, California

ABOUT THE COVER

Armature lamination plates of Bosch 223 series starter.

INDUSTRY NEWS

& ANNOUNCEMENTS

Show Facts

Expo 2018 in Montgomery will be the 30th Anniversary for the ERA's all electrical trade show, started in 1989 in Kansas City, MO by the late Ralph Alberes. This will be the first one ever held in Alabama. Montgomery is the home of Regitar – USA, which is also celebrating its 30th Anniversary.

This is the first show to be held at an Embassy Suites by Hilton facility, where every room is an upscale two-room suite, with luxury bedding, sleeper sofa, two flat screen televisions, coffee maker, refrigerator and microwave. Access to high speed internet is free for Hilton Honors members which anyone can join. You can enroll online at no charge before you make reservations to save time or as late as when you check in.

The complementary manager's reception shown on the show schedule each evening includes a variety of beer, wine, soft drinks and appetizers, all included with your room. The full breakfast buffet includes a made-to-order omelet bar.



The Embassy Suites offers free shuttle to and from the Montgomery Regional Airport. American Eagle and Delta Connection provide daily service with Atlanta, Charlotte and Dallas/Fort Worth, making single-connection flights possible with most major cities in the US and Canada. For those who drive, a fenced parking lot is available in front of the hotel for a daily charge, but the city has a large free parking lot behind the hotel.

With Sadness



Zachary Marx Ernst, age 24, son of WAI's Bill Ernst, passed away on Sunday, October 8, 2017. Zack was born in Hoffman Estates, IL on May 18, 1993. He was a lifelong resident of the area and a 2011 graduate of HD Jacobs High School in Algonquin. Zack was a national and international karate competitor and was employed as an instructor at FOCUS Martial Arts and Fitness. He was a volunteer and supporter of the Green Tara Program, which teaches self-defense to at-risk women in prevention of human trafficking.

Memorials can be made to the Zachary M. Ernst Karate Competitors Fund. Please mail to Bill Ernst, 5733 Breezeland Rd, Carpentersville, IL 60110.

AUTO ELECTRIC CORNER — Rotor Specs and Nissan Inhibitor Relays



BY MOHAMMAD SAMI

Leece-Neville Rotor Specifications

When I was assigned as the ERA's Technical Service Advisor as part of ERA's Technical Service and answering the Help-line, I promised to the Association and members to use all of my resources—official and unofficial—to find an answer to most questions to the best of my ability. One such question that came the other day proves that knowing the right and cooperative people can put you on the right track for finding answers.

The question came from a rebuilder, John from Joe's Starter & Generator in Hewitt, Texas. He needed to know the rotor draw for a certain 320-Amp Leece-Neville. The alternator in question turned out to be a 4931PGH unit that I figured it out after a lot of cross-referencing and finding its latest supersession. This is a pad-mount alternator rated at 320-amps. It had a defective regulator but the rotor (A020104805S) was drawing 10 amps, a little too far above the comfort level of 4-6 Amps that is a figure we are used to. John wanted to know the normal amperage draw for not stressing and blowing the new regulator.

The available Prestolite/Leece-Neville sites may show breakdown and part numbers or show the performance curve of the units, but as far as detailed rebuilding instructions and testing specifications, they do not provide a lot of information. If they do, I have not been able to find it yet.

So for finding the amperage draw of the rotor we discussed, I decided to go to the source and seek help from my supplier. In our part of the country, J&N is the largest supplier of Prestolite/Leece-Neville. Contacting a very helpful Bill Shannon who is their Senior Product Analyst was the next thing to do. Bill provided a contact email to get in touch with a Sales Engineer/Product Specialist at the Prestolite Electric Company. An email was sent and was quickly replied with an answer, quoting **6-6.45 Amps @25° C** as the amp draw of the rotor.

The point is pursuing all available sources, having the right contact, and knowing the right people can always produce positive results.

Self-exciting 10-SI, Positive Ground...!

Responding to a call regarding the use of AC-activated self-exciting regulator required a little head-scratching but at the end it all worked out.

AC-activated 10-SI regulator is purely an aftermarket creation, particularly the kind that do not require diode trio and control the field on the high side, meaning operate on "B" circuit. They normally come with a couple of leads and an instruction sheet as how they need to be installed or wired. A simplified example of it can be seen in *Figure 1*. The leads are used to connect the regulator to a stator phase (P), and also a +B source (output post) which functions as the source of field current.

The caller wanted to do this modification but the 10-SI that he was modifying was a *Positive Ground* unit. The question was a how to connect the wires to make it work if possible.

After thinking about it, rather than guessing, I decided to modify one, and make me a Positive Ground self-exciting,

