ERA EXCHANGE

YOUR GUIDE TO ELECTRICAL REBUILDING

July 2022 $12.95

AUTO ELECTRIC CORNER
Chrysler PCM By-Pass, 36-RI Remote Sense and Over-Charging

IDENTIFYING A REGULATOR'S TERMINALS
And "It Worked For Me"

MORE SPOTS ADDED!
ERA Technical Conference

A WORD FROM THE PRESIDENT
Book Now Before Room Rate Increases



I would like to pass on a friendly reminder to all who plan on attending the ERA Technical Conference in Indianapolis, Indiana on the weekend of August 12-13, 2022. The negotiated host hotel special room night rate of $139 plus tax will increase to over $200 plus tax on July 21st. So don't wait any longer to reserve your overnight room at the special discounted rate.

As I mentioned here in the April edition of the ERA Exchange, the association held its annual meeting during the June monthly Board of Directors meeting. As many of you are aware, the agenda of our annual meeting includes the election of officers to fill all the expired terms on the Board of Directors and Board of Advisors. Luckily, we had enough members present at the meeting to form a quorum and the elections were held in accordance with the ERA's bylaws. I want to thank our nominating committee for their work in providing and presenting our slate of candidates. I also want to thank all of the members who volunteered to become an officer and those that volunteered to continue to serve another term. Our association would not be able to function or be as successful as it has been without the dedication of all of those that committed to giving up their own time and efforts to maintain and grow our little industry association.

On another note, surprisingly I received two correspondences following my May edition of "a Word from the President - "B.O.M. Woes." One telephone call was from a rebuilder member that expressed that my article was "Dead-On" and that he hopes that it gains momentum to provide some positive change to this serious problem. The other response was an email from one of our own supplier members, expressing that their company does actually have an enhanced B.O.M. program on their website, but stated their website's B.O.M. program was hardly ever used by the membership.

We both agree that we need to work together to provide this type of information to the membership. I did state that I myself tend to look at suppliers who provide quality products, acceptable fill rates, next day shipping with reasonable shipping charges, and least of all, reasonable pricing, as without the product I cannot make the sale. Again, my door and ears are still open to hear from all membership, especially suppliers on this subject.

Ken Plourde

NEW ERA MEMBERS

Pasco Battery
Annapolis, Maryland

ABOUT THE COVER

Resulting voltages with and without resistor

ERA EXCHANGE

Volume 39 Number 8

July 2022

Published monthly by the
Electrical Rebuilder's Association
PO Box 906
Union, MO 63084
Phone 636-584-7400
office@electricalrebuilders.org

EDITORIAL ASSISTANT / Bob Thomas

DESIGN & PRODUCTION / Stephanie Schroeder

CONTRIBUTING WRITERS / Ken Plourde, Mohammad Samii, Nathan Unger

CONTENTS

2 A WORD FROM THE PRESIDENT
2 NEW ERA MEMBERS
4 ERA TECHNICAL CONFERENCE
9 AUTO ELECTRIC CORNER — Chrysler PCM By-Pass, 36-SI Remote Sense and Over-Charging
14 IDENTIFYING A REGULATOR'S TERMINALS And "It Worked For Me"
19 CLASSIFIED ADS

Copyright 2022 • Printed in the United States

The publisher retains the right to edit for content, style or space. All submissions become the property of the ERA Exchange. Opinions expressed herein of contributing authors do not necessarily reflect the opinion of the staff or policy of the ERA Exchange. All advertisers herein warrant that they are duly authorized to engage in the business described by them when applying for advertising and further warrant they are duly authorized to use any copy, illustration and any trademarks or trade names which may be specified for use in their ad. The ERA Exchange limits its liability due to production errors or omissions to the running of a correction in the next issue.

Rebuilding is Recycling!

INDUSTRY NEWS
& ANNOUNCEMENTS

2022 ERA Honor Roll Inductees (10 years of Continuous Membership)

Grotberg Electronics, LLC of Little Fork, MN
MJ Auto Electric of Milwaukee, WI
The Alternator and Starter Store of Forest Lake, MN
P&R Electric Inc. of Baton Rouge, LA
Larry's Auto Electric of Melbourne, FL
Agri-Services of Alen, NY
Nighingale Auto Electric of Shippensburg, PA
Industrial Starters Inc. of Riverside, CA
Lyly's Radiators, Mufflers & Electric of Ukiah, CA
WT. LLC of Fallon, NV
Forks Auto Electric of Forks, WA
A&S Service of Bay Roberts, NF, Canada
Herold Supply of Sudbury, ON, Canada

2022 ERA Officers (2 year terms)

Executive Vice President: Lonnie Bain of Big Moe Starter & Alt.
North East Vice President: Alan Reynolds of A & J Transport, Inc.
North West Vice President: Jerry Kieffer of Allstart Auto Electric Inc.
South West Vice President: Jonathon Keisner of Action Alt. & Starter
Treasurer: Mike Schroeder of Central Automotive Electric
Canadian/east Vice President: Mike Mackey of Mackey Auto Electic

2022 Board of Advisors

Al Steadman - Litens Automotive Group
Bob Wagner – Wagner Alternator & Supplies, Inc.
Alan Melton – AmFor Electronics
Tom Barrett – Dakota Battery
Jason Kiser -JK's Starter & Alternator Services
John Prinvale – John's Automotive Electrical
Casey Barrett – Dakota Battery
Howard Gore – Big River Electric
Ronnie Charnes – ACC Rebuilders
Dennis Jacinto – YouTech Group LLC
Ted Heywood – Chic Armature
Joe Mazzone – Byuckeye Auto Electric
Derek Foxon – Foxon Alternator & Starter Rebuilders
Paul Sailon – Sailon Auto Electric Inc.
Michele Schroeder – Central Automotive Electric
Art Glass – Willard Generator Inc.
Glen McGlaughlin – Alternator-Starter Service
John Brillman III – The Brillman Company
Mike Tweed – Standard Starter Drive (Metco)
Brian Hagedorn – Manitowoc Motor Machining
Beth Dickson – BPS Cores Inc
Nick Staub – Romaine Electric
David Kieffer – Allstart Auto Electric Inc
Luke Hagemeister – Hagemeister Enterprises, Inc
Dan Bell – Whatcom Electric
Mohammad Samii – Sammy's Auto Electric Service
Stephanie Schroeder – ERA Exchange
Ryder Keller – Del Ray Voltage Systems

Special Event!

ERA TECHNICAL

Due to extended COVID-19 restrictions, the ERA has cancelled the 2022 trade show and will conduct a first-ever ERA Technical Conference.

This event will start on Friday evening and run all day on Saturday. Friday will kick off with a Supplier Showcase meet-and-greet, your chance as a rebuilder to meet one-on-one and speak with our industry's suppliers. Saturday will be jampacked with technical seminars, starting at 8am and continuing throughout the day, culminating with an ever-popular roundtable discussion.

DON'T DELAY; CALL THE ERA OFFICE NOW TO REGISTER!! 636-584-7400

The industry's suppliers have graciously offered to cover the $100 per person registration and luncheon expense fee for the first ~~50 rebuilder members to register!~~

80 rebuilder members to register!

Spots still available!

Thank you to our current sponsors!

Amsco Valley Forge, Apptrak, BPS Cores, CC Battery, Dixie Electric, IMI Performance Products, International Automotive Trading, JIMCO, J&N Electric, Mahle Aftermarket, PLP Battery, Regitar USA, Romaine Electric, Standard Starter Drive, Wagner Alternators, and WAI Global

AUGUST 12-13TH, 2022
INDIANAPOLIS, INDIANA

TECHNICAL CONFERENCE

CONFERENCE



$139+tax /night
includes breakfast

Holiday Inn Indianapolis Carmel
251 Pennsylvania Parkway
Carmel, IN 46280

Don’t forget to reserve your stay!
317-574-4600, press zero

SCHEDULE OF EVENTS

Friday, August 12th:

6:00pm-9:00pm - Supplier Showcase

Saturday, August 13th:

8:00am-10:30am - *Testing & Rebuilding Techniques* w/ Mohammad Samii
10:30am-12:00pm - *Start-Stop Starters* w/ Dan Smith
12:00pm-1:00pm - Buffet Luncheon
1:00pm-2:00pm - *Essential Tests First* w/ Ted Wires
2:00pm-3:00pm - *Ag/Heavy Duty Updates* w/ Clint Stohler
3:00pm-5:00pm - Roundtable Discussion
5:00pm - Adjourn

Seminar Presenters & Topics



Mohammad Samii

Mohammad Samii is a noted industry educator and writer who has has been involved in electrical rebuilding since 1973. He opened his own automotive electric business, Sammy's Auto Electric Service, Inc in Champaign, IL in 1979 and been presenting seminars for our industry since 1992. His monthly column, Auto Electric Corner, was a regular feature in APRA publications for nearly 25 years before he joined the ERA team as Technical Advisor in June of 2017. Like his monthly columns, Sammy's seminars are always filled with pertinent and up-to-date information, based largely on his own research and hands-on experience.

Seminar Topic: Testing & Rebuilding Techniques

ERA's Technical Advisor Mohammad Samii's presentation is in part based on the calls he receives on ERA Help-Line about various alternator testing and test boxes that might be of interest to most rebuilders. Some rebuilding issues such as slip-ring changes and newer units will also be discussed. Addition of aftermarket electronics such as radios with interactive displays, alarm systems, and GPS locaters that increase parasitic drains and cause battery run-downs and no-start problems are becoming major issues in the service bays. This is a subject that will also be briefly discussed along with some real world case-studies to locate and repair such problems.

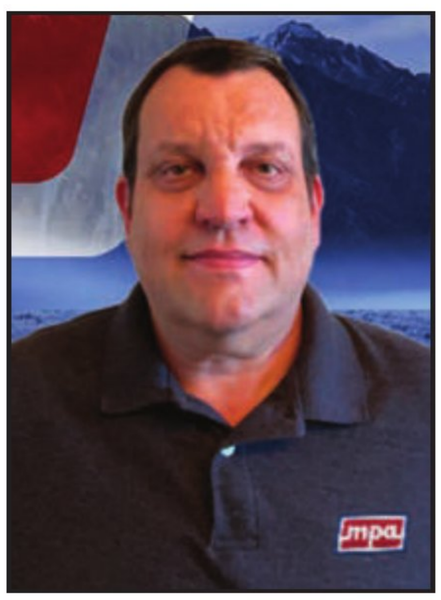


Dan Smith

Dan Smith is currently in his 50th year in the automotive electric industry, starting in 1973 working in his uncle's rebuilding shop. He then opened his own shop, United Auto Electric, in 1978 until 2001. He then worked for Boston Auto Electric until its acquisition by Arrowhead in 2011. He currently works as the Account Manager for OEM Sales for Arrowhead/J&N Electric.

