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AUTO ELECTRIC CORNER
Aero Units, 36-SI Alternator, 7-SI Alternator

FUN WITH THE VRC101 REGULATOR TESTER
And About Overheated Slip Rings

THE GURU OF ROTATING ELECTRICALS
APRA Celebrating and Honoring a Leading Light of Automotive Rebuilding and Remanufacturing

A WORD FROM THE PRESIDENT
An Update On Member Savings



Happy New Year. I say this lightly though, as I write this President's Letter on the eve of my COVID vaccine booster shot. Again, the COVID virus has raised its ugly head with the new Omicron variant. Here in the Northeast, COVID cases are on the rise along with COVID patients at local hospitals and regretfully a rise in deaths of patients.

At the ERA's December Board of Directors meeting, the Trade Show Committee introduced a motion to table the ERA Trade Show Committee Report until further notice. It was felt that the committee should not waste time trying to schedule the next Trade Show Expo until the country has better control of the pandemic. So as far as the 2022 ERA Trade Show Expo for the Board of Directors, we are in wait and see mode. That's enough of the bad news.

I do have some good news to report though. I have reached out to another organizational buying group program that I was already a part of through another trade organization. My objective was to increase buying group benefits for our members. While I was in negotiations with the new buying group, our current provider was completing a partnering agreement with them.

The Member Savings Group is now the new and current ERA Membership Buying Group Program. This new membership buying group program includes all the previous discounts to members and adds many more at a substantial discount or savings for ERA members.

I urge all members to review and register with Member Savings Group to take advantage of the discounts and savings for many essential business goods and services. Some of these discounts can easily exceed your yearly ERA membership dues. All information for the Member Savings Group can be found on our website's home page, near the bottom of the left side menu under Buying Group. That link will take you directly to their website.

I can confirm that these programs have worked well for me. I enrolled with UniFirst Uniform Services and will save close to $400 a year on my employee's shop uniforms. Being a part of an association like the ERA, with a substantial membership, does provide our small shops with some advantages. I along with the Board of Directors will continue to look for and try to provide programs like this to enhance your business and increase the value of your yearly dues.

I along with the Board of Directors and the editors of this magazine wish everyone a happy, COVID free and prosperous 2022.

Ken Plourde

NEW ERA MEMBERS

AJ Starters & Alternators Inc
Etobicoke, Ontario, Canada

Ecorse Electric Rebuilders Inc
Romulus, Michigan
Referred by Buckeye Auto Electric

ABOUT THE COVER
VRC101 Transpo Regulator Tester

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AUTO ELECTRIC CORNER —
Aero Units, 36-SI Alternator, 7-SI Alternator



BY MOHAMMAD SAMII

I was hoping that the proverbial light-at-the-end-of-the-tunnel of 2021 would truly be the end of this COVID-19 nightmare and the effect it has had on businesses at every level, every location, and every country. Unfortunately, with the emergence of its variant, we still seem to be stuck in the tunnel.

Of course, we are further away from the situation we faced at the beginning of 2020, and things are much better. The numbers are showing improvements, fewer people are getting sick comparatively, and fewer are dying due to the virus. A great number of people have been vaccinated in addition to a booster shot, and hopefully this all helps to overcome the spread of the disease, especially among the sick and elderly. Hopefully with God's help, we will get to the end of this pandemic in 2022.

For me personally, I have been struggling to adapt to the unexpected early retirement of a key employee due to a stroke that disabled him. For 28 years, Denny Tuttle has been my right hand, shop foreman, and our main impeccable rebuilder who is nearly irreplaceable. Despite his retirement, I am continuing with the business, adapting to the shortage. With slight changes in our business model, we are doing okay. However, I cannot deny the additional stress that it has caused me, but I will do my best to continue on. That is my goal for 2022: do the best I can to keep going.

Aero Units

There has been a slow but steady transformation of the automotive type starters and alternators into the aero applications, especially in general aviation with single or light twin-engine aircrafts. The general aviation field of the category in this discussion was always dominated by familiar names such as Prestolite, Chrysler (MOPAR) and Ford Motorcraft first generation (1G) alternators for decades that almost all used an external electro-mechanical and later electronic B-circuit voltage regulators.

The starters used were usually direct-drive or reduction gear Prestolite or even a Delco-Remy in the earlier years. Since almost all of those named manufacturers have gotten out of the general aviation supply business, there has been a great move using the basic designs of recent automotive units, modifying, adapting, and certifying it for aero applications. Parts authorized to be legally used in certified aircrafts need to obtain a PMA (Parts Manufacturer Approval) from the Federal Aviation Agency, FAA. (*Figure-1*)

The advancements in the designs of automotive alternator and starters of the last 3 decades has moved them well beyond the technology and reliability of the older aero units with a design history that goes back well into 40's, 50's, or 60's.

Here is an example of an alternator wholly designed and built based on a Denso internal fan alternator that replaces some old Motorcraft 1-G alternators. The manufacturer is Plane-Power which is a division of Hartzell Engine Technology, which in turn is part of the world renowned Hartzell Corporation, a leading manufacturer of Hartzell aircraft propellers for over a century, established in 1917. (*Figure-2*)

This unit is 24 volt and was sent to us to be tested. It had a relatively larger diameter (4 inches) which in operation will spin at 4000-6000 RPM in normal range of the aircraft's cruise speed. The design has an insulated rotor with F1 and F2 brushes much like a typical Denso alternator used for Chrysler application. The F2 was grounded externally for B-Circuit regulator operation. (*Figure-3*)



Figure 1 – An FAA approved unit with PMA label



Figure 2 – Plain-Power alternator, a Denso-inspired unit for aircraft

The high cost of such units ($600+) is mostly due to efforts that the manufacturer and supplier puts into getting an FAA's certification to receive a PMA for the unit. This is a rather lengthy and costly process, but obviously is justified by the high cost of such units. Nearly every major brand of automotive starter have also been copied, modified with appropriate DE housings, and certified to be used in aero applications. Most of these manufacturers use the permanent magnet (PM) technology of automotive starters to come up with lighter and more efficient units, mostly modified to 24V and used extensively in the general aviation market. Figure-4 is an example of an starter made by Sky-Tec (now owned by Hartzell Engine Technology), based on a Ford PMGR starter modified to 24V, with a specialty designed DE housing to replace old Prestolite MZ-4222 starter used on Lycoming engines.

