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CAFÉ Standards, Mild Hybrids, eTorque, WAI-1000

THE 23SI BRUSHLESS ALTERNATOR

A WORD FROM THE EXECUTIVE DIRECTOR
Setting the Stage



The Board of Directors chose the city to host the 2026 trade show at the show in Hershey, PA. in April, the new location being San Antonio, Texas. That is the first step of many that it takes to see it through completion, a process that usually takes a full year.

In late July, Michele and I traveled to San Antonio to interview 4 hotels as possible sites for the show. We brought back all the information for the board to make a choice. Sometimes this decision becomes difficult to make as several of the choices are very appealing and offer nearly the same amenities, such was the case this year. The choice came down to which facility had the most suitable date available for our show.

The Embassy Suites San Antonio Brooks Hotel and Spa was chosen as the host facility and will be held on **Thursday, March 19th thru Saturday, March 21st of 2026.** (mark your calendars) At the writing of this article the official contract is being finalized with both parties.

As many of you frequent travelers already know, the Embassy Suites chain, owned by Hilton features every room as a suite, making every guest room much "roomier" and more comfortable.

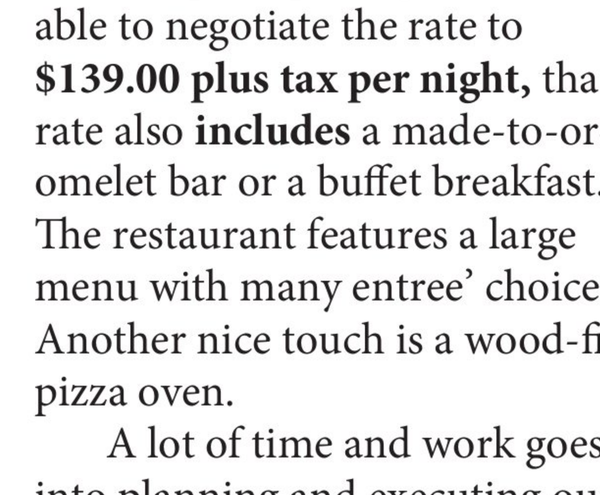
After the initial search for available hotels, done from the association office, we narrow the search to a handful of hotels. A large list of amenities are vetted during the actual, in person interview process such as restaurant facilities, their hours of operation and the menus that are available, banquet and meeting room size and availability, down to table sizes and shapes. The guest rooms are inspected as well as the entire, rest of the facility.

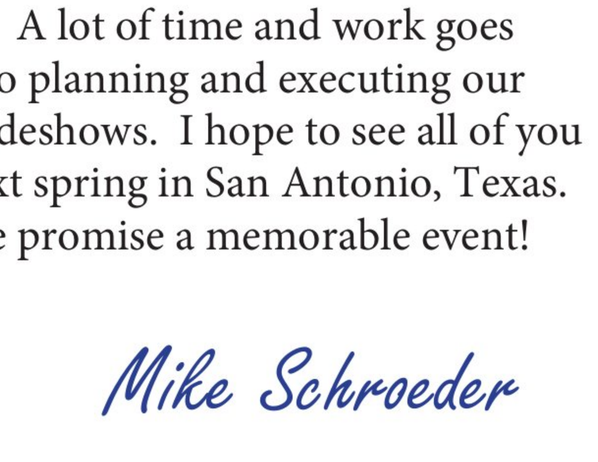
The next part of the process will be to create a schedule of events for the three-day show, research seminar topics and do the meal planning. Several off-site activities being explored as extra-circular activities are a daytrip to the infamous River-Walk and/or visiting the Alamo historic site!

A very important determining factor is price per night. We were able to negotiate the rate to **$139.00 plus tax per night,** that rate also **includes** a made-to-order omelet bar or a buffet breakfast. The restaurant features a large menu with many entree' choices. Another nice touch is a wood-fired pizza oven.

A lot of time and work goes into planning and executing our tradeshows. I hope to see all of you next spring in San Antonio, Texas. We promise a memorable event!