Seminar Topic: Start-Stop Starters

This seminar will cover the differences in start-stop starters and their components. Dan will present a comprehensive view of these starters and this technology. He plans to exhibit the components and some complete units. He will discuss the various technical differences in the operation of these units and some of the failures that are starting to surface.



Ted Wires

Ted Wires is an ASE Master Technician and holds a degree in automotive technology. He has over 35 years in auto repair, parts, and training business as a technician, technical instructor, and field service rep. He currently works for Motorcar Parts of America (MPA) and will share with us some of the training he currently teaches to technicians and installers around the country.

Seminar Topic: Essential Tests First

This seminar will cover initial diagnosis procedures to determine the proper repair or replacement of starting and/or charging system components on automotive and light duty applications.
Some of the tests will include: comprehensive battery testing and replacement, voltage drop testing in starting & charging systems, visual inspection of system components, and use of scan tools and other test equipment.



Clint Stohler

Clint Stohler is the National Sales Manager of Dixie Electric LTD. He worked for Delco Remy for 24 years in various positions, from Product Engineer to Director of Field Technical Service and Training. Clint was the Director of Customer Quality Engineering that investigated and documented customer product complaints, tested components for warranty replacement, and performed failure analysis on parts to determine the reason for failure.

Seminar Topic: Ag and Heavy Duty Updates

Agriculture equipment manufacturers are following suit with automotive technology in regards to their high-tech features. Clint will share with us some of these latest developments, how they function, and how to diagnosis problems. The heavy duty world has gone high-tech also. Learn the latest developments, diagnosis and repair techniques.

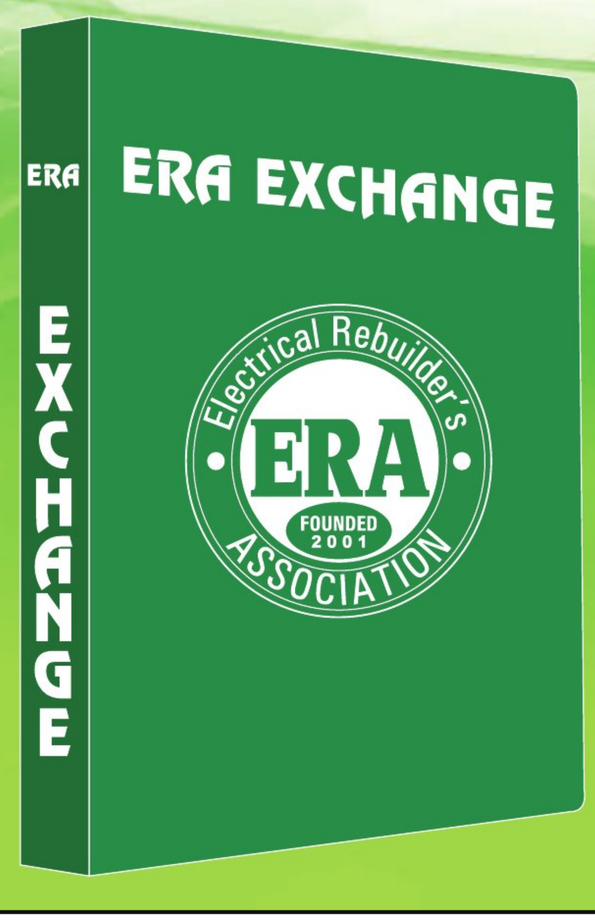
Keep your EXCHANGE magazines organized!

Protective binders now available!

$20.00 plus shipping

Holds 12 issues

Call the ERA Office to Order 636-584-7400



COLLET BEARING PUSHER

A newly improved bearing removal system for removing those challenging bearings.



A Tool that Pays for itself in Time Saved!

DELCO

Automotive, Industrial, Marine
Applications with 35mm bearings behind slipring, against straight or spiral fan blades

DENSO

Automotive, Industrial
Denso hairpin type alternators with 35mm bearing inside dust shield

Removes Bearings & Races Super-Fast In Seconds!

CAE PULLERS LLC

Tel 727.432.2406

Email caepuller@yahoo.com

MEMBER OF ERA Electrical Rebuilder's Association

Tools designed by a Rebuilder for Rebuilders Since 1989

Romaine Electric
PRECISION PRODUCTS

"You asked, We listened!"

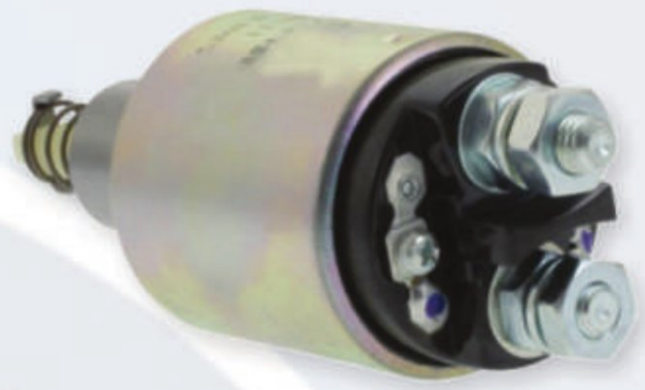
Romaine Electric is a Master Distributor of ZM solenoids and we have expanded our offering of Genuine ZM solenoids

Check out Romaine's Buyer's Guide to see all ZM solenoids



7-1044ZM

PG260F1, -F2, -M, 12 Volt
4 TERMINAL, R/H SWITCH, L/H RELAY
WITH PLUNGER, MOUNTING HOLES M4-0.7



SSBO-758ZM

BOSCH 359, 362, 364, 366, 367
12 Volt, 3 TERMINAL, L/H SWITCH



7-400ZM

39MT KOREAN, 12 Volt
4 TERMINAL



7-414ZM

39MT IMS RELAY, 12 Volt
SOLENOID CONTROL RELAY



7-1076ZM

FORD PMGR, 12 Volt
3 TERMINAL, L/H SWITCH
UNIVERSAL W/SPADE & STUD



SSLU-863ZM

LUCAS, 12 Volt
3 TERMINAL, R/H SWITCH

Romaine is only a call or click away
www.romaineelectric.com

ROMAINE EZ-CONNECT

West Coast 1-800-426-5005
Midwest/East Coast 1-833-994-1251

AUTO ELECTRIC CORNER —
Chrysler PCM By-Pass, 36-SI Remote Sense and Over-Charging



BY MOHAMMAD SAMII

A 2013 Chrysler Town & Country showed up for a charging system test, the owner confessing he already knew his newly installed alternator was good but he wanted us to confirm it and then bypass the computer control which he claimed was the culprit. Since he did not want to endure the cost of a new PCM and programming, to him, installing an external regulator was a viable option, as he had seen it done successfully on a *YouTube* video, and now he wanted to know if we could do this.

My only and immediate response to him was a resounding *"Absolutely not…"* comment. I explained to him such a simple-minded repair or hack (as it is known in the industry) may have been done successfully in the past but is no longer recommended. Actually, it's illegal as it could be considered tampering with the vehicle's emission control system depending on how such an issue is viewed in a court case. In modern vehicles of the last 10-15 years with sophisticated electronics and a complex internal communication system (CAN bus) where all modules are in constant contact with each other, bypassing an output function such as alternator control portion of the PCM would not go unnoticed and would have dire consequences.

I explained to him that condemning the PCM just because the alternator is not charging is like getting a brain surgery because of a headache where taking an Aspirin tablet should be the first step followed by detailed diagnostic work. He agreed that we should look into his charging system, and confirm that if it indeed needed a PCM…for our diagnostic fee.

This particular alternator (11570) which has a plug code #379 is already a subject of many calls on the ERA Help-Line which usually the callers misinterpret the two pins as F1 and F2, a common configuration used on Chrysler's products for many years. This alternator as well as any other alternator with #379 plug code has the F2 grounded internally and the only pin that runs the alternator is the Field terminal (F) shown in *Figure-1*.

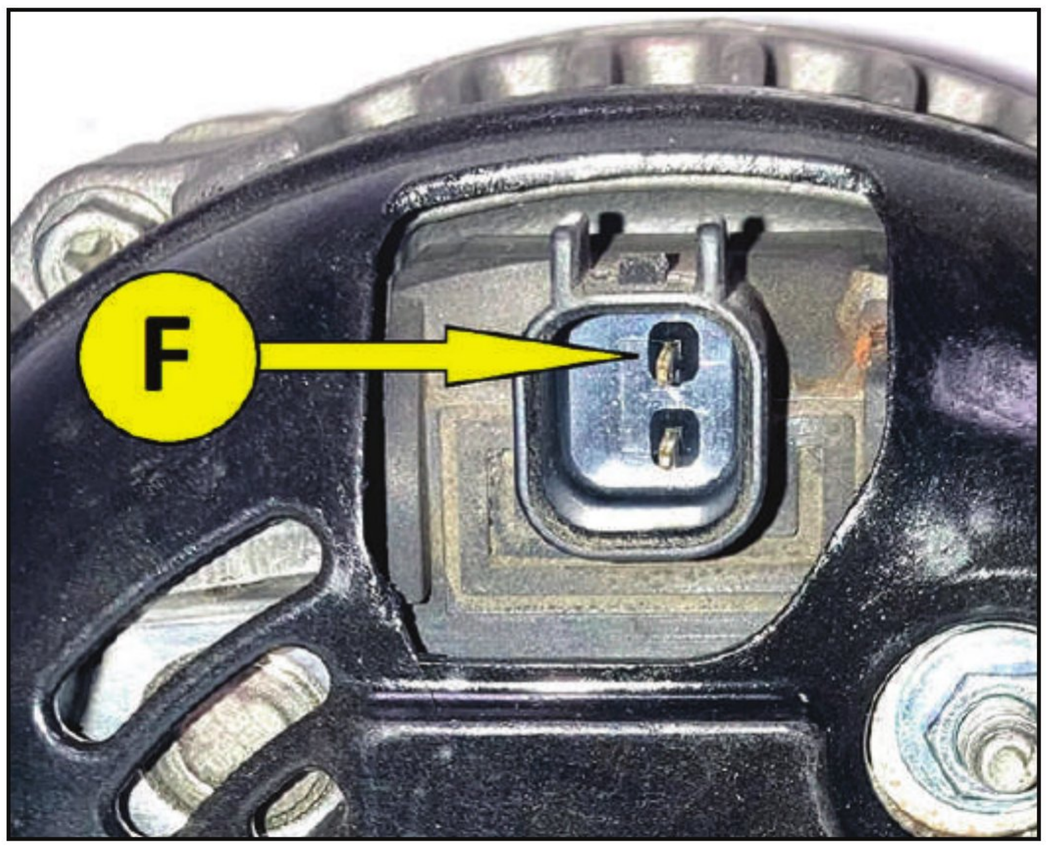


Figure 1 – Plug Code #379 showing "Field" terminal



Since grounding one brush makes this alternator a "B" circuit field, applying a variable +B to the "F" is all that is necessary to make this alternator charge, of course in addition to a clean +B and clean Ground for the output.