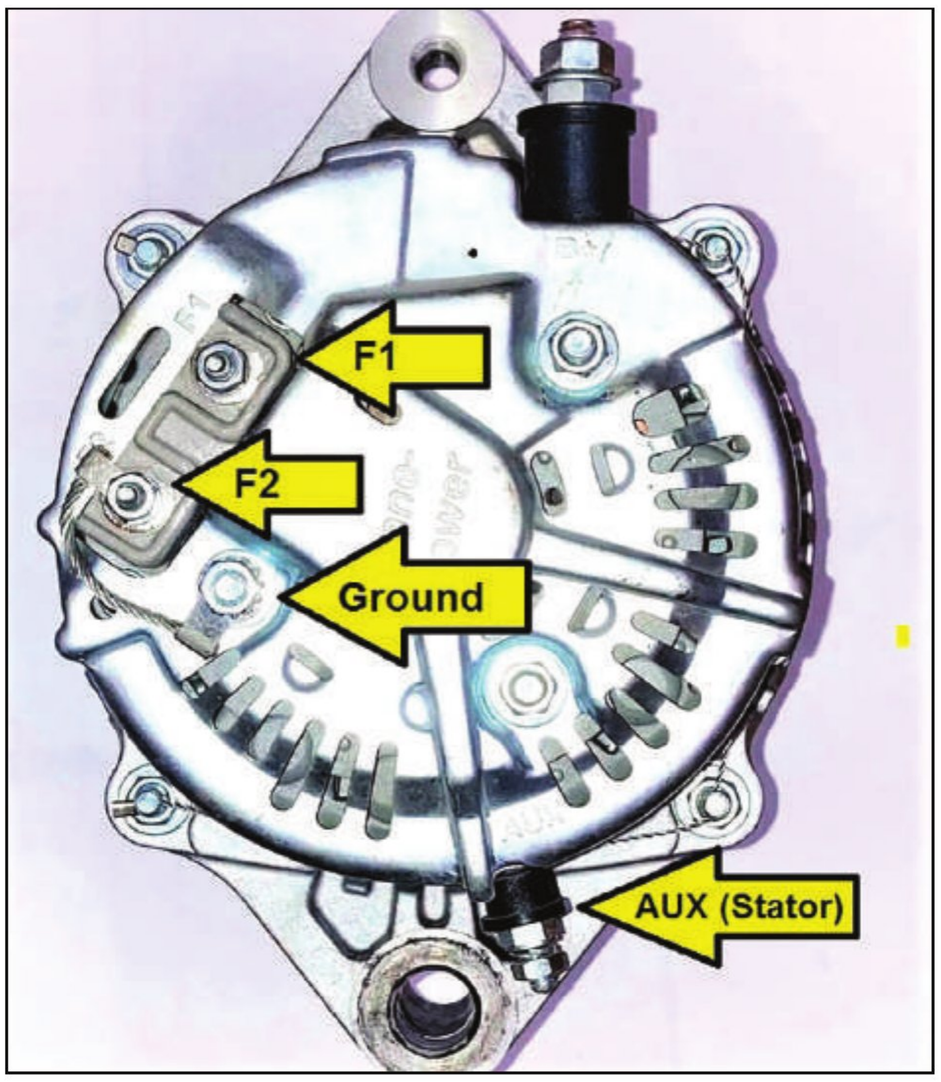


Figure 3 – Extremal configuration, resembling a Denso/Chrysler application

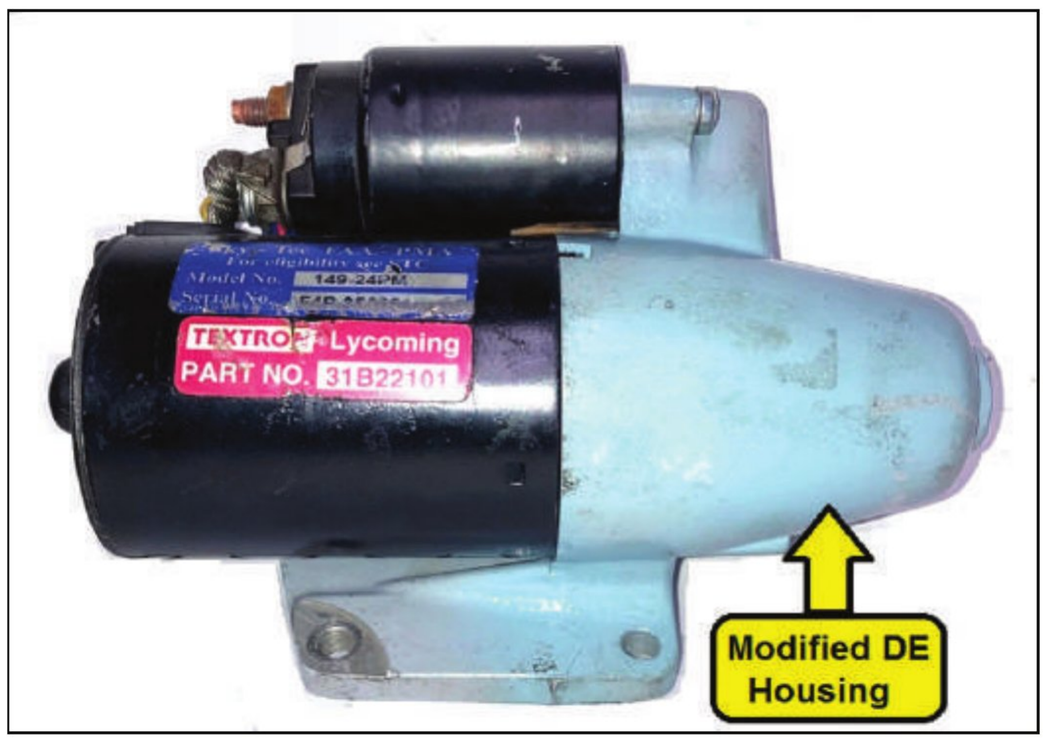


Figure 4 – A Sky-Tec starter based on a Ford PMGR starter



It is interesting to see that the automotive units that were shunned upon and were prohibited for use in aircraft application are now the basis of the newer generations of units for general aviation. They now provide a more efficient design, lighter weight, better output, and improved reliability. Maybe our units and our industry were a little ahead of the FAA all along…!

36-SI Alternator

For those rebuilders who do mainly heavy duty and truck alternators, a 36-SI is not an uncommon thing to rebuild. These Pad-mount 160-170 alternators are commonly seen on many IHC and Freightliner trucks, as well as others, and occasionally with 200-plus amps output rating. (*Figure-5*)

I am not going to go over the step-by-step rebuilding procedure as it is not a very uncommon unit. We have seen similar configuration in 30, 33, and 35-SI versions in various configurations. This alternator's arrangement is shown in Figure-6.