Mike Schroeder





NEW ERA MEMBERS

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Stratton, Ontario, Canada

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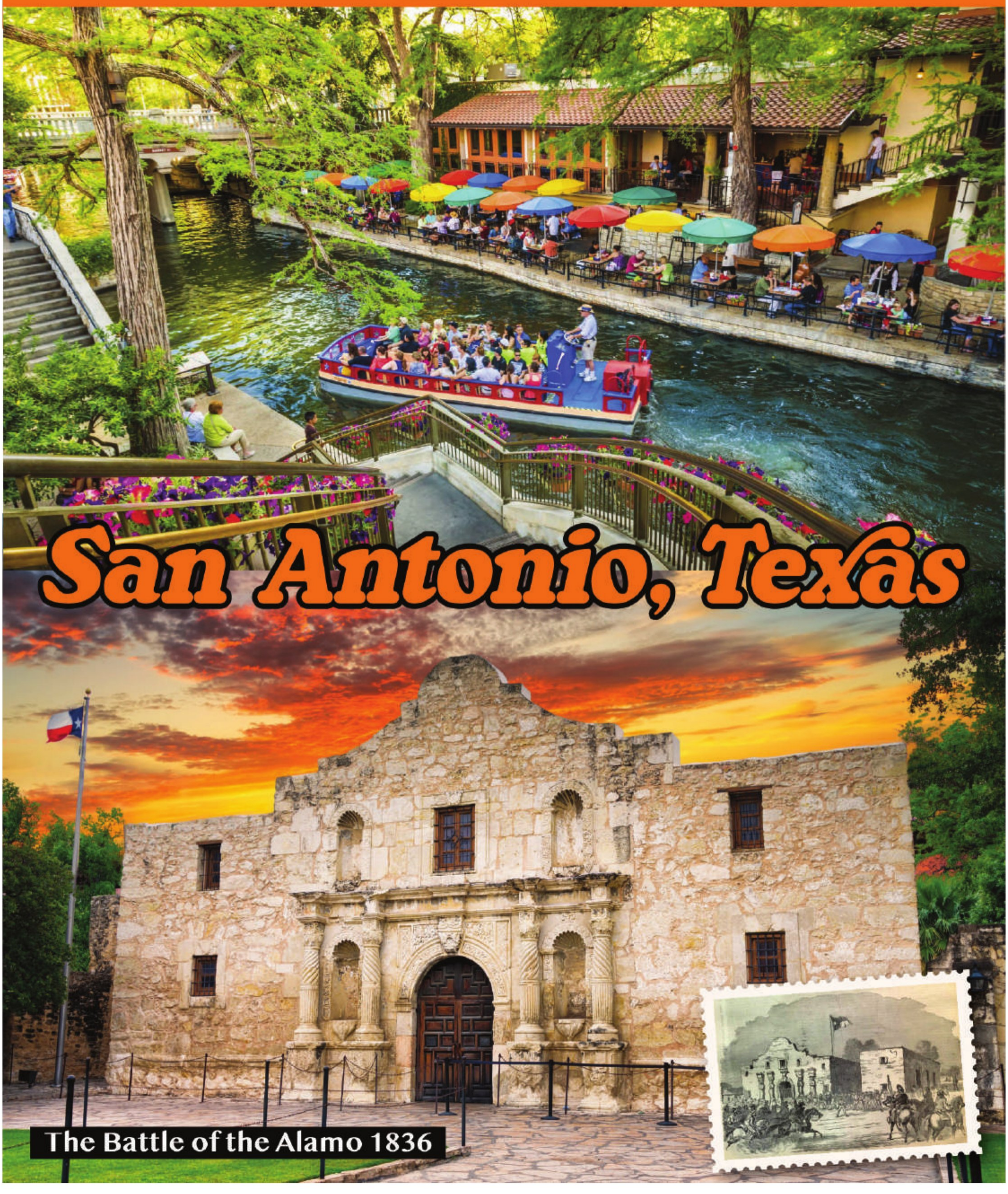
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INDUSTRY NEWS

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CONGRATULATIONS MARK HOOGTERP ON YOUR RETIREMENT!



On March 5th, 1979, Mark started driving a delivery truck for Dubois Marketing in Grand Rapids, Michigan. Over the next 37 years he advanced thru the ranks of salesman, sales management, general manager and the latter 12 years as vice-president of the company. When Dubois was purchased by WAI in 2016, he moved to Florida to assume the role of Senior Director of Rebuilder Sales. Then Covid Hit! After a nine-month furlough, he landed a purchasing manager position with MPA at Dixie Electric. In March of 2023, WAI offered him an opportunity to re- join them again as Director of Rebuilder Sales, a position he will remain in until his retirement at the end of September.

He plans to reside in central-Florida, he vows to continue spoiling his two young grandchildren who think “grandpa is cool” and live only ten minutes away.

Mark offered this comment to us, “I am extremely fortunate to have spent my entire career in our segment. I was able to travel the country making calls on hundreds of rebuilders and met scores of wonderful entrepreneurs, many of whom I consider friends to this day. I wish you all continued success and good health”.

Mark has always been close to the ERA having served early-on as a regional vice-president and still as a member of the advisory board. We wish to thank you for your service to this industry! Enjoy your retirement!



AUTO ELECTRIC CORNER —
CAFÉ Standards, Mild Hybrids, eTorque, WAI-1000



BY MOHAMMAD SAMII

For the car and truck manufacturers to be meet government mandated CAFÉ (Corporate Average Fuel Economy) Standards, they continuously try devise systems and increase efficiency to increase the mileage and meet the mandates. Failure to do so incurs fines per vehicle and when multiplied by the number of vehicle sold by a particular company, the levied fine can run into substantial amount, in tens of millions of dollars. So there is a huge financial incentive for automakers to make vehicles more efficient and that is the reason within last few decades we have seen engines that are can attain great gas mileage. Use of electric motors and newly devised system such as Stop-Start and hybrid vehicles is a part of this effort.

It should also be noted that vehicles made to use special fuels such as hydrogen or electricity (Tesla, Rivian, etc.) are not counted in the total tally for the CAFÉ standards by the manufacturers who produce such vehicles along with regular gas or diesel auto and trucks, but the gas mileage figures for mild or full hybrid vehicles such as a Toyota Prius and others are considered.

It is believed that the fines for not meeting CAFÉ standards will be reduced or completely eliminated by 2025 budget proposals which a discussion about it is beyond the scope and purpose of this column.

In this issue I would try to briefly explain a couple of such efforts and their related systems.

Mild Hybrid

The tem Mild Hybrid or correctly (MHEV) Mild Hybrid Electric Vehicle applies to a system that consist of an alternator/starter combination unit that is able to charge the battery, and when needed, use the power of its higher voltage (42-48V) battery to crank the motor using the belt. Due to this, this type of systems are also called BAS for Belted Alternator Starter as well as others. A common one that is a Hitachi built unit is shown in *Figure-1.*