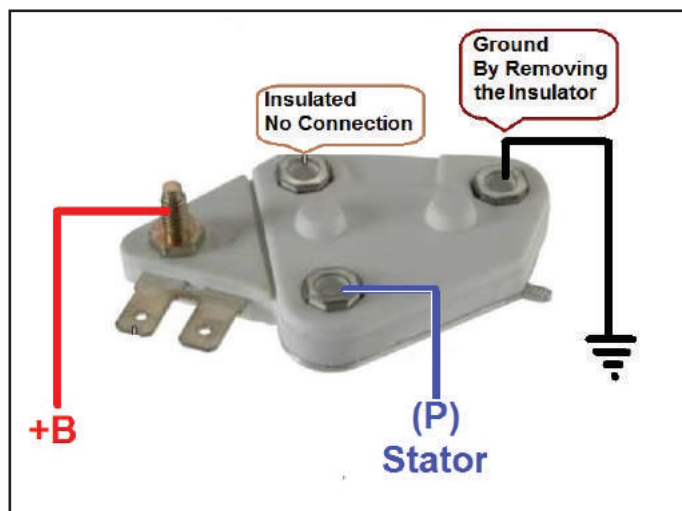


Figure 1 - A 10-SI Self-Exciting B-Circuit Regulator's Connections

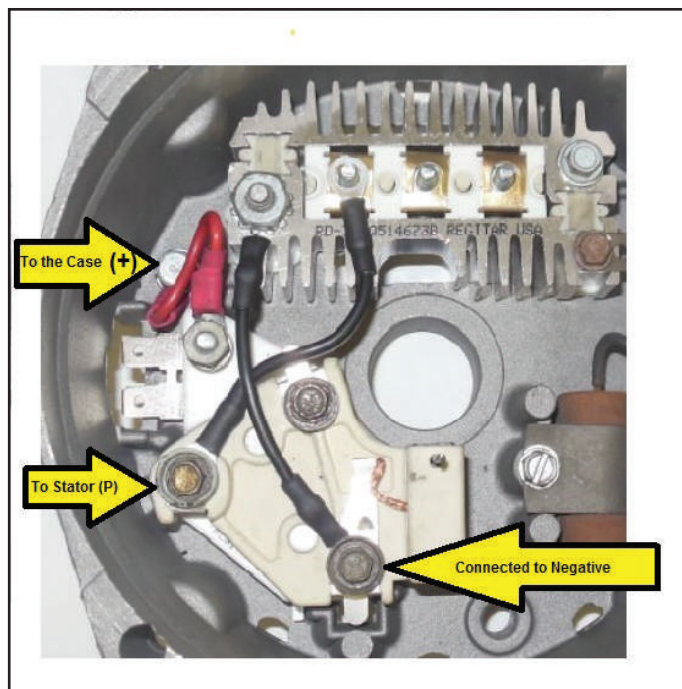


Figure 2 - Installing the Self-exciting Regulator for Positive Ground

B-circuit 10-SI, to keep it on the shelf...which I did. I am pretty sure we will sell it sometimes soon for a tractor modification job.

Looking at the regulator, I decided to make connection in terms of Positive and Negative rather than +B and Ground. So where the instruction sheet said connect it to ground, I isolated it and connected it to the output post which is a Negative now. Where the instruction said connect it to +B, I connected it to Positive, which in our case is now the alternator's case. The "P" (Phase) does not make a difference and still goes to the center of the stator on the rectifier. (*Figure 2*)

After alternator was assembled and run (as Positive Ground)

AUTO ELECTRIC CORNER

on the test bench, It worked fine and kicked in at speed that I found it to be very comfortable with. A simple modification, doable with the right rectifier and regulator.

Nissan's Starter Relay

The starter relay is usually used to lighten the current that goes through ignition switch contacts for starting. The newer design of the switches with their very delicate contacts requires ever more to have a relay in the system as not to burn the ignition switch and prevent premature failures.

Having a relay in the system adds another level of control for the starter activation. Control coil of the starter relay can be routed through a neutral safety switch, a security system for starter interruption, or a double start prevention scheme. Regardless of the function, a relay takes the initial solenoid current out of the ignition switch by running it through the contact points of the starter relay.

An exception to the rule is that many Nissan cars and trucks that use what is called an *Inhibitor Relay* for starting control (Figure 3). What becomes an issue is the fact the starting ("S" post) current, however does run through this relay, but the source of power into and out of the relay is still through the ignition switch. The relay is used to *inhibit* the starting process (thus the name) but it does not alleviate the current that goes through the ignition switch contact. (Figure 4)

This system was used by Nissan for a long period of time from early 90's well into mid-2000. As these vehicles age, we see a lot of no-start or intermittent starts due to wear and tear of the switch. Changing the relay does not help, unless a quality ignition switch is installed.

At times when availability of a good OE ignition switch is an issue, we change the power feed to the inhibitor relay by removing it from the switch and feeding it via a fused line from a +B point. The inhibitor function remains intact, but now the load is removed from the ignition switch contacts. A quick fix of sort that saves a lot of future headaches.

13978 Denso/Ford Alternator

This alternator that is used on Lincoln LS and Ford Thunderbird with 3.9L engine for a limited time from 2003 to 2006 is sort of unique in its operation. This Denso hairpin alternator has a 126600-0110 regulator that its 3-pin connector resembles any 6G ford alternator, and by looking at the related schematics, it seems to be a typical Ford 6G PCM-controlled regulator, but it is not. All PCM does is to turn it on by a very weak analog signal at the "L" terminal, and monitor the regulator's duty-cycle via the AM/LI (Load Indicator) terminal. Of course the feedback signal must be within predetermined limits for the PCM to turn the warning light off, via the data-bus and the vehicle communication system. (Figure 5)

The details takes a lot of room to explain here, but a recent case with a 2006 Lincoln LS where the alternator worked but the warning light was staying on turned out to be interesting enough that I turned it into case-study for presentation during the 2018 ERA Show in Montgomery, Alabama. I am already looking forward to see many of you there.

Until I see you again, keep up the good work.

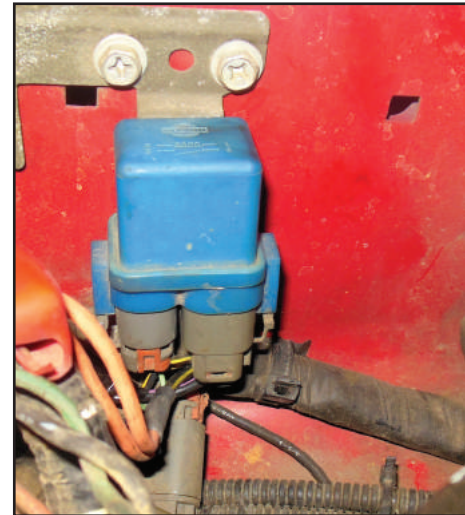


Figure 3 – A Nissan Truck's Inhibitor Relay

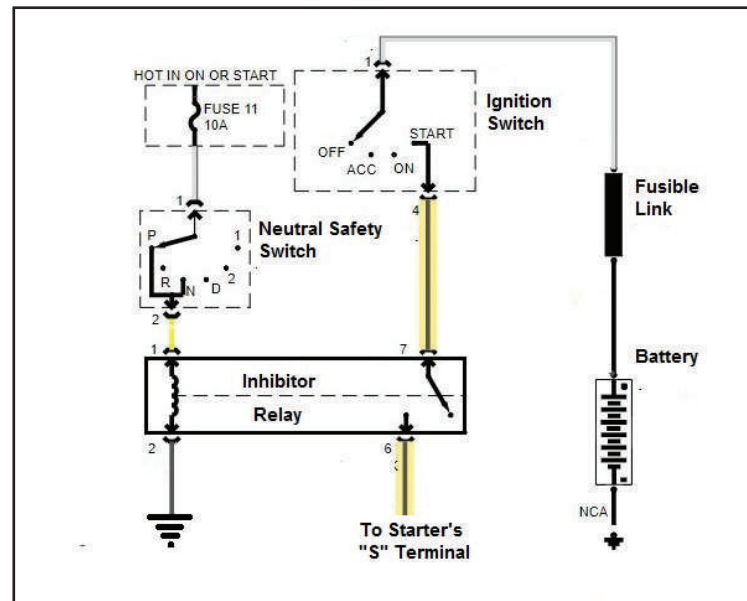


Figure 4 – Inhibitor Relay's Wiring (Partial)