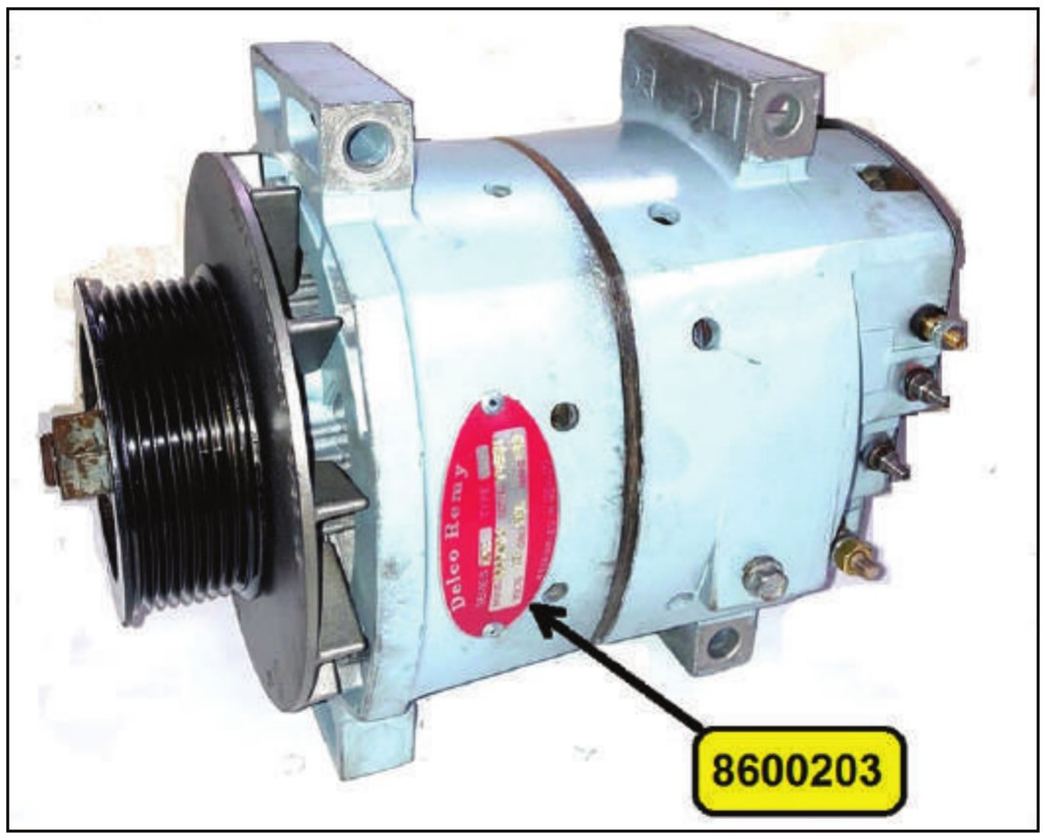


Figure 5 – A 36-SI (8600203) with remote sense

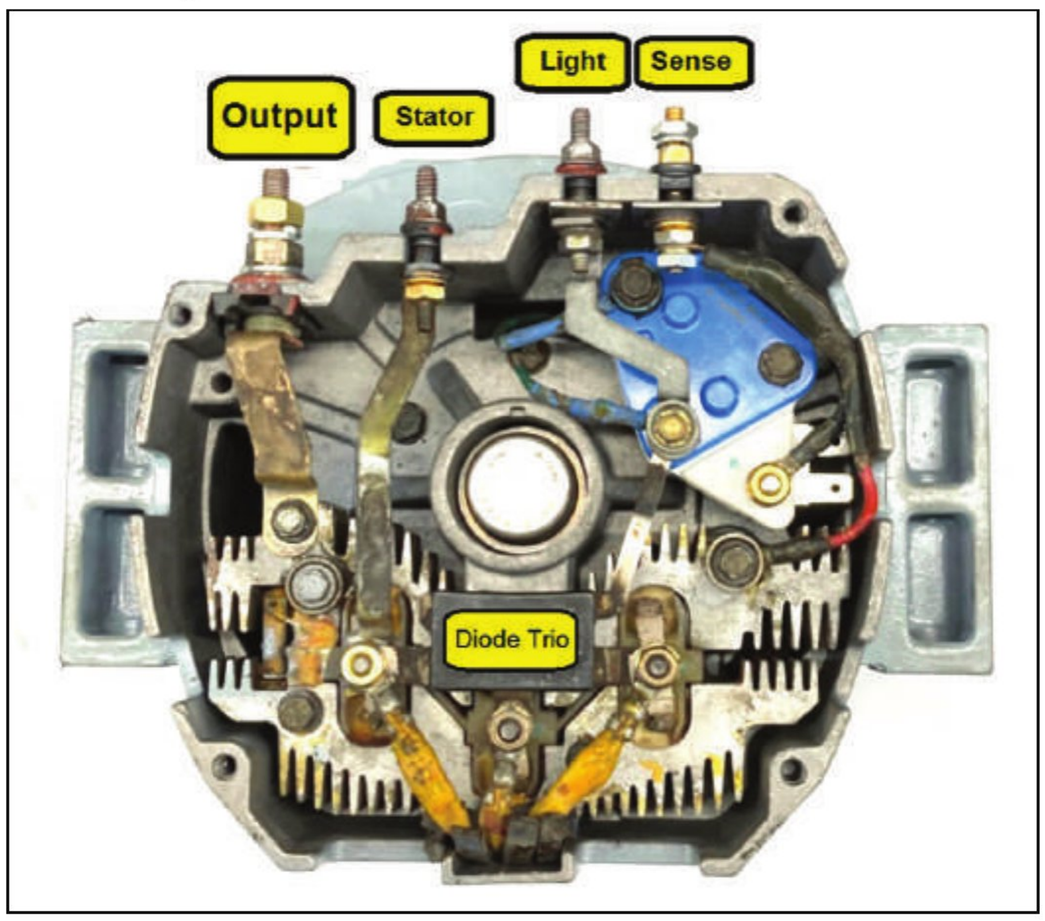


Figure 6 – 36-SI's component & terminal arrangement



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YearRange	Engine	Note	PartType	Romaine Electric	Price
1999	V8 5.4L 330CID	Battery located in engine compartment; 24 Mo Warranty; Part CCA: 850; Cranking Amps:1045; Reserve Cap:150; OE Group:65; OE CCA:650	Vehicle Battery	665MF	Check Price
1999	V8 5.4L 330CID	Battery located in engine compartment; 30 Mo Warranty; Part CCA: 750; Cranking Amps:925; Reserve Cap:140; OE Group:65; OE CCA:650	Vehicle Battery	765MF	Check Price
1999	V8 5.4L 330CID	Battery located in engine compartment; 30 Mo Warranty; Part CCA: 750; Cranking Amps:860; Reserve Cap:150; OE Group:65; OE CCA:650	Vehicle Battery	9A65	Check Price
1999	V8 5.4L 330CID	Battery located in engine compartment; 12 Mo Warranty; Part CCA: 650; Cranking Amps:800; Reserve Cap:120; OE Group:65; OE CCA:650	Vehicle Battery	VL65	Check Price
1999	V8 5.4L 330CID	Battery located in engine compartment; 18 Mo Warranty; Part CCA: 675; Cranking Amps:830; Reserve Cap:130; OE Group:65; OE CCA:650	Vehicle Battery	565MF	Check Price
1999	V8 5.4L 330CID	Battery located in engine compartment; 24 Mo Warranty; Part CCA: 580; Cranking Amps:715; Reserve Cap:85; OE Group:59; OE CCA:540	Vehicle Battery	658MF	Check Price
1999	V8 5.4L 330CID	Battery located in engine compartment; 24 Mo Warranty; Part CCA: 590; Cranking Amps:725; Reserve Cap:100; OE Group:59; OE CCA:540	Vehicle Battery	659MF	Check Price
1999	V8 5.4L 330CID	Ford PMGR 12V 1.4KW 12T	Starter Motor	6646N	Check Price
1999	V8 5.4L 330CID	130 Amp	Alternator	36-7749-3	Check Price
1999	V8 5.4L 330CID	Optional, 130 Amp	Alternator	7764N	Check Price

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The unit is rather heavy, weighing in at 35 pounds with attached pulley. It has a stationary field coil which adds to its weight and makes handling it slightly more cumbersome. The regulator is a common looking SI-type regulator with a stud, common in such series of regulators. Delco # 1116435 (D687) is the OE for this alternator but some available aftermarket regulators (WAI's D33QS and J&N's 230-12212) that have a sort of built-in Auto-Start circuitry are designed to energize in lower speed can be used. In fact, some rebuilders claim these regulators can eliminate the use of Auto-Start in 22-SI units with the use of an appropriate diode trio.

The price of the alternator may justify the use of available OE bearings as shown in Figure-7. The rotor lacks the SRE bearing's inner race, meaning that is built as a solid piece, thus any scratch or wear on the tail end of the shaft requires replacement of the rotor which is not an inexpensive item. (*Figure-8*)



