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Hyundai/Kia "C" Terminal & Profitable Antiques

PERMANENT MAGNET MOTOR
Is It AC or DC?

IMPORTANT 2020 TRADE SHOW INFO
See Page 3

E•R•A TECH TIP | Sprinter Van No Charge

A WORD FROM THE PRESIDENT
Trade Show Rescheduled



By the time you receive this issue of the ERA Exchange, it will be at least four weeks since we made the decision to cancel the March 26 -29 weekend of the annual ERA trade show because of the worldwide coronavirus (COVID-19) pandemic. With the Governor of Ohio instituting ban on public gatherings of 100 people or more, it was like a Delco 50MT being lifted off our shoulders and it became a no brainer.

After 3 days of communicating with the Executive Board and Trade Show Committee members, the show's Holiday Inn host hotel and the entertainment venues which were already contracted, it was decided to reschedule the 2020 ERA Expo to the weekend of June 11–14 2020. The complete Executive Board was in agreement that this option was the best we could do at this point in time. It was agreed by the Executive Board that cancelling the 2020 ERA Trade Show altogether would be financially detrimental to the future of the ERA.

With the continued loss of membership due to retirements, the ERA's annual trade show has become a necessary yearly event for the association to maintain the current level of membership benefit programs (Technical Helpline, Website, Forums Website, and the monthly ERA Exchange magazine).

A loss of the income that the trade show provides would cause a drastic financial burden to the association that would cause a large reduction or elimination of most or all of those benefits. This re-scheduling of the 2020 ERA Trade Show Expo gives the association a second chance. Unfortunately there will be no chance for a third strike.

Hopefully our country can get a grip on the COVID-19 pandemic and our country can return to some sort of normalcy. I look forward to seeing all of my fellow ERA members in Cincinnati, Ohio on the weekend of June 11 – June 14 2020. In closing I express my deepest concern for the health and success of all members along with their family and friends. I believe with the help of the person upstairs we will get through this pandemic. Please stay safe and healthy.

Ken Plourde

NEW ERA MEMBERS

Miller Welding
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Trois-Rivieres, Quebec, Canada

Uricchio Services
Suffield, Connecticut

American Magneto & Starter Service
Batavia, Ohio

Phillip Hulsey
Cornelia, Georgia

ABOUT THE COVER
A single relay, early Chrysler mechanical voltage regulator.

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INDUSTRY NEWS

& ANNOUNCEMENTS

URGENT!

Due to the circumstances beyond our control concerning the Coronavirus (Covid19) outbreak nationwide, **the ERA Trade Show has been rescheduled for Thursday, June 11th thru Sunday, June 14th, 2020.**

Your registrations will carry forward to the new dates.
We are not offering refunds to the event.

There will be some revisions to the event schedule that will be forthcoming. We will make those announcements as soon as the information becomes available.

Holiday Inn has also agreed to reschedule the event. Your room reservations have been carried forward to the same days in June that you had reserved in March. **You only need to call the reservation department if you are wanting to alter or cancel your room reservation!** 888-294-5067

J&N is onboard with us to still have the tour of their facilities! The American Sign Museum has also rescheduled along with the ventriloquist for our entertainment!

The ERA office will be contacting you about your registrations as soon as all the schedule changes are made and finalized.

If you have not registered to attend at all yet, we will offer the same early registration discounted fees until May 15th, 2020. Please join us at the show!

AUTO ELECTRIC CORNER —
Hyundai/Kia "C" Terminal & Profitable Antiques



BY MOHAMMAD SAMII

In the June 2018 issue of the Exchange, I wrote about an unusual unit called a Cougar/Martin truck vibrator, which is a 10-MT looking DC motor with a strong counterweight mechanism, used to shake the bed on dump trucks to empty out the remaining gravel, crushed concrete, sand, salt, or anything else that a truck might haul (*see Figure 1*).

Testing the device is a challenge as it can generate a force of 3200 pounds at 4000 vibrations per minute (VPM), thus free running it on the work bench with a bank of batteries is not feasible. It can literally shake the bench apart and throw around anything that is on the bench or partly attached, including the vise holding the unit…!