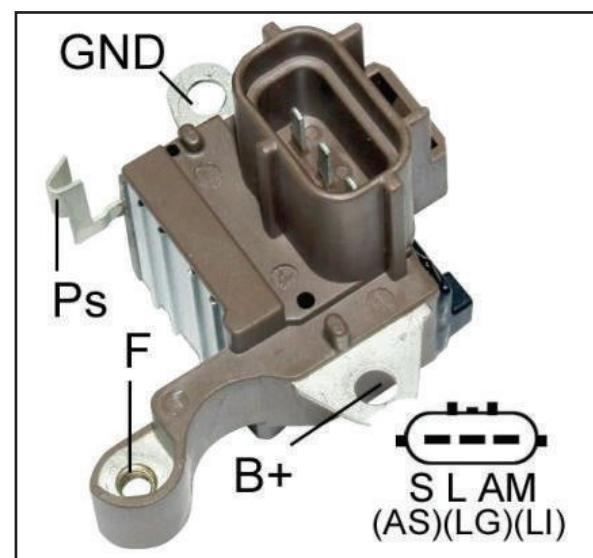


Figure 5 – 13978 Alternator's Regulator...
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PLAIN TALK — FOR A MATURE AUDIENCE ONLY

Aim Towards the Light



BY ROB BUKSAR

If you have problems with perspectives different than your own, do not read this! Throw it away or use it to wrap your garbage in.

I've addressed this subject frequently, but not too many times more. This is for the many close friends I'm watching self-destruct due to the zones where they've chosen to remain incarcerated!

Back during another life, I spent a couple days a month with a senior Christian minister. He wasn't trying to convert me and I wasn't looking to him to get saved. You see, somewhere along the line, I picked up some master credits in comparative theologies. Finding folks to discuss sports over a drink is easy. Discussing the world's religious ideologies is a little tougher!

We shared a bunch of interesting insights. I think I got the better end of the deal. One of the questions that I asked him shortly before he passed away was this: after countless hours of study and preparation, are you wounded or upset knowing that the lion's share of your audience could care less what you were preaching about? He answered, "Absolutely not!"

He told me without blinking an eye, that Christianity dictates that he should talk to whomever will listen. God will take care of these that don't? I adopted the same thinking long ago. I write articles, send emails and letters to those who are sincerely interested. For those that aren't, "Oh, well", my feelings aren't hurt and since I'm not running for Archbishop, so be it.

Today, there is a new economic optimism motivating our country. The stock market is breaking records weekly. The GNP is growing again and has exceeded 3%, which is great. A tax cut could send our economy into overdrive and everyone is chomping on the bit, waiting for it to happen. We're growing jobs again and unemployment and food stamp usage is shrinking. It's nice seeing everyone cheery with a surge of optimism concerning the future. The last administration ushered in doom and gloom and held in place during their entire tenure. For me, so sad but so glad they're gone!

So, what does this upward economic spiral have to do with you and me as rebuilders? Probably not a damn thing! So, don't get caught watching the paint dry waiting for Donald Trump to take us back to the 20th century!

A small handful of companies are going to return from China and Mexico. These organizations will be showcased by the administration trying to sell the idea that this in part is regaining America's greatness by restoring our manufacturing base. Folks, don't be deceived, this is not going to happen. The whole world is in too deep with the global supply chain and Chinese manufacturing. Sorry, that just is not going to change.

There's a lot of talk about tariffs. The only thing that will do is hurt the consumer. You see, corporations don't pay taxes and tariffs, consumers do. It's just passed on to the end user. Besides, most don't realize the huge difference in cost between what we can do domestically and what's done in the

Orient. If it costs us \$40.00 per unit to make something here, China can do it for \$4 dollars or less. If that 4 bucks is taxed 100% making the inbound price \$8.00; do you think that will shut out China? Ha! We're stuck with them. I suggest you figure out some way to get on board and profit rather than sit by and have it crush you.

Take a quick glance. Starting and charging technology is better than ever. The bodies rot off the vehicles before the powertrain and accessory parts quit. The availability of new replacement parts is off the charts - they are everywhere and they are cheap! Most of this plus much more is no secret and unless you're living in a cave, you are probably familiar with it.

So, here we are again. What to do? Just sit around and wait for the phone to ring or some old farmer to walk in with an antique generator that needs to be fixed for nothing? That's up to you but if that's your choice, you're soon to be history.

I want to revisit a few thoughts because these days they are vital for your survival.

Do you have or are you working on additional revenue streams? In most cases, rotating electrical will not provide enough regular sales to float your boat. Are there exceptions? Of course; but those are dwindling daily! You need money coming in every day! Do you have a great website where potential customers can clearly find you with ease? Do you stay in regular contact with all of your accounts and repeat customers? Are you contacting or visiting new customers weekly? Are you or at least working on being computer savvy?

If your answer to the above is no, you're probably the walking dead and just haven't fallen down yet! Maybe sugar coating this would make it easier to swallow but I've become a little too old to pull punches.

The up-and-coming ERA show is beginning to depart from the exclusive tech, bearings, bushings and brushes show. For a long time we needed speakers and seminars providing information that may help folks survive. Now we are going to see some. Bravo!

Start putting away some money so you can attend. I really think that there's going to be a couple of events worth the price of admission and then some.