The way the PCM does it is by applying a pulse-width modulated signal (PWM) near +B voltage at a 400 Hz frequency. The width of the pulse, in other words, its duration depends upon the load demand and the desired voltage determined by PCM, and thus it applies the right "ON-time" of field current necessary to have the desired alternator output. Figure-2 shows a capture of this PCM generated pulse at about 80% duration, which on this specific RPM generated 90 Amp output. A DMM can average this pulse and read its equivalent value as 9.3V as shown.

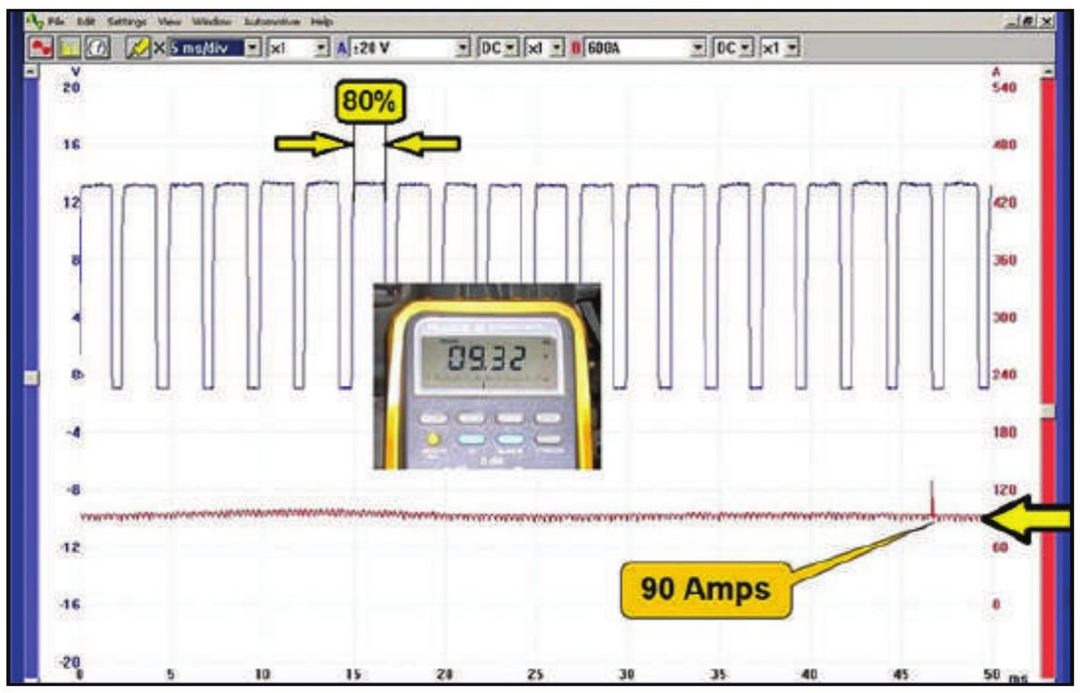


Figure 2 – Capture of field current signal applied by PCM

Since this pulse (the field current) is generated by the PCM, any anomaly in the circuit from the computer, the associated wirings, connections, and open/shorted rotor will register a Diagnostic Trouble Code or DTC. Most common DTC for the field circuit anomaly is a P0622. Here are a few steps we follow to determine the cause of this code, which our customer's van indeed had:

- Clearing the code, running the engine to see if it appears again. If so:
- Check the continuity of the circuit K20 from PCM to the alternator (*Figure-3*)

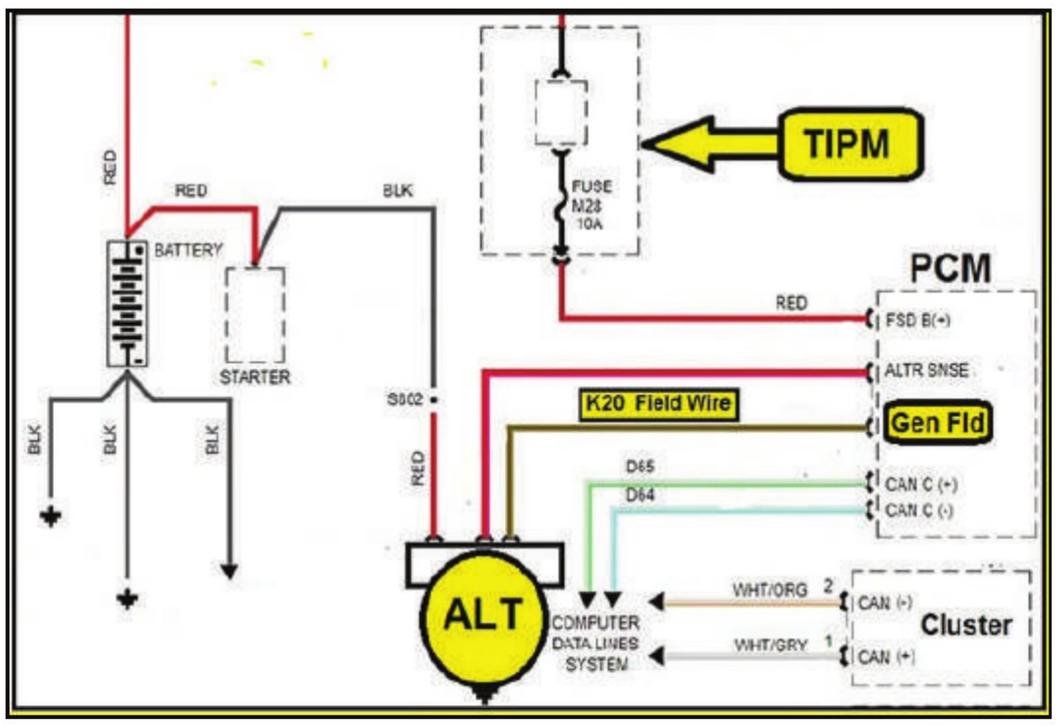


Figure 3 – 2013 Chrysler charging system/PCM interconnect



• Applying field current to the alternator via a service pigtail to see if alternator works without the PCM feed

After all of these steps are taken, then existence of clean powers and grounds to the PCM need to be checked and voltage drop tested to confirm their integrity. Then, and only then, can you consider pulling the trigger and condemning the PCM. Otherwise, replacing the PCM would not accomplish anything but unnecessary cost and a lot of anguish.

In the case above, second step that is the integrity of the circuit from PCM to the regulator plug showed it was open. This *Field* circuit has been called K20 in Chrysler's jargon for decades. Tracing the circuit from the alternator to the PCM led us to a poor connection in the multi-pin plug which is almost under the battery tray (*Figure-4*). Once the plug was pulled apart and the corroded pin repaired, the K20 circuit became alive. When all was put together, the charging system worked perfectly fine with no problem and changing the PCM was not necessary.

It is ironic that at the very time of this writing, a very similar question was posted on the ERA website from a member who was asking how to bypass the Electronic Voltage Regulator (EVR) function of the PCM and install an external regulator on a 11575 alternator, a 180-amp Denso unit used on mid to late 2010's Chrysler/Dodge cars, trucks and certain Jeeps, much like the vehicle we were working on.

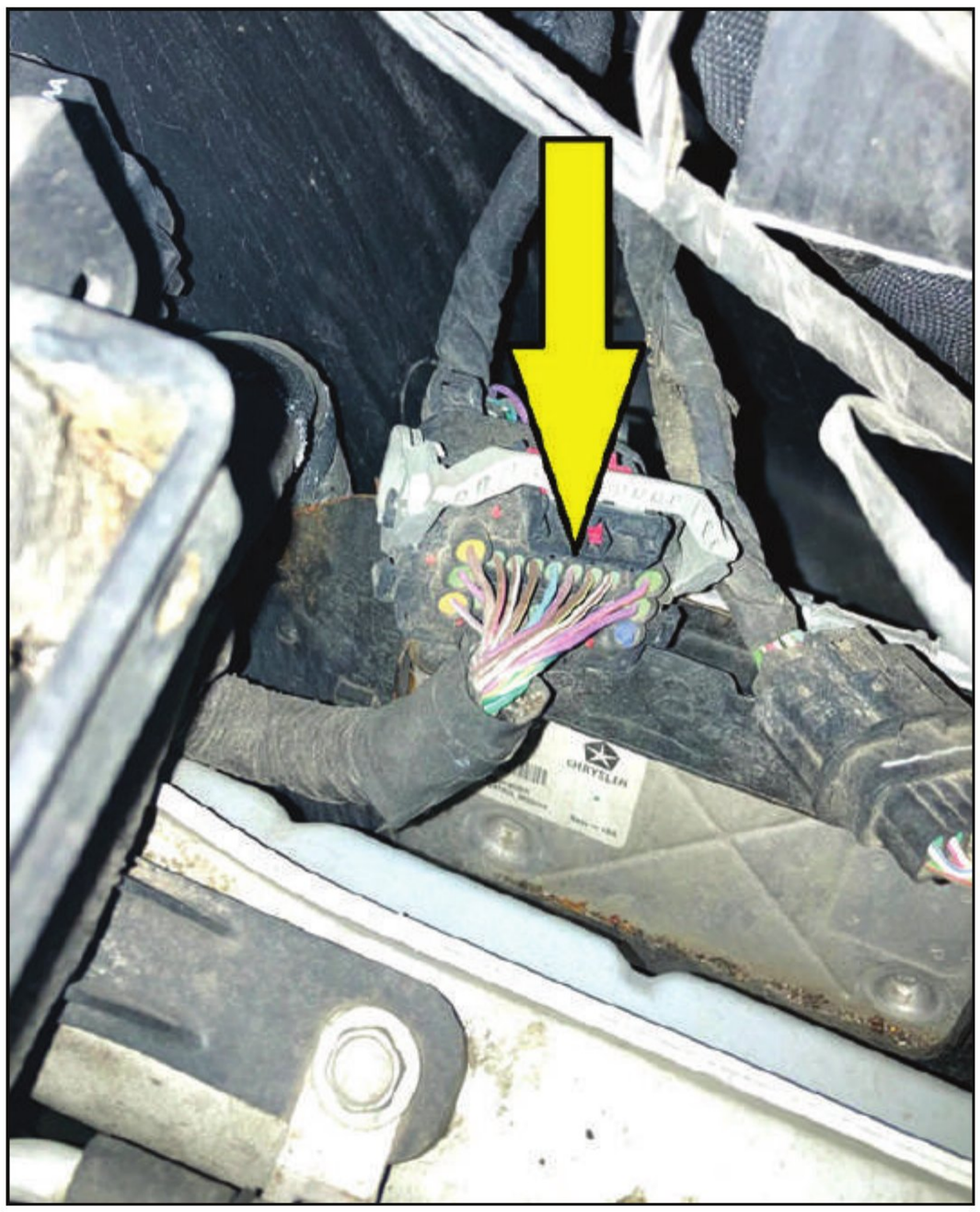


Figure 4 – Wiring harness with poor connection



My response to him was this modification should be avoided at all cost. Any tampering with the circuit will trip a P0622 code which in turn will turn on the battery light, a "Check Gages" light, and eventually a Check Engine Light (MIL) which would not go off no matter what the charging voltage is. Through a subsequent Help-Line call from the poster I found out due to difficult accessibility, the connector to the alternator had not been taken off, and they really had no idea about the existence of the field current at all, and have made the defective PCM assumption without checking any related steps mentioned above. These kinds of modifications and hack jobs can have serious consequences if the vehicle ever gets called back for a warranty repair or PCM update through the dealership. These modifications will invariably void any implied warranty by manufacturer, accompanied by an exuberant cost to repair by the dealer.

