

ERA EXCHANGE

YOUR GUIDE TO ELECTRICAL REBUILDING

January 2017 \$12.95

DENSO SC RECTIFIERS AND REGULATORS
What You Need to Know

FORD STARTER SHIMS
Know the Symptom and Cure

DON'T TAKE BATTERY CONNECTIONS
For Granted

2017 Trade Show Registration!
See Page 15

**PLAIN
TALK**

WALLFLOWERS WON'T WIN IT



A WORD FROM THE PRESIDENT

How Do You Handle Scrap?



Back in November there was a post on the ERA Website's Forums asking other members how they manage their cores. It caught my attention because this is one of the most difficult categories of inventory to manage. For me, it has been changing as our industry changes. Due to part number proliferation, it is becoming even more challenging all the time.

Most of the replies to the original questions were about what, when and how do you scrap a core. I wish I could provide an answer that would fit every rebuilder's operation, but we all know that there is not one. The decision to scrap a core must be based on the amount of available space to store it and the likelihood of its value in the future – tomorrow or five years from now.

When I first started in this business I kept most all of my cores in barrels by unit type. Now the only barrels I have are for scrap. They are sorted by clean aluminum, dirty aluminum, solenoids, whole units, steel, clean copper and dirty copper such as stators and rotors. This is the way that my local scrap dealer can give me the best value per pound. I am sure if you take some samples of your different types of scrap to a local dealer, they will advise you on the best way for you to sort yours. If you do not ask them, most will not come out and tell you.

In my area there are a dozen or more scrap dealers to talk to, but only a few that realize the scrap value in starters, alternators and their assorted parts. Avoid the dealers that just buy beer cans and copper wire. Also, I prefer to deal with scrap yards directly. I realize this might not be viable in some rural areas. Just make sure that whoever you decide to deal with knows the difference between an alternator and a power steering pump.

As for when I sell my scrap, it is based on market value and the need for floor space. As for how much labor I want to spend breaking units down into higher profit categories, it

“What, when and how do you decide to scrap a core? There is no single answer to fit every rebuilding business.”

is just a matter of simple math. If I spend fifty dollars in labor to get one hundred pounds of scrap at forty more cents a pound, I try to apply that labor towards other tasks that are more profitable. The next big question is what to scrap and what to save. The answer to that question will be somewhat different for each rebuilder. Next month I will share some guidelines that I follow when making that decision. I would like to wish our membership a very prosperous and happy new year!

Mike Dietrich

“A business that makes nothing but money is a poor business.”
– Henry Ford



NEW ERA MEMBERS

The Starter Shop
Warren, Maine

Duke's Alternator & Starter Clinic
Oxford, North Carolina

ABOUT THE COVER

Denso Segment Conductor rectifier from a
225 amp unit

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Rebuilding is Recycling!

PLAIN TALK — WALLFLOWERS WON'T WIN IT



BY ROB BUKSAR

One of the incredible blessings from writing Plain Talk is that I've come to meet a whole lot of small business folks from coast to coast. Whether they like, dislike, agree or disagree, I am contacted regularly and get to make new friends. It's great!

Here lately, I've been receiving more than a few communiques from small shop owners crying out for help. The lions share are in small towns and have dedicated themselves to rebuilding starters and alternators only. They have followed my column for years regarding the necessity of diversifying their business. Of course, so long as you had plenty of work and a phone ringing off the hook my point of view was hard to swallow. Nevertheless, time marched on and the future availed itself whether we were ready or not. Guess what? The floor is no longer piled up with jobs waiting to be done and we all call a friend or neighbor to see if our phone is still working.

So, here's the common calamity. John Doe's Electric is the only starter and alternator shop in a small rural community. John took care of all the rotating electrical needs for everyone. He faithfully served his area for the last 25 years. Whether it was individual or commercial, everyone accepted that if John didn't have it in stock, they may have to wait a day or so until John could get around to it or procure a part he didn't have. This was a bitter pill to swallow for some customers. Americans are no longer interested in waiting for anything. Yet, the community endured John's business model, not because they were as loyal as "old Yeller", but only because he was close and convenient. His customers didn't have "an easy option"! You see, Americans have become lazy - no longer picking the road less traveled. I'll save further explanation on that for another day.

Back to John Doe. John was so busy rebuilding in the same form and fashion that he failed to see that the market had changed dramatically for lots of reasons. Then, one day as if it were magic, someone built an Auto Zone in the empty lot 4 blocks down from John's shop. The population of John's little farm town is only 7,000. John thought that there would never be enough business to support an Auto Zone, so it couldn't last.

Well, guess what? Within 12 months Advance Auto and O'Reilly's popped up down the street from the Auto Zone, so close you could hit each one with an underhand pitch!

In the meantime, John's business is turning to mush at the speed of stink. The big boys did their marketing homework and are able to cover most of the community's needs right off the shelf. Moreover, most parts are cheaper, warranted for life and if you're a commercial consumer, every dollar you spend goes towards a vacation or at very least a cash gift card.

Needless to say, John Doe is being handed his hat and shown the door. Not an untypical situation these days! At this point, lecturing him on a coulda-shoulda- is like describing the water to a drowning man. What John needs now is good sound advice from someone who has John's best interest at heart, someone well-versed in John's total circumstances and the market he serves. These are facts and figures that I couldn't possibly know about John nor could I gain over a short phone call. Yet, situations like this represent more than a few of the calls that I get and they truly break my heart.

Here are a few thoughts. Even though they're general, they

may add insight.

Assuming that you have a customer base that continues to sustain you, there is no time to waste. The good ole' days are gone and not coming back. **Waiting** for your market to rebound only adds nails to your coffin. Someway, either you or someone working with you needs to be out in the street finding opportunities for you to utilize your skills and shop. You may not be able to afford your own salesman and your time is limited. The best bet is finding someone who is already calling on the type of customers you need and pay him a commission to represent your shop. Providing that you're reliable and your quality is good, independent sales reps are always looking for another line to sell. How do you find an independent sales rep? Google is a good place to start.

Look for similar but different types of work that you have probably been passing up - DC motors, scissor lifts, lift trucks. There is no shortage of motors with all sorts and sizes being used in America. They all break and need to be repaired or replaced.