On a closing note, don't wait for the ERA show to start a personal and professional transition. With all immediate hast, kick this baby into gear and start moving toward bigger and better things. It's happening all around you and I suspect too many are focused on the losers. Misery loves company and you may have joined them because it's an easy path to follow. "Woe is me" is a popular chant these days. Aim towards the light, not the darkness. The good ole days are today, tomorrow and the day after so get with the program and succeed.

God bless America and our little industry!

Rob can be reached at: hoosierelectric@comcast.net, 219-545-8682, or at Sluiter Auto Electric: 708-338-5000.

EDDY CURRENTS

Energy Loss and More Heat



BY BOB THOMAS

For anyone who has ever done any serious canoeing or kayaking, an eddy current is a place to easily get out of the river's main current. Those eddies are circulating currents that form behind any obstruction to the river's main flow, a safe haven of sorts. But electrically, the term has a whole different meaning that can affect the quality and performance of armatures and stators. To keep this as simple as possible, we will discuss eddy currents in terms of armatures only to begin with.

The body or core of a generator or starter armature is made from soft iron-rich steel, which has desirable magnetic characteristics but also happens to be a conductor. Michael Faraday discovered long ago that any conductor that is rotated within a magnetic field will have currents induced into it. Of course, normally we think of only the copper coils receiving induced current in a generator armature. But currents are also induced into the iron core because it too is a conductor. That applies to all armatures – even DC motors and starters. The current induced in the core is called eddy currents because, like a river eddy, they circulate in a loop.

Eddy currents serve no useful purpose. In fact, they cause problems. The electrical power of the eddy currents has nowhere to go as they make a complete circuit within the conductor. Hence, all power from them must be dissipated in the form of heat. As a result, eddy currents are considered an energy loss in addition to a source of an undesirable increase in the temperature of the armature's core.

If a continuous solid iron core were used, the resistance to eddy currents would be small due to the large cross-sectional area of the core (see Figure 1). Consequently, the magnitude of eddy currents and hence eddy current loss would be large. Eddy currents can be best reduced by making the core's resistance as high as is practically possible. This cannot be completely accomplished by altering the core's metallurgy, although silicon steel, aka electrical steel, is used to make armature cores. Electrical steel has enhanced permeability and also a resistance that is greater than pure iron.

But the core's resistance can be increased significantly by constructing it from a stack of thin plates called a lamination (see Figures 2 and 3). The lamination's plates are insulated from one another with either a light coat of varnish or in many cases the oxidation that forms naturally when the lamination is annealed. This greatly limits current flow from one plate to the next. The resistance between plates need not be high because eddy current voltages are inherently low.

The thin plates in the lamination stack limit the physical size of the eddy current's loop, which forms near the outer edge of the armature where the influence of the magnetic field from the pole shoes is the strongest. That also prevents the eddy currents from passing through the armature's shaft that is pressed through the center. Thus laminating an armature core increases the core's resistance and decreases the eddy current and the inherent energy loss associated with it.

It should be noted that eddy current loss increases by the square of lamination thickness. That means that eddy currents will increase drastically with even a small increase in plate thickness. For this reason, lamination thickness must be kept as thin as possible (see Figure 4). Obviously, that also increases cost, and therein lies a potential problem for manufacturers. An increase in plate thickness can be used to reduce cost of a new armature, but that savings comes

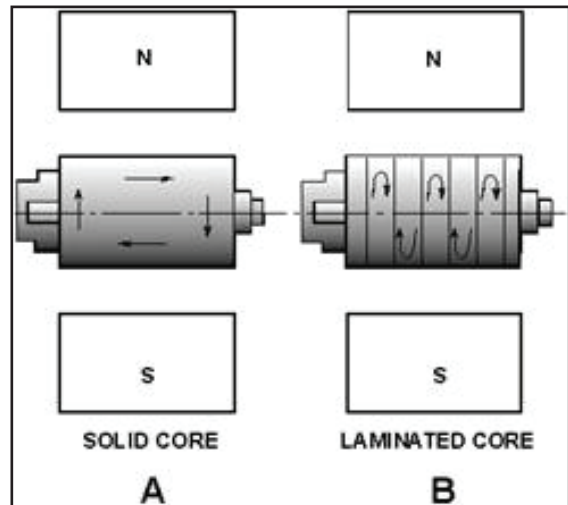


Figure 1 – An armature's eddy current flow shown here in a solid core (left) and a laminated core (right).

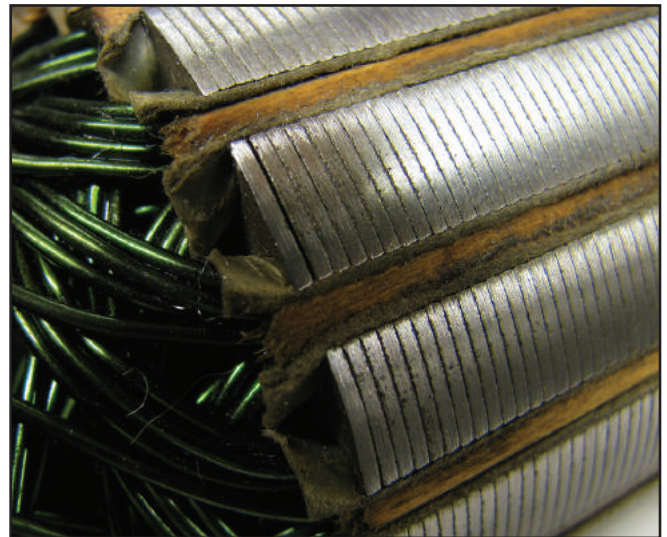


Figure 2 – The individual plates of the laminated core in this armature help to reduce eddy current loss.