36-SI Remote Sense

I wrote about the 36-SI alternator in the January 2022 issue of the exchange, and had completely forgotten about it when a call from our own ERA Treasurer Mike Schroeder (Central Auto Electric, Union, MO) asking me about an issue he had with such alternator. His alternator was installed on a late model Freightliner that had an electronically controlled engine with its related ECU. The issue was that the voltage would creep up and once it got above certain threshold (15V+), the Over Voltage warning light would turn on and an audible warming would go off, alerting the driver of this anomaly. Replacing the voltage regulator did not help as the same problem happened with the new regulator installed.

The alternator Mike had was a replacement provided by the owner and not the original that came with the truck. At best one could guess, we thought perhaps the original alternator used on the Freightliner application did not have a Remote Sense feature and the regulator that replaced it did. That was the cause for overcharging.

Here is a little more explanation about the remote sense: It should be noted that not all 36-SI alternators are equipped with the remote sense feature. The ones that do have the terminal shown in Figure-5. It is basically a

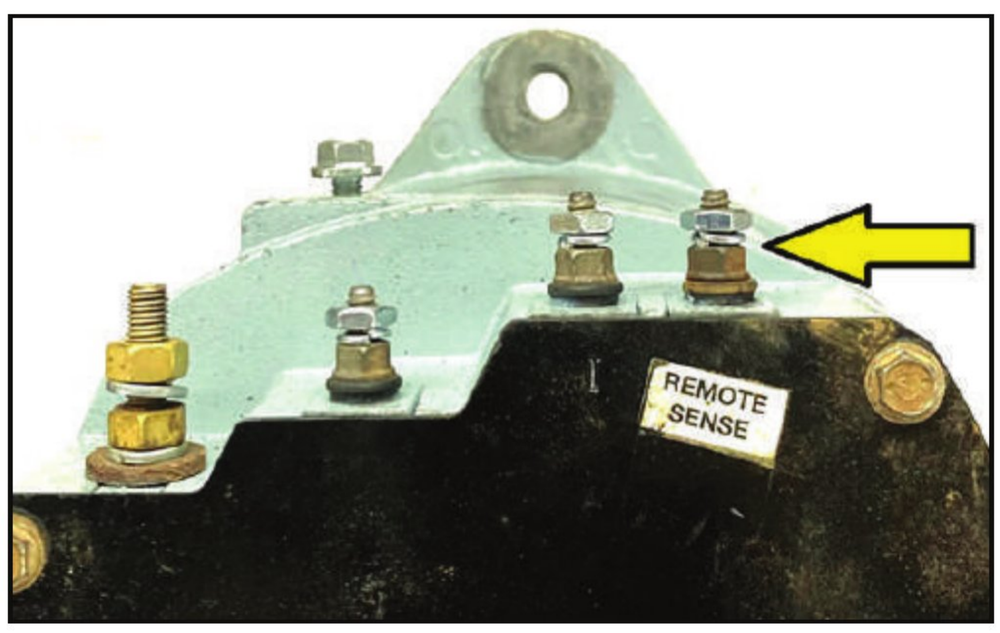


Figure 5 – Remote sense terminal on a 36-SI



resistor network that sits between the positive heatsink and the regulator's sense terminal (*Figure-6*). The part number for this resistor is 10525964, it is a $20 item available at J&N or perhaps others. The input from vehicle's battery temperature sensor conditions this network to vary the sensing voltage of the regulator to a point that trims the alternator output voltage to match the most efficient battery State of Charge (SOC).

On the alternator I was experimenting with, I noticed when there is no connection to the Remote Sense terminal, the voltage would hover around 14.6 and might creep up slightly higher. Once a potentiometer was used and a 25 resistance was applied to this terminal, then the voltage setting of the regulator would creep back to a comfortable 13.8V. The before and after voltages are shown in Figure-7.

The actual Delco Remote Sense resistor and the potentiometer I was using are shown in Figure-8. Just set one up and experiment with it and apply variable values to "S" terminal of any alternator and see how it sets the output voltage.

The conclusion is: using an alternator with Remote Sense feature in an application that does not have associated wiring may cause an over-charging condition. It might turn on the warning light and warning buzzer in more sophisticated applications with electronic diesel engine controls.

I do not have much more information about the details of the Remote Sense and its associated Battery Temperature Sensor circuitry, but I am happy to report this will be addressed during the ERA Technical Conference by the highly qualified Clint Stohler of Dixie Electric whose vast knowledge of 24 years with Delco Remy as a Product Engineers and Director of Field Services is unmatched. I personally will be looking forward to hearing about that.

Well, that's it for this issue. I am looking forward to see many of you in Indianapolis in August. Until then, 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