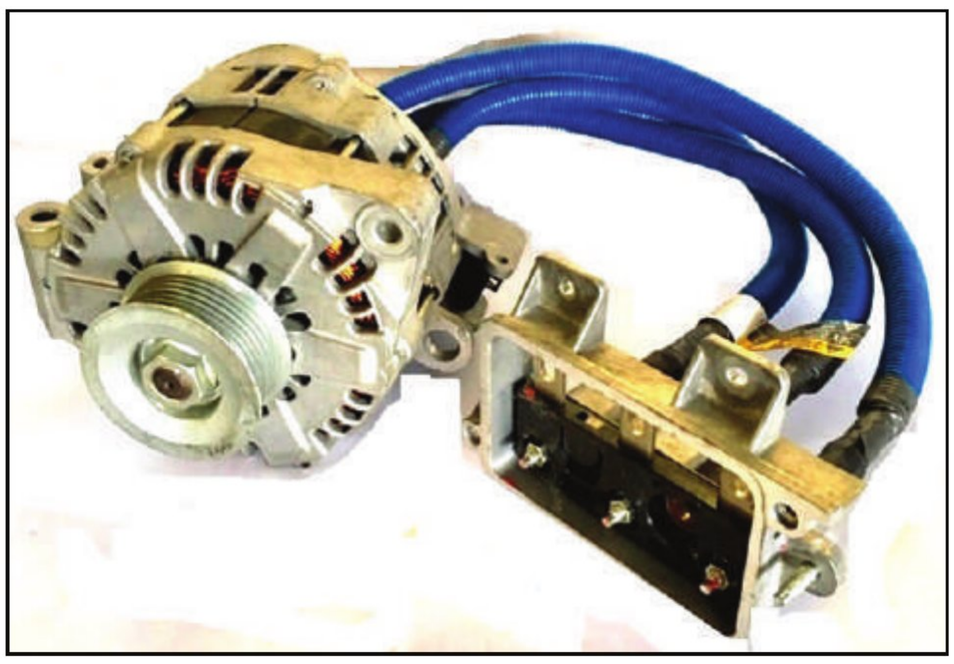


Figure 1 – Hitachi 11469 BAS Motor-Generator

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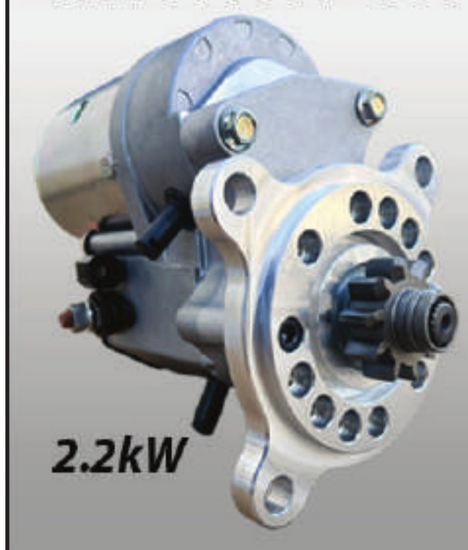
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Onan Applications

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This system was initially used on 2007-2009 Saturn Vue Green Line hybrid vehicle. *Figure-2* shows the 3 blue wires that are the 3-Phase output of the alternator. They go into a module called GBCM (Generator Battery Control Module) that gets rectified into 42V for charge the battery. A 12V from this module runs into the system to charge the regular 12V battery and run the 12V accessories. (*Figure-3*)

The motor/generator serves as the Stop-Start function of the vehicle. When certain condition regarding the load, battery's charge level and the status of the accessories such as A/C are met, the engine will shut off when reaching a stop light, and then when driver decides to move on and takes his foot off the brake and on the gas pedal, the motor/generator will use the power of 42V battery and spin the engine to get it started. So this unit serves a double function.



Figure 2 – Blue 3-Phase AC Output Wires of the Unit

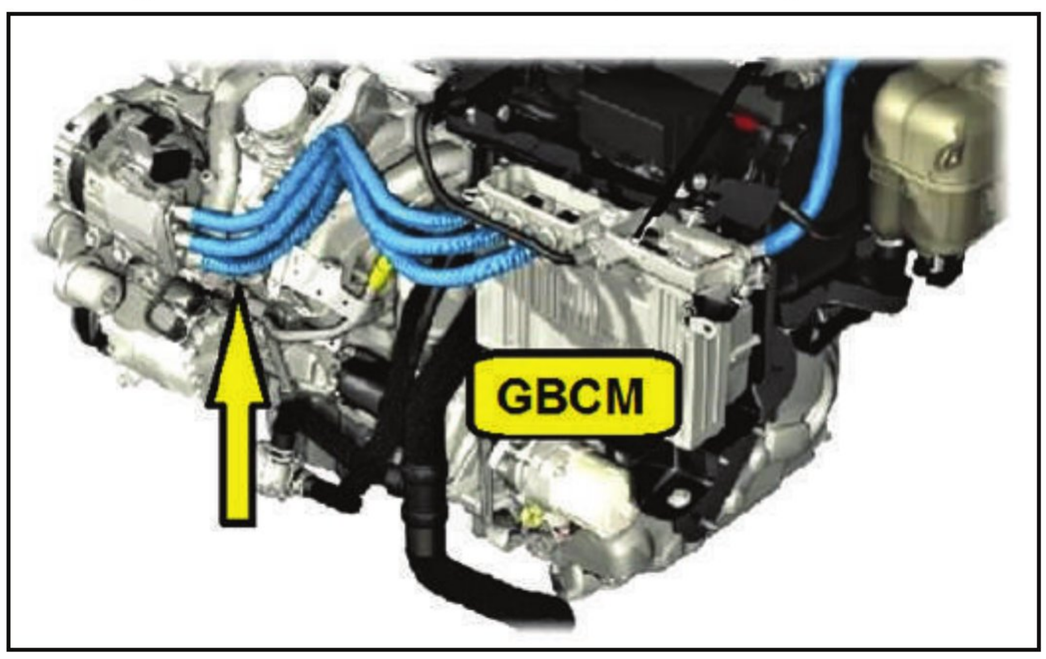


Figure 3 – Output Wires Connected to the BGCM (GM drawing)

Unlike full hybrid vehicles, mild hybrid system cannot drive the vehicle solely on electric power. Instead, the electric motor primarily may have some minimal assists with acceleration, regenerative braking, but definitely operates the auto start-stop system.