To digress a little; I do not allow customers in the service or rebuilding area of the shop, unless accompanied by me or one of our guys to do our "*Show and Tell*" thing…! That is, we set up any alternator that the customer claims did not work, and show him that it indeed is working or sometimes hand him a printout which eliminates any doubts. In the case of the starter/cranking motors, we set it up on the Crumbliss machine, connect the cables, power it up, and hand the customer a connected remote starter push-button switch. After a few tries they see that it runs every time and there is no clicking, they are handed the unit back to then go find the real problem.

Now back to our truck vibrator motor. The last one we rebuilt was for our local airport's snow removal equipment. It connects to the blade of their large plow, and when activated, it shakes any stuck snow off to clear the blade for a next pass. After a few weeks, during a snow storm, they called and said it was not working, and I asked them to

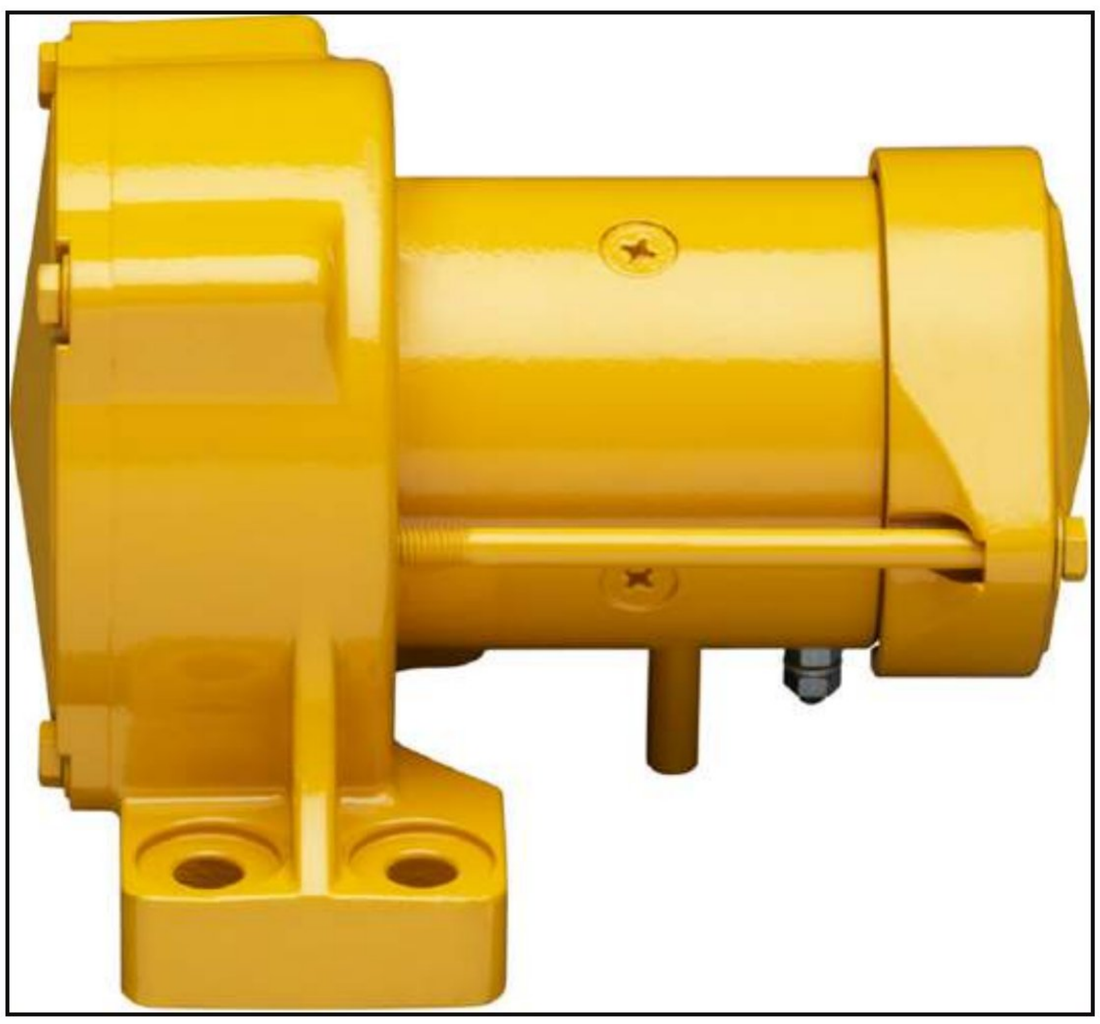

Figure 1 – Cougar/Martin Model DC-3200 Truck Vibrator



bring it back to see what might have gone wrong…if any.

It was brought in, inspected, and we found out that with exception the very poor condition of the +B stud on the motor, there was nothing wrong with it. Now we needed a set it up to check it out and do our "*Show and Tell*" for their maintenance man to see that it was working…but how…?

The solution we came up was to use our shop lift. We lowered the lift all the way down to keep the motor secure against the concrete floor and wired it up to a battery with the some cables, a Ford starter power relay, and our push-button switch. In its operation for a few seconds, it still vibrated the whole lift very severely, even with one my guys standing on the lift's leg, but it was enough to convince the customer who was operating the push-button that it worked, and perhaps they did have other problems on the snow-plow. This is not necessarily an approved method of testing this device, but as a last resort, it was the best we could come up with (*see Figure 2*).

Old, Strange, Antiques, but Profitable…!

One of the unique units that we occasionally run into was this item (*see Figure 3*) that was brought in for an overhaul. It was made by Delco-Remy and the tag had a part number 9910 stamped on it which I do not believe it is in any catalog as far as I could research. The familiar "A" and "F" marks on it seemed to indicate it was a generator but it was not. It actually worked liked a motor, as the operating principles of the two are nearly the same.