Figure 7 – 36-SI's OE bearings

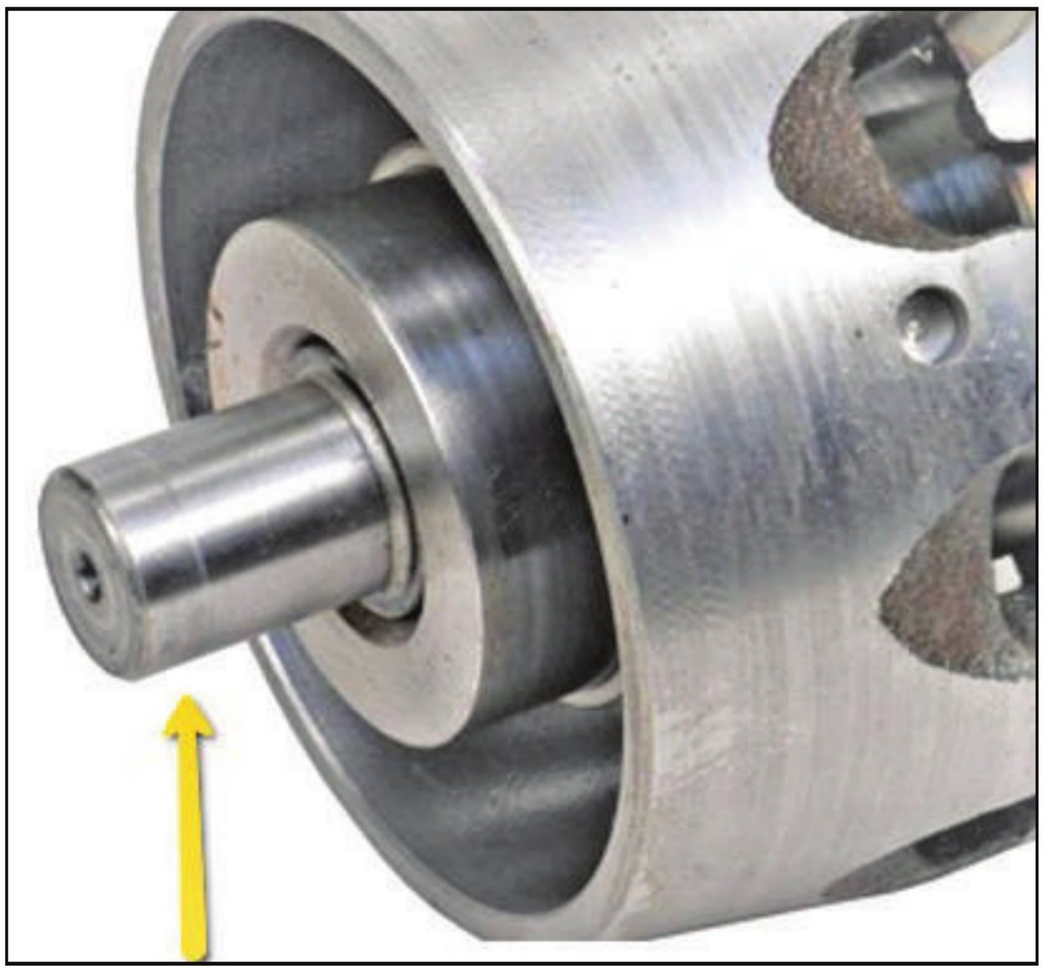


Figure 8 – 36-SI's rotor



The performance curve shown is from a 8741N (WAI) alternator purchased as a replacement. It is rated at 200 Amps but the power curve shows it to be considerably higher (*Figure-9*). The initial run for the test was done when the unit was cold. Once on the engine, warmed up by generating output and soaking the heat of the engine compartment, the Max output will decrease, and stabilized around the rated figure. Going by an unspoken rule of thumb, alternators that can produce 80-90 percent of their rated output at about 3000 RPM are considered to function satisfactorily.

Output tested @ 12.8 V						
Alternator RPM	1800	2000	2400	3500	5000	6000
Amperage	126	155	190	226	242	246

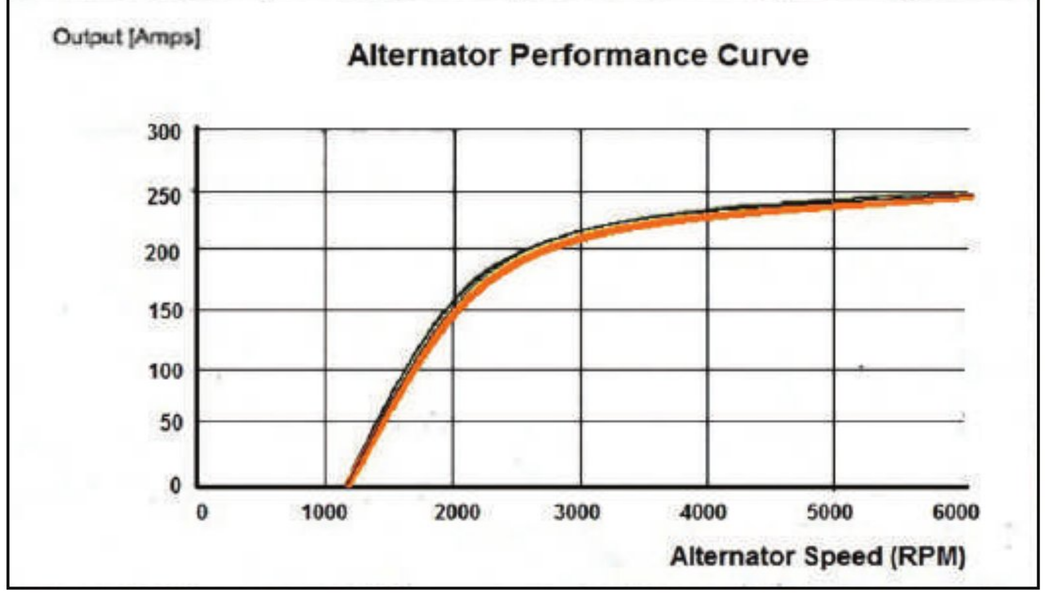


Figure 9 – 36-SI's power graph

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Rebuilders may consider replacement rather than rebuilding when major parts need to be replaced like any other labor-intensive units with hi-priced parts. But generally speaking, servicing this alternator if it does not require a rotor, stator or any housings can be profitable if priced right.

7-SI Alternator

Built in Korea by General Motors Korea Corporation or GMK (old Daewoo), these small but efficient alternators are found in growing applications such as Marine, Light Industrial, Forklifts, and some utility tractors. Moderately priced replacements units (clones) are available to a certain extent for certain part numbers but recent shortages in supplies and volatile shipping issues does make some or most of them unavailable, thus a good candidate for rebuilding due to high replacement cost. (*Figure-10*)

Teardown of the alternator requires unsoldering the stator leads so the two halves can be separated. Exploded view of major component shown in Figure-11 are similar to many alternators. The rectifier contains 3 additional small diodes that constitute its diode trio, thus the regulator is an A-circuit, available from our industry's major suppliers as well as the rectifier.



Figure 10 – 7-SI alternator



Figure 11 – Exploded view of a 7-SI alternator

The regulator is identified by a #921 plug code with S-L terminals. In some applications only the "L" terminal is used. (*Figure-12*)

To service the rotor, CS-130D slip-rings are used if needed and the same goes for the brushes. Stators are available to a certain extent, if needed, along with rectifiers and regulators. But then the cost may fall into that grey area that a decision has to be made to rebuild or replace. That of course heavily depends upon the availability of the replacement parts or a complete unit, and finally on the customer.

The SRE housing contains 3 grommets that the stator leads run through. If housing needs to be shot blasted, it is advisable that they be removed, saved, and reinstalled after blasting and during assembly. Depressing a small tab from inside allows it to be pulled out, and for installation, they are inserted from outside and pushed in, as shown in Figure-13.