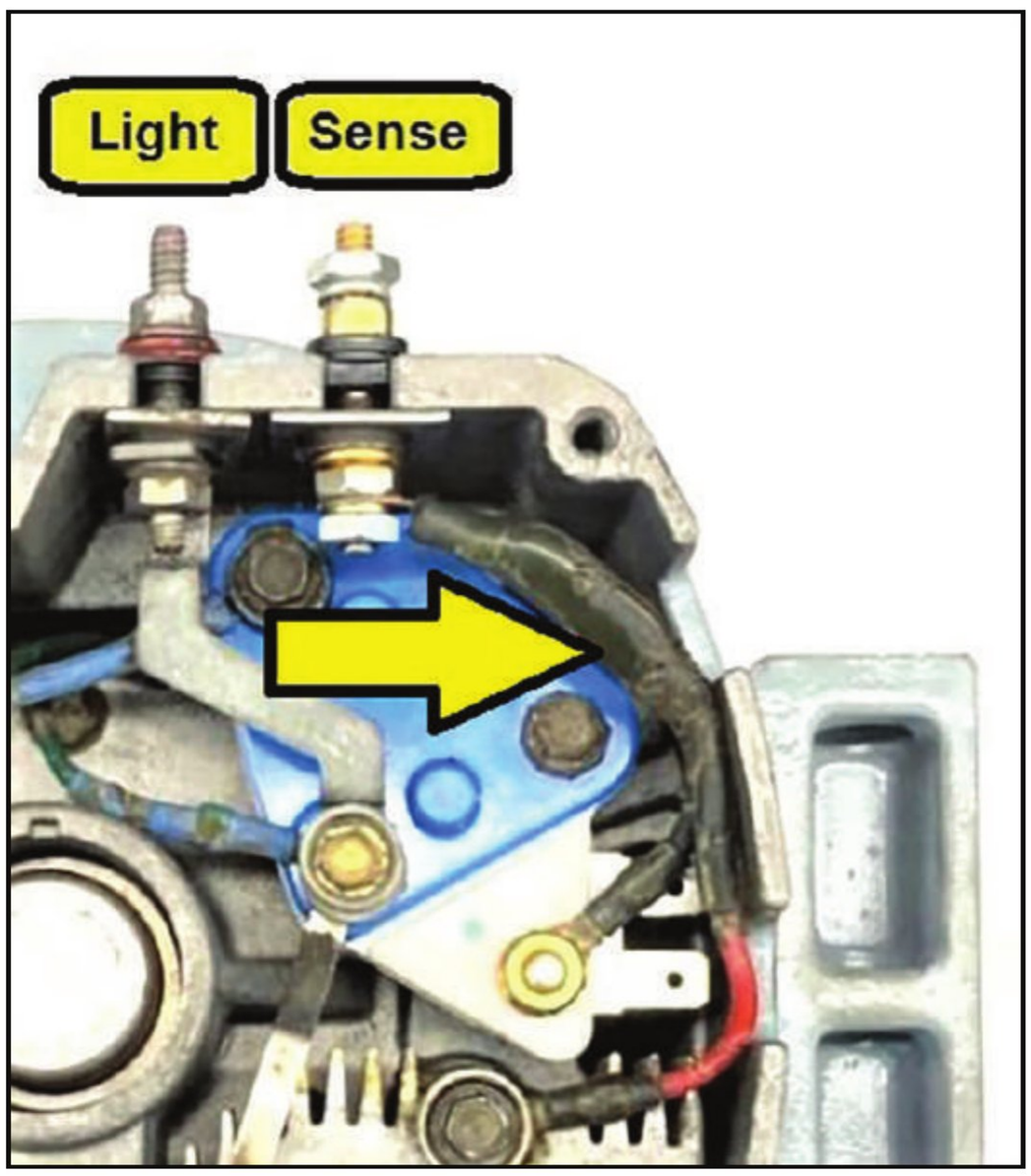


Figure 6 – Remote sense connections to the regulator

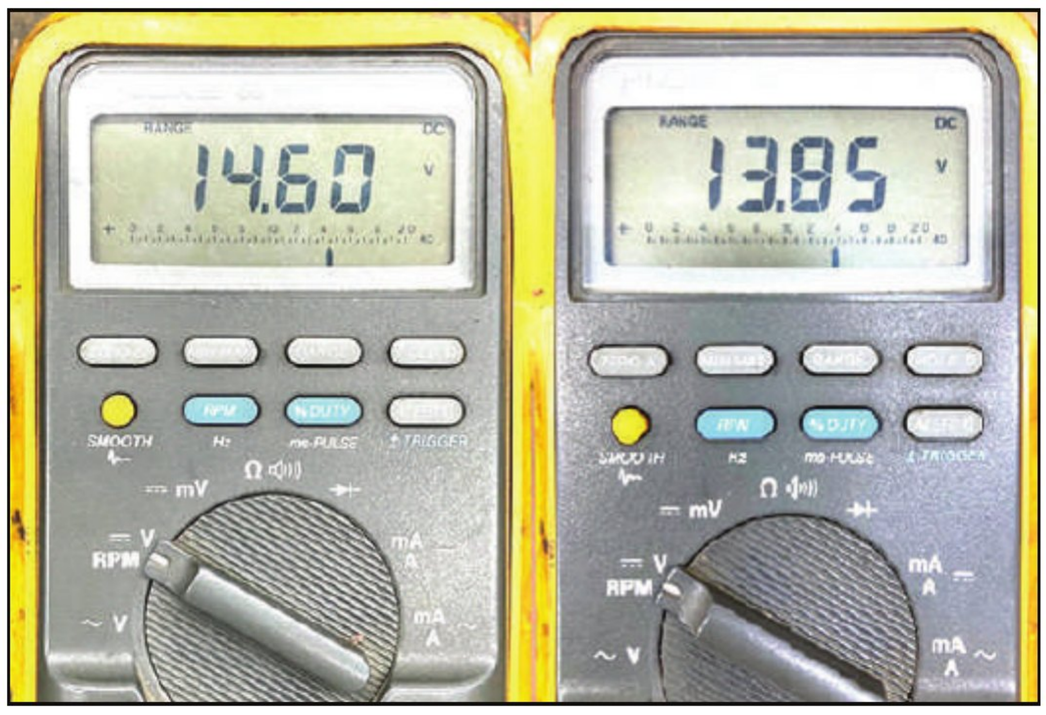


Figure 7 – Resulting voltages with and without resistor

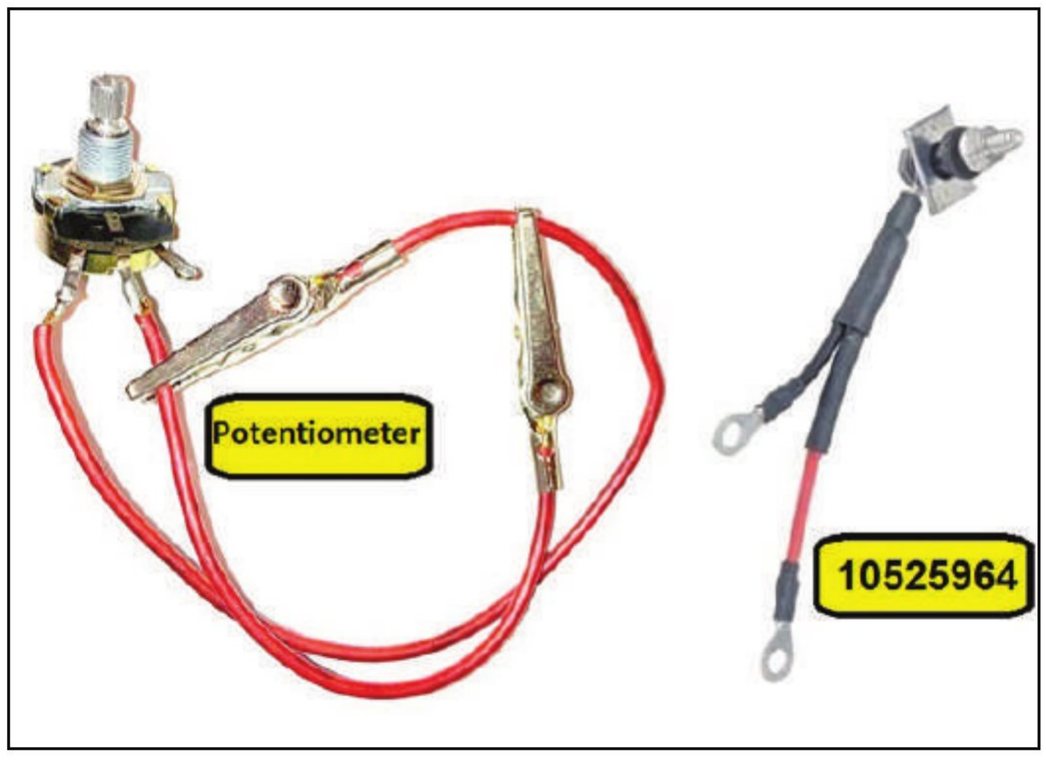


Figure 8 – Remote Sense resistor and 0 – 25 Ω potentiometer



IDENTIFYING A REGULATOR'S TERMINALS
And "It Worked For Me"



BY NATHAN UNGER

This 90-amp two-foot-mount alternator (*See Figure 1*) is from an India-made Mahindra 2538 cab tractor. My colleague Morgan from McDonald Carb and Ignition (ERA member) was able to find a regulator number, 26217751 but we found no cross, and no plug code. The alternator numbers we came up with are: Lucas TVS E007701757B91, SIA120 or 26021722.

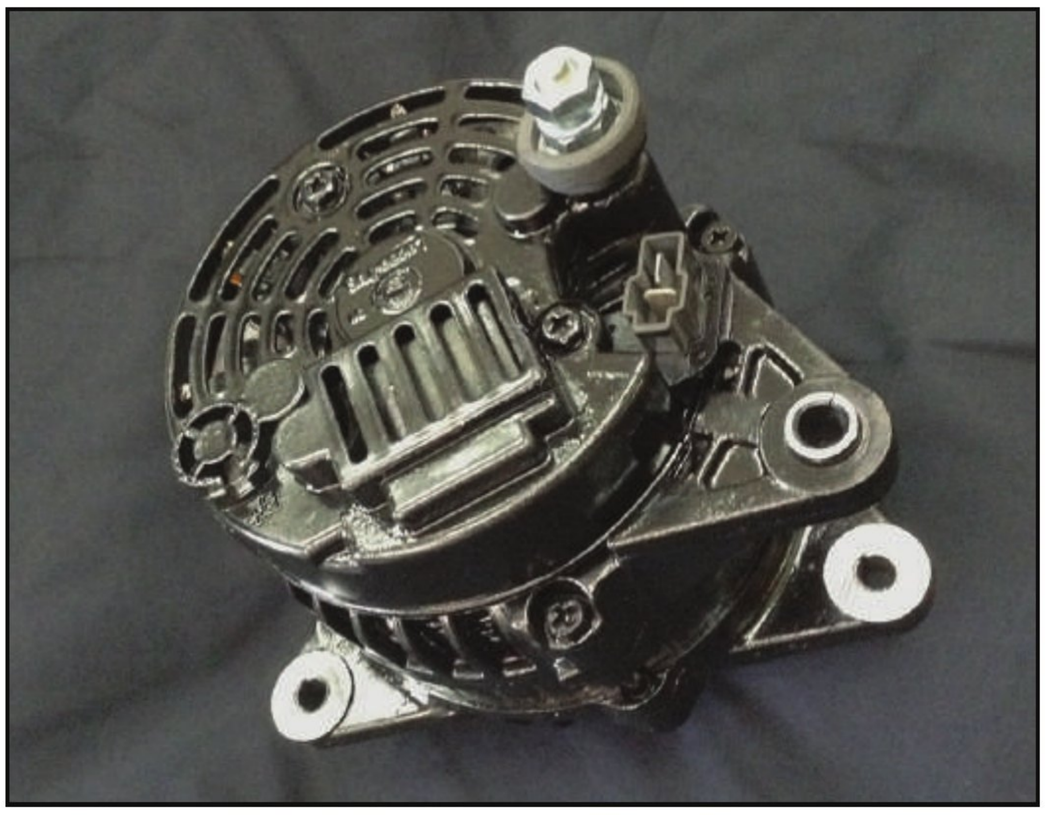


Figure 1 - alternator

Once I had it apart, I tested all the components in the usual way, but the regulator needed some figuring. (*See Figure 2*)

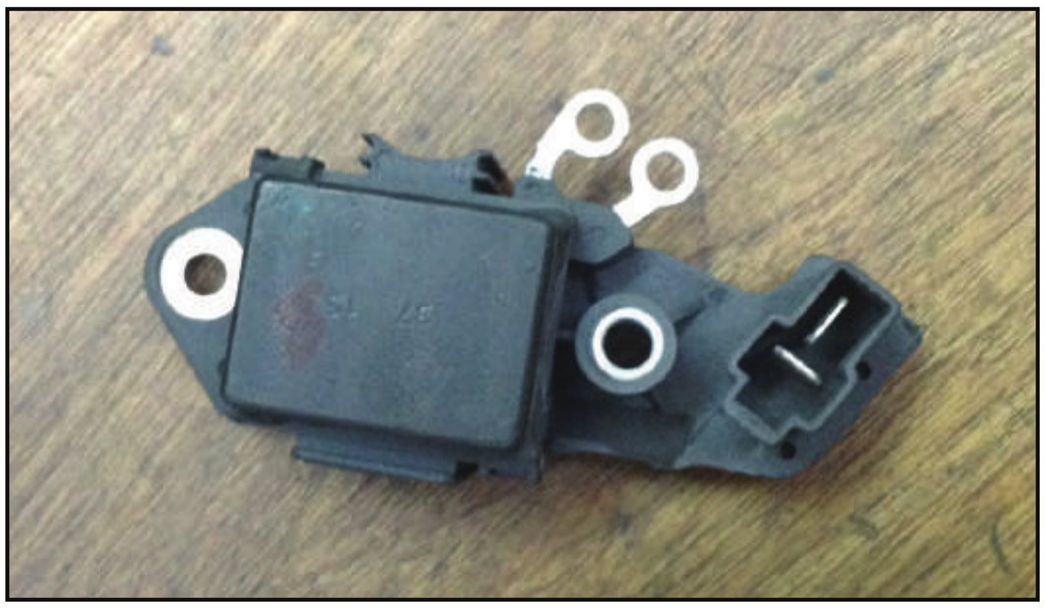


Figure 2 - regulator

First Some Basics

Every regulator has to have at least 3 terminals. One for the ground, one for the positive, and one for the field control, which is considered the output. Actually, most alternator regulators have more than three, but let's start with the basics. We will use an M5-765 or VRVW002. (*See Figure 3*)