Make yourself available to the new parts stores in town. They may want to farm out items that they can sell but don't stock.

If you don't have a website, get one. If you do, make sure it's not just a story on how you started and who you are. Nobody cares. Explain and display in a colorful punchy fashion what you do and how you are the solution to the shoppers' problem. If you have the know-how, single out motorcycle, ATV, off-road, high-amp upgrades, marine or specialty alternators and starters.

Network- Network- Network! You need to be a member of your local Chamber of Commerce. You need to rub shoulders with the business community in your area and they need to rub shoulders with you. The chamber is worth its weight in referrals alone. Besides, all these guys are keeping their doors open. Find out how they are doing it. Since you're probably not competitors, members are more likely to share ideas and speak openly. Further, **you'll find a customer or two in the group.**

Lastly, if you're going to remain in this industry, attend the trade shows. You can't afford not to go! Although, if you're going to attend and behave like a "wallflower", stay home.

When you attend, go with a specific purpose in mind aside from picking up the free promotional pens, pads and gizmos the vendors give away. Make it your mission to return from the show with an idea you can use to increase your sales. I am not short-changing the technical aspect of the show. Yet, there's a lot of ways to get tech information either over the phone or Internet. The heavy value of the show is the opportunity to rub shoulders with guys who are all facing similar challenges and finding out what they're doing to overcome them.

If nothing else, remember this. Just one good idea acted upon can not only change the course of your business but also your life. Friends, there are lots of good ideas out there and plenty of opportunity. What we seem to be short of are the innovators willing to sort through the opportunities, finding one that's comfortable and running with it. This much is certain. Sitting on your hands watching the paint dry isn't the answer. Wall flowers won't win it.

God bless America and our little industry!

*Rob Buksar can be reached at International Winding, Inc
800-323-7521*

DENSO SC RECTIFIERS AND REGULATORS

What You Need to Know



BY BOB THOMAS

The component that appears to be the most vulnerable on Denso's SC Series alternators is the rectifier. Open diodes are the most common failure being reported in the field after worn out brushes. In the last issue, we explained the consequences of interchanging rotors and stators by physical size and appearance. The same advice applies to rotors and rectifiers.

One case in point are two different alternators that look nearly identical (see Figures 1 and 2). Both were used on Dodge Durango and Ram pickups from 2003 through 2006. Their Denso numbers are 421000-0210 and 421000-0280. Both are rated at 160 amps. While the stators are identical, the rotors and rectifiers are different. If you look closely through the plastic back cover you can see enough of the rectifier to tell them apart.

But because these two alternators will interchange on the vehicle, they have been assigned the same Lester number - 13988. That could lead some to believe that the rotors and rectifiers may be interchangeable. They will fit together but cannot be interchanged without affecting output and reliability.

The difference between the rectifiers is very obvious (see Figure 3). The 0210's rectifier has a copper heat sink with seven diodes. That number not a misprint. This rectifier has four negative diodes and three positive diodes. More about that later. The 0280's rectifier is aluminum and it has 12 diodes.

The two rotors also look very much alike (see Figure 4), however their coils are different. The 0210's rotor has a higher resistance value - 2.5 ohms, with an amperage draw of about 5 amps (see Figure 5). The 0280's rotor has a lower resistance value - 1.8 ohms, which results in a higher amperage draw of about 7 amps (see Figure 6).

I should add here that while researching these parts, I found conflicting information on several supplier websites and online databases. When replacing rotors or stators on these two units, verify that have the correct rotor and stator to match the rectifier.

Other than this seven diode rectifier, all other Denso SC rectifiers that I am aware of today have either 6 or 12 diodes. Generally, the 12 diode rectifiers were used on higher amperage (160 to 225A) alternators with the lower resistance rotor (higher amp draw). Generally, the 6 diode rectifiers are paired with the high resistance rotor (lower amp draw) on the lower amperage (100 to 160A) alternators. But there may be other exceptions like our example. It is important that you match the rotor, stator and rectifier whenever you are rebuilding a Denso SC alternator.

Repairing Rectifiers

The first SC alternators that appeared in 2000 utilized dish diodes that were soldered to their respective heat sink (see Figure 7), similar to past Denso alternators. Failures of the dish diodes and their soldered connection to the heat sink were common (see Figure 8). Denso switched to press fit diodes soon after (see Figure 9), which makes the SC rectifiers more practical to repair. I mention this because Denso has used dozens of different rectifiers within this series. The investment to stock all

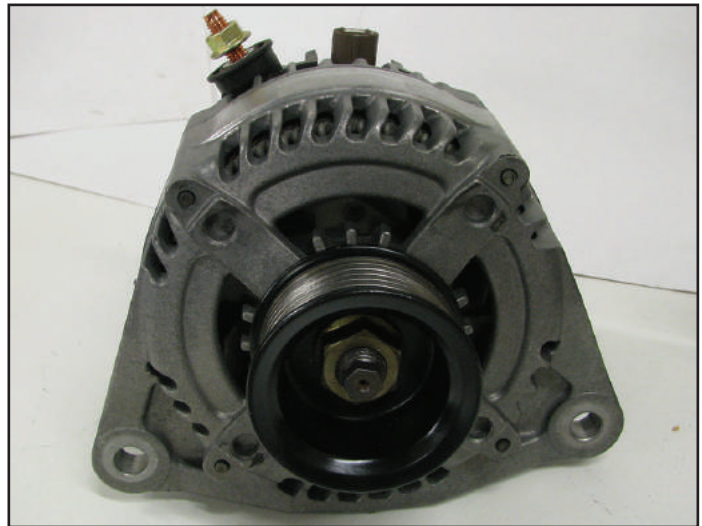


Figure 1 - This Denso SC alternator, Lester 13988, could be either one of two different OE unit numbers.



Figure 2 - From this view, you can identify it as 421000-0210 by its seven diode rectifier - if you look closely.



Figure 3 - The rectifier on the left, taken from 421000-0280, has 12 diodes. The seven diode rectifier is on the right.