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

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

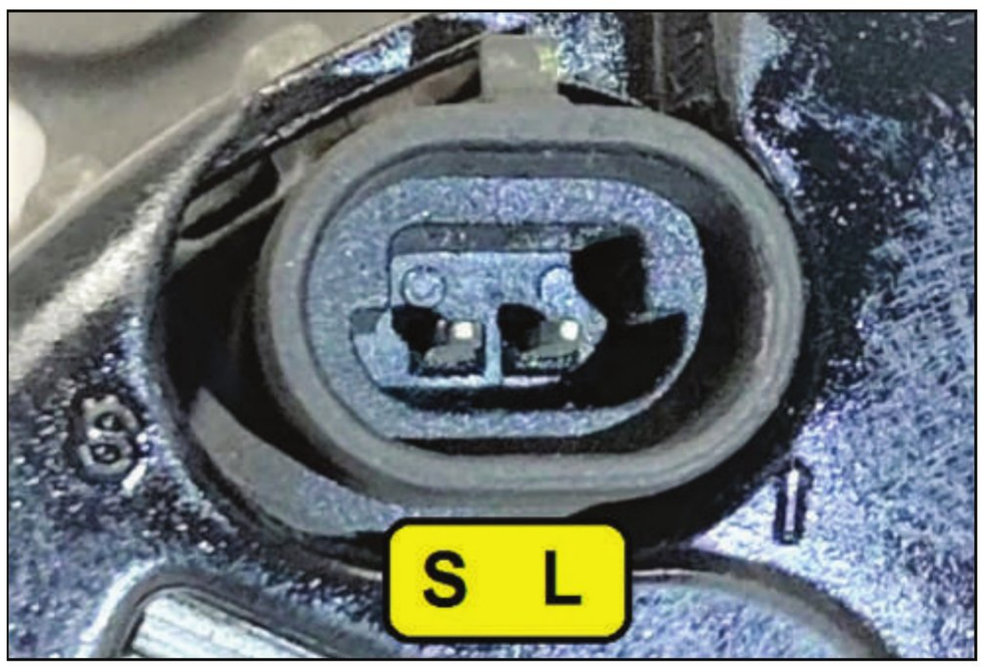


Figure 12 – Plug code #921

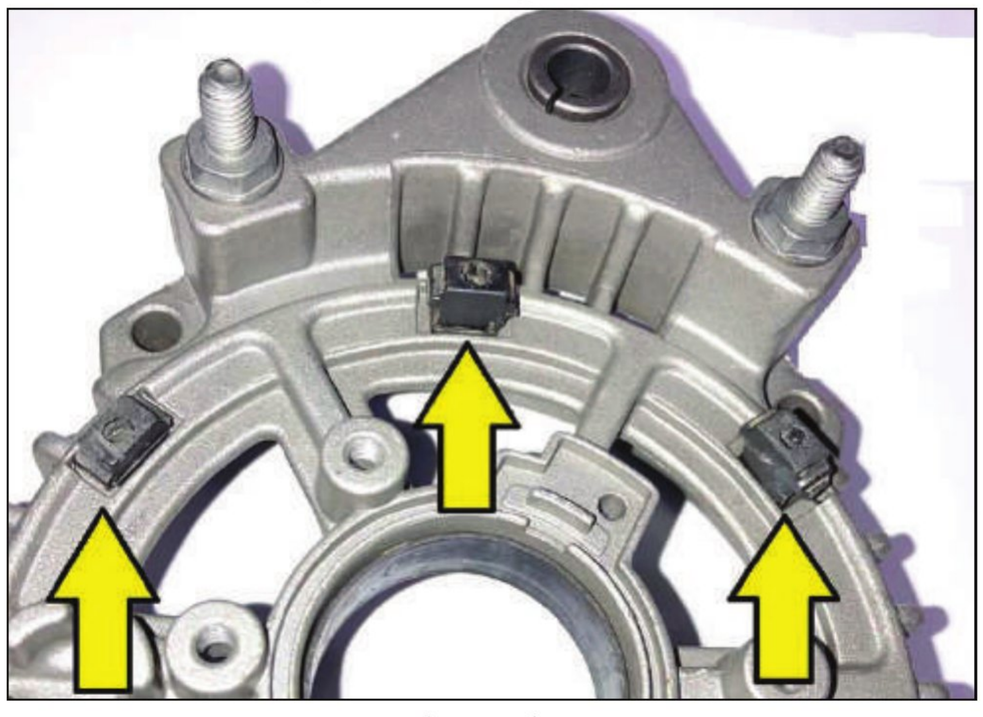


Figure 13 – 7-SI's SRE housing grommets

FUN WITH THE VRC101 REGULATOR TESTER

And About Overheated Slip Rings



BY NATHAN UNGER

Section 1

The ol' VRC101 Transpo regulator tester is being sold off very cheap nowadays. I've seen used ones advertised for like, $100. (*See Figure 1*)



Figure 1

If you haven't got a digital copy of the VRC101 manual, Google it, or download it from here: http://vrr.dyndns.biz/Docs/OLE/Transpo/TestMan_Nov04.pdf

By the way, you can also download the latest manual (2021) for the VRC2010 from the WAI website under the "Publications" menu, as a PDF. Make a shortcut on your desktop.

To find the regulator you want to test, enter the Transpo regulator number into the finder box at the top right of the pdf manual.

The new manual information is helpful even if you only have the old tester. Here's some fun stuff you can do with it, besides what's in the manuals:

Test Avalanche Diodes

The idea behind an avalanche diode is that when it has reverse voltage across it, it will not allow current through, except if there is a surge higher than the avalanche range. This helps protect vehicle electronics against surges and spikes, like during a load dump event. Just for review, a load dump happens when you switch off a heavy electrical load, like rear window defog, or AC fans on high. The alternator will be putting out lots of current and have a strong magnetic field inside. When you suddenly switch off the load, the magnetic field energy must go somewhere. If it can't find anywhere to go, then it will build up voltage until it does. 400-volt spikes have been measured in that scenario.

I heard that up to 30 percent of the auto-electric hardware costs have to do with spike/surge protection devices. Avalanche behavior is very fast-acting.

There are several basic types that are in common use.

- 19-24v Bosch
- 24-32v Ford & Delco
- 38-42v 24-volt units
- No avalanche voltage. Peak inverse rating might typically be 50, 100 or 200 volts (or more)

These are the ranges of avalanche voltages you might find. They also come in different current ratings.
I recommend matching diodes' avalanche properties when rebuilding a rectifier. You don't want one diode to be much lower than all the rest and end up taking all the surges.

I heard of one case where a rebuilder was using the Bosch type in a Ford application. When the setpoint went high enough, it blew all the diodes because the peak of the ripple went too high. So, make sure you have the right diodes.

First set the switches on your VRC101:

- Field Circuit B,
- Field Load 0.5 amps,
- and DC Volt Range 32 volts! (None of these tests should be done for very long. Just enough to get a reading.)

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Simple hookups:

1) If you have a negative diode, connect the red lead to the stem (cathode) and the black wire to the case. (*Refer to Figure 1*)

2) If you have a positive diode, connect the red lead to the case (cathode) and the black wire to the stem.

You need to set the VRC101 to the highest voltage setting (32V), and the readout will show the diode's avalanche voltage.

In the case of the 38-42v diodes (used in 24v applications), connect the Field Yellow lead to the Battery Positive Red lead, and that will jack the VRC101 voltage up to about 44 volts. None of these tests should not be done continuously, only momentarily. You may want to put on some gloves when working with DC voltages this high.

Verify the 22SI auto-start/trio. (*See Figure 2*)

You can test it by connecting

A) Field yellow

B) Battery Positive 12v red

C) Stator white

D) Battery negative black Set the switches:

Field Circuit B, Field Load 0.5 amps, and DC Volt Range 12 volts

The voltage readout should climb up to around 16 volts, showing that the autostart is providing voltage to A which supplies the regulator and the field a little bit. This gets the alternator charging, at which point the diode trio takes over.

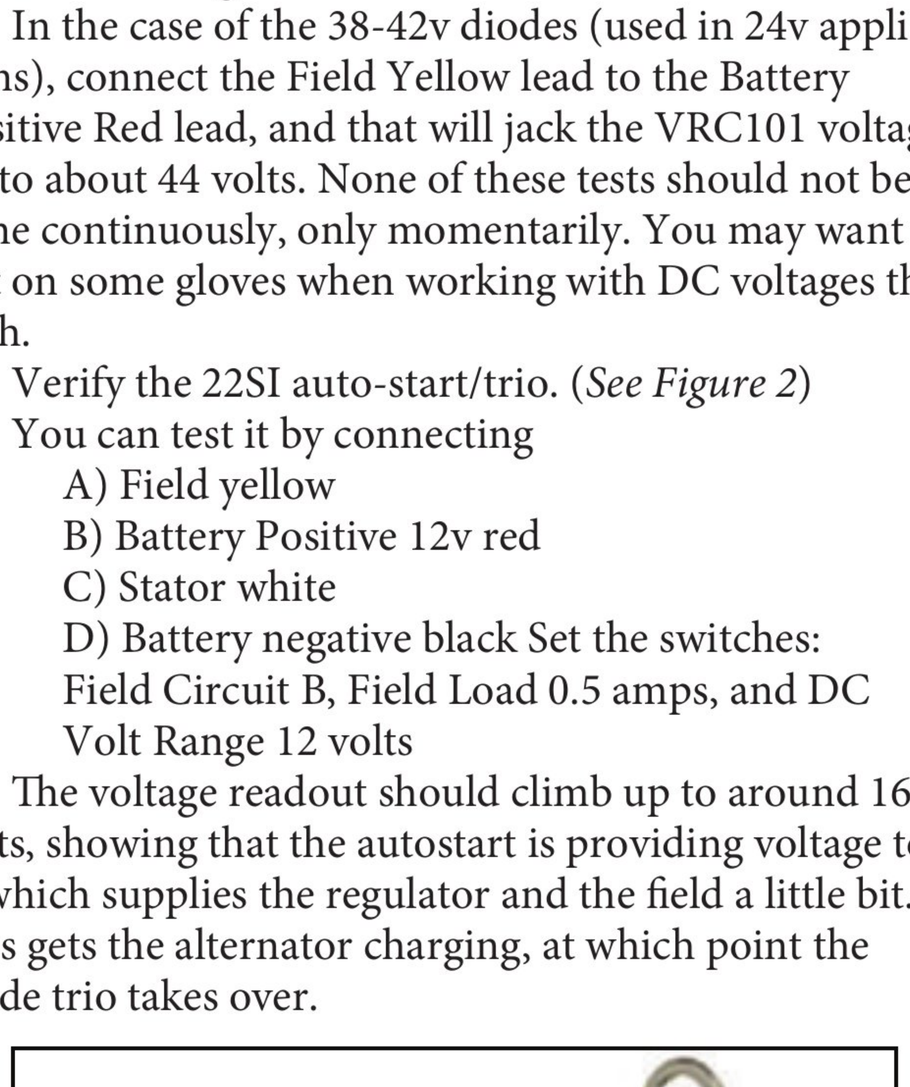


Figure 2 - autostart trio

get warm. It's not uncommon to see alternators with 7 amps of rotor current. This means that the resistor to control that could be dissipating up to 25W! So now you have to keep the resistor cool. With these newer high amperage alternators in tight engine compartments, you have to get creative on how you are going to do that. And then there is the fuel economy thing. You are wasting power because the resistor gets hot, and then wasting power trying to blow air on it to cool it again.