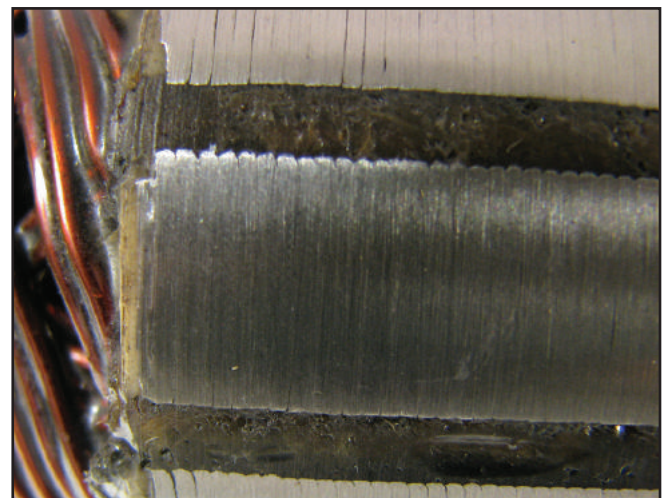


Figure 3 – This generator's armature core "looks" solid to the eye, but if you magnify it you can see the lamination.

EDDY CURRENTS

at a price.

Eddy currents affect stators in much the same way, except that they form along the inside edge of a stator (see Figures 5 and 6). As you can see in this 10SI Delco stator, the lamination plates are relatively thick because heat was not much of a problem in the 1970's.

But extra heat in any alternator is a potential problem today and this is especially so in high amperage alternators. The trend most recently is to make stator laminations as thin as possible. Denso was among the first alternator manufacturers to reduce lamination thickness dramatically when they introduced their first internal-fan alternators in the 1980's (see Figure 7). Those stators were totally enclosed within the housings and the dissipation of the heat produced from eddy current was an obvious concern. The latest design from Denso, often called "hairpin" for its square wire, also uses extremely thin laminations (see Figure 8). But unlike their predecessors, these stators are exposed to outside

air, possibly to help dissipate heat.

The bottom line is that eddy currents are present in all armatures and stators. They generate heat that must be dissipated. They can be kept at a minimum by laminating the core.

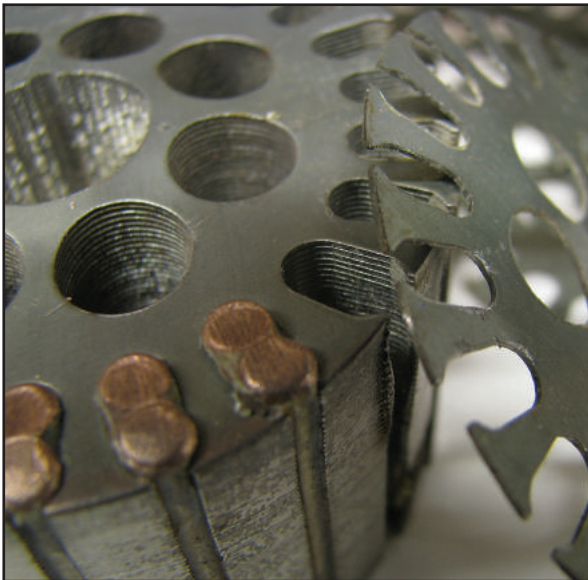


Figure 4 – This cut-way view of a Bosch 223 series armature reveals just how thin the plates have become in today's starters.

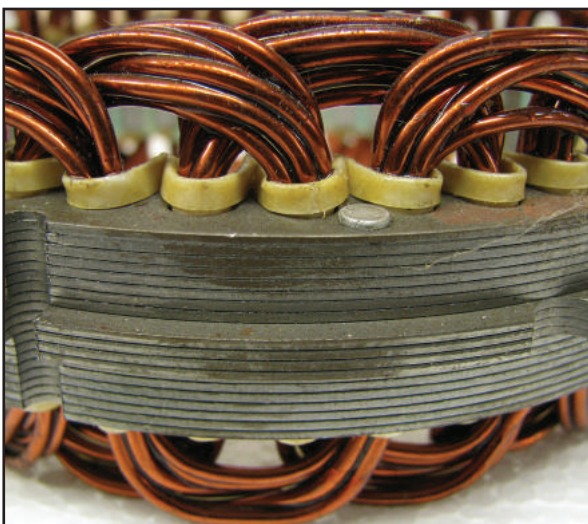


Figure 5 – Notice the thickness of the lamination plates in this 10SI Delco stator.

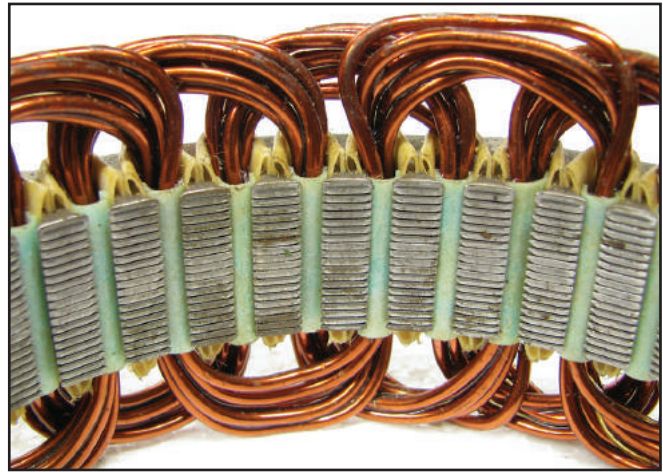


Figure 6 – Eddy currents form along the inside edge of a stator's lamination. Here you can see how small that area is.

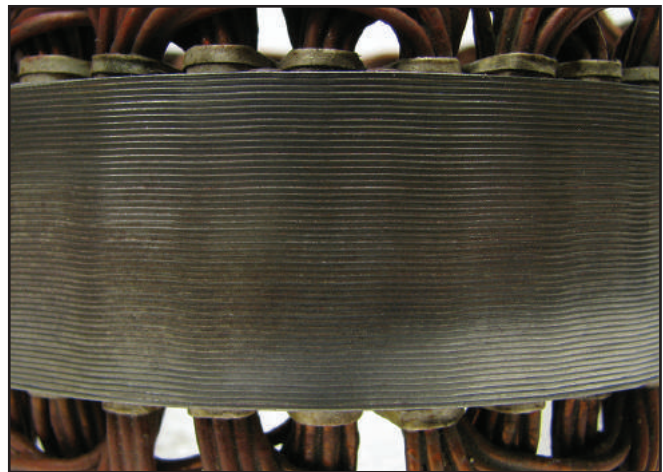


Figure 7 – Denso began using very thin plates to reduce heating on their first internal fan alternators in the 1980's.