The initial design of the system described above called BAS-I (Belted Alternator Starter) had shortcomings due to the size, design and availability of its battery that was a 36V system, and 42V when being charged. The later version of this system called BAS-II used a better battery which improved the system somewhat with better performance.

The evolution of the BAS-II and BAS-III culminated into what is called eAssist which uses a 120V battery and a liquid-cooled motor-generator (*Figure-4*), used on some Chevy Malibu, Buick Regal and LaCrosse mild hybrids. This unit (GM# 24266687) is made by Continental Motor System in China. Rebuilt units are available from International Automotive Trading (IAT) who provides it at prices less than what we have seen on eBay or such for a used one!

Stellantis "eTorque"

This is a rather new system that is made by Chrysler Corporation. Chrysler is now part of a conglomerate named Stellantis. It is an amalgamation of Fiat/Chrysler and other manufacturers that make 14 different brands of cars and trucks, mostly for Europe and some for North American market.

Stellantis somehow dropped the name of Dodge from its truck line which are now identified as Ram Trucks. In 2019 they introduced the eTorque into their Ram-1500 lineup which I try to briefly explain as best as I know and I can.

The Ram Trucks with eTorque are offered with Chrysler's Penatstar 3.6L engine as standard equipment and also with 5.7L HEMI engines as an option, costing roughly about $2500 extra. The eTorque system is basically a Mild Hybrid system as explained above. It

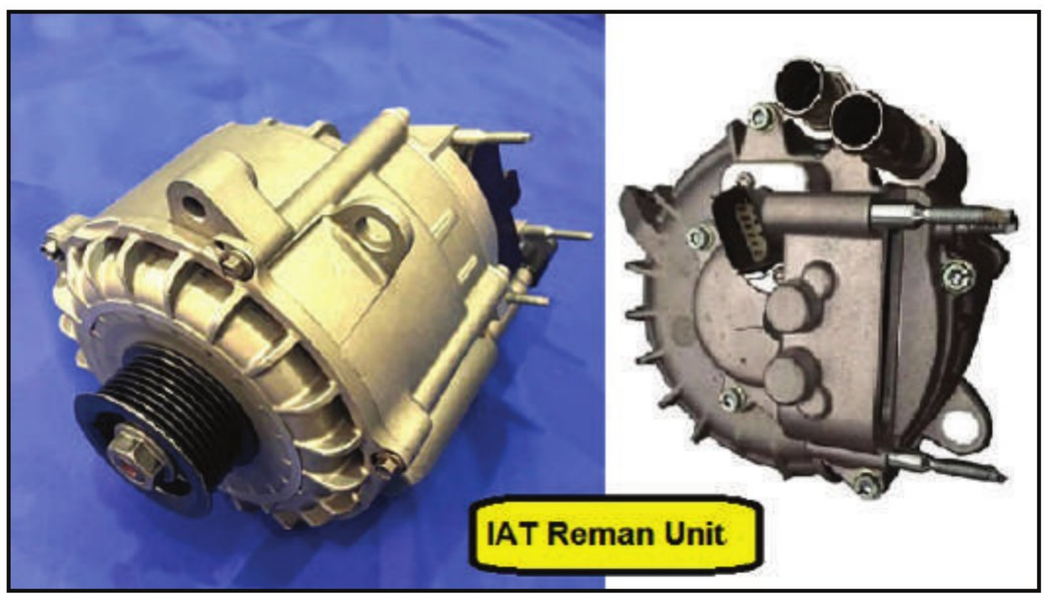


Figure 4 – Front and back view of the 11692 Motor-Generator (GM)

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uses a 48V Lithium-Ion battery pack that is in the rear right passenger sidewall (*Figure-5*)

The heart of the mechanical part is a 48V Motor-Generator (*Figure-6*) that its 3-phase output is internally rectified by Generator Unit Motor Module (GUMM) that is attached to the motor-generator to provide 48V supply and charge up the 48V battery. The 5.7L HEMI engine use a bigger motor-generator as shown in *Figure-7*.



Figure 5 – 48V Battery Pack of the RAM Truck with eTorque



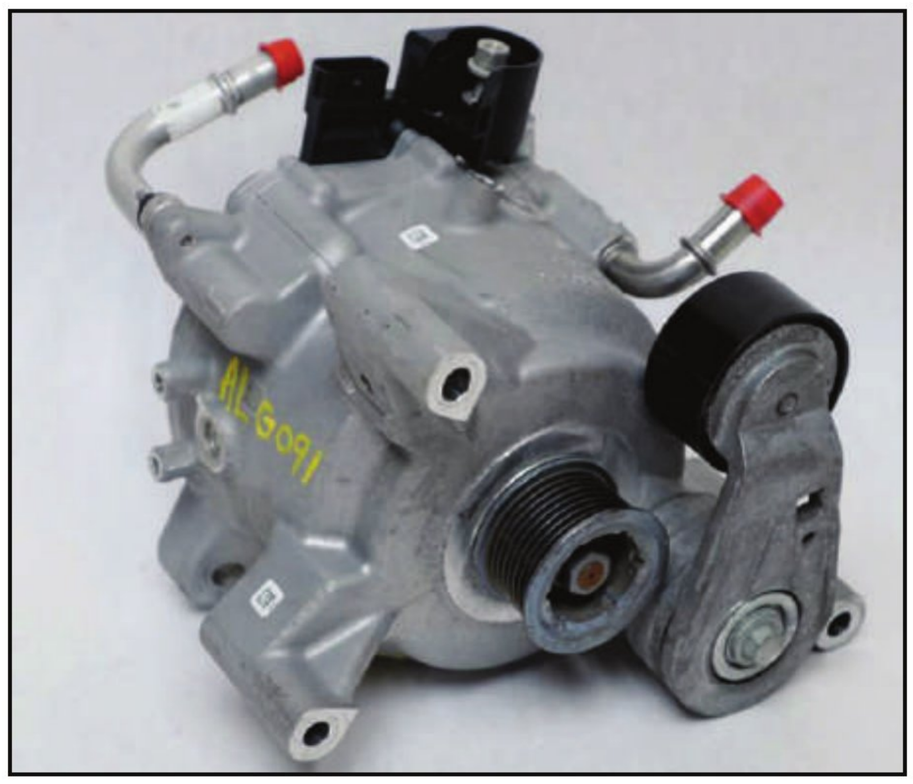


Figure 6 – Motor-Generator for RAM with 3.6L Engine (Photo: Dane Kouttron)