DENSO SC RECTIFIERS AND REGULATORS

of them is beyond the resources of most small shops. However, by stocking a few dozen diodes, you can repair 90% of them if needed. If you do a repair, it is important to replace all of them using diodes of the same specification. Always meet or exceed the amperage rating of the original diodes. Diodes rated up to 80 amps are available. These press fit diodes have small stems (see Figure 10). Use a hemostat or heat sink tool on the stem when soldering these diodes to the lead frame – a connection that Denso spot welded.

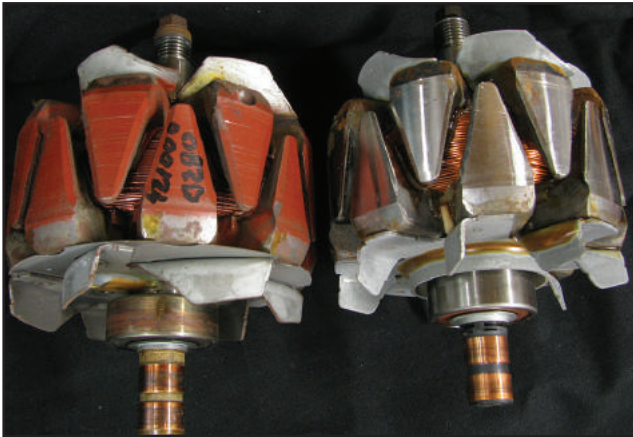


Figure 4 – The rotor on the left was used with the 12-diode rectifier while the one on the right must be used with the seven diode rectifier.



Figure 5 – Field draw on the higher resistance (2.5 ohms) rotor is around 5 amps and goes with the 7-diode rectifier.



Figure 6 – Field draw on the low resistance (1.8 ohms) rotor is around 7 amps and goes with the 12-diode rectifier.

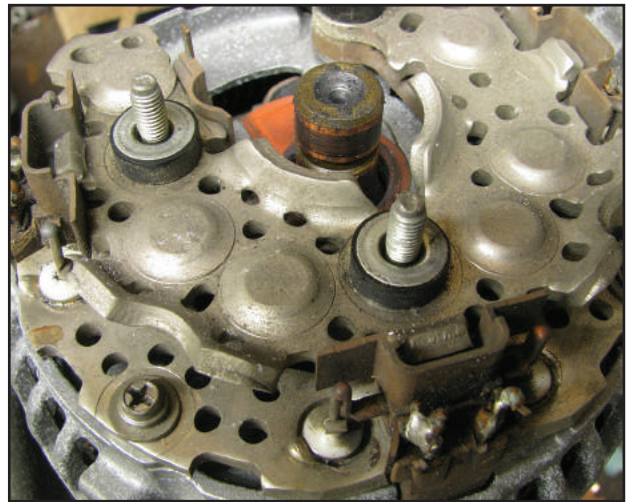


Figure 7 – The first SC series rectifiers utilized dish diodes, soldered to the heat sink.

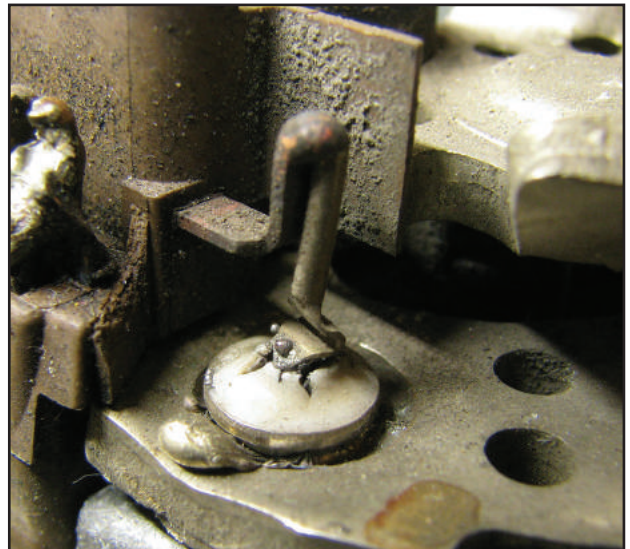


Figure 8 – Diode failure from overheating was a common problem.

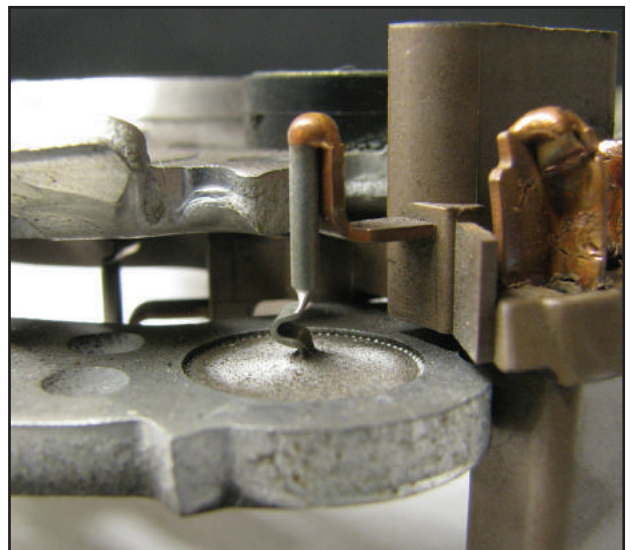


Figure 9 – Denso switched to press fit diodes which proved to be more durable while making them more repairable at the same time.



Figure 10 – The Denso press fit diodes have small stems which require good heat sinking technique when soldering them to the rectifier's lead frame.

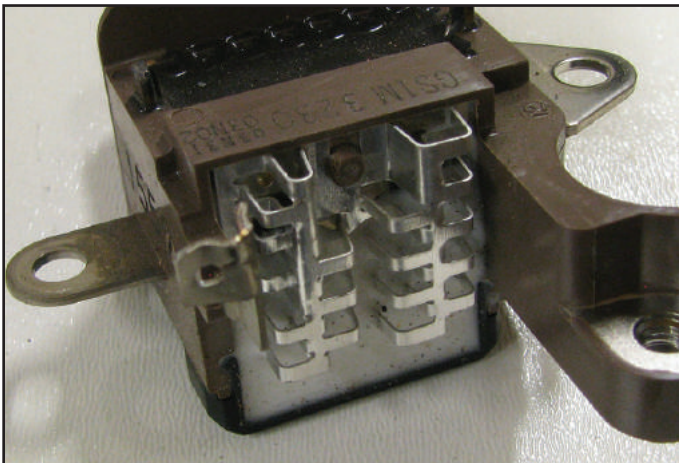


Figure 11 – Notice the SC regulator's unique heat sink design, needed to cool its power transistor.