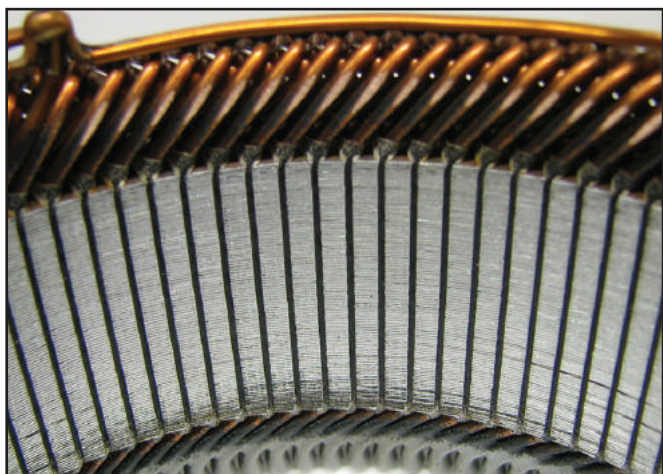


Figure 8 – Denso's most recent alternators have taken stator lamination plate thickness to a new level.

SWITCHES, SOLENOIDS AND RELAYS PART 3

How Loads Affect Contacts

BY BOB THOMAS &
WES GRUENINGER, SR

Switches, solenoids and relays are all used to control current flow in any number of devices over a wide range of demands. Arcing causes contacts to wear, especially in DC applications. In extreme cases, arcing can lead to contact destruction. The nature of the circuit load plays a major role in the intensity and duration of each arc event.

Electrical loads fall into one of four load categories. They are:

1. Resistive
2. Capacitive
3. Inductive
4. A combination of the above

In reality, few loads are purely one type. Most automotive loads are a combination, because all three types are inherent in DC devices. However, one or possibly two types are almost always responsible for the largest part of any high current demand.

Resistive Load

A resistive load is found in any device with a fixed resistance value. This includes things like incandescent lights, LED lights and heating elements. There are two types of resistance loads—those that have an element and those that do not. The latter group, which includes LED lights, is the least stressful on contacts and is most often used to determine a switch's amperage rating.

In the case of incandescent lights or heating elements, current flow changes—even though the element has a fixed resistance value. This happens because of the dramatic change of temperature which occurs once the current is flowing through

the element, creating both light and heat. When the switch is closed, the initial current will be extremely high because of the element's cold near-zero resistance. The sudden inrush of high current causes arcing at the contacts. But as the element heats up, resistance increases, causing the current to drop to a steady rate. In the first current-flow graph (see Figure 1), you can see the inrush of current in a resistive circuit with an element.

Inductive Load

An inductive load is produced by any device which uses coils and magnetic fields. This includes all types of motors and transformers. A motor places a lot of stress on contacts, particularly if the motor is working hard from a dead stop. When the switch is closed, the at-rest motor has a very low resistance value, causing an inrush of current which, under normal conditions, can be six to eight times more than the "running" current (see Figure 2). As the motor starts to turn, current begins to drop. It continues to drop until the motor reaches its designed running speed. At that time current consumption will level off.

Capacitive Load

A capacitive load has a contributory role in many devices—but in the case of a DC power supply—a major role. A capacitor is capable of accepting a charge almost instantly, which creates an extremely brief but extraordinarily high inrush of current (see Figure 3). While most of the capacitors used in older vehicles were limited in the amount of energy they could store, today's manufacturers are using larger capacitors to store energy

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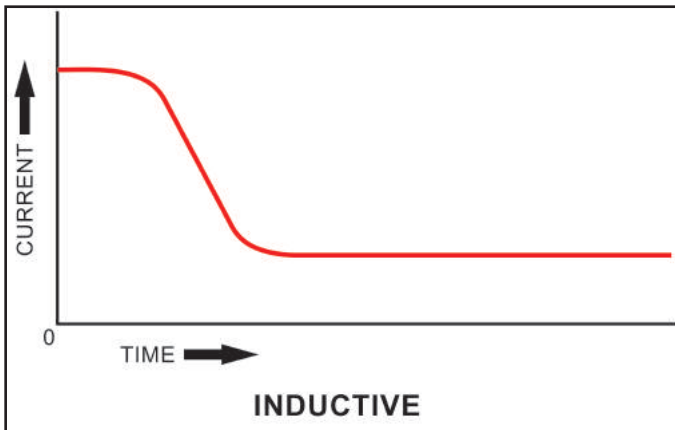
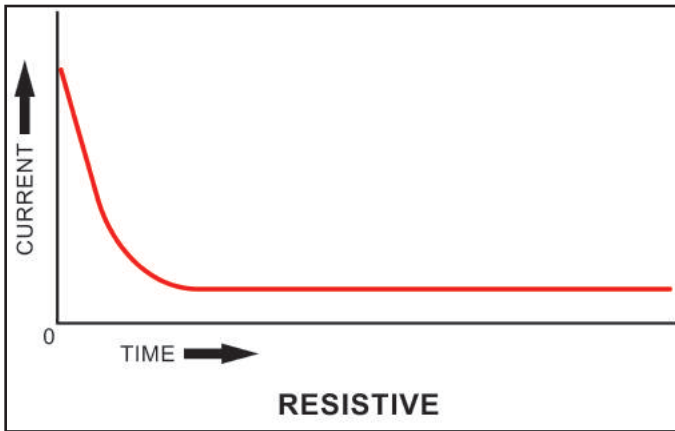
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for short-term emergency use. For example, airbags are fired by a capacitor in the event the battery is disconnected or destroyed in a crash. That capacitor is capable of holding a charge for up to 30 minutes. Once discharged, it requires another inrush of current.

The current rating of any switch is based on its constant-duty load unless otherwise specified. As you can see from our graphs, initial inrush current will exceed constant-duty current with most loads. Even though that inrush current will last for only a few milliseconds, it can damage contacts when the current is extremely high.