On the other hand, if you just have a switch to turn it off and on again, the switch doesn't waste power, or at least very little.

Here is a little example to explain how pulse width modulation works.

Suppose you get a job at the public works department of your town. One of your responsibilities is to make sure that the water tower always has water in it. Let's say you have to maintain the level between 3/4 and full. You can never let it get empty. (*See Figure 4*)

Check for Choke Drive

Use an IN436, VRH2005-17 regulator for example. Use a 194-marker bulb and pigtail, and add it to your "L" connection, and ground. (*See Figure 3*)

Then hook up all your VRC101 leads like normal and test it. The 12v Lamp (green wire) should go off and your 194 bulb will go on bright. This means that your regulator



has the capability to drive a load such as an electric choke. Some websites call this function "Active Lamp", or "Choke Drive".

Next, disconnect the Stator Output (white) and then your 194 bulb goes out and the 12v lamp (green) goes on. Disconnecting the Stator Output (white) removes the signal that the regulator needs for detecting when the alternator is turning. Then it behaves as if you have KOEO.

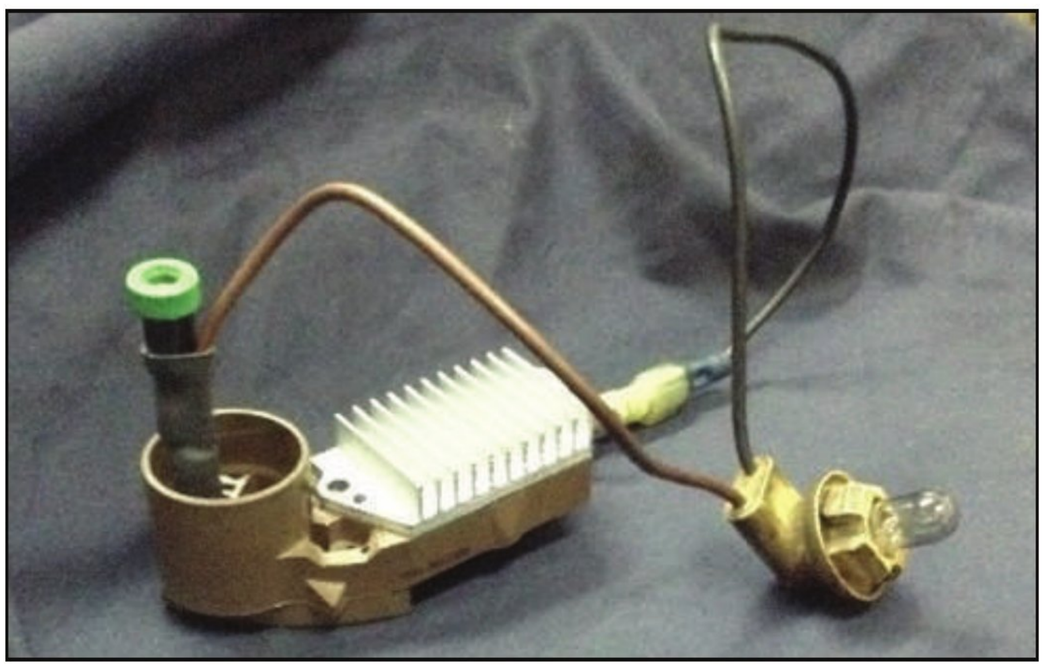


Figure 3 - choke drive test light

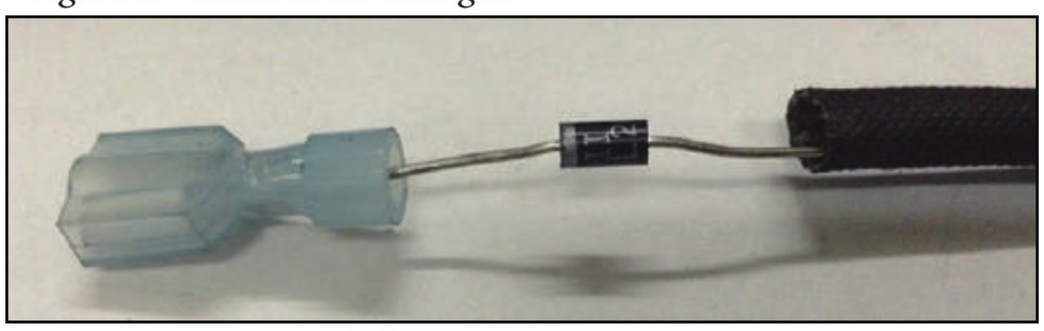


Figure 4 - diode

This regulator, the IN436, VRH2005-17 fits an alternator which does NOT have a diode trio. It has a small driver transistor instead to turn the indicator light on or off. It has a second small driver transistor to supply the choke. The regulator turns the choke driver on only after the indicator light goes out.

If the regulator is not 'active-lamp/choke drive', then the 12v Lamp (green on your VRC101) and your 194 bulb on a pigtail will both glow dimly. You can use this to sort regulators between 'active-lamp/choke drive' and 'non-active L' types. Please note, regulators that work with a diode trio may have a slightly different hookup internally.

Verify the S Terminal

In last month's article I showed a picture of an axial diode that I used for testing the 'S' function on a regulator. (*See Figure 4*)

This will work on the VRC101 also. Insert the diode between the S wire and the regulator, and your setpoint voltage will increase a little bit. This verifies that the "S" is sensing a voltage drop from the normal setpoint voltage and is compensating for it.

On some tests for certain regulators in the manual they say to disconnect "S" entirely. The voltage will automatically increase somewhat, maybe even by a couple of volts. This is called secondary regulation. Because of secondary regulation, a regulator will never

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go 'wide open' in the case where the wiring on the vehicle is faulty. If it did, that could cause catastrophic failure of the alternator, battery, and wiring, and maybe other components too.

Section II: About Overheated Slip Rings

This type of alternator fault usually comes from the various tractor dealers in our area. The slip rings are overheated, and the regulators have failed, but the rest of the alternator is fine.

I took a picture of the new slip rings beside the old ones. You can see the signs of heat on the used one (*See Figure 5*). This one isn't even that bad. I've seen them where they turn purple.

Tractor alternators sometimes run long hours at low(ish) rpm, and that with poor batteries and/or sloppy belts. The farmers have been known to jump-start or pull-start the tractor, because "a diesel doesn't need an alternator or a good battery anyway", they tell me. I don't need to argue. After all, they're in my shop!

So then the tractor goes to work in the field, even though the battery, alternator, and belt is inadequate.

Here is what I have found so far:

1) Alternators do not put out their rated amperage until quite a bit higher than engine idle. This means that at low rpm, the regulator goes to full duty cycle to eke out as much as is available so that the battery can reach full charge. This means that the regulator and the slip rings will heat up.

2) At low rpm the fan is not turning very fast, so possibly the heat builds up inside the enclosed slip ring cover if it has one.

3) If the belt is loose or worn out, then the alternator will not work as hard as it can. This will certainly make the low rpm problem worse. You can usually tell by the worn-out pulley!