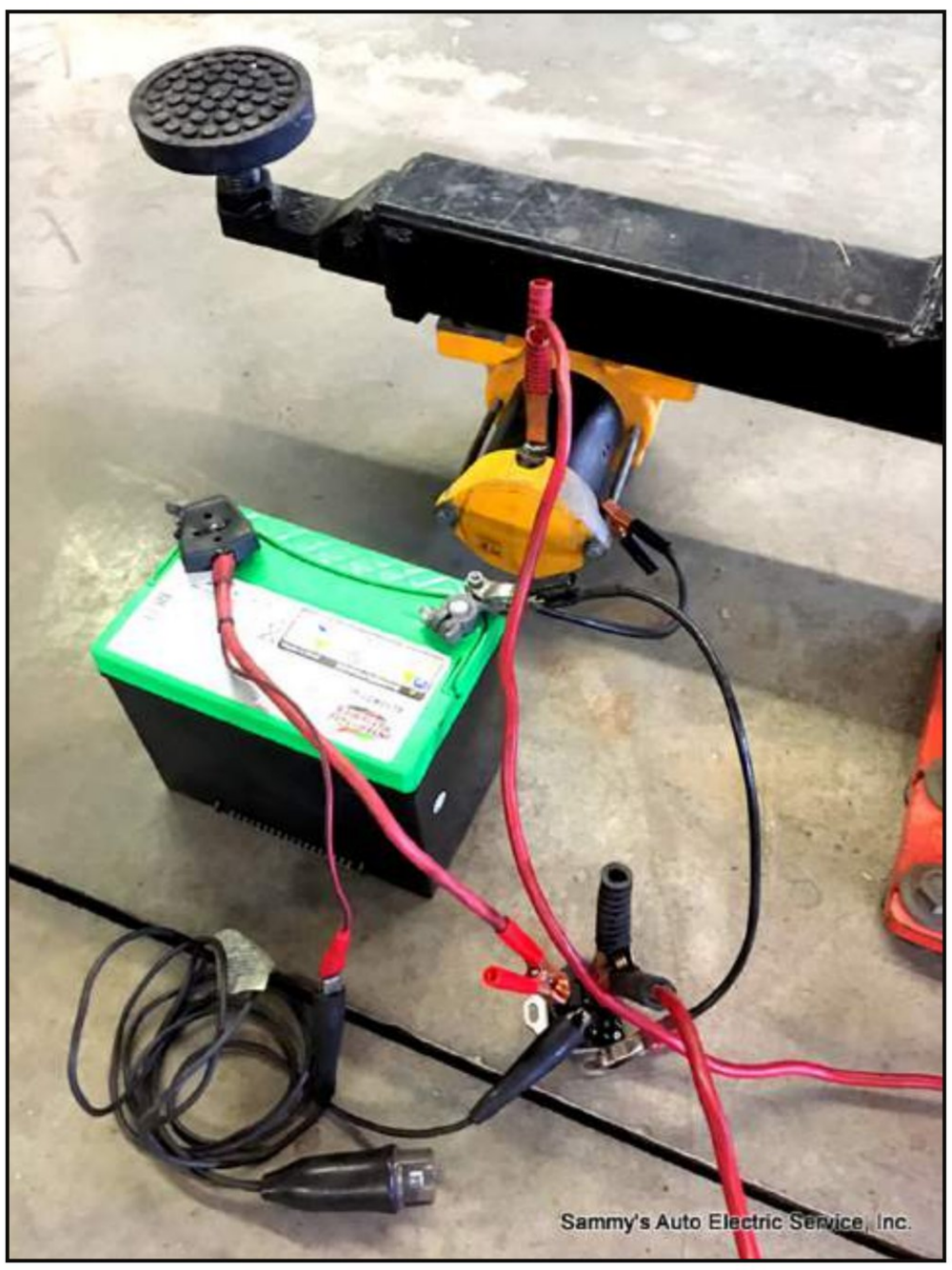

Figure 2 – Holding the vibrator down for testing

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Figure 3 – Packard's Torsion Level Ride Lift Motor