You may find switches with amperage ratings based on AC and believe that you could exceed the AC rating in a lower voltage DC application. In reality, DC is significantly more abusive to contacts than AC. Remember that arcing causes metal transfer from positive contacts to negative contacts. Arcing and metal transfer still occur with AC, but material transfer is dramatically less severe because AC current is constantly changing in direction and intensity. As the current's direction changes with each cycle, the current flow stops momentarily. In AC applications, the transfer of contact metal takes place randomly in both directions.

This chart from NKK Switches can help you see how loads affect switch ratings for both DC and AC switches (see *Table 1*). The chart provides multiplier factors for determining the switch-rating for a DC load compared to the switch-rating of a base resistive load at 125 volts AC. Notice that using a lamp load on 12 volts DC drops the 125-volt AC

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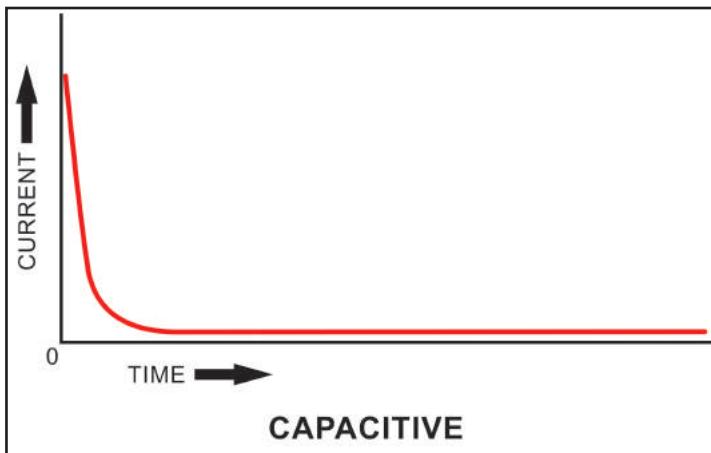
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When choosing a switch, solenoid or relay for any application, the type of load and its unique characteristics must be taken into consideration. Original equipment relays in particular are often designed to handle their own specific load. Contact-metal alloys may differ, depending on the type

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of load. General purpose relays, on the other hand, may be rated based on a non-element resistive load. When substituting a switch, relay or solenoid, the use of a higher current rating is advised.

Another factor to consider is the use of a suppression device in a relay. It may be used to inhibit unwanted discharge from a relay's coil or to limit severe arcing under normal use. It does this by providing an alternate path for the arcing current to take around the contacts. In a future issue, we will explain how these suppression devices operate, to help you choose the best relay for a given application and load.

New Voltage Rating	Resistive Load Multiply by:	Inductive Load Multiply by:	Lamp Load Multiply by:	Motor Load Multiply by:	Capacitive Load Multiply by:
125VAC	1	0.50 ~ 0.66 (PF 0.6)	0.20 ~ 0.25	0.33	0.25
250VAC	0.50 ~ 0.66	0.25 ~ 0.33 (PF 0.6)	0.10 ~ 0.16	0.16 ~ 0.22	0.12 ~ 0.16
12VDC	1	0.75 ~ 1	0.20 ~ 0.25	0.33	0.25
30VDC	0.50 ~ 1	0.25 ~ 0.50	0.10 ~ 0.25	0.16 ~ 0.33	0.12 ~ 0.25
48VDC	0.25 ~ 0.33	0.20 ~ 0.25	0.05 ~ 0.08	0.08 ~ 0.11	0.06 ~ 0.08
125VDC	0.05	0.02 ~ 0.03	N/A	N/A	N/A

Mark this date now! April 7-9, 2017

TENTATIVE 2018 MONTGOMERY SHOW SCHEDULE:

THURSDAY, APRIL 12

12:15

Load Shuttles for
Hyundai VIP Plant Tour

1:00 – 2:30

Hyundai VIP Plant Tour

3:00 – 4:00

Seminar: Challenges of
Rebuilding & Testing Today's
Units - Part 1
with Mohammad Samii

4:15 – 5:30

Seminar: Cataloging Options
with Dan Bell & Dennis Jacinto

5:30 – 7:30

Free Managers Reception

FRIDAY, APRIL 13

6:00 – 9:00

Free Breakfast Buffet

7:30 – 7:45

Load Shuttles to Regitar

8:00 – 10:30

Seminar: Manufacturing Tour
of Mobiltron in Taiwan - Live
with Gene Kaiser

10:30 – 11:45

Seminar: Understanding
PCM – Alternator
Communications
with Mohammad Samii

FRIDAY, APRIL 13

12:00 – 1:00

Luncheon Buffet

1:00 – 1:30

Seminar: Navigating ERA
Website
*with Jessica Myers, Bob
Thomas & Ken Plourde*

1:30 – 2:30

Seminar: Roundtable Open
Discussion
*with Ken Plourde, Jessica
Myers
& Bob Thomas*

2:30 – 5:30

ERA Expo Show Floor Open

5:30 – 7:30

Free Managers Reception

SATURDAY, APRIL 14

6:00 – 9:00

Free Breakfast Buffet

8:00 - 9:15

Seminar: DC Motor
Rebuilding
with Sam Casolina

9:30 – 10:30

Seminar: Topic to be
announced
*with WAI speaker to be
announced*

SATURDAY, APRIL 14

10:45 – 12:00

Seminar: How to Survive in
Today's Marketplace
with Dan Smith & Nick Staub

12:00 – 1:00

Luncheon Buffet

1:00 – 4:00

ERA Expo Show Floor Open

4:00 – 5:15

Seminar: Challenges of
Rebuilding & Testing Today's
Units - Part 2
with Mohammad Samii