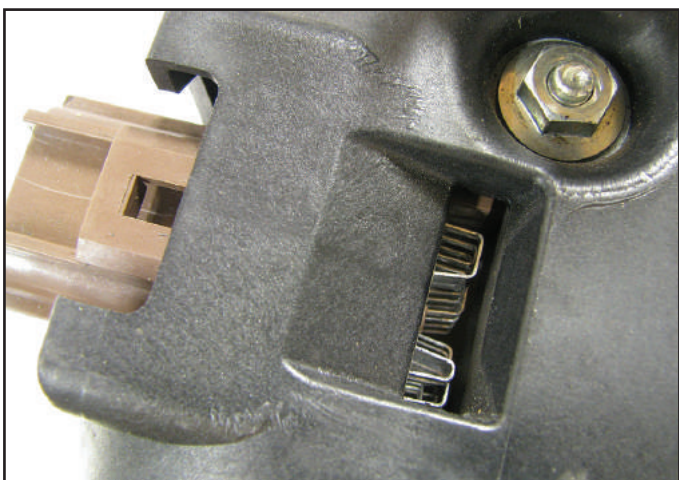


Figure 12 – On the 225 amp Denso SC alternator, used on some Ford diesel pickups, a back cover air duct directs an air stream right through the regulator's heat sink.

Regulator Reliability

The SC Series voltage regulators are small in size but have proven to be fairly reliable. If you read the article in last month's issue about saturation voltage, then you may remember that one of the regulators tested was from a Denso SC alternator. That regulator's V_{sat} was remarkably low when compared with other regulators. However, the SC regulators are so compact in size there is little room for a heat sink to cool its power transistor. Denso's solution is a unique heat sink (see Figures 11) that I'm sure you have already noticed. On high amperage alternators with hungry rotors, you may even see an air duct in the back cover, over the regulator's heat sink (see Figure 12).

You can reclaim SC regulators, but we strongly advise that you test each one for voltage saturation as described in the December edition before making that decision. If the V_{sat} is comparable to a new regulator then it is safe to assume that it is in good condition. Worn out brushes that have been arcing enough to burn the slip rings is another warning sign that the regulator has been stressed.

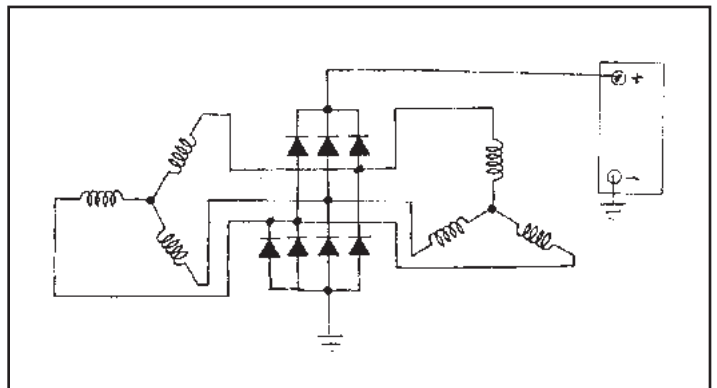


Figure 13 – This is a diagram of the stator-rectifier that uses seven diodes. Notice that one half phase (negative) passes through two diodes connected in parallel.

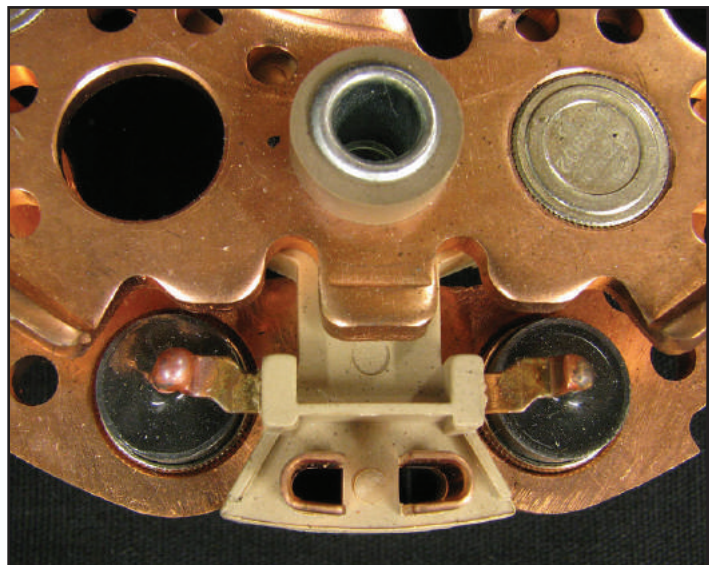


Figure 14 – These are the two parallel diodes looking down.

DENSO SC RECTIFIERS AND REGULATORS

The Seven Diode Rectifier

When I stumbled upon that seven diode rectifier that was mentioned earlier, I was sure that the extra diode must serve a purpose. The stator is double wye wound, with the two sets of coils connected in parallel (see Figure 13). As you can see in the diagram, two of the winding's three legs are connected to single positive and negative diodes. The third pair of stator leads is connected to one positive diode but two negative diodes which are in parallel with one another (see Figure 14). I felt sure that Denso must have had a good reason to add that second diode – but what was it? Electrically, it made no sense. There was no way that it could affect output that I could see.