Figure 7 – Motor-Generator for Ram with 5.7L HEMI Engine

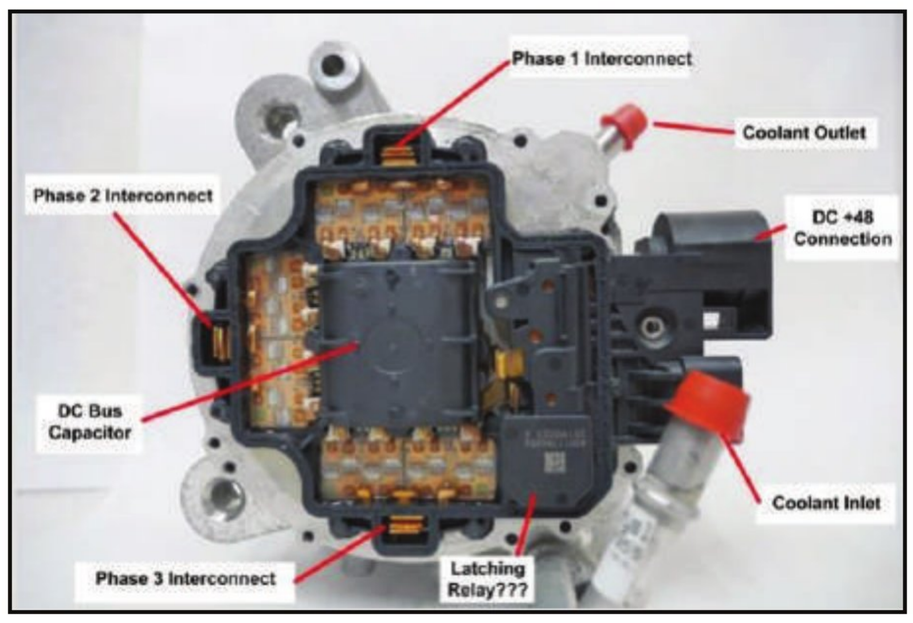


Figure 8 – Integral Generator Unit Motor Module (Photo: Dane Kouttron)

The electronic controller on the unit (*Figure-8*) also functions as the controller to turn the 48V power into a 3-Phase pulsating DC, applying the necessary phase shifts to make it run like a motor. An electronic control unit located inside the battery box contains a DC-DC converter, providing the 12V for charging the 12V battery and running the 12V system accessories and components.

In the motor mode it can rotate the engine (via the belt) to crank it for starting, it can assist the engine for the initial take off, and it can also absorb the energy of coasting RPM to generate extra electricity that will be absorbed by the battery. As best as I can summarize, the key features of the systems are as follows:

1 - The motor part of the system is used for automatic Stop-Start function without the use of the engine starter. Since in Stop/Start mode, starting the engine is accomplished by turning the crankshaft by the belt and the electric motor, the noise of a clank and spin common to a typical engine starter is not heard, which makes it for a quieter engine start. This feature is of course common on almost all Mild Hybrid systems and is nothing new.

2 - After starting the engine and once the wheels start turning, it will apply a push to the crankshaft pulley that increases the initial torque necessary to move the vehicle from a dead stop. This push that is called Roll Assist will last for one half turn of the wheel's rotation, resulting in easier and smoother take-off while the engine's torque has not developed to the desired level, thus making the take-off easier.

3 - During the upshift and downshift of the gears, it can assist the engine, or it can absorb the engine RPM to make an easier match between the engine and transmission speed. This allows for smoother shifting and prevents momentary high RPM or a mild jerk common to an upshift or downshift.

4 - Regenerative braking common to most such Mild Hybrid is also a feature of the system. During coasting or a sudden decrease in the RPM, the electronics of the system will turn the unit into a heavier generator, increasing the drag on the crankshaft to assist stopping the vehicle to slow down. This will not only generate additional electricity that would have been wasted but will reduce the load on the brake pads, making them last longer thus saving on future brake repair expenses as it is claimed.

Regenerative braking and the generation of some electricity that would have been wasted by the heat in brake system has been a main and strong feature of full hybrid vehicles as Toyota Prius and others. The energy generated by braking is put back into a battery, to be used for the next time when the HV battery power is needed.

These features are supposed to collectively improve the gas mileage and make the whole driving experience more pleasurable and smoother. It totally relies on software and the assumption that the system would work flawlessly. Many opinions and posts on the social media do not agree with the claimed fuel saving and some consider the gain in gas mileage of the eTorque equipped engines to be between one or two miles when compared to similar engines without eTorque.

Whether the complexity, price, and probability of expensive repairs of the system are worth such a small gain in gas mileage remains to be seen and is judged by each individual owner who will have the final say in the



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matter. In the next month issue of the Exchange, I will discuss the possibility of field repair of the eTorque motor-generator that some rebuilders have contemplated.

WAI-1000 Test Box

As the increase in the necessity for having a test box capable of generating proper signals to test newer alternators with COM or "C" terminal continues, I will continue to showcase some of these test boxes as I did one last month in this column.