5:30 – 7:30

Free Managers Reception

7:45 – 8:00

Board Riverboat

8:00 – 10:00

Riverboat Dinner Cruise
aboard the Harriott II -
Dinner Served @ 8:30 pm

SUNDAY, APRIL 15

7:00 – 8:00

Free Breakfast Buffet

8:00 – 9:00

Annual ERA Board of
Directors Meeting

A Glimpse of What You'll See at the 2018 ERA Show

Thursday, April 12th



Saturday, April 14th



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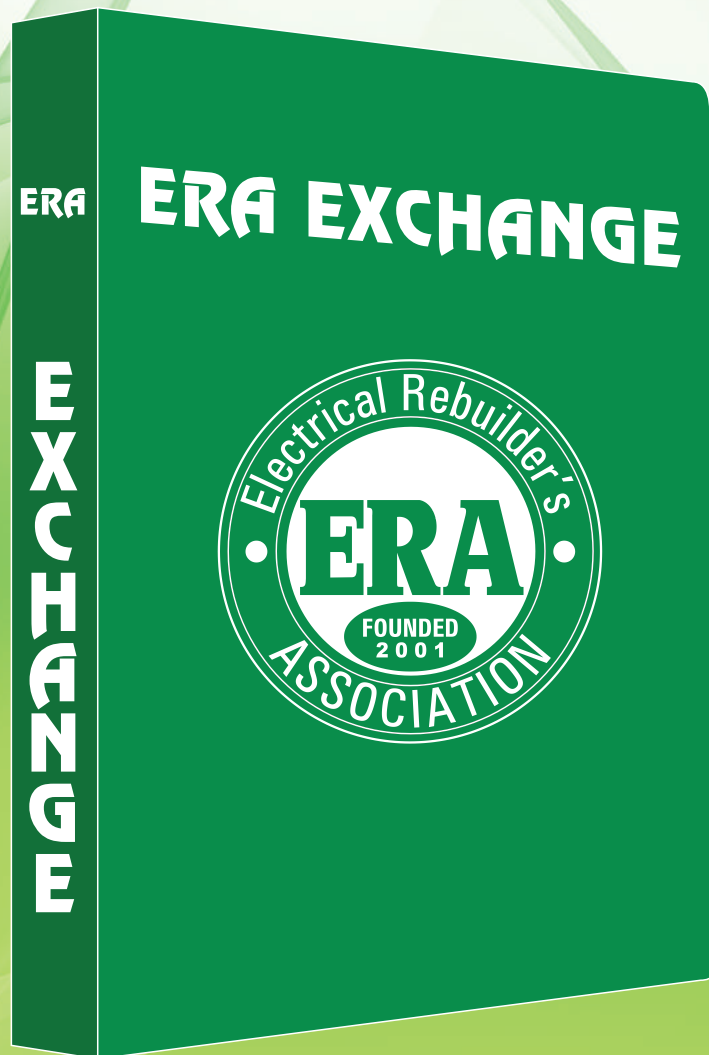
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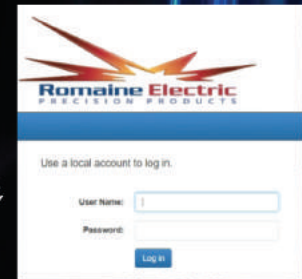
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	V8 360CD-6-0L	DOLD / A3 - Technology - Maintenance Free Two-battery required for best results, replace both of same type. 24 Month Warranty Part CCA, 850 Charging Amps, 154E Reserve Capacity, 150.0C Group 65 DE L2CA - 600	Battery	605UF	+
	V8 360CD-6-0L	DOLD / A3 - Technology - Maintenance Free Two-battery required for best results, replace both of same type. Battery located in engine compartment. 24 Month Warranty Part CCA, 950 Charging Amps, 154E Reserve Capacity, 150.0C Group 65 DE L2CA - 600	Battery	605UF	+

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VIDEOS WANTED

for the era website

The ERA needs your help. Share your rebuilding tricks, tips or techniques with other ERA members. You may receive recognition and earn a reward.

THE RULES:

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- 2 – The three best videos will receive an additional \$200. The winners will be announced at the 2018 Trade Show in Montgomery, AL.
- 3 – Only current Rebuilder and Honorary ERA members are eligible.
- 4 – The ERA reserves the right to edit any video that is submitted but this does not affect the reward.

Experience is the best teacher – Share your experience with other ERA members.

- To submit ideas for videos that you would like to see done, contact the Technical Committee at: techideas@electricalrebuilders.org
- To submit videos for approval, contact the Technical Committee at: techvideos@electricalrebuilders.org
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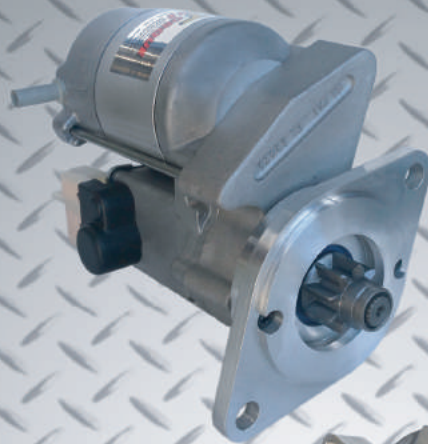
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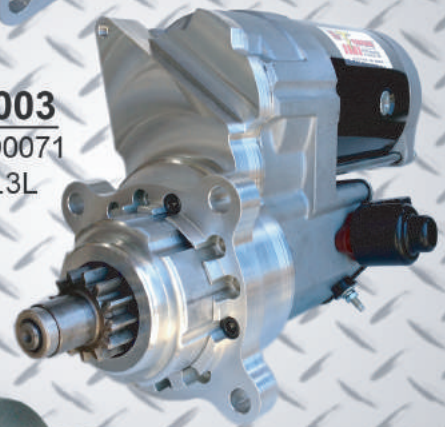


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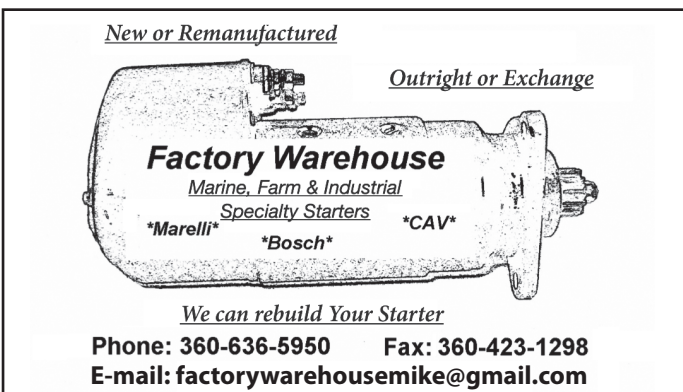
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