4) If the battery is in poor condition, it can accept as much as, or more than the slowly turning alternator can produce. So that adds another reason why the alternator's regulator would be at full duty cycle.

5) If the tractor has an AGM battery, I've been told, the regulator setpoint should not be higher than the

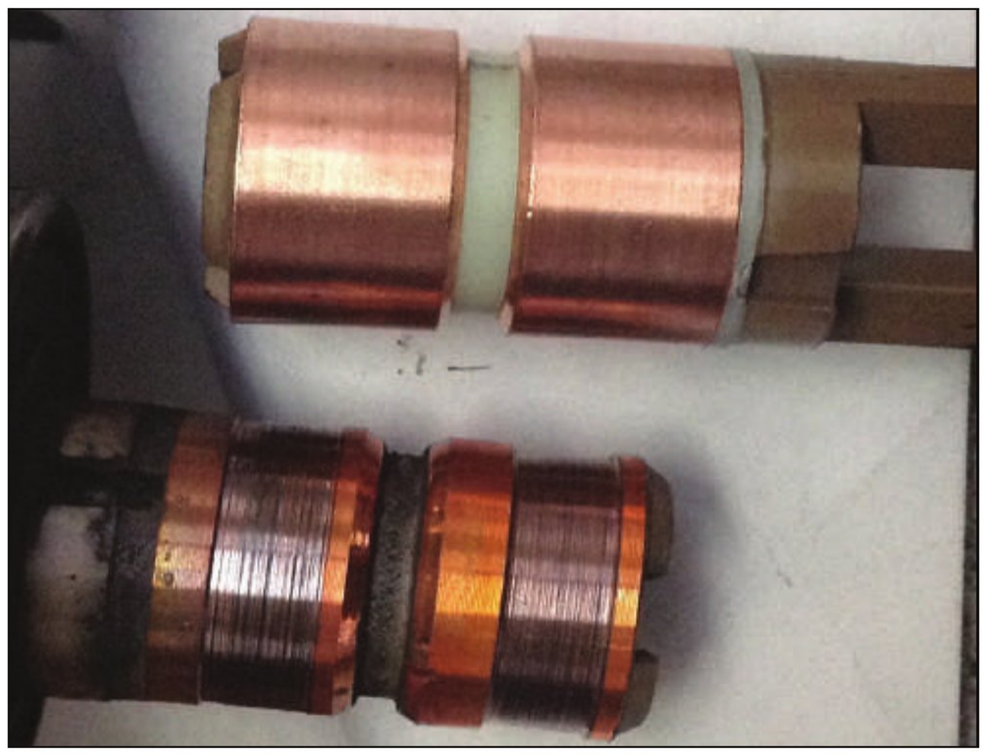


Figure 5



battery is designed for. If the setpoint is too high, then the alternator will have a hard time bringing the voltage up so that the regulator can start cutting back. This means that even if everything else was fine, the regulator will stay at full duty cycle and get hot just to try and get the battery up to this excessive setpoint. I generally do not advise a farmer to install an AGM battery. First, I want to measure the setpoint of the regulator in the alternator, especially if the regulator has ever been replaced.

On top of all that, if the cables are in poor condition, and if the regulator has a sense terminal, the regulator will go to the full field condition even more readily, to bring the voltage at the alternator high enough to compensate for the loss in the cables and connections. Say the cables lose 0.7 volts each; 1.4 volts combined. The alternator will have to put out 15.6 volts in order to see 14.2 volts at the battery. The rotor will draw about 10% more current because of it, which will make the regulator even hotter.

When a core comes in for rebuilding, because of the minimal alternator output at low rpm, the stator and rectifier are usually in good condition and can tested and re-used, having never gotten really hot, unlike the slip rings. If the slip rings got hot (see Figure 5) and I think it's because of the full duty cycle operation, I'm willing to bet that the regulator overheated as well.

Having said all of that, if the alternator is otherwise faulty – blown diode(s), bad stator, excessive air gap, etc. but the brushes are good, you may see the overheated slip rings in that case too.

I doubt if most OE regulators are designed to operate at higher-than-normal voltage (to compensate for bad cables), and maybe even higher field current because of it, and all at full duty cycle continuously. Get this: I've noticed over the years that the aftermarket people are all advertising regulators with high output driver transistors. I've seen 10-amp drivers, even a 50-amp version! I suspect they do that because if the OE regulators fail under the above-mentioned conditions, the aftermarket copies will too. Besides, by the time an alternator needs to be replaced, those conditions will usually have gotten worse. The electronics people tell us that excessive heat causes premature semiconductor failure.

Whenever I see the signs of heat on the slip rings, I always recommend replacing the regulator, because it will have been thoroughly heated also. If you decide to not replace the slip rings, I suggest re-soldering the connections. If the copper got hot enough to turn reddish, the solder would have melted, and probably flung out some of it. When it cooled again, it probably produced a cold solder joint with what was left of the solder.

Many thanks to Mohammad Samii, Larry Hagemeister, and Bob Thomas for their input on this article.



THE GURU OF ROTATING ELECTRICALS

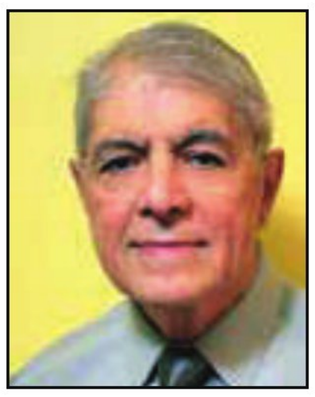
APRA Celebrating and Honoring a Leading Light of Automotive Rebuilding and Remanufacturing

BY NIELS CHRISTIANSEN, *APRA WRITER*

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Sammy's Auto Electric Service, Inc., Champaign, IL



Mohammad Samii

Mohammad Samii saw his first glimpse of the American Dream in 1963 when he was one of 1200 young Iranians vying for 26 positions as career officers in Iran's fledgling air force.

After academic testing, interviews and physicals, Samii was chosen to become an aircraft maintenance officer in the Shah's tiny version of the mighty US Air Force.

"Same training, same books, same methods, same technologically advanced airplanes," Samii recalls.

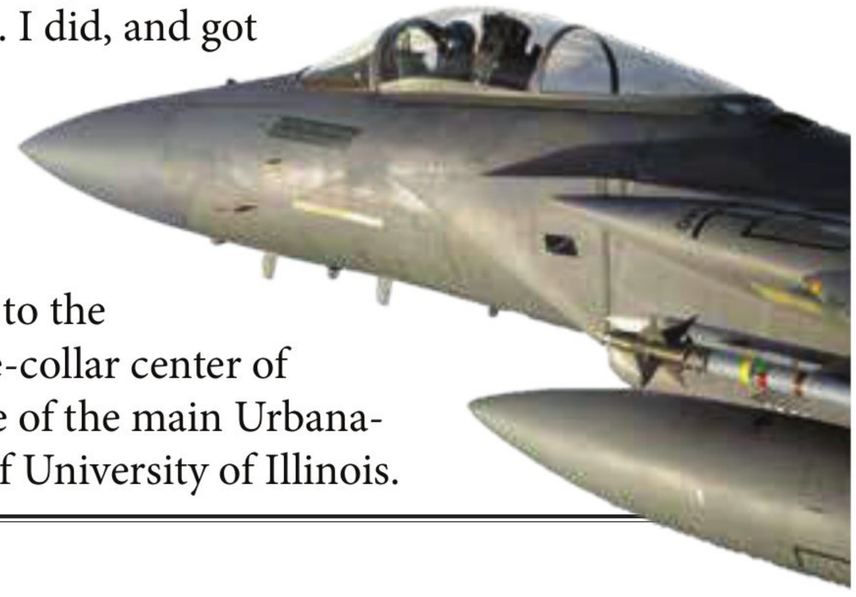
Three times he was sent to the US for training. During his third US visit, he met Colleen Galey, then an American college student, who became his wife. He resigned his commission and immigrated to U.S. in 1973.