While I cannot confirm this, I believe it has to do with cooling, the use of copper for a heat sink and the location of the middle stator leads in relation to the two-piece negative heat sink, or should I say heat sinks (see Figure 15). Both are grounded to the slip ring end frame. Notice the location of those parallel diodes in question. Each is at the very end of its respective heat sink, with little metal surface on one side to carry heat away from the diode. Now compare that with the spacing

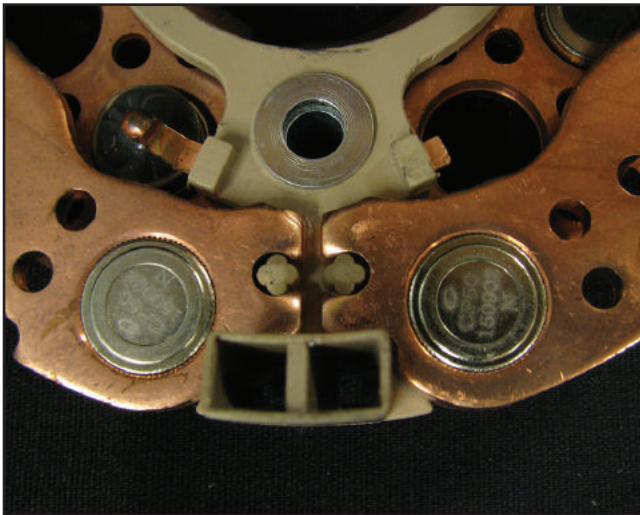


Figure 15 – From the bottom you can tell that the negative heat sink is split into two pieces and the diodes are very close to the end of each side.

of the positive diodes on the upper heat sink in the photo (see Figure 16). Notice that they are spaced out evenly with plenty of metal around each one to dissipate heat. You can also see how narrow the negative heat sink is compared to the positive side. If Denso had used only one diode, it would have run much hotter than all of the others. It would have been the a weak link for the alternator.

What does copper have to do with it? Copper was probably used here because it conducts heat away from the single diodes more efficiently. But it is fixed onto an aluminum end housing with four small mounting screws. The thermal expansion rate of aluminum is 35% greater than copper. I surmise that the two-piece negative heat sink was designed to minimize stress from thermal expansion differences. Of course, all of this is speculation on my part. If you know more or have another idea I would love to hear it.

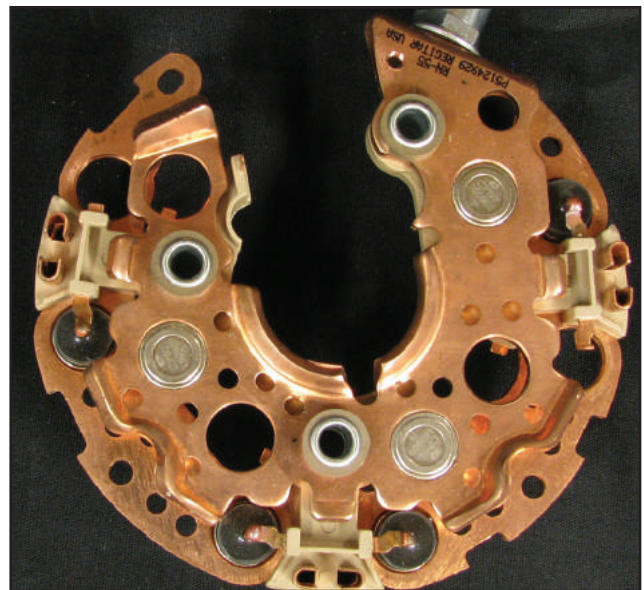


Figure 16 – Looking down on the whole rectifier, it is obvious that the positive diodes have much more heat sink surface to carry away heat.



Scott Scharrer
Equipment Manager
JIMCO, Inc.

My horsepower sale:

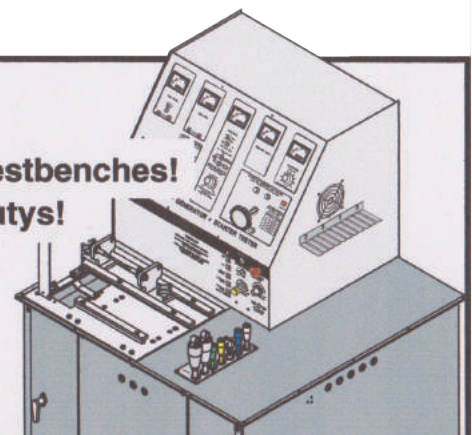
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FORD STARTER SHIMS

Know the Symptom and Cure



BY LARRY HAGEMEISTER

Most of us have seen a Ford starter with a drive clutch retaining cap that had been rubbing against the flywheel.

This is almost always caused by a worn crankshaft thrust bearing – common on older Ford V-8's with over 60,000 miles on them. The resulting slop allows the crankshaft and attached flywheel to float toward the front of the engine – moving it closer to the starter. That can allow the starter drive to engage too deeply into the flywheel and damage the starter and drive assembly.

When a Ford starter is brought in, examine the core carefully. If the face of the clutch has marks on it and the snap ring is still on the starter, the replacement starter should be installed with a shim. If the shim is not installed, this will result in a very short life for the replacement starter and drive assembly.

To correct this problem, Ford made a shim, part number D7T2-11N004 (see Figure 1). It was .090 thick to move the starter away from the flywheel. But Ford discontinued the shim years ago.

WAI now offers this Ford shim, part number 76-2306 to solve the problem. This shim will fit both two and three hole starters. It is an inexpensive part that can be a real problem

solver for the customer who comes to you after replacing his starter multiple times because his engine needs a new thrust bearing..

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Figure 1 – Ford's part number the starter shim is D7T2-11N004.

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DON'T TAKE BATTERY CONNECTIONS For Granted



BY DAN MARINUCCI

The biggest mistake an automotive professional may make is overlooking the battery terminals. Indeed, auto electricians and installer technicians agree that battery terminals are the most-important connections on the entire vehicle. But agreeing on that topic doesn't ensure that they faithfully inspect the terminals before proceeding with an electrical diagnosis or repair.

My work requires a great deal of photography and testing on the vehicle. Sometimes I borrow "homework" vehicles from friends, neighbors and auto repair shops. Other times, I do my homework at someone's repair shop. But regardless of where I'm working, I still encounter the same problem and encounter it routinely – loose or marginal battery terminals!

Mind you, we're all human; we all make mistakes and overlook problems. But my experience suggests that every automotive repair pro should develop the work habit of inspecting battery connections **first** and **foremost**. That's true because no matter how much experience you have accrued, there's no guarantee that loose or marginal battery connections create conclusive – let alone **obvious** – symptoms. Personally, I've been amazed at how long some vehicles have continued operating with marginal battery connections.

There's an old saying that a picture is worth a thousand words. So, let's go out under the hood and review some examples of **proper** connections. Although the accompanying photos happen to be OEM terminals on popular Japanese vehicles, the format still applies to the millions of top-terminal batteries in service today.