WAI-1000 has been around for a long time and has a proven quality record that many rebuilders are familiar with its capability. (*Figure-9*)

I am showing it here running a Bosch alternator with an OE Bosch F00MA45218 (WAI IB-678) regulator (*Figure-10*). On power-up, you rotate the knob to select "COM" from a list of options and then push it in to click. This will interface with the regulator's operating protocol (BSS in this case) and will stablish communication with the regulator.

The specification retrieved from the regulator is shown on the face of the test box. Once the test bench speed increases, the voltage setting can be selected (Vset) and what the alternator/regulator respond (Vread) will be shown which are usually within 0.1V or 0.2V of each other (*Figure-11*). All the communication going back and forth between the regulator and the test box is accomplished via data through a single green wire of the test box.

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I have used WAI-1000 for many years and have enjoyed it versatile performance. A newer version. WAI-1001 is also available as an updated software which is also capable to test 24V alternator with COM and LIN protocols.

Well, that's all for this issue. Until I see you again, keep up the good work and stay healthy.

You can contact Mohammad Samii by email at: sammyselectric@sbcglobal.net, or by calling the ERA Tech Help Line at 636-584-8324 and leaving a message with your call-back number.



Figure 9 – WAI-1000 Test Box

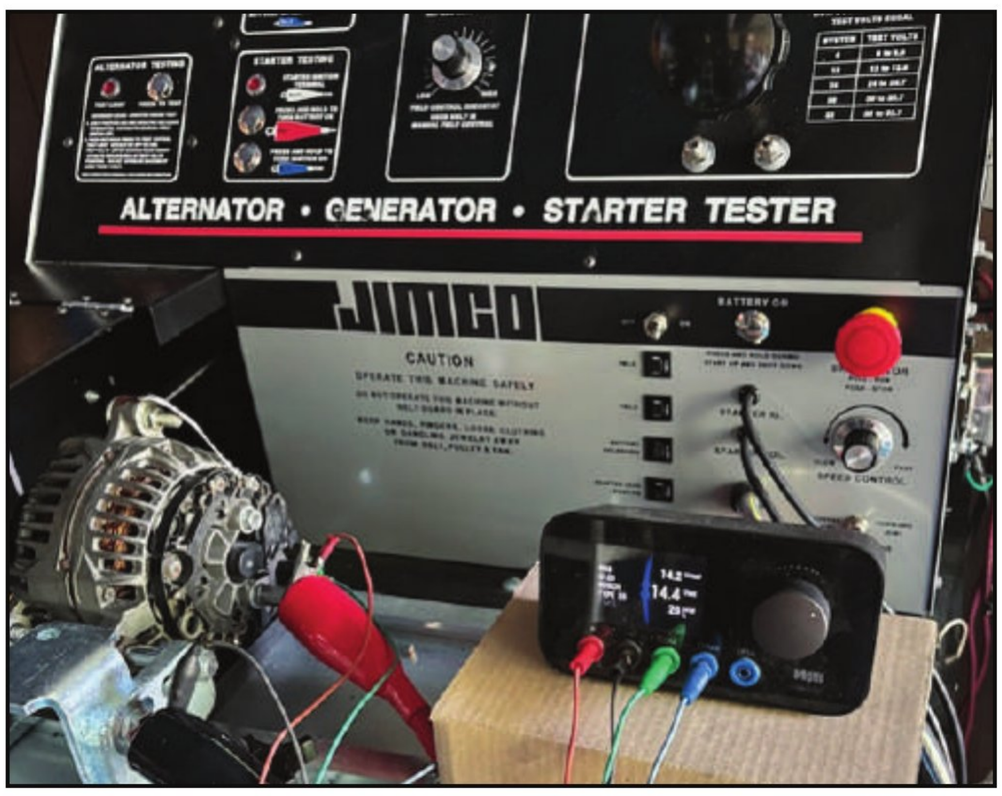


Figure 10 – Running an Alternator with WAI-1000

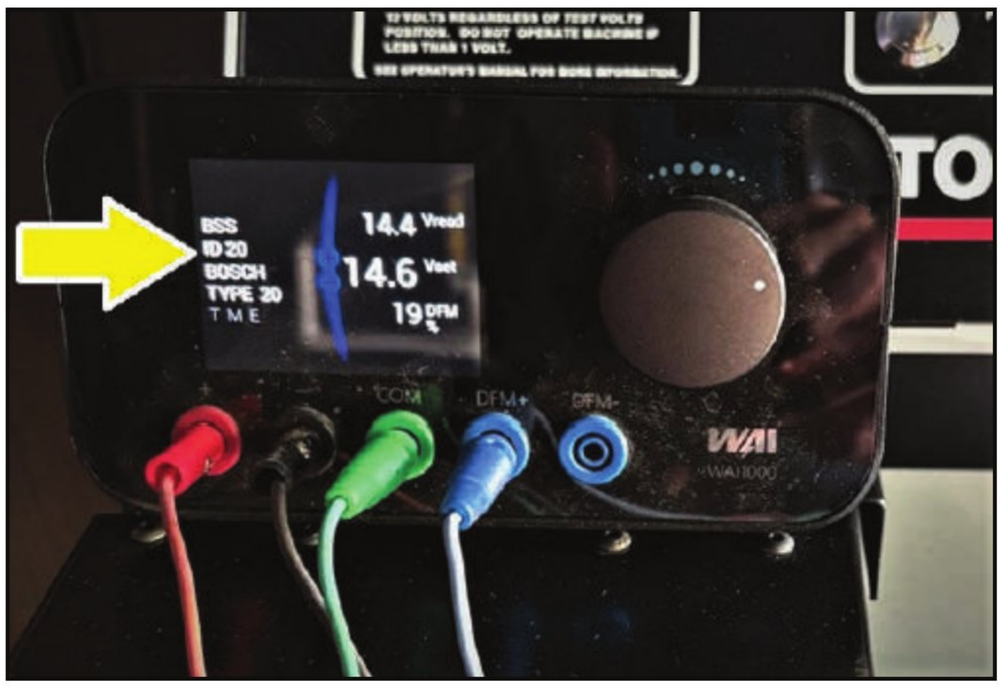


Figure 11 – Regulator Data Retrieved by the Test Box

THE 23SI BRUSHLESS ALTERNATOR

BY CLAYTON AUGUSTINE

I had heard about the brushless 10SI alternator but had never seen one. But now a 22SI brushless??? I had no idea until one day I got a skid of cores from a truck outfit in town and found this interesting unit. A 23SI Delco 12V 130A. 19011017 (*See Figure 1*).