The son of the provincial tobacco commissioner in Rasht, Iran, near the Caspian Sea, Samii—who obtained US citizenship in 1978—has since been known in his American community as Sammy. Together with his wife Colleen, he has lived a dream as American as apple pie—as a successful family man, entrepreneur, educator, aviator, amateur vegetable gardener, and a thrice-weekly senior league tennis player. His curiosity and search for new discoveries and knowledge cemented his reputation as the leading and most popular expert, teacher and consultant in his part of the remanufacturing industry for decades.

For all his accomplishments in the industry over the 31 years since he joined APRA, Mohammad "Sammy" Samii is about to receive the status of honorary member of the organization.

Much of Samii's professional success is directly tied to his air force training and experience. He first benefited from his practical and technical expertise soon after he settled in Colleen's hometown of Danville, Illinois.

"At that time, in 1973, electronics were gradually coming into automotive application," he explained. "Typically, your garage mechanics had no idea of the transistors and diodes, and somebody with background information could excel pretty fast. I did, and got tied in with a local company."



After a few years, Samii decided to go independent, moving to the educational and white-collar center of Champaign, the home of the main Urbana-Champaign campus of University of Illinois.

THE GURU OF ROTATING ELECTRICALS



Sammy's customer waiting room.

He rented a building, bought equipment and founded his rebuilding company, Sammy's Auto Electric Service, Inc.

"I opened our business in 1979, not knowing a single person in this town. We grew gradually. Now, 41 years later, we are locally well known. We cater to a large community around us, with farmers and other customers in a five county area. We are their only source for rebuilding rotating electricals, which is starters, alternators and generators," he said.

Sammy's Auto Electric Service is now serving three generations of customers, with the customer base mostly built by word of mouth.



But there is more to Sammy's: "We are not only a rebuilder, we are a shop, and we do installations—electrical and electronics only. So from a business standpoint, I am familiar with both sides of the industry business," Samii explained.

This planted him solidly in both of two often disparate camps in the rotating electricals industry, which, he points out, has always been characterized by one particular problem: Whereas manufacturers might occasionally fail to provide the right unit, the installers and end-users might misdiagnose issues with inappropriate equipment or methods. The result has often been high rates of returned units as 'defective', sometimes as high as 30-40 percent.

Within this failing industry business model, Sammy earned his North American reputation as the first technical and practical responder to put out and prevent fires, conflicts and financial losses.

He works all sides of the issues, educating suppliers, installers and end-users in the US and Canada, so appropriate equipment is supplied and appropriate testing is done. He works directly with individual suppliers and manufacturers, teaches classes and seminars for technicians and end-users, and has written monthly technical columns since 1992.

> "Much of Samii's professional success is directly tied to his air force training and experience."

For 12 years, he was coordinator of APRA's electrical training programs. Today, he is the Technical and Training Advisor for the Electrical Rebuilders Association, ERA.

The Covid-19 pandemic put a temporary halt to the seminars, usually held on-location at companies and at trade shows. Samii's local rebuilding business recently suffered a serious setback when a key employee of 28 years retired early after suffering a stroke.

But at the age of 78 years, Samii is still working full-time and has no immediate plans to give up either his rebuilding business, which Colleen calls his 'day job', or his educational activities and monthly columns, which Colleen calls his 'night job'.

His biggest pride is his family, with a son and two daughters all successful and highly educated as well as his six grandchildren ranging in age from 2-20. He finds peace and calm in his vegetable garden. He no longer

Sammy testing his rebuild product.

flies his own airplanes, but finds practical and intellectual stimulation as an engaged member of the Experimental Aircraft Association. Prior to the pandemic, Samii enjoyed frequently traveling throughout the country and often visited his family in Europe. And of course, he keeps in shape playing tennis.

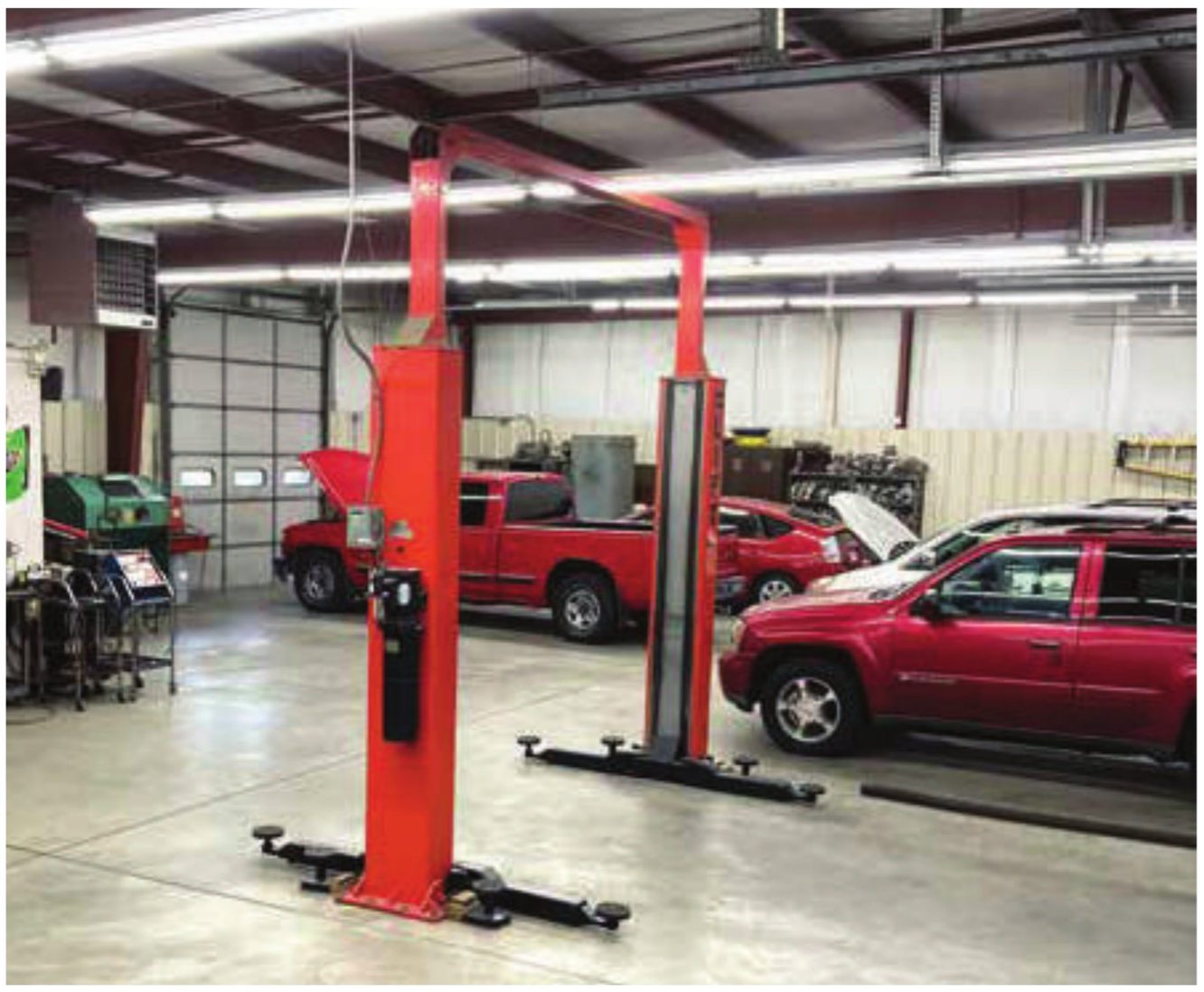
Taking a worn, old unit and giving it a new life, saving resources and energy and generating an income is still as satisfying as ever, he says. And for now, he still wants to be part of the future of the industry to which he has dedicated his professional life.

"The changes in rotating electricals have been greater than we could possibly have expected 25 or 30 years ago," he said. "The trend is toward fewer, longer living, more sophisticated units, resulting in fewer, but more pricey units to be rebuilt."

Adding the impact from changing foreign competition and worldwide supply chain issues, Samii believes rotating electricals rebuilding opportunities will still be available, both on local and large scales.

"But to take advantage of the opportunities," he adds emphatically, "the rebuilders must adapt to the new technologies."

Just as Samii has done for more than half a century. ■



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