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February 2021 $12.95

AUTO ELECTRIC CORNER
Denso SC Rotor Slip-rings and High-End Battery Charger Repair

USING APPTRAK ONLINE
Part 3 - Unit Lookup

BOBCAT DENSO 12337
An Update

A WORD FROM THE PRESIDENT

Website 30 Day Trial Access



Well, 2021 did not start off too well and hopefully the tone of division within our country will lighten up. I was brought up with a number of principles to live by and the top three are: (1) Faith in a Supreme Being, (2) Family, and (3) Country. Unfortunately, the latter brought upon shame and utter disappointment for myself. We Americans are better than this and we can and need to fix this now. It will take some time, but as history has shown, the country and its people can make it happen.

Now on to ERA Business. You may have noticed some changes to the ERA website homepage. As I have mentioned in past issues, I, along with the Board of Directors, have been working on our website to make it more user friendly. As mentioned in past issues I, along with the Board of Directors, realize that with the loss of membership from members reaching retirement and shops just closing down, we need to find ways to recruit new members. One option to do that is through our website. There is now a quick and simple button on the top right corner of the homepage to request a Free 30 Day Trial Access so that a non-member can see a sample of what we have to offer. The Find-A-Rebuilder link has been removed temporarily and we are working on a revamp of that too. We want the public who visit our website's homepage to also have a quick and simple way to find an ERA member rebuilder. Find-A-Rebuilder is still active for ERA Membership from the website's homepage, left side menu under Association Info, Member Directory in the dropdown. My hope is that this new revamp will be up and running within the next 30 days. A reminder to all: Be on the lookout on the website's homepage for information on the 2021 ERA Trade Show to be held in Cincinnati, Ohio on the weekend of May 20 -23rd.

Ken Plourde

NEW ERA MEMBERS

A.C.K. Enterprises Inc.
Des Moines, Iowa

Benders Farm
Hydro, Oklahoma

ABOUT THE COVER

Hitachi heavy duty stator

ERA EXCHANGE

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The 2021 ERA Tradeshow in Cincinnati, Ohio has been scheduled for

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AUTO ELECTRIC CORNER — Denso SC Rotor Slip-rings and High-End Battery Charger Repairs



BY MOHAMMAD SAMII

Our Hope for 2021

I was looking at the January 2020 issue of this column and recounting the business resolutions I had planned for the coming year then. Most of my resolutions like increasing our labor rate, charging more for diagnostic work, increasing our fees for rebuilding odd units and combining our purchases to get free shipping and better prices were all met to a degree, but no one had ever imagined the COVID-19 outbreak and the effect it would have on various businesses, our entire community, the whole country and the world.

In my home state of Illinois, the automotive related service businesses were classified as *essential.* Being a part of the Transportation Support Group, it allowed us to stay open as we did. When the general shut-down was announced, for a period of 3 days (a Monday through Wednesday) I let our employees stay home. That was in mid-April and coincided with the planting season and the rush of Ag units that has to be taken care of, regardless. So my guys got back to work and kept a relatively busy schedule until the general work slowly and gradually picked up and finally reached a near normal level by the end of the July. We have been complying with health measures, cleaning more often and observing social distancing as much as possible in the shop.

Meanwhile we took advantage of the provision and applied (and received) our PPP loan which was really a shot in the arm. I paid our employees for the time they stayed home and according to the terms of the loan, we kept them on full-time status without being laid off. Now the business is almost close to a near normal for this time of the year but one cannot deny the effects that the pandemic has had on the health of our citizens and the unfortunate loss of lives that has occurred.

We, who are a part of the big picture of automotive service are lucky that our business has not been affected by the virus to a great degree. But when you compare us to businesses like food service, catering, restaurants and such, you cannot remain indifferent and not feel sorry for those less fortunate. There are a lot of people struggling and our heart goes out to them. Let's hope this all will end soon, that the vaccines will stop the spread of the disease, and the life in the New Year of 2021 will get back to what we were once used to. Amen…!

11570 Alternators, Rotors, and More…!

There has been a few calls and some discussions regarding the premature brush-wear of the 11570 Denso alternators that might be a cause for concern.

These alternators were used on a variety of Chrysler (FCA) products from Town and Country vans to Dodge Avengers, Journeys, Grand Caravans, Ram vans and even Volkswagen vans, all equipped with a 3.6L V-6 engines. There seems to be a lack of valid reason as to why the brushes are wearing faster than one would expect from a robust Denso SC-type



alternator where 150K+ miles is the norm. We have seen some failures at below 100K miles and that is considered unusual for these alternators.

Of course leaking oil and anti-freeze into the alternator does contribute immensely to the demise of the brushes, but we have seen clean 11570 alternators with worn brushes where contaminants were not a factor.

A direct result of excessive brush-wear in these alternator is the deterioration of their rotors' slip-ring that needs to be replaced (*see Figure 1*). Replacing this slip-ring is truly a must for any rebuilder, large or small. The option of replacing the entire rotor is not viable as they are expensive and mostly unavailable. Also, the replacement rotors are not exactly cheap either and are not always in the stock when you need one.

Since replacing these slip-rings have also been the subject of few calls, I will try to explain the process with the use of a series of pictures.

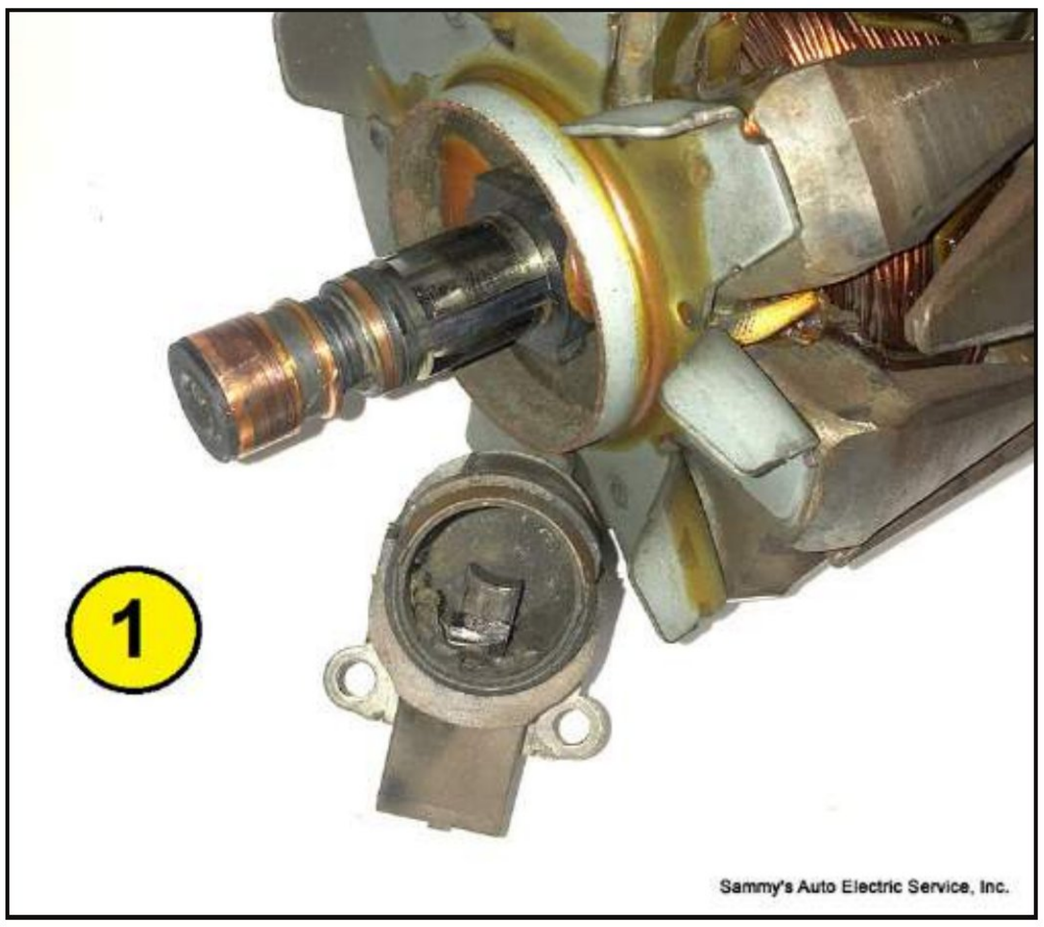


Figure 1 – This slip-ring was damaged by excessive brush wear.