Figure 1

It looks similar to a 22si but got 'crossed' with a 25SI. After disassembly, it was obvious why it failed. The battery post was loose and mostly burnt off on the inside. Everything else tested good. I built a new connector by cutting/shaping a new connector using two 46-1312 from a 22SI alternator. I welded them together to get the right length. Then I cleaned it up with the glass bead blaster.

It uses the same regulator, stator and rectifier as a 22SI alternator, but the rotor is very different. It has the shaft pushed in backwards to the way a 25SI is. (*See Figure 2*).

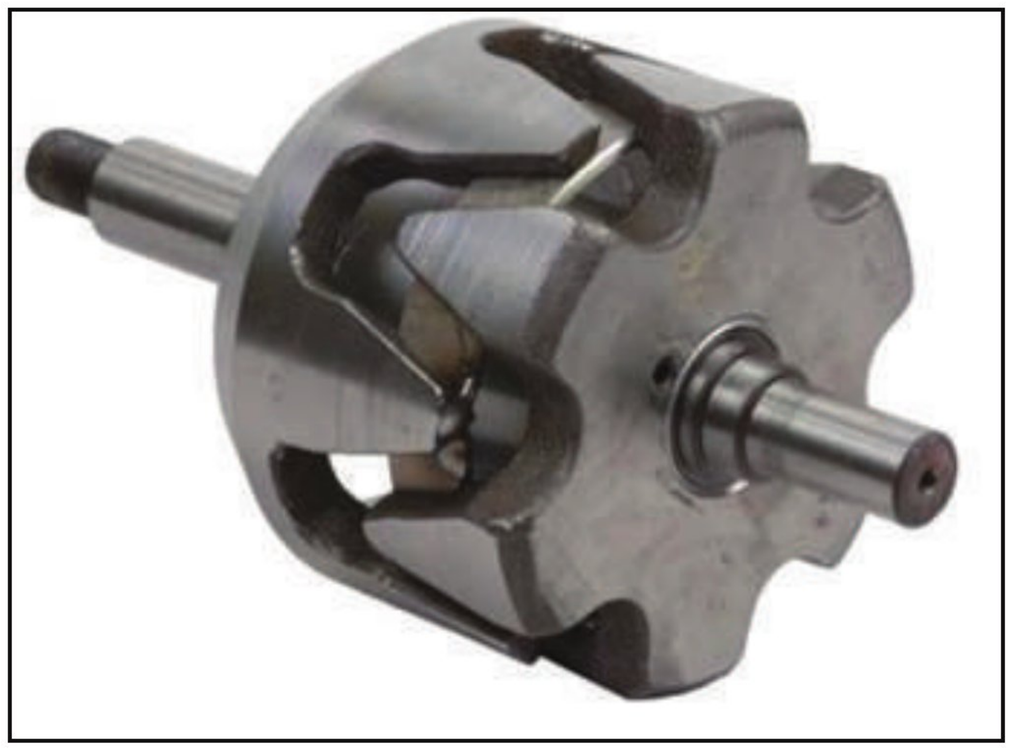


Figure 2



THE 23SI BRUSHLESS ALTERNATOR

Figure 3 is a picture of the DE housing with the rotor mounted in it.

The stationary field coil (*See Figure 4*) is mounted in the DE housing under the rotor with the plug sticking up at the bottom of *Figure 3*. Yes that's right, the rotor coil is in the DE housing! *Figure 5b* shows the DE housing with the rotor removed so you can see the stationary field coil mounting. It also serves as the bearing retainer. It uses a two-pin connector between the two housings to connect the field current from the front case to the back. See the red arrow in *Figure 5a and 5b*.

The regulator is mounted 180 degrees from the way Delco normally mounts them: with the two spades pointing inward. (*See Figure 5a*) The trio, correspondingly, has a special long output leg to fit. See *Figure 6* for a comparison of 23SI vs 22SI trio. The connector straps are also unique.

The 23SI is now considered obsolete, but I'm sure it would command a higher price than a 22SI because it is brushless. It was a joy to work with this unique design.

Clayton Augustine owns EK Auto Electric in Cranbrook BC, Canada. Also, a special thanks to Nathan Unger, ASI Rebuilders for help with the editing, and Bob Thomas for help with proof-reading.