Choose Your Savings then
take home from the ERA Conference

SAVE 15%
Preorder
& Prepay

New Test bench as little as
$300/mo

SAVE 10%
Preorder &
Pay at Conference



AD100
COM TESTER



SR200 STATOR-ROTOR-
DIODE TESTER



TSH-016
COM & REGULATOR
TESTER



TSH-012 REGULATOR
LOAD TESTER



ANY CONSOLE OR
BENCHTOP TEST BENCH

JIMCO 2.0
611 E Walnut, Raymore, MO 64083

Call to Order Today! PH: 816-331-1917
EMAIL: JIMCO@JIMCOTEST.COM

IDENTIFYING A REGULATOR'S TERMINALS

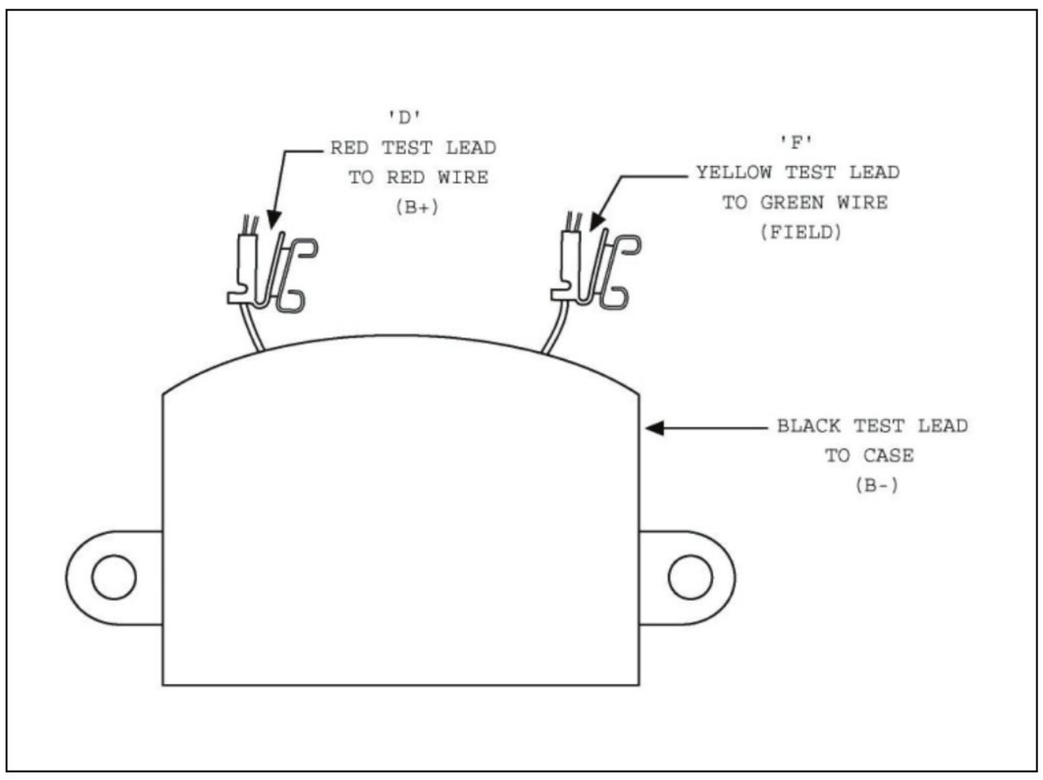


Figure 3 - M5-765

The idea is that if the voltage is too low, then it will turn the rotor field on. If the voltage is high enough, then it will turn the rotor field off. It's like a thermostat that controls the furnace in your home. (Actually, there's more to it, but this gets us going for now.)

Next you have to know if it's A or B circuit. 'A' circuit means that the battery-neg side has the control: 'B' circuit means that the battery-pos side has the control. (This regulator, being a B circuit, will supply current from the battery-pos side to the field when it's on. This means that the other end of its rotor field is grounded outside of the regulator.)

To hook this up, obviously you connect the red to battery positive, black to battery negative, and F to one lead (or one slip ring) of the rotor field, but what do you do with the other end of the rotor field? It could be an A circuit , or a B circuit regulator. As it turns out, for the test I am going to explain, it won't hurt anything to try it both ways.

You will need a test light harness with a 194 bulb. (J&N number GRT-68380 with EIK194 bulb) Every rebuilder should have at least two of these. (You can put them in series when you are working with 24v).

Connect your B+ and B- to a battery that has at least 12.0 volts. The regulator will see this voltage as needing to come up, so it will turn the field transistor on. Then hook up the light from the 'F' to positive and see if it lights up; this will be 'A' circuit. If it doesn't light up, hook the light from 'F' to ground and then see if it lights; this will be 'B' circuit. (*See Figure 4*) It won't hurt the regulator if you don't get it right the first time. In this case, the regulator is a 'B' circuit.

Alternately, if you have a small power supply with variable voltage, you can hook this regulator up to the power supply instead of a battery. Then let's say the bulb lights up, showing the regulator is switched on. Slowly advance the voltage knob so it rises from the 12.0v up to like 16v max. The point at which the bulb turns off again, will be approximately the setpoint of the regulator.

Years ago, I bought the HY3030EX (linear DC power supply) which provides up to 30 amps at up to 30 volts. There are many other options at Volteq.com or other suppliers.

Now back to our unknown unit

Some regulator connections can be deduced from the rectifier. (*See figure 5*) I use my DVOM set to 'diode test' because that will load the circuit a wee little bit and display voltage drop. This is my circuit tracer for the regulator's connections on the rectifier and/or brush holder – if it shows approximately 0 volts (it might show like 0.01 volts or something), we have a connection. Don't get that mixed up with (.0L) "open" in which case it is not connected at all. If we are testing what happens to be a diode or a resistance, then it will show a voltage drop accordingly.

This is how I systematically identify terminals

(It's actually faster than just probing around because this way, you won't accidentally miss something) Make a sketch of your rectifier, regulator, or stator and try each

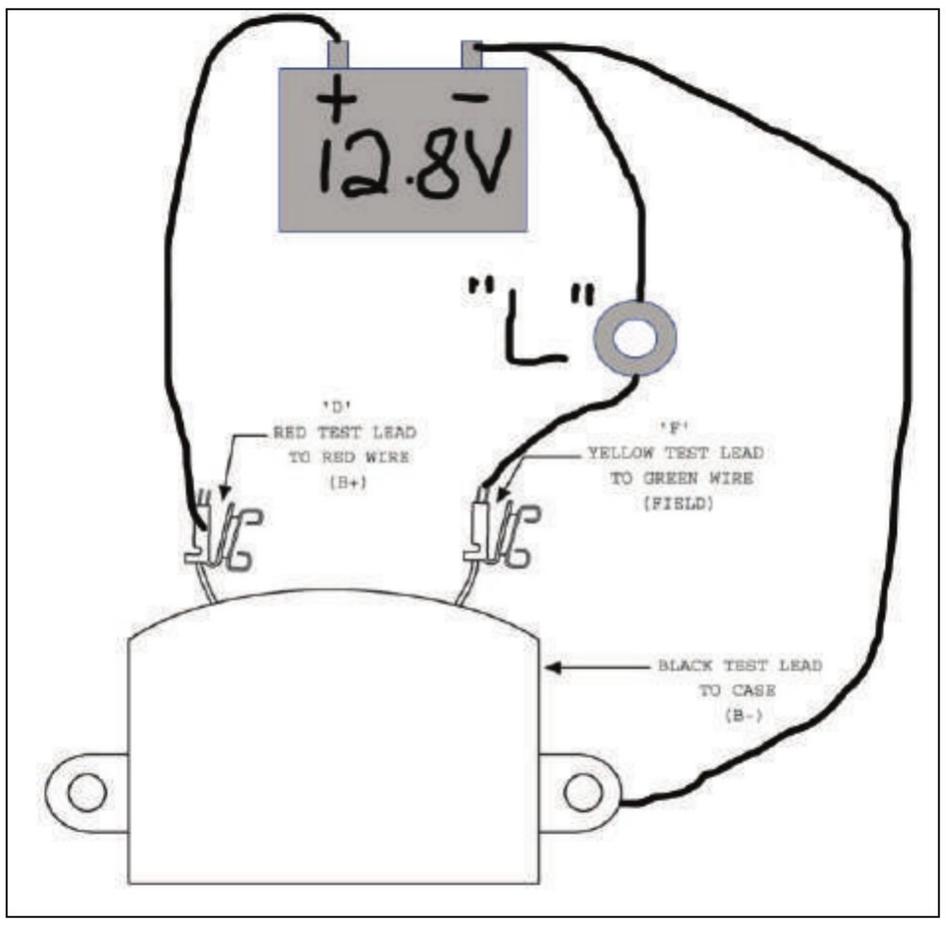


Figure 4 - reg test cct

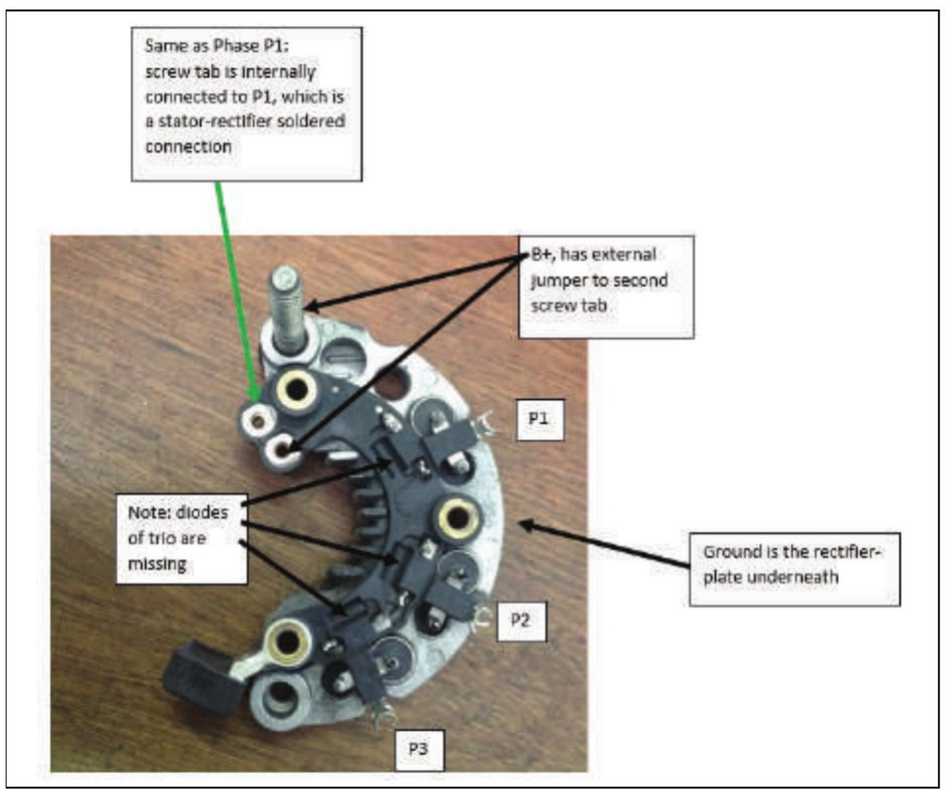


Figure 5 - rectifier

combination: Put your #1 lead (DVOM, diode test mode), on the first connection then try each of the other ones. Then put your #1 lead on the second connection, and try each of the other ones, except the first one. Then put your #1 lead on the third connection and try each of the other ones except the first two. Put your #1 lead on the fourth connection and try each of the other ones except the first three, and so on until you have been to every connection. No need to test them all in the reverse direction as well because you are not looking for diodes this time. At every try, write down your reading. Once you are used to this method, it's not hard to remember. I also like to mark the terminals with a paint-marker.