First of all, visual inspection is a vital **initial** check. But by no means is it the final word on the integrity of any battery connection. A prime example is a battery terminal that's covered with a blob of grease or a thick coating of "protectant" from an aerosol can. Simply out of curiosity, I have opened up dozens of these connections. Believe it or not, **some** were visibly corroded inside. I suspect that the elements managed to attack the connection from the **underside** of the terminal.

I cite this experience in order to remind readers that seeing **external** protection does not ensure that a connection is clean **inside**. No doubt, **ERA EXCHANGE** readers have their own, favorite techniques for treating battery terminals. By all means, continue using those techniques if they've been reliable methods.

But in case you missed it, I offered my opinion back in the July 2016 issue (page 9) of **ERA EXCHANGE**. For years, I have applied a film of silicone grease or paste to a clean battery post. Then I connected the battery terminal to it. Yes, I said treat the **inside** of the connection; it's worked very reliably for me. (No, the silicone material does not create any **measurable** increase in the voltage drop across the connection.)

Second, I prefer to visually inspect battery terminals after cleaning them. That is, I dampen a shop rag or wiper with electrical or brake cleaner. Then I use it to wipe off the exterior of each terminal – clean it just enough to see the battery post. I become suspicious any time I cannot see the top of the post protruding **through** the battery terminal. Suppose the top of

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Figure 1 – This is a side view of a common Honda top-terminal battery terminal. I have loosened the nut, spread the terminal and then fully “seated” it on the post. Consequently, a noticeable portion of the post protrudes through the terminal.



Figure 2 – This happens to be an OEM Nissan top-terminal setup. Once again, the terminal is fully seated on the battery post and a noticeable portion of the post sticks up above the terminal itself.

the battery post appears to be flush with the top of the battery terminal. If so, I try to twist the terminal. When I do, the terminal usually is **not** tight on the post!

Third, please refer to the accompanying photos that show normal battery terminal placement on a battery post. I hope it’s clear in these examples that the battery post is protruding up through the battery terminal. When in doubt about either the internal condition of the terminal or its location on the post, correct the problem right away. Remember that fairly or unfairly, your name is attached to a vehicle the moment you’ve put your hands on it. Eliminate or minimize opportunities for the vehicle owner to blame your work after the fact, okay?

Where appropriate, connect back up power to the electrical system so the vehicle’s computer(s) retain memory during your repair. (For additional info on applying backup power, refer to pages 7-8 of the February 2016 issue.) Then remove the battery

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terminals; clean the terminals and posts with a suitable cleaning tool. Next, see if the battery terminal slides all the way down onto the battery post. If it doesn't, don't force it. Instead, loosen the terminal nut and use an appropriate terminal tool to carefully spread the terminal. Carefully spread the terminal just enough so you can fully "seat" it on the battery post.

Does the terminal slide all the way down the battery post now? If so, then remove it, put a film of silicone grease on the battery post and reinstall the terminal. Tighten up the terminal nut and you're ready to go.

I prefer the terminal-spreading tool shown in the accompanying photographs. No, this style of tool isn't essential. But I've found it to be fast and effective – not to mention inexpensive. (Many times I've been in a repair shop and

couldn't find one of these tools!) It's a shame to see battery terminals misshapen and distorted – apparently because someone used whatever tool was handy rather than the correct one.

Last but not least, you can verify the integrity of each battery connection by performing a voltage drop test on it. Safely disable either the ignition or fuel system so the engine won't start. Grab a digital voltmeter (preferably set to its lowest voltage scale). Firmly hold one test lead on the battery post itself; hold the other lead firmly to the battery terminal. Or, use an alligator clip to secure the other test lead to the battery terminal. Next, have someone operate the ignition switch for you – crank the engine for five seconds. Over the years, I've found that the voltage drop across a healthy battery connection measures **very** close to zero. Certainly, the measurement has been **less than** 0.10 volt across a trustworthy connection.

(Remember that a minus sign on the voltmeter display just means that you have the test leads reversed during this voltage drop test. But reversed leads don't affect the actual voltage drop measurement.)

Assuming that battery connections are good can be costly to everyone involved in a repair job – the installer technician as well as the person who built the starter or alternator for him. Furthermore, rebuilders may take an installer's skill and knowledge for granted. Sometimes, an installer is either unaware of proper procedures or perhaps too lazy to follow procedure. In the long run, there's no substitute for proper, reliable procedures.

Dan Marinucci, a former automotive technician who is ASE certified, is a nationally recognized automotive instructor and regular contributor to trade journals such as Motor and Tire Center.



Figure 3 – Here, I am using the basic, pliers-shaped tool to carefully spread open a top-post battery terminal. No, this spreader tool isn't essential but I've found it to be inexpensive and efficient for the task.



Figure 4 – This is just a closer view of the simple spreader tool at work. Naturally, it's preferable to spread a terminal just enough to fit fully onto the battery post – without distorting or damaging that terminal.

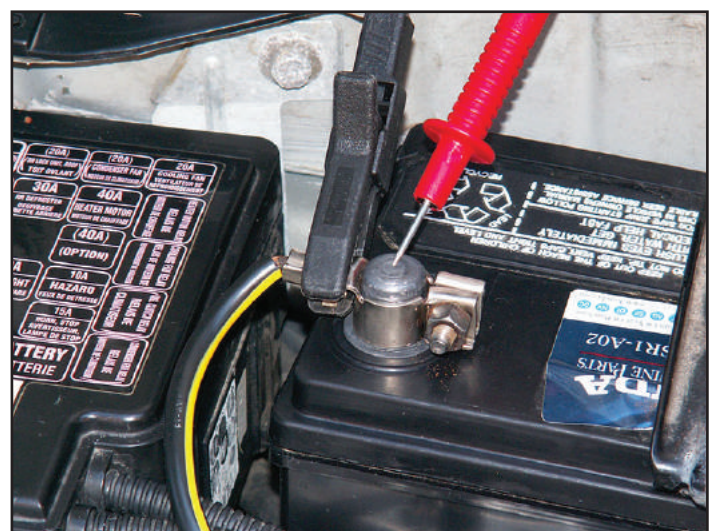


Figure 5 – Here, I'm performing a voltage drop measurement across a battery connection. I clipped one voltmeter lead to the terminal itself. I'm holding the other lead – equipped with a sharp probe tip – onto the battery post.