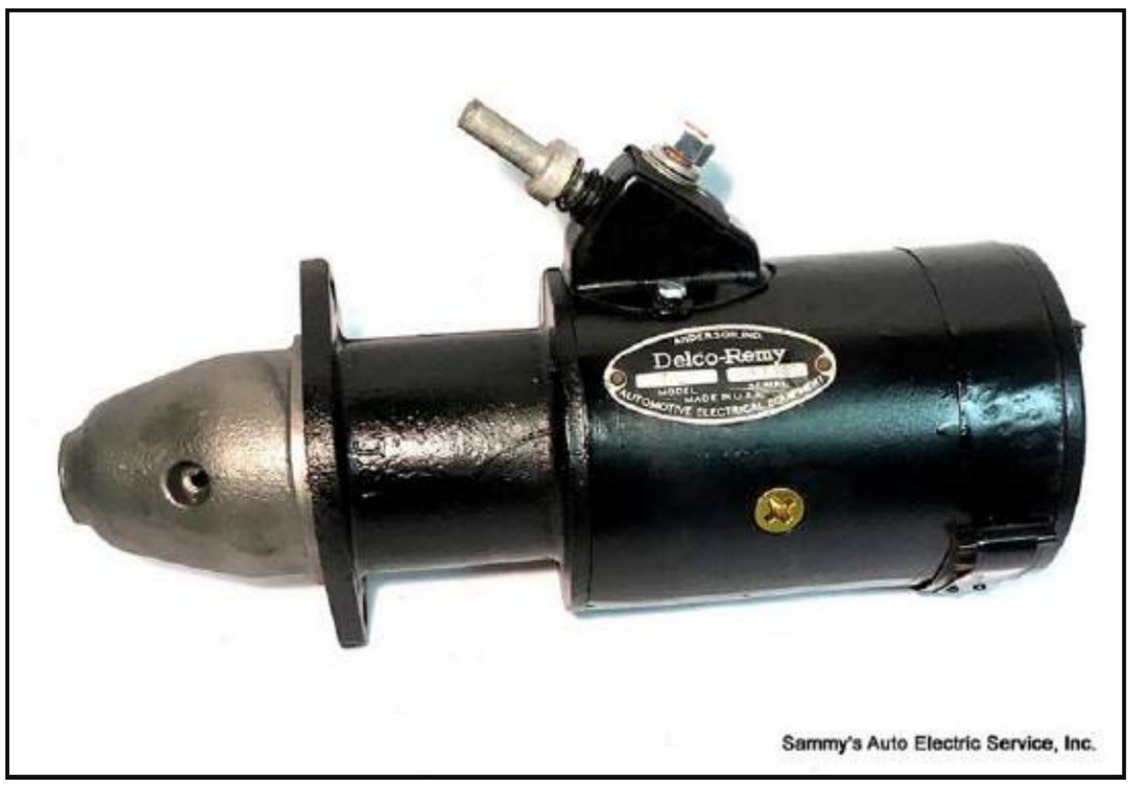

Figure 4 – Delco 714L starter for a 1929 Chevrolet

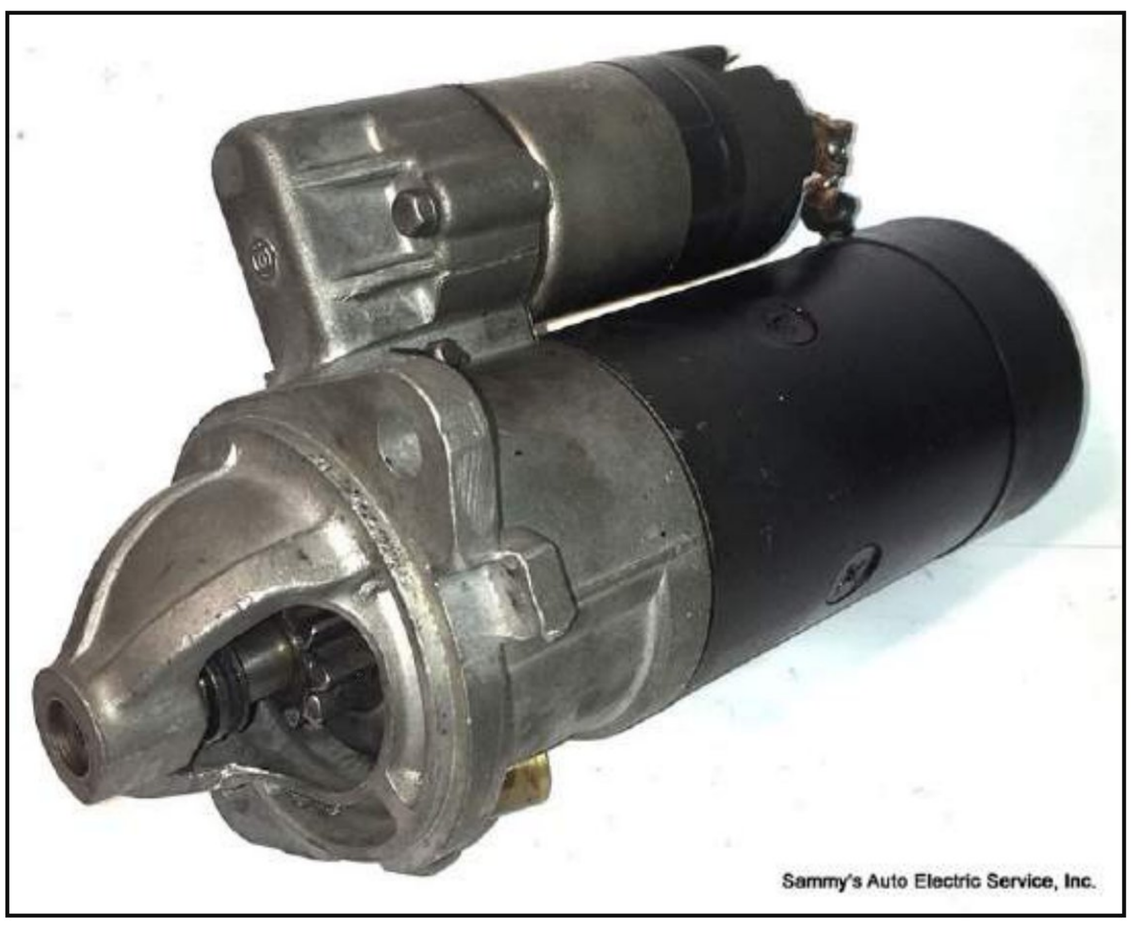

Figure 5 – Hitachi starter for 1970 Datsun 1600 Roadster

In 1955 and 1956, Packard Motor Company that was combined with Studebaker at that time came up with a new method of ride control called Torsion Level Suspension which was a unique design it its day, and boasted the smoothest ride that could be provided at that time. It appeared on the 1955 and 1956 Packard Caribbean models and some others. Explaining the system is beyond the scope of this column but a 9-minute vintage video on You-Tube by the Detroit Historical Society named "*Out of Future (1954)*" can be easily accessed and watched to get the idea.

Included in the system as is shown in last the part of the video is the introduction of Torsion Level Ride, which was a system that compensated for the passenger weight in the rear seats and actually lifted the car to a level position so the dynamics of the smooth ride did not change with back seat load. It was an early attempt at a level ride control system.

That was the purpose of the motor you see in the picture. It is connected to a very complex system, and as soon as the passengers were loaded, within a 7-second time period, it would raise the tail of the car via the torsion bar suspension mechanism, without the engine running or even the ignition switch being turned on…! A very novel idea for the time with the available technology of the day, requiring a few limit switches, relays, and timers.