Another issue is whether the alternator is positive or negative ground. We previously tested the rectifier and it passed. Now hook the 194 bulb from the B+ on the rectifier to the Battery positive. This will limit the current and prevent any unexpected current spikes. Hook the ground plate of the rectifier to negative, just as if it was a negative ground alternator – if it is, all the diodes will block any current from the battery positive. But if the bulb lights up, you know that the diodes are conducting when connected in that way so it must be a positive ground alternator.

I made some assumptions along the way

I do a lot of tractor alternators, and unless it's a high-end tractor, the regulator's voltage set point probably will not be controlled by an onboard computer. Therefore, since it was for a small, inexpensive tractor made in India, it probably did not have a LIN, BSS, or PWM type connection.

The P,L (phase, light) plug was a bit of a surprise. Usually one expects to see an (IGN, L plug code 193) or (S,L Plug code 191) with that kind of a plug. But my "diode-test" continuity showed that the one terminal was hooked up to the phase input tab. (*See Figure 6*)

Now I had to decide on the other plug terminal. Just from experience, it would probably be a wire from the ignition switch (maybe through an indicator light) that turned the alternator on.

This gives us two possibilities: It could be a 'Light' terminal, or it could be an 'IGN' terminal. If I use my 194 bulb to activate it, it would probably activate even if it turns out to be an 'IGN' terminal. If I treat it like an 'IGN' and connect it directly to positive with no current-limiting-194-bulb, then if it turns out to be a 'Light' terminal, I could blow the circuit inside. Better safe than sorry; treat it like a 'Light' terminal and use the bulb.

But since the brush holder is part of the regulator assembly in this case, which brush is which?

I had to do 4 continuity tests:

- Brush closest to rotor: check if continuity to ground, then to positive
- Brush closest to back cover of alternator: check if continuity to ground, then to positive.

I discovered the brush closest to the rotor was connected to ground. The meant the regulator was a 'B' circuit. The other brush would then be on the 'F' as in our M5-765 example above.

It also seemed reasonable that the regulator might need the stator frequency as well as the light to activate it, because many regulators do.

This unknown regulator thus gets connected as follows, based on how it was hooked up at the rectifier, what I measured, and what my assumptions were. (*See figure 6*)

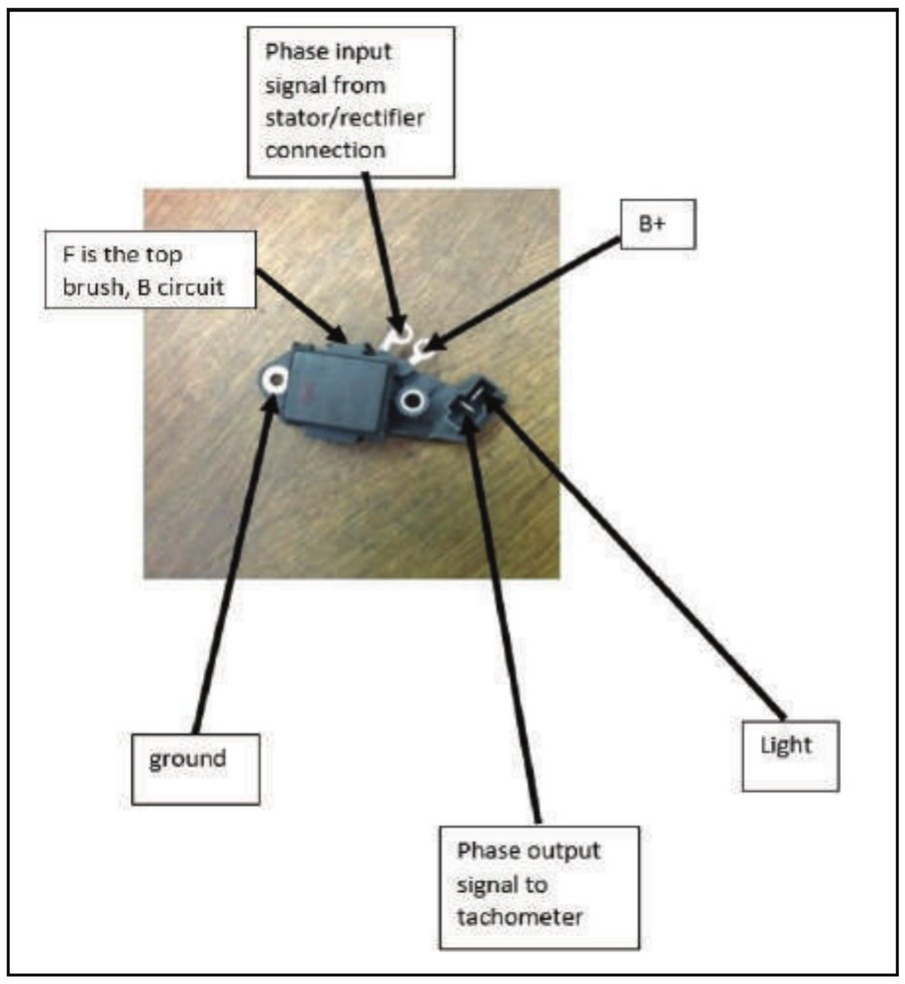


Figure 6 - India reg pinout

Once I knew the regulator connections, then I used my good ol' Transpo VRC101 regulator tester to try it. I selected 'B' circuit. (It wouldn't hurt anything to try it with the 'A' circuit setting – it just wouldn't work.)

I then disconnected the Phase output terminal (which is directly connected to the phase input terminal inside the regulator housing) from the Transpo white wire because I guessed that it activates the regulator (a very common scheme). Sure enough, without that 'P' signal, the 'L' terminal made the light go on and turned the regulator off, confirming my guesses. This is how the regulator lets the operator know that the alternator is not turning or else otherwise not charging – when that signal is not there.

It Worked For Me

One of our ERA members, Seth Lancaster (Anchored Motorworks) posted this idea on the "It Worked For Me" forum. If you, (our reader) have ideas, post them, or let me know and we will see if we can publish your idea too!

As we read in the 'olde' Delco manuals, you were supposed to force the 10MT retainer over the snap ring by putting the flanged thrust collar on top. Then with two pliers, squeeze it like a sandwich. (*See Figure 7*)

IDENTIFYING A REGULATOR'S TERMINALS

Seth encountered a Bosch "flat front" starter where the retainer and snap ring were inside the starter drive shroud. How to get the retainer to capture the snap ring was going to be interesting!

He says, "I used a 1/8"npt brass pipe nipple about 2" long and ground it down so that it would fit inside of the end of the drive. I then tapered the end a little so that it would push the retainer clip in." He could then tap it down with a hammer while supporting the drive. (*See Figure 8*) Alternately, it could be set up in an arbor press.

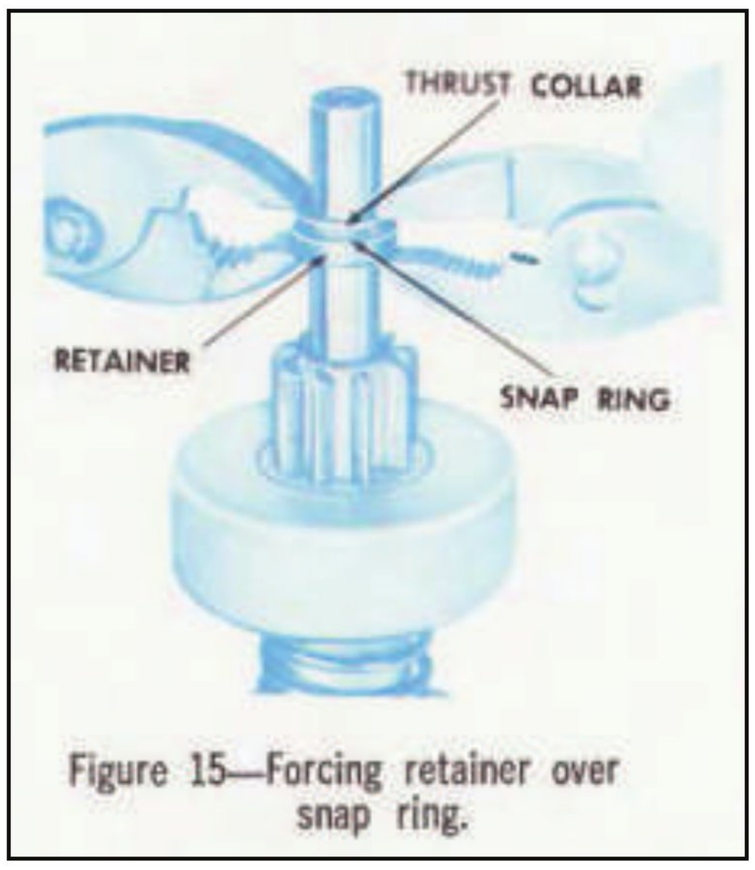


Figure 15—Forcing retainer over snap ring.

Figure 7

Comparing to the Delco 10MT example: the starter drive supports the retainer, while the brass nipple does what the Delco flanged thrust collar did – put pressure on the snap ring to drive it down inside the retainer.

I like his idea of using a brass fitting because it's softer than the steel and may prevent some damage to the starter parts.

I would like to see someone design and sell a set of these for the various shaft sizes on "flat front" starters. It should also include the kinds with the splines, eg Denso.

Many thanks to Morgan McDonald, Seth Lancaster, Jim from Jim's Auto Electric, Mohammad Samii, and Bob Thomas for help with this article.