Meet the Seminar Presenters



Tim Weyandt

Tim Weyandt & Sam Fox with Allegiant Power

Friday, April 7th 1:00-2:30 p.m.

Topic: AGM Batteries Explained

With over 36 years in the battery industry, Tim brings a wealth of knowledge to the Allegiant team. He was self-employed for 16 years as a battery specialist. Tim worked with a large tire chain where he managed the battery division for 10 years. He has worked for two battery specialists while sitting on manufacturer/dealer council, and has even taught at a vocational school. His strength is his ability to understand the business side of the battery industry and apply his marketing background.



Sam Fox

Sam Fox has an extensive knowledge of the battery industry that spans over four decades. He has successfully operated his own battery specialist company. His work history includes Southern Battery, Chloride/Conrex, Chloride, Battery Associates, Co-Founder of Battery Alliance with Art Wilson, and now the current Vice President of Allegiant Power. His expertise in dealing with supplier partners as well as sharing his knowledge with battery specialists across North America has earned him a reputation for sound business ethics.

Bill Bowman – Retired from Delco Remy

Friday, April 7th 2:30-4:00 p.m.

Topic: Alternator Electronics

Bill has extensive experience in both the aftermarket and OE. In the early 80's while working for Delco Electronics, he designed and patented the CS130 voltage regulator (411). The features and functions (Load Response Control, High Side Drive, Active Fault Indication, etc) are now standard on modern voltage regulators.

He worked for WAI and Renard Manufacturing in the 90's. His latest "real job" was the Director of Global Electronics Engineering for Delco Remy (Remy International) from 2010-2015.

For 3 years he wrote the "Driving Quality" column of the APRA Global Connection. In those articles, he discussed ideas of how to improve product quality primarily in the alternator field. In August 2006, he wrote "The MOSFETs are Coming" which predicted the diodes being replaced by transistors in the rectifier. Ten years later, active rectification (with MOSFETs) is a reality.

Bill will present a 90-minute seminar called, "Alternator Electronics." It starts with Ohm's law and goes through regulators, rectifiers, and finally communication protocols (LIN, CAN, COM, etc). To keep the presentation interesting and to engage the audience, Bill uses stories more than boring technical facts to teach. It will feel more like a conversation than a lecture.



MEET THE SEMINAR PRESENTERS



Dan Marinucci – Automotive Technical Training

Saturday, April 8th 8:00-10:15 a.m.

Topic: Vital On-Vehicle Tests That Minimize Starter/Alternator Returns

Dan is an ERA member who has presented a variety of seminars for the association over the years. He's also a member of the North American Council of Automotive Teachers (NACAT).

He has been reporting on the automotive service industry since 1976, writing for **MOTOR/AGE**, **UNDERCAR DIGEST**, **IMPORT SERVICE** and **ELECTRICAL REBUILDERS EXCHANGE**.

What's more, he has written **MOTOR Magazine's** monthly "Foreign Service" column for 27 years. (**MOTOR Magazine** is a Hearst publication that has served the professional auto repair market since the 1920's.

Dan has written the twice-monthly "Automotive Management" column in **TIRE BUSINESS** for 27 years. (**TIRE BUSINESS** is a Crain journal serving the tire dealer market since 1983.)

Dan has been presenting tech training seminars for installer-technicians nationwide since 1993. He has taught these classes in 38 states and across Canada. Dan gathers data for his seminars by investing countless hours in hands-on testing. As just one example, he has captured more than **4000** oscilloscope patterns during his research.

His depth of knowledge and ongoing data-gathering give Dan a unique perspective on the automotive service business.

Mohammad Samii with Sammy's Auto Electric

Sunday, April 9th 9:00-11:30 a.m.

Topic: Newer Starter and Alternator, Testing, Rebuilding, and Case-Studies

Mohammad Samii or "Sammy" as he is often called has been involved with electrical rebuilding since 1972 and currently is president and owner of Sammy's Auto Electric Service, Inc., in Champaign, Illinois which he established in 1979.

His company does custom electrical rebuilding, electrical/electronic diagnostics and installation on various vehicles, and modifications and customizing of charging starting systems for higher power and torque. He is a member of the Society of Automotive Engineers (SAE), an ASE certified technician. Sammy serves on the board of governors of the Electrical Division of the Automotive Parts Remanufacturers Association (APRA). His monthly column, "Auto Electric Corner" appears in the Global Connection (APRA's monthly newspaper) which he has been sharing his experience with his peers since 1992.

He teaches various courses in installation, rebuilding, and diagnostics throughout the U.S. and Canada for rebuilders as well as technicians and mechanics. He has been involved with teaching APRA's Electrical Clinics as well as conducting many training sessions for ERA during their annual ERA Show in the past several years.

Mohammad is a graduate of the Iranian Air Force Academy as well as USAF Air University at Maxwell Air Force, with a degree in aircraft maintenance engineering.

His career in electrical rebuilding since 1973 coincided with the introduction of power electronics in automotive applications, where his educational background made him quickly grasp the new technology. Invention of computers and their introduction into the automotive field peaked his interest where diagnosing some hard to find electrical/electronic problems remains his interest and is part of his daily work, in addition to rebuilding rotating electrical units.

He has lived in Champaign, Illinois since 1979 with his wife and 3 children who are now all grown. As a private pilot he enjoys General Aviation and flying various single engine airplanes, and is an avid tennis player who enjoys playing the game and watching various tennis tournaments.