The unit was brought to us by a long-time customer of ours who owns one of the largest Packard collections (12-15 cars) in the country, two or more from each decade they were built, all in well-maintained, clean, and running condition. This 1956 Caribbean was their latest acquisition.

To complete our list of antiques and rare units for this month, we also had this Delco 714L starter (*see Figure 4*) that was for a 1929 Chevrolet car, and an early Hitachi starter for a 1970 Datsun 1600 Roadster (*see Figure 5*). Both vehicles were later trucked to antique car auctions, the Chevy to Iowa and the Datsun to the famed Mecum Antique Car Auction in Phoenix, Arizona. The owners were very happy to now have overhauled original units, particularly the Datsun's owner who could find no original starter anywhere, no matter how hard he looked.

Testing Hyundai and Kia Alternators with "C" Terminal

There are many questions that come through the ERA Help-Line involving the testing instructions for certain alternators and as to what needs to be connected to which pin of the regulator. Some are easy to answer but there are others that need additional test boxes and more explanation.

Later models of alternators used on the Hyundai and Kia lines of automobiles have a 3-terminal plug with pins that are identified as "**C – L – F**". The

function of the "L" and "F" pins are the conventional "Light" and "Field Response", but the "C" terminal function is a little different (*see Figure 6*).

These alternators have a variable voltage set point that is determined by the PCM. Very similar to Ford's newer charging system that was partially explained in last month's issue, and much more like GM's RVC that has been around for many years. This is a new design trend in the charging system where the PCM can lower the load on the engine by lowering charging voltage and thus lowering amperage. The purpose is mainly to improved fuel economy and lower emissions even if the effect will be minuscule.

However I am not aware of any specific test box made to apply the needed signal to the "C" terminal of such alternators. But we have discovered that by using our existing test boxes that are used for testing GM's RVC alternators, we are able to test a typical Hyundai/Kia alternator, such as 11493 unit…but it must be done in reverse…! Some Nissan/Infinity alternators like the 11341, test the same way, but their C terminal is on a different pin (*see Figure 7*).

That is to say, when connected to such alternators, if you turn the control knob of the test box for a higher voltage setting, you will see the alternator's voltage go down, and vice versa, if you turn the knob toward the lower voltage setting, the alternator output voltage will go up. This is somehow called Reverse RVC in some aftermarket regulator specification sheets.