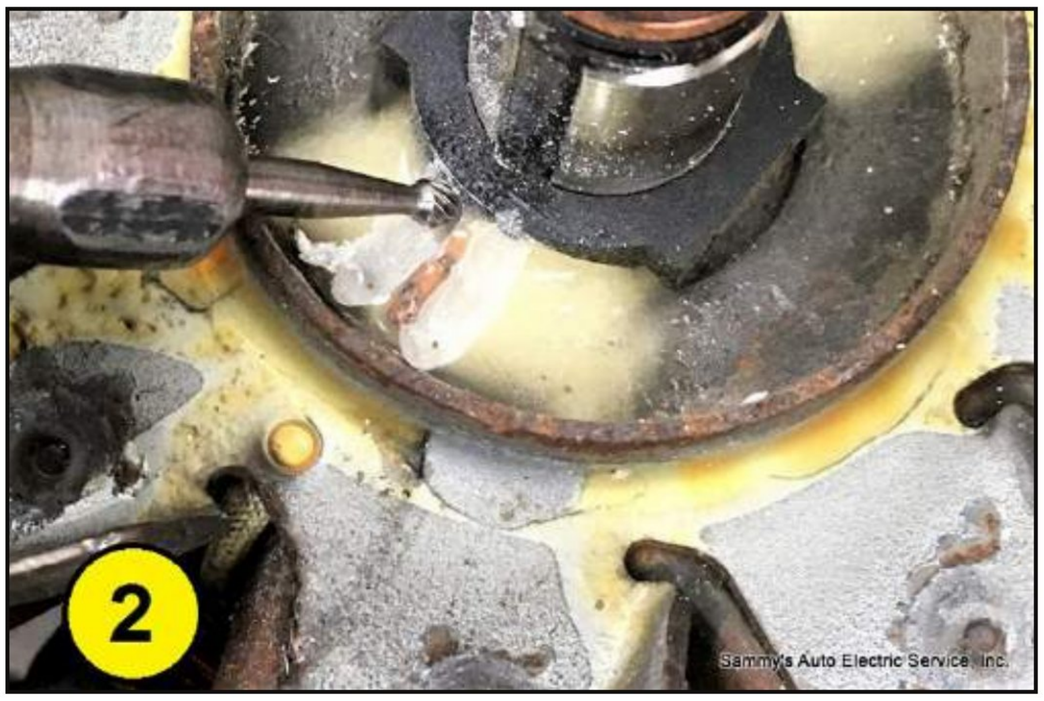


Figure 2 – The bearing needs to be removed. Each person has his or her own way of doing it. There are also specialized pullers available for the job. In the September 2020 issue I showed a rudimentary one I have made for this purpose.

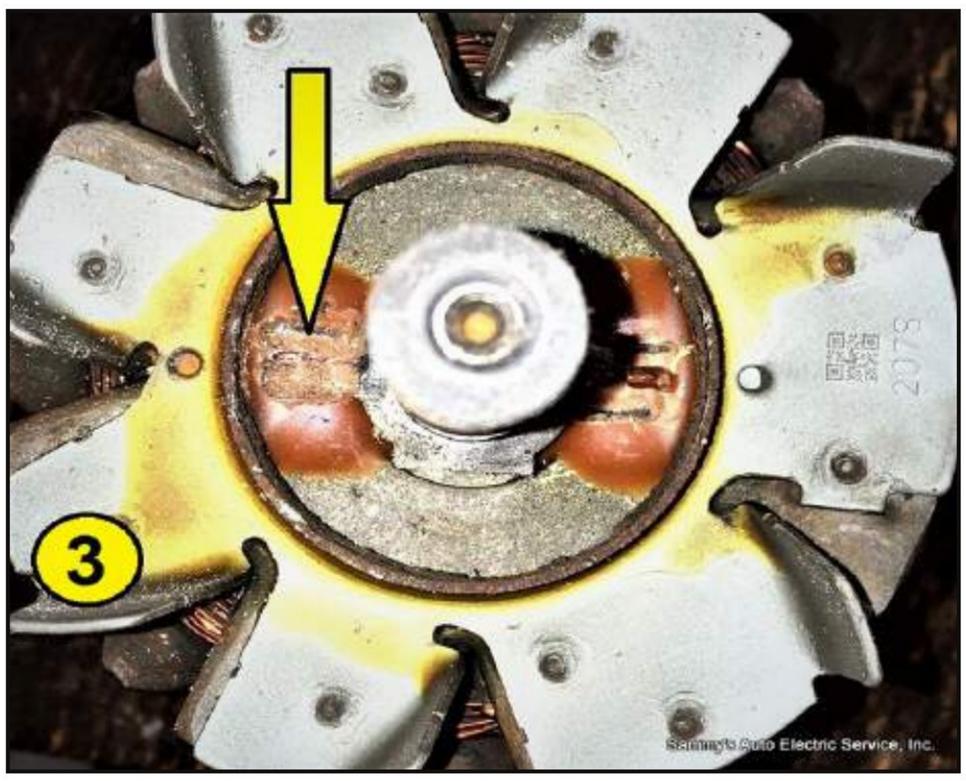


Figure 3 – To access to the rotor leads, with the help of a Dremel tool, dig two grooves alongside of the leads (mostly visible in the epoxy) to expose the leads. Make sure you do dig underneath them and do not cut the leads once they become partially exposed.



Figure 4 – Using the same Dremel, try to clean sides and top of the exposed portion of each lead and make sure you do not break it. The bottom part of the lead can remain in their hard epoxy to stay in place. Better cleaning of the leads facilitates the soldering.

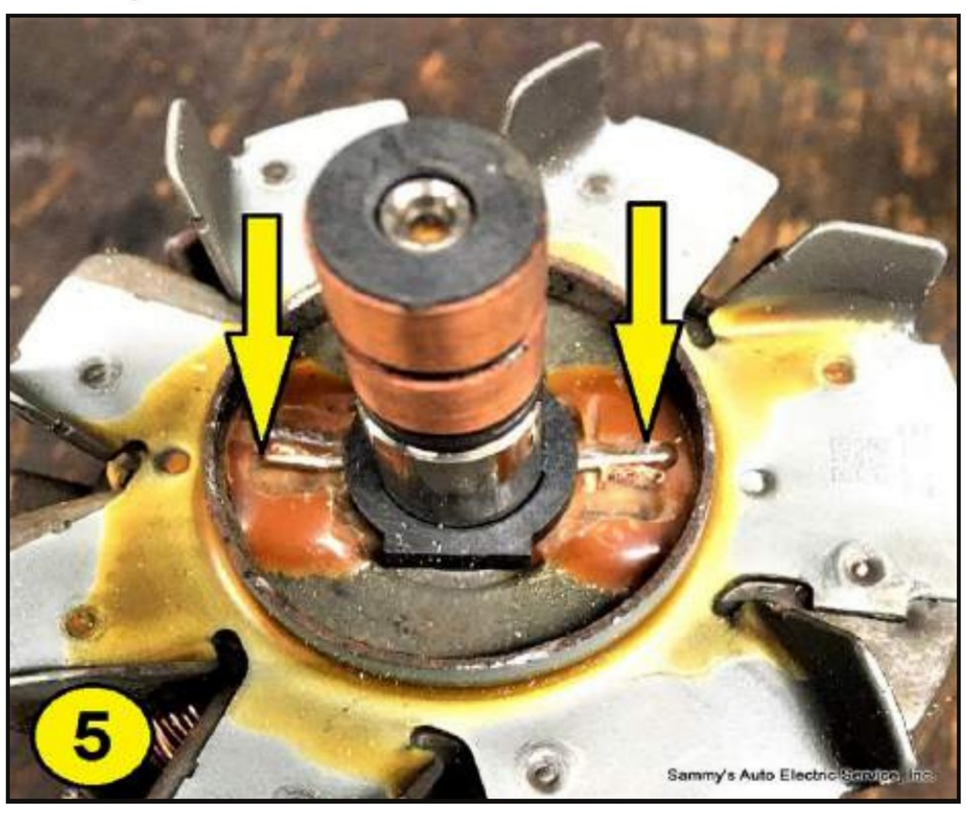


Figure 5 – Cut the leads as close as to the old slip-ring as possible and remove it from the rotor shaft.

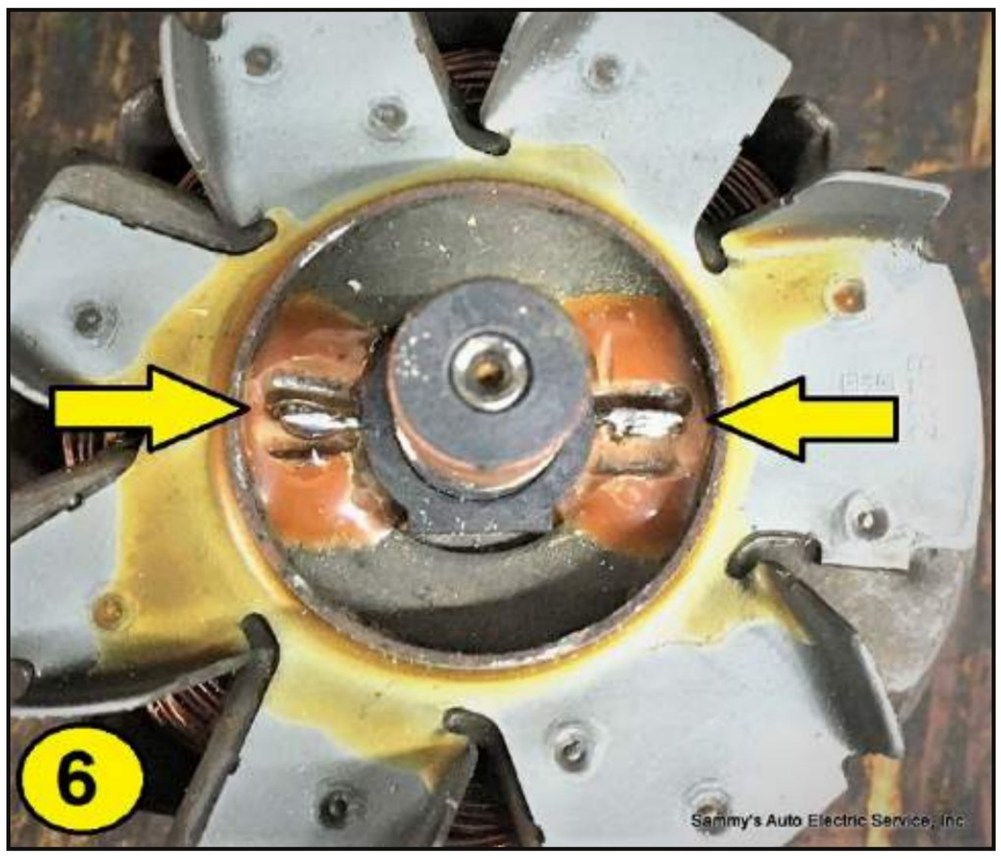


Figure 6 – After cleaning extra epoxy that might be remaining on the shaft and interfere, install the new slip-ring (J&N's 313-52004 or WAI's 28-82854). The new slip-ring's leads needs to be measured and trimmed to the size necessary. Now you can solder the slip-ring's wires to the leads that you exposed.

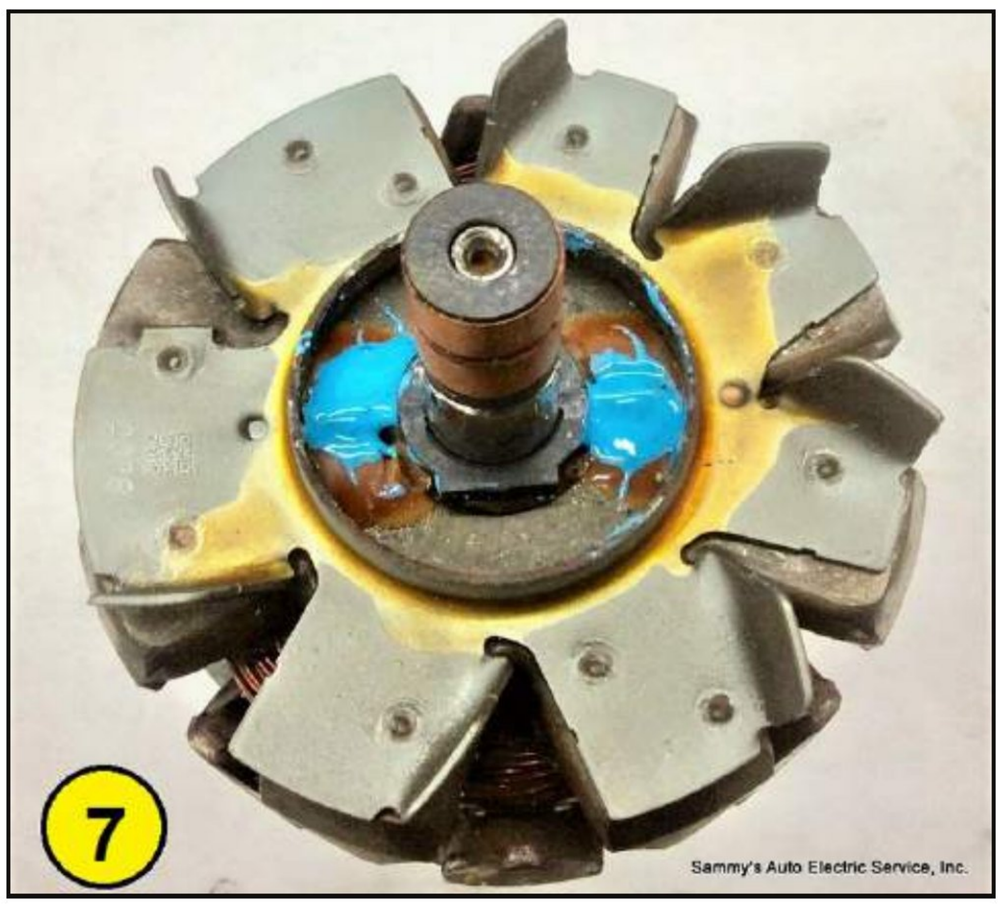


Figure 7 – The exposed cavities can now be filled with the epoxy of your choice.

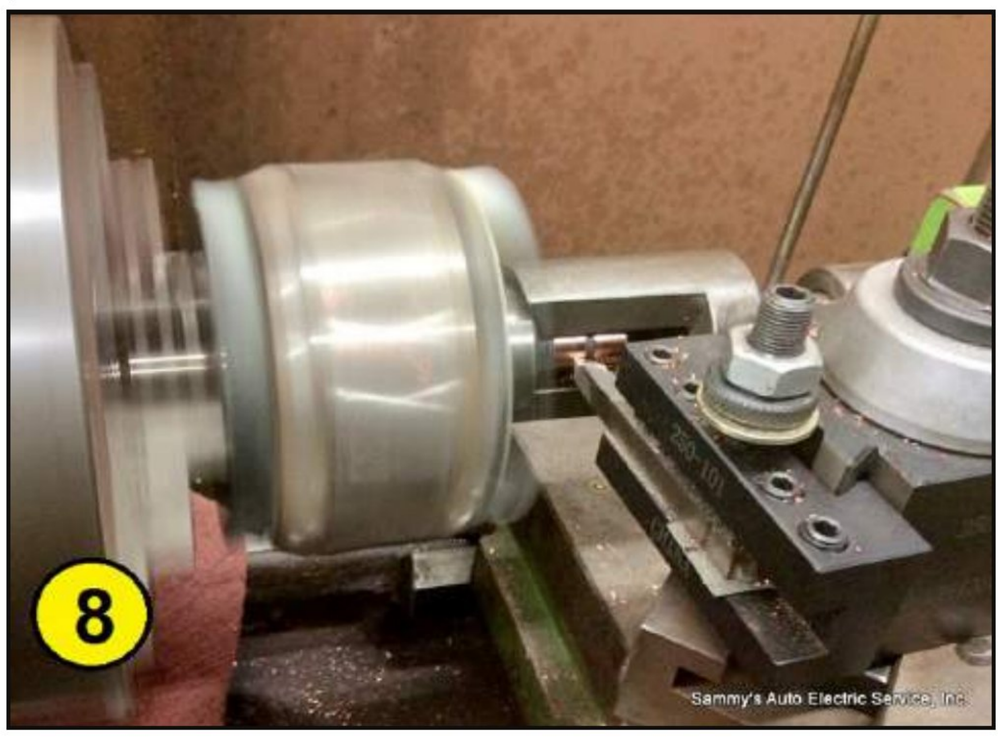


Figure 8 – Install the bearing and machine the slip-ring for run-out.

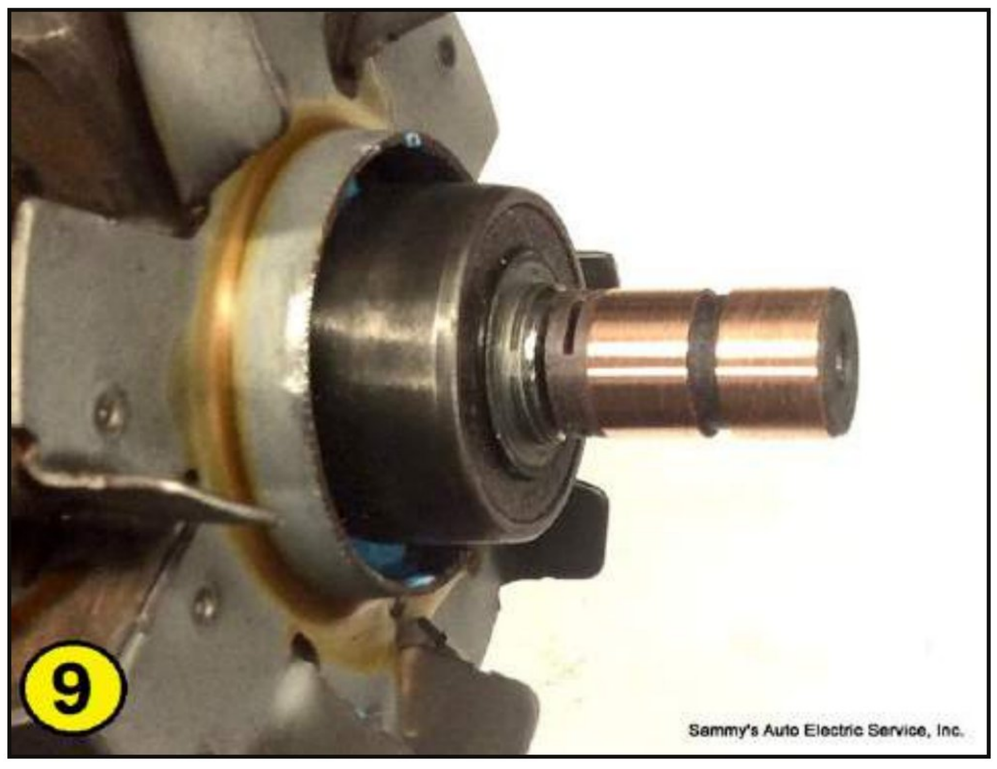


Figure 9 – Your finished product is now an OE quality rotor with a new slip-ring.

Remember to measure the rotor draw and check for shorts to ground before you pour the epoxy. By and large, on Denso SC alternators if used on Chrysler applications (PCM-driven), draw is from 5.2 to 5.4 amps. On Denso SC alternators that have internal voltage regulators like the ones used for GM, Ford, Toyota, Honda and other applications, the rotor draw is between 3.5 to 4.0 amps. The figures given may vary for some of the higher output Denso alternators (200+ Amps) and are based on measurements using my SR-200 Jimco tester. Measured by other test equipment may result in getting different readings.

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Figure 10 – High-output commercial chargers

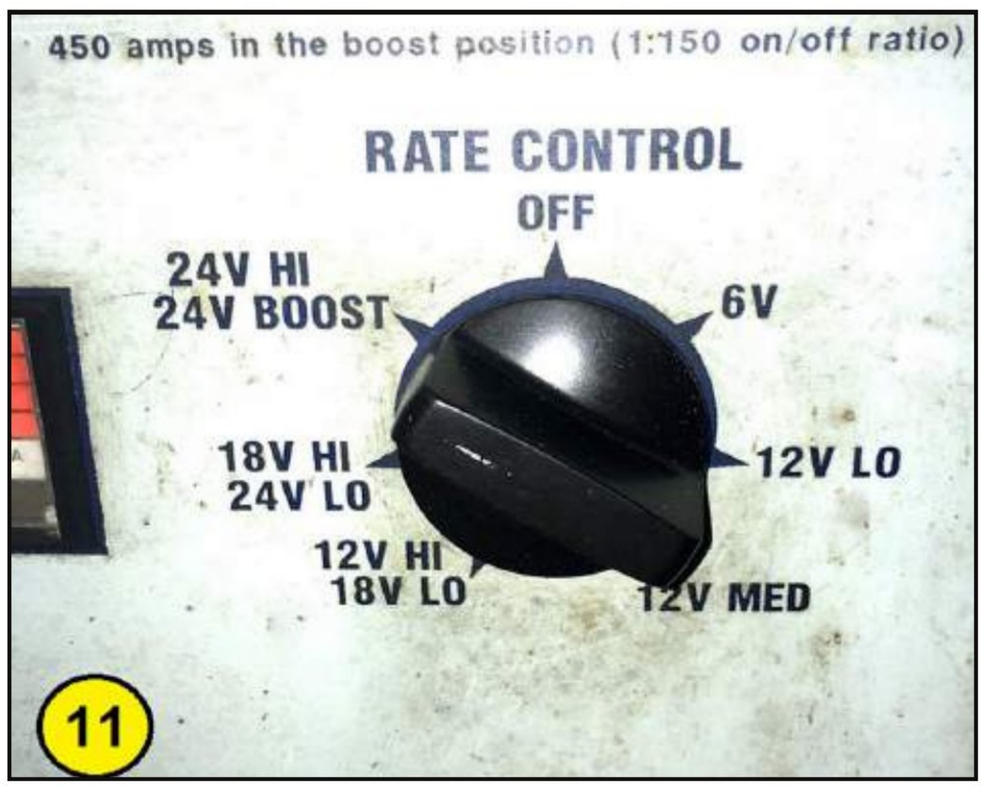


Figure 11 – Multi range voltage selector



Figure 12 – Timers purchased from PLP Battery

The same problem with premature brush wear can also be seen on a similar family of Denso alternators such as 11295 that is used on 3.3L and 3.8L engines in the 2008-10 Chrysler Town & Country as well as Dodge Grand Caravan (that used 13870 and 13871 alternators on earlier applications), but to a much lesser degree.

In a difficult and time-consuming installation where the 11570 alternators are used, we must make sure that everything gets done perfectly and the unit is in top shape for service. There is no room for any short-cuts or savings on these applications, as any away-from-home breakdown and alternator replacement can get very costly.

Battery Charger Repair…!

I usually do not accept battery chargers for repair as most owners can purchase an inexpensive one through local stores. But when it comes to larger commercial chargers (*see Figure 10*), their higher cost justifies the repair price, and in that case, I do not mind spending the time that it takes to tinker with them.

This batch sent to us by a good customer who happens to be our local Mass Transit District (MTD) who operates our city buses. While the majority of those buses have turned hybrid and do not have conventional starters and alternators, we still get some of their units for smaller vans and shuttle buses, as well as some bus blowers and such.

These are multi-voltage chargers, some with 6-12-18-24 volt settings (*see Figure 11*). They are complicated and repairing them can be quite challenging. Fortunately, PLP Battery Supply, who is a supplier member of the ERA, has most of the most of the parts necessary to repair most battery chargers such as this, including the timers that we needed (*see Figure 12*). They can help you in finding the necessary parts or help with technical support. Their comprehensive website is well organized for repair parts as well as new battery chargers, and they are rebuilder-friendly. So if you get a call for such repairs, it is good to know that repair parts and advice are available.

Well, that's all for this issue. Until I see you again, keep up the good work, stay healthy and Covid-free if you can help it.

You can contact Mohammad Samii by email at: sammyselectric@sbcglobal.net or by calling the ERA Tech Help Line at 636-584-8324



USING APPTRAK ONLINE
Part 3 - Unit Lookup



BY BOB THOMAS

An under-used and least known feature in Apptrak is a tool that they call **Unit Lookup.** When we think of the word "lookup", applications and unit numbers come to mind. But this tool has nothing to do with applications, or where any particular unit was used. Rather, it is a tool that can identify a unit of unknown origin or application based purely on its measurements and specifications alone. Or it can be used to verify that a specific unit is what you believe it to be.

If you have ever found yourself in a situation of trying to identify an alternator or starter that had no identifying numbers on it, or perhaps a 20MT Delco starter with a field case number that does not match the drive end housing, then this tool is for you.

To get to it, simply click on the "Tools" button on Apptrak's main menu bar (*see Figure 1*). This will take you straight to the Unit Lookup page, which defaults to the Starter Lookup page as shown in this screenshot (*see Figure 2*).

On the left side, below "Unit Lookup" there is a link Unit Lookup Instructions. If you hold down your control key when you click on the link, it will open a brief set of instructions in a second browser tab. That can be helpful if you need to refer to them half way through a search. While this tool takes a little practice to get used to, it quickly becomes second nature after you use it a few times.

Directly below the instructions link, there is box that says "OE Unit Number/WENO". Entering an OE unit number, or Whatcom Electric's own unit number (WENO) will fill in all of the specifications and measurements for that unit in the fields in the lower part of the screen. So if you want to verify something like the distance between the pinion and the mounting flange on a starter that a customer may been having an engagement problem with, you can simply plug in the OE unit number there to find out what that measurement should be. All of the information that you will find in this section has been meticulously accumulated



Figure 1 – Apptrak's Main Menu Page.



USING APPTRAK ONLINE

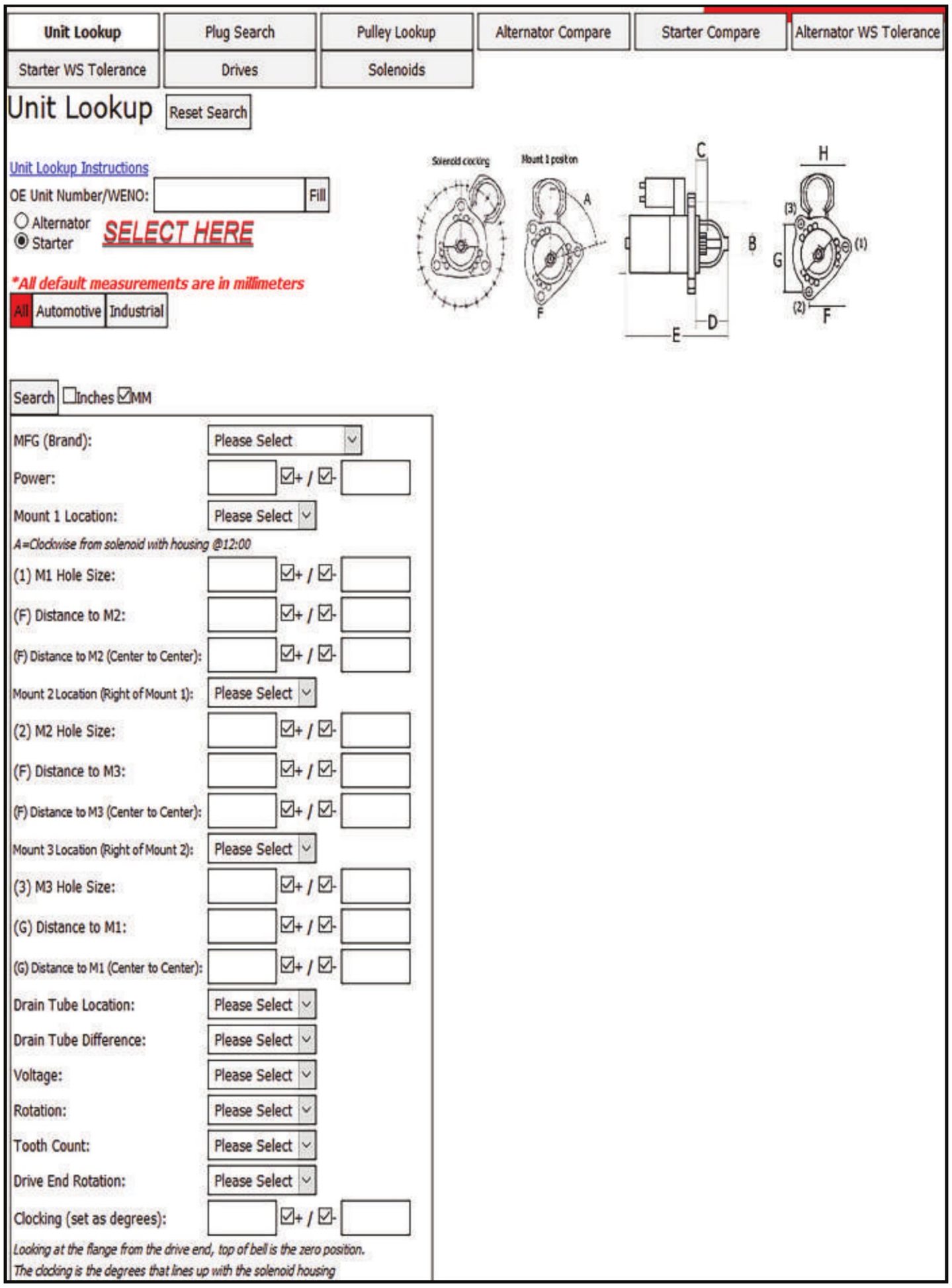


Figure 2 – Upper portion of Unit Lookup (for starters).

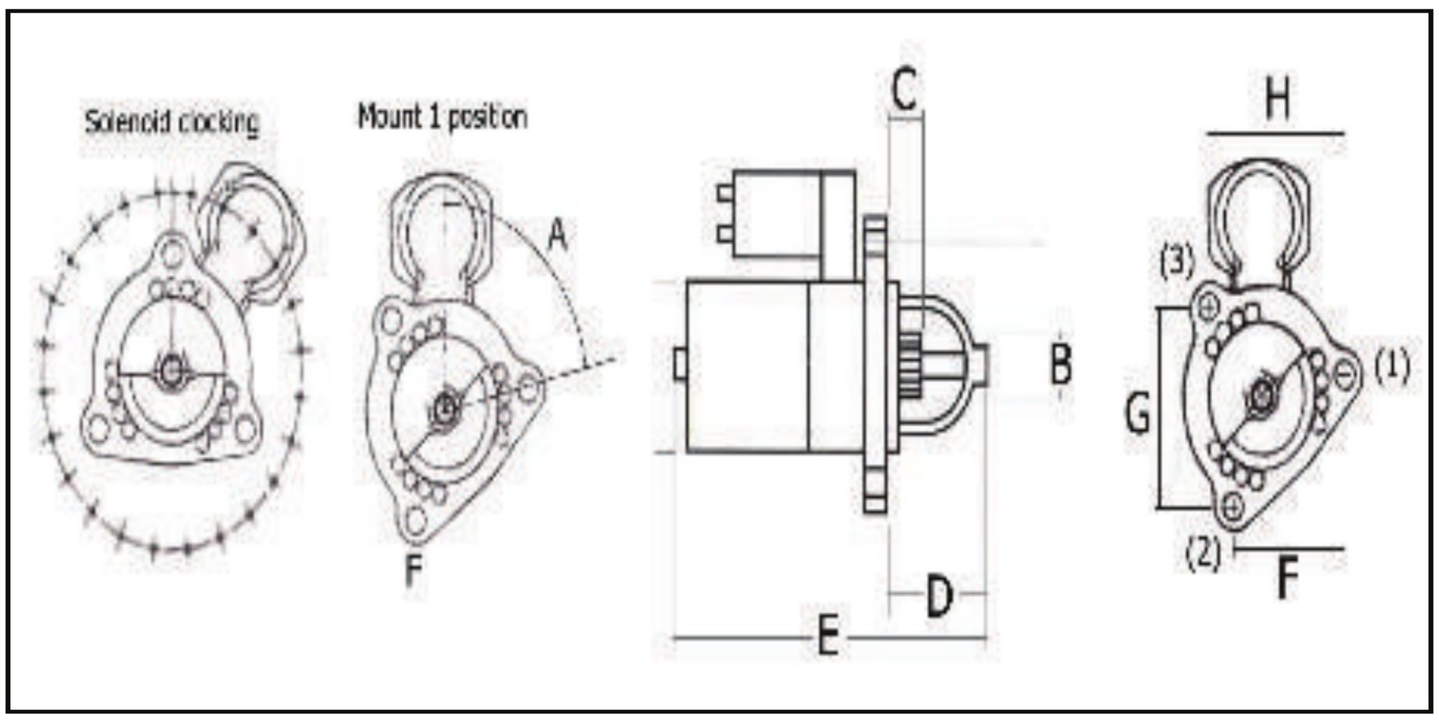


Figure 3 – Starter diagrams showing various dimensions.

in house and verified multiple times.

Why use WENO? Most other databases that serve our industry, tend to lump all units together under one unit number if they can be interchanged. Apptrak does not do that. Each unique unit is given its own WENO. While this creates more part numbers, it also has benefits. For one, it makes it possible to catalog component parts by the WENO.

Apptrak users can be confident that any component parts ordered based on component breakdowns in their system will fit. If there are any other versions or different units that will interchange with the one that you have, their database shows those a "substitutions" on that unit's details page (explained in *Apptrak Part 1* in the December issue). If there are any fit or size issues with any substitution, it will be noted there. This feature also includes high performance substitutions, such as IMI High Torque Starters with IMI's part number.

Whatcom's owner Dan Bell encourages Apptrak customers to use WENO numbers if they so desire. Their five digit numbering system is based on several parameters including packaging size. Therefore, all units using the same size box, can be shelved together in numbering sequence, which makes best use of shelving space. Maybe not for everyone, but it is there if you want it.

Directly below the OE unit Number/WENO, you can change this tool from starters (default) and alternators. I suspect that it defaults to starters because rebuilders are less likely to need the tool for an alternator. None the less, it can be used to verify an alternator too, or will differentiate between two very similar alternators.

Just below the alternator/starter button, you can see another way to narrow your search. Notice that the page defaults to "All". But you can also choose between "Automotive" and "Industrial". Industrial in this case is anything that is not automotive or light truck.

To the right you can see diagrams of starters from different angles (*see Figure 3*). Notice the letters and lines that are on each diagram. Those are the various measurements that are used in Unit

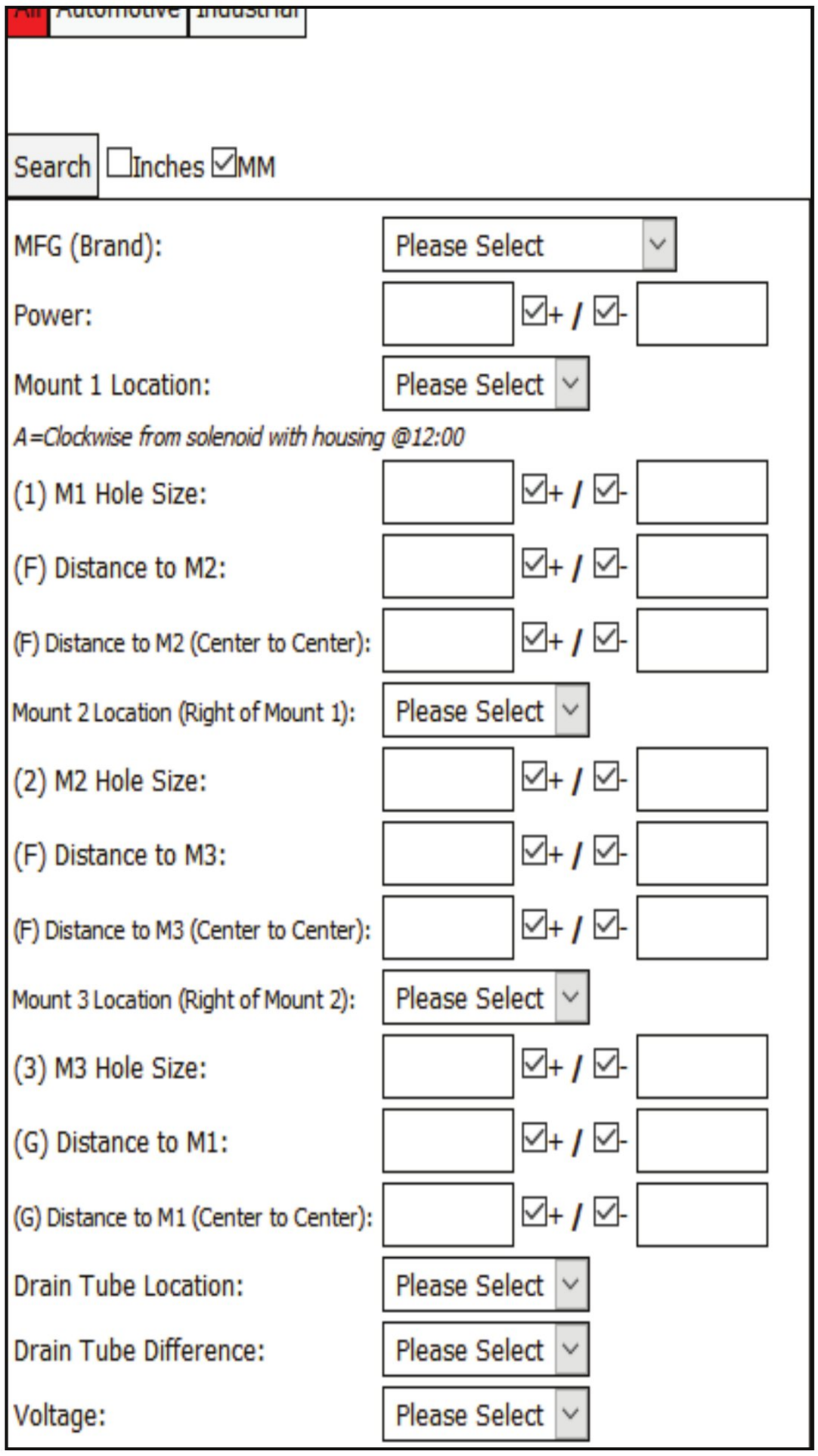


Figure 4 – Upper half of dropdowns and text boxes (for starters).

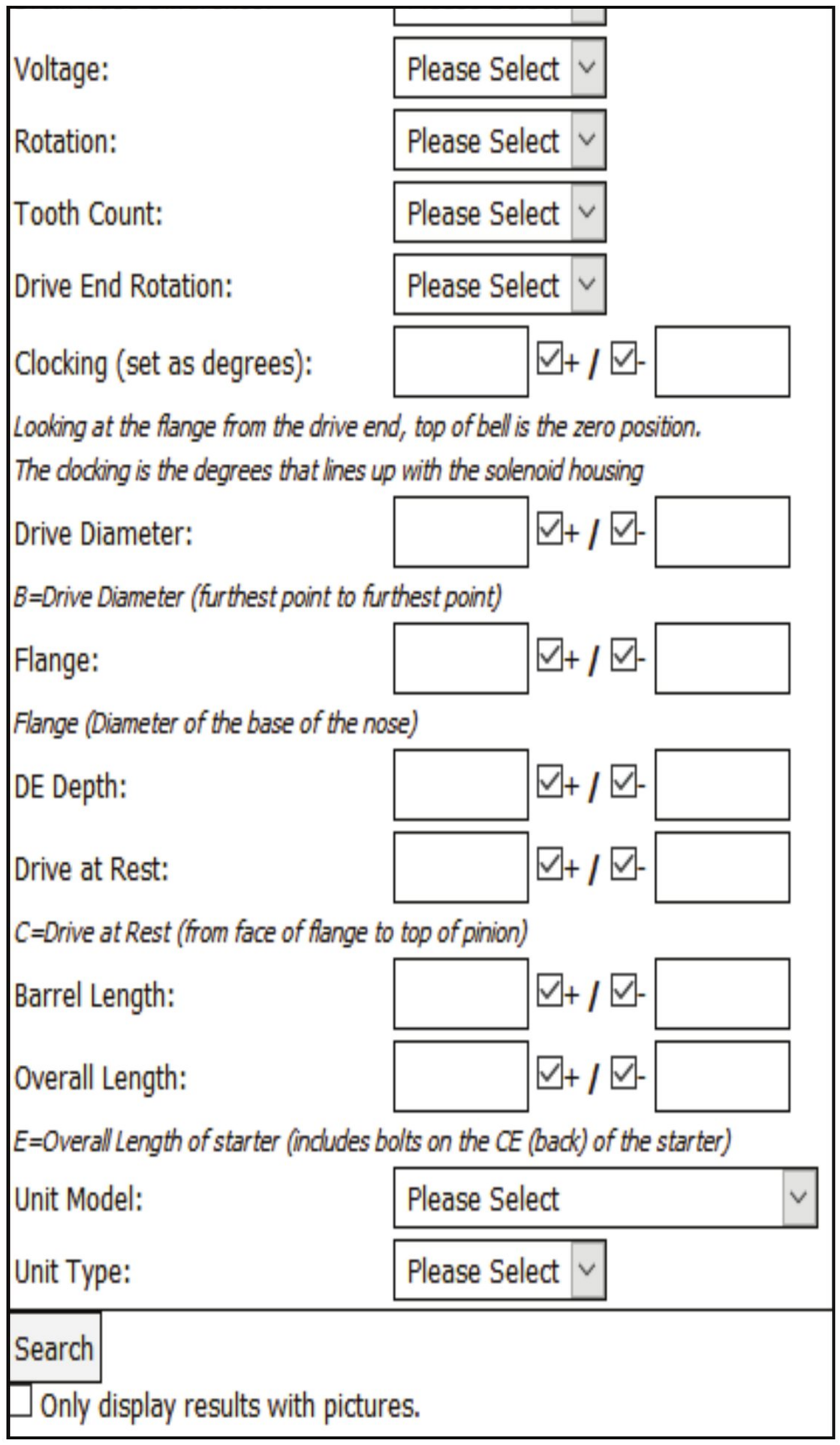


Figure 5 – Lower half of dropdowns and text boxes (for starters).

Lookup. Distance between mounting holes (M1, M2 and M3) on a starter can be done center-to-center or edge-to-edge. Both options are offered.

Further down on the page is a collection of drop-downs and text boxes (*see Figures 4 and 5*). Using the diagrams as a guide, fill in as many of them of them as you can. You must enter at least three before the program will do a search. If you do an early search, you will see that numbers will appear in most of the other text boxes. Some or all may be filled with two numbers with a dash between them. That means that all possible matches fall between those two numbers. Measure one or two of those dimensions and a second search will likely find your starter, or narrow it down even more.

If you already have Apptrak and have never tried to use this tool, you should at least familiarize yourself with it. I would recommend that you start by putting in an OE unit number at the top of the page and watch what comes up – all dimensions and specifications of that unit will appear.

Rebuilders can sign up for a two-week free trial to Apptrak by calling 360-255-5990. ERA members get a special rate of $249 per year which includes two user accounts per business.

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BOBCAT DENSO 12337
An Update



BY BOB THOMAS

About five issues ago, we told the story of contradicting plug codes for a small industrial alternator - specifically Denso 101211-1100 or Lester 12337 (*see Figures 1 and 2*). It was used on many Kubota and Bobcat applications. Unfortunately, the facts were still not completely clear as the issue went to the printer, and that caused some confusion for readers at the time. We apologize for that.

To be clear, the regulator terminals for this alternator have always been and continue to be D-IG-L or plug code 318 (*see Figure 3*). But an ERA member, Merlyn Martin, of Martin Repair LLC in Goshen, Indiana, had encountered two different Bobcat walk-behind mini loaders, both model MT-55, with factory wiring harnesses that had B+ connected to the L terminal of this alternator. To back up this observation, he found and provided a wiring diagram page from Bobcat's own factory service manual that clearly showed a battery sense wire going to the alternator's third terminal on this model machine and at least one other.

Both the MT-52 and MT-55 walk-behind loaders have voltmeters on their control panels instead of charge lamps. On all applications that use this alternator, the IG terminal provides excitation. The lamp terminal just controls a charge lamp – **if the machine has one.**

But for some unknown reason, Bobcat's wiring harness has a B+ wire going to the L terminal (only on certain model numbers that do not have a charge lamp). In reality, that regulator terminal is an active lamp circuit. Active lamp terminals provide an output (positive voltage) to turn off a charge lamp and sometimes power another component like a relay or an electric choke used on carbureted gasoline engines in the 1980's – so they have been around for a long time!

Martin's original problem was that if an aftermarket alternator or regulator was installed on one of these loaders, it would turn on and charge the battery fine. But then the regulator would unexpectedly remain turned on when the machine was shut down, which would then drain the battery overnight. The original Denso regulator (126000-2490) did not do that. And as Regitar's Gene Kaiser pointed out, it was impossible for one terminal to operate properly both ways, (L terminal and S terminal). "It cannot perform both functions," he stated when we first shared this story. "It has to be one or the other."



Figure 1 – Denso 101211-1100 or Lester 12337

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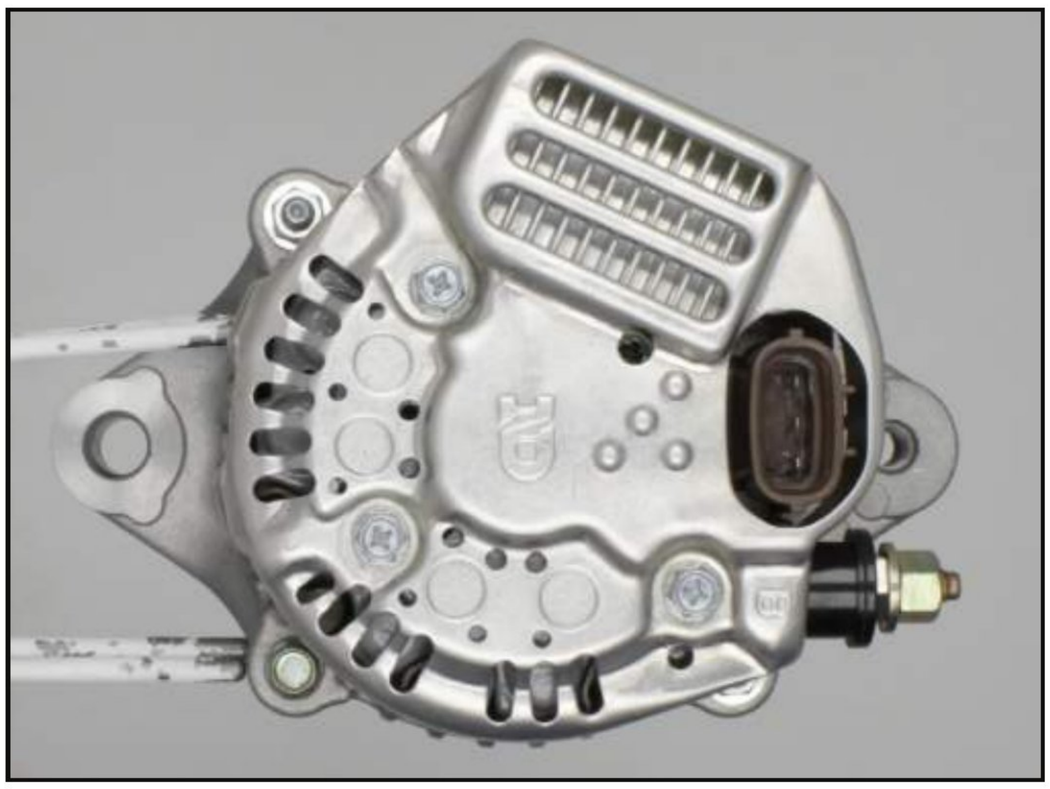


Figure 2 – Rear view of the alternator

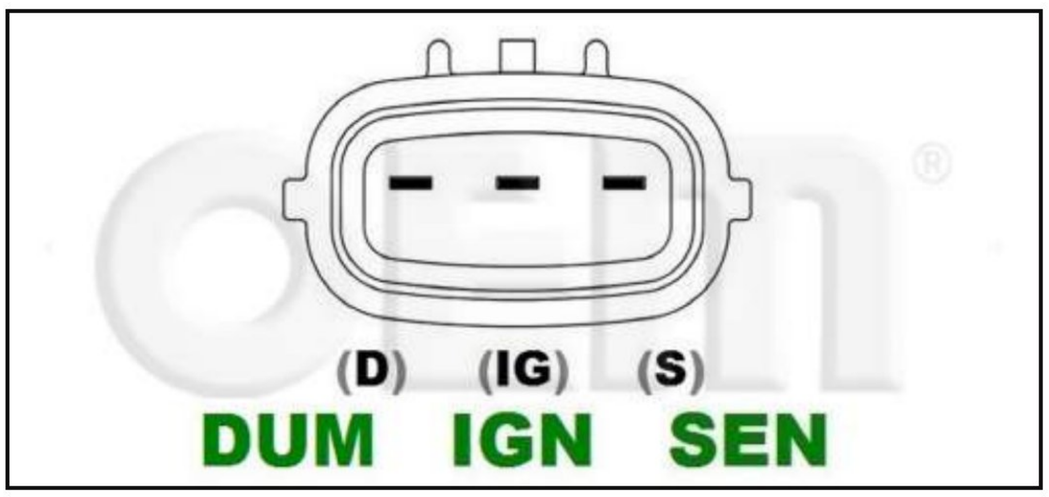


Figure 3 – Plug Code 318

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Tech Help from Mohammad Samii



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BOBCAT DENSO 12337

Once given the opportunity to test a new OE Denso alternator, Kaiser determined that the terminal in question was definitely an active lamp terminal and not battery sense. In fact, it proved to be incapable of sensing voltage or affecting the charging rate in any way. So much for Bobcat's B+ sense wire. Why it is there may forever be an unanswered question.

But another question remained that required an answer. How was the OE regulator able to have B+ connected to its active L terminal, yet not turn on the field like all of the aftermarket regulators we doing. The high price of the OE voltage regulator (about three quarters the cost of a new complete OE alternator) was a clue that Denso had done something different to this particular regulator. What was it? And how was it able to have B+ connected to its L terminal, yet not keep power on the field and drain the battery?

Kaiser had a theory of how that might be accomplished and modified one of Regitar's regulators (VRH2005-87) to match his theory. Then he tested it in the OE alternator to determine if it behaved in the same way as the Denso regulator. It did. There was no battery drain after shut down with B+ connected and the L terminal still functioned properly following that test. But Kaiser wanted a second party to confirm his solution, so he shipped the alternator with both regulators (OE and modified Regitar) to Whatcom Electric in Bellingham, WA.

Whatcom's owner Dan Bell then tested the OE Denso alternator on his D&V tester using both regulators and confirmed that the modified Regitar regulator functioned exactly the same as the OE Denso, with the exception of its activation speed. The OE Denso regulator activated at 860 RPM (shaft speed), while the Regitar regulator activated at 601 RPM. The output performance curve of the Regitar regulator was identical to the OE, except that it turned on 259 RPM sooner.

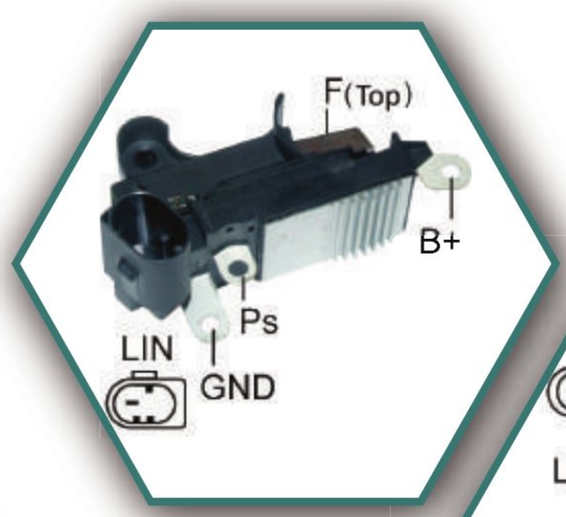
So if a customer comes into your shop for a 12337 alternator, you might want to ask what kind of equipment it was removed from before you sell him one from your stock. If it is for a Bobcat, make sure that his machine has a charge warning lamp. If not, then he may have a B+ wire going to the L terminal which will cause most aftermarket regulators to drain his battery overnight.

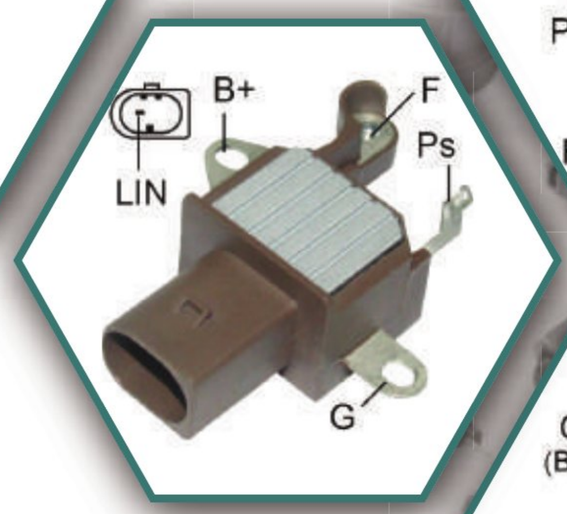
You can get an aftermarket regulator that will function properly on all applications that use the 12337 alternator by calling Regitar and requesting a VRH2005-2490. That regulator, modified in Montgomery, will perform exactly like the OE Denso regulator.

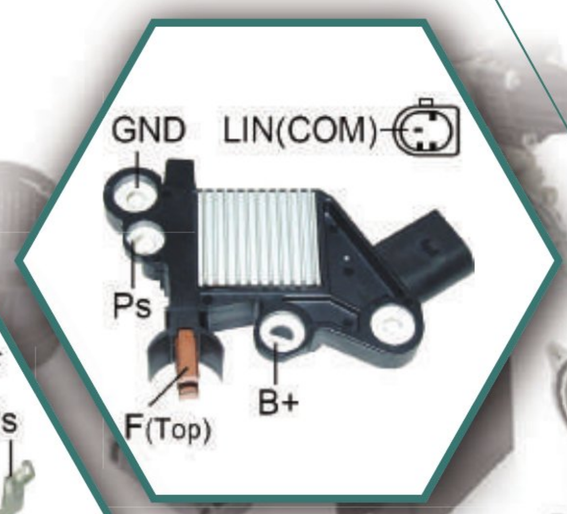
Special thanks to Gene Kaiser at Regitar-USA and Dan Bell at Whatcom Electric for their assistance in solving Merlyn Martin's dilemma. *You can contact Bob Thomas by email at ere.bobt@gmail.com or by phone at 904-673-7301.*

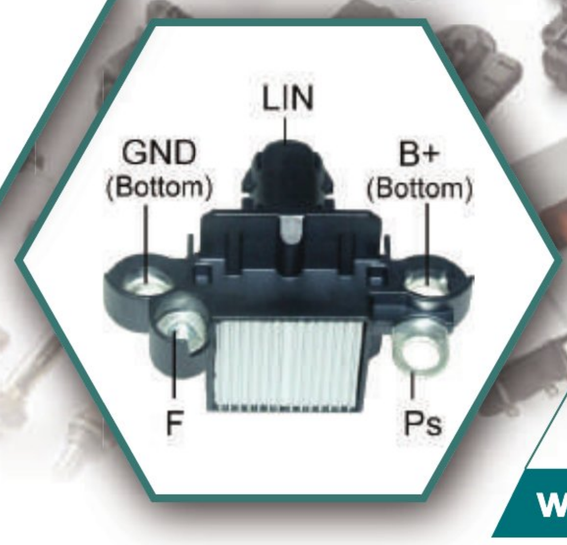
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