Mark this date now! April 7-9, 2017

TENTATIVE 2017 DEARBORN/DETROIT SHOW SCHEDULE:

FRIDAY, APRIL 7

8:30

Load Bus at Hotel
for Ford Tour

9:00 – 11:30

Ford Tour

11:30 – 12:00

Return to Hotel

12:00 – 1:00

Hot Lunch Buffet

1:00 – 2:30

Seminar: Tim Weyandt
— with Allegiant Power —
AGM Batteries Explained

2:30 – 4:00

Seminar: Bill Bowman
— retired from Delco Remy —
Alternator Electronics

4:00 – 5:00

Reception with Cash Bar

5:00 – 8:00

Exposition Open

“Customers can have the
Model T in any colour that they
want, so long as it is **black.**”
— Henry Ford



SATURDAY, APRIL 8

8:00 – 10:15

Seminar: Dan Marinucci
— Automotive Technical Training —
Vital On-Vehicle Tests That
Minimize Starter/Alternator
Returns

10:30 - 11:30

Roundtable

11:30 – 1:00

Hot Lunch Buffet

1:00 – 5:00

Exposition Open

SUNDAY, APRIL 9

7:00 – 8:45

ERA Breakfast
& Annual Board of
Directors Meeting

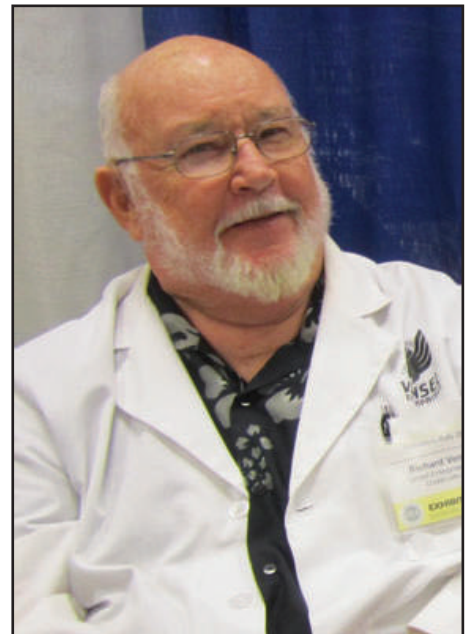
9:00 – 11:30

Seminar: Mohammad Samii
— with Sammy's Auto Electric —
Newer Starter and Alternator,
Testing, Rebuilding and
Case-Studies

“Quality means doing it right
when no one is looking.”
— Henry Ford



Most of you are aware that the Electrical Rebuilding Industry lost one of its best friends, mentors and supporters of the business last June. Dick Vensel spent his whole life working in the rebuilding industry. He was a lifelong member of the Automotive Parts Remanufacturing Association (APRA) and a founding member of the Electrical Rebuilder's Association (ERA). To honor Dick's participation in both associations in 2017, the ERA Board of Directors have decided to honor both associations memberships and allow APRA members to participate in the 2017 Tradeshow/Training Event in Dearborn, Michigan this April for the ERA member price. Show your appreciation for all that Dick has shared with all of us for a lifetime by attending this event.



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APRIL 7-9, 2017**

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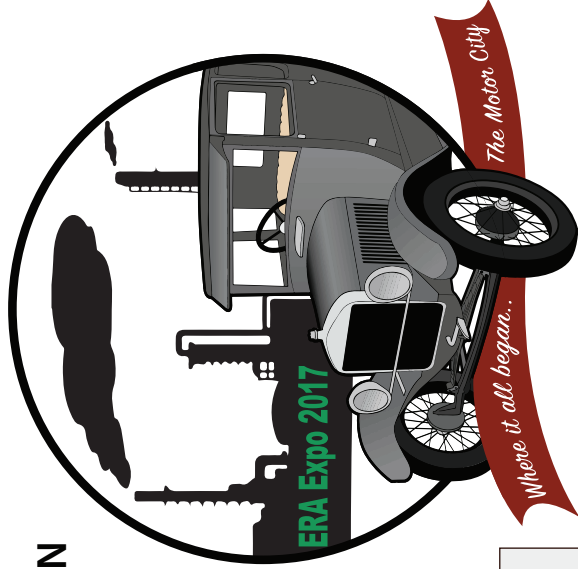
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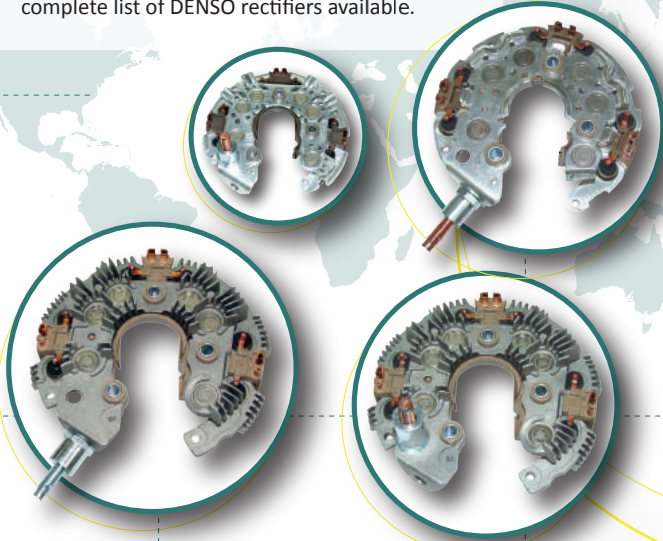
ATTENDEES NAMES (Please print clearly)	EXHIBITION/SHOW FLOOR		ALL SEMINARS		FORD PLANT TOUR INCLUDES FORD TOUR, BUS FEE, AND LUNCH \$50	ERA ANNUAL MEETING BREAKFAST \$15 ERA/APRA MEMBERS ONLY	20% SAVINGS BUNDLE ALL EVENTS \$180 ERA/APRA MEMBERS ONLY	SUB TOTAL
	ERA MEMBER \$35 LUNCH INCLUDED	NON-MEMBER \$45 LUNCH INCLUDED	ERA MEMBER \$125	NON-MEMBER \$175				
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2)								
3)								
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Cancellation Policy: Cancellations are subject to a 15% processing fee. NO REFUNDS will be made after March 1st.

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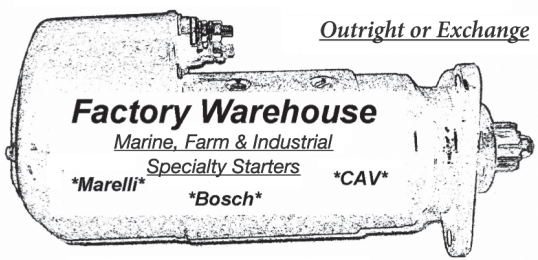
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