Figure 8

ONLINE CATALOG

PARTREF.com

50,000 Rotating Electrical Units

Lookup by Vehicle App, Part # or Attribute

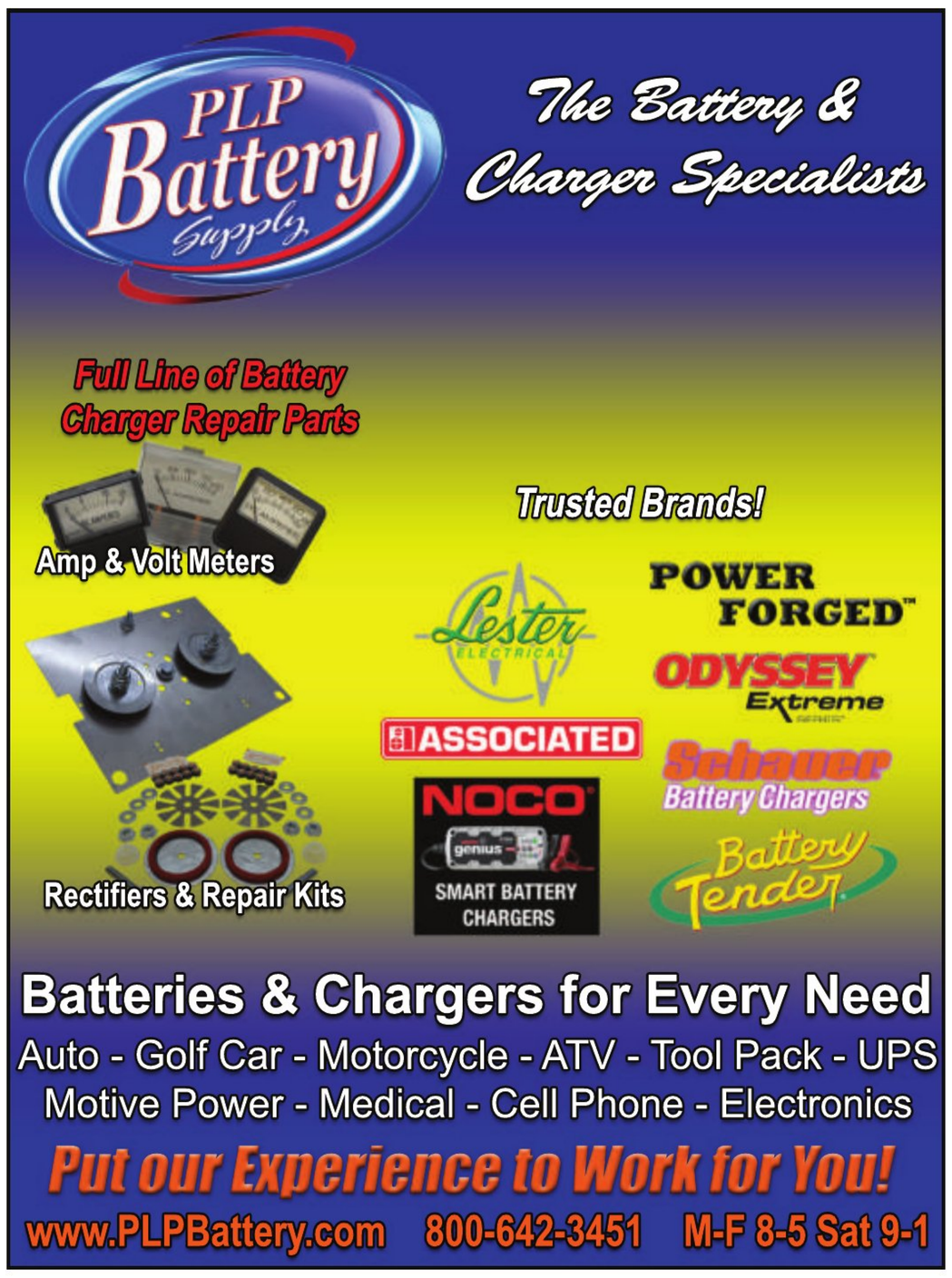
Includes Product, Bills of Material, Specs & more

Offered FREE to ERA members accessed through ElectricalRebuilders.org

Non-Members who want access, please use contact info below

YouTech Group LLC

(866) 285-1292 • dennis@youtechgroup.com



NEED HELP?
It's just a phone call away

1-636-584-TECH (8324)

Tech Help from Mohammad Samii



Do you need help testing an alternator or getting it to work as it should on a vehicle? Call the ERA Tech Help Line and talk to an industry veteran that has over 40 years of rebuilding and on-car experience. Mohammad Samii can help you to find the answers that you need to solve any rebuilding problem. No question is too difficult. "Sammy" has a formidable list of resources at his disposal and is backed up by a line of regular ERA Forum contributors. The ERA is there to help when you need it.

C.C. BATTERY CO., INC.

TRUSTED QUALITY AND SERVICE SINCE 1923

WANT IT BRAND NEW & OEM?

WE'RE YOUR WAREHOUSE FOR

Prestolite electric · QuickCable · Leece-Neville · C.E. Niehoff & Co. Charging and Power Management Systems · Littelfuse · Cole Hersee · MAHLE Driven by performance · Delco Remy · DENSO · Dixie

...& MORE!

REWOUND, REMAN OR NEW?

WE DO THAT, TOO!

ARMATURES ROTORS STATORS

CATERPILLAR CONVERSIONS

D.E. HOUSINGS COMPLETE UNITS

NEED MORE?

WE ALSO STOCK

COMPONENTS DRIVES SOLENOIDS

OR ANYTHING ODDBALL...JUST GIVE US A CALL!

ccbattery@aol.com (800) 531-1038 www.ccbattery.com

3513 Agnes St. Corpus Christi, TX 78405

ERA REBUILDER UNIT LABELS

All labels are printed in bright color on a heavy heat-resistant stock with high-bond adhesive backing. They are laminated with a clear layer that is resistant to oil, gas and water. They will give your products a professional look that will set them apart from the competition. Labels are affordably priced and can be ordered right off of the ERA website or by calling the ERA office at: 636-584-7400. All prices include free shipping.



REBUILT BY A PROUD MEMBER
Size: 1" diameter
Sold in sheets of 81
$16.00 1 sheet
$13.00 6 sheets or more



WATER DAMAGE MAY VOID WARRANTY
Size: 1.5" x 3.0"
Sold in sheets of 18
$11.00 1 sheet
$9.00 6 sheets or more



DO NOT STRIKE
Size: 1.5" x 3.0"
Sold in sheets of 18
$11.00 1 sheet
$9.00 6 sheets or more

FREE SHIPPING WITHIN THE U.S.



START ONLY FROM SEAT
Size: 1.5" x 3.0"
Sold in sheets of 18
$11.00 1 sheet
$9.00 6 sheets or more

REBUILDER'S MARKETPLACE

PARTS, SUPPLIES, EQUIPMENT FOR SALE

Vintage starter and generator field coils. Ace, Autolite, IPM, Preferred Electric and Vulcan part numbers. Listed in Excel spread sheet to send via email. Call 860-528-8174 or email ken@guyselectric.com

---

Battery charger repair parts for all brands, batteries and battery chargers for all applications. PLP Battery Supply 800-642-3451 www.plpbattery.com

---

Have you had an experience or learned something new that you'd like to share with other members? Call or text Bob Thomas at: 904-673-7301 or drop him an email.ere.bobt@gmail.com.

WANTED rebuildable Military electrical cores, any quantity, Prestolite 60 amp alts, Leece Neville 24V starters, CE Niehoff 24V alternators, Bendix 650 amp oil cooled alts, 300 amp Teledyne generators, any quantity, send your list or if not sure send pictures, and we can identify. 305-633-1524 or hy@cmearma.com

PARTS, SUPPLIES, EQUIPMENT FOR SALE

3500 AND 3599 CORES. Contact Larry at Hagemeister Enterprises. 800-944-0494

BUSINESS FOR SALE

Retiring! WELL ESTABLISHED, turn key starter and Alternator Business in IDAHO. Includes units, parts, equipment, and customer base. Shop and apartment available for lease. idahorebuilder@gmail.com

SERVICES

R&R ALL STARTER DRIVES. North Atlantic Starter Drive, 741 Broadway, Pawtucket, RI 02861 800-822-2735 Email: popsy26@verizon.net

MISCELLANEOUS

HIRING: Looking for a change but want to stay in the industry? Join our growing Sales team! Please email info@regitar.com for more information.

EXPERIENCED REBUILDER: Kaestner Auto Electric in Waukesha, Wisc. looking for starter, alternator, and generator rebuilder. Emphasis on HD and Industrial. 3-5 years experience required. Send resume to steve.kaestner@yahoo.com.

ADVERTISING: If you'd like to submit a classified ad, email Stephanie at smsdesigns@hotmail.com. ERA members receive the first 25 words free. It's an ERA benefit!

NEW ERA MEMBER BENEFIT
from
LESTER
CATALOG COMPANY
Effective January 1, 2019
Lester Catalog is offering a $100 discount for an annual subscription to ERA members
lestercatalog@waiglobal.com
or call
1-800-877-3340
Contact your customer service representative at WAI Global to request your discount upon purchase or renewal of Lester Catalog
Electrical Rebuilder's ERA FOUNDED 2001 ASSOCIATION
Members Helping Members

MERCHANT LYNX SERVICES
A proud merchant services provider for the ERA
MEMBER OF ERA Electrical Rebuilder's Association
A PARTNER YOU CAN COUNT ON
- Virtually eliminate credit card processing fees
- Get contactless payment solutions
- Waived application fees & program fees for ERA Members
- Award winning US based 24/7 Customer Support
- Family owned & operated for over 26 years

Steve Kyhm, ERA Account Manager
917-565-7246 | steve.khym@merchantlynx.com
www.merchantlynx.com

INFORMATION YOU NEED — AT YOUR FINGERTIPS!
ERA
Apptrak Online
CREATED BY A REBUILDER FOR REBUILDERS

- APPLICATION LOOK-UP
- UNIT CROSS REFERENCE
- PARTS BREAKDOWNS
- CLEAR UNIT PHOTOS & SPECS
- UNIT SUBSTITUTION INFORMATION
- UP TO DATE INDUSTRY PRICING
- KEEP YOUR OWN NOTES

$395/YEAR - INCLUDES 2 USERS PER BUSINESS
$249/YEAR - SPECIAL PRICE FOR ERA MEMBERS
Join the ERA Today and Save!
TRY BEFORE YOU BUY! 2-WEEK FREE TRIAL FOR REBUILDERS
Sign Up Today! 360-255-5990 info@apptrak.com

ERA EXCHANGE
PO Box 906
Union, MO 63084
CHANGE SERVICE REQUESTED

PRSRT STD
U.S. Postage
PAID
Permit No. 137
Washington, MO
63090

JULY 2022

NEED HELP? It's just a phone call away. 1-636-584-TECH (8324)



The ERA ... We've Got It All Online For You!

Books • Forums • JIMCO Manuals • Wiring Diagrams
DVDs • Technical Library • Training Videos • Supplier Sources
Equipment Manuals • Forms • ERA Exchange

WE'RE HERE FOR YOU 24/7
www.electricalrebuilders.org

WAGNER

RED, WHITE & VROOM

ONLINE WEB ORDERING
BILL OF MATERIAL LOOKUP
USA FAMILY OWNED SINCE 1976



TOLL FREE 800-345-5927

WAGNERALT.COM