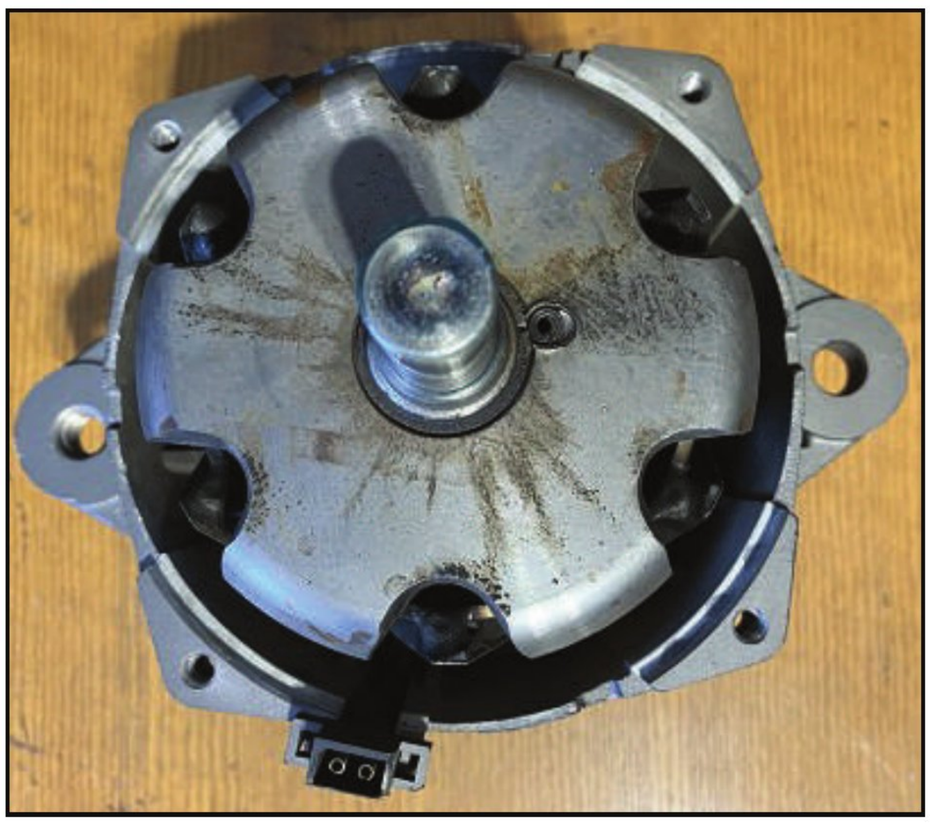


Figure 3



Figure 4

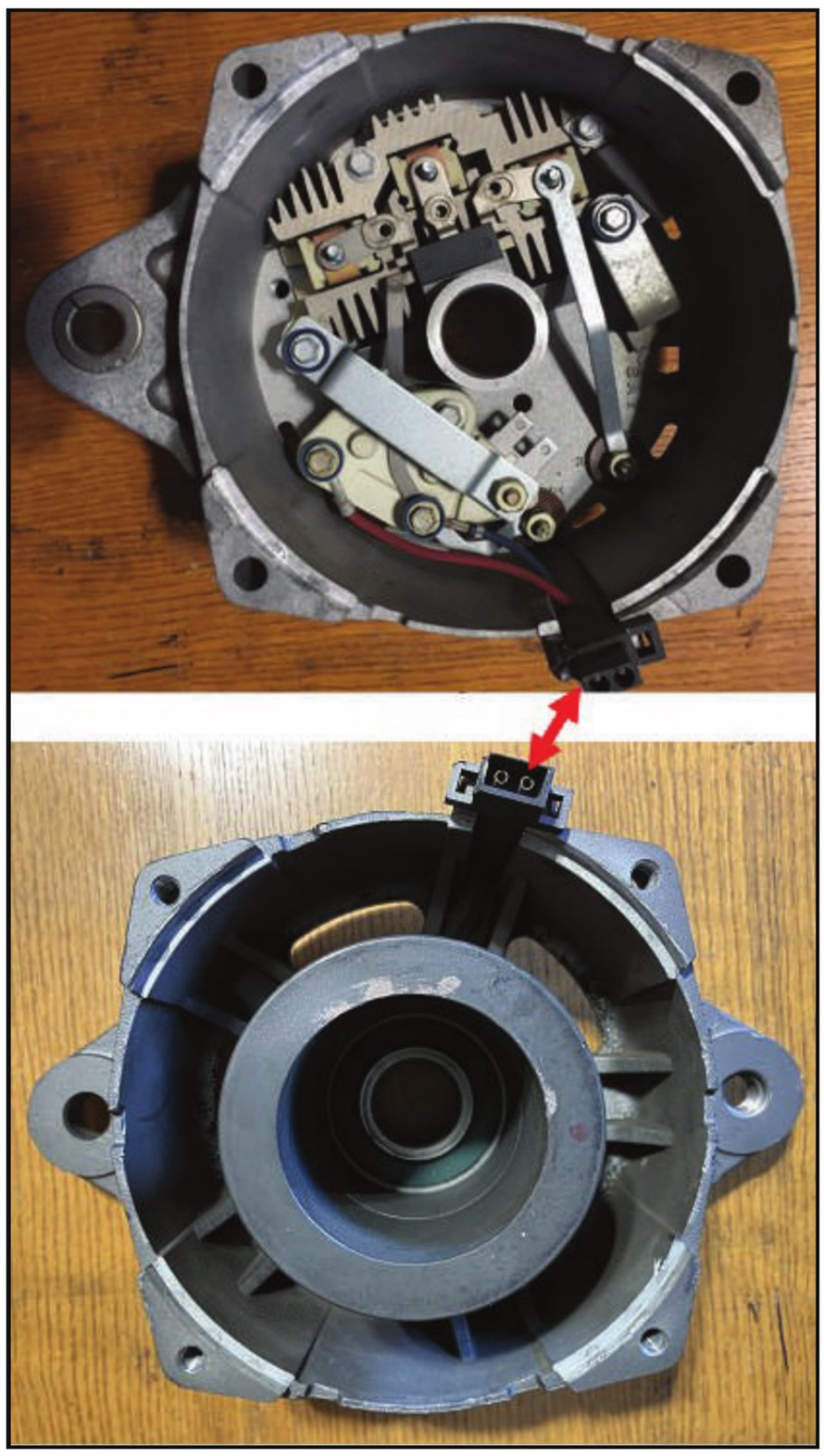


Figure 5a and 5b



Figure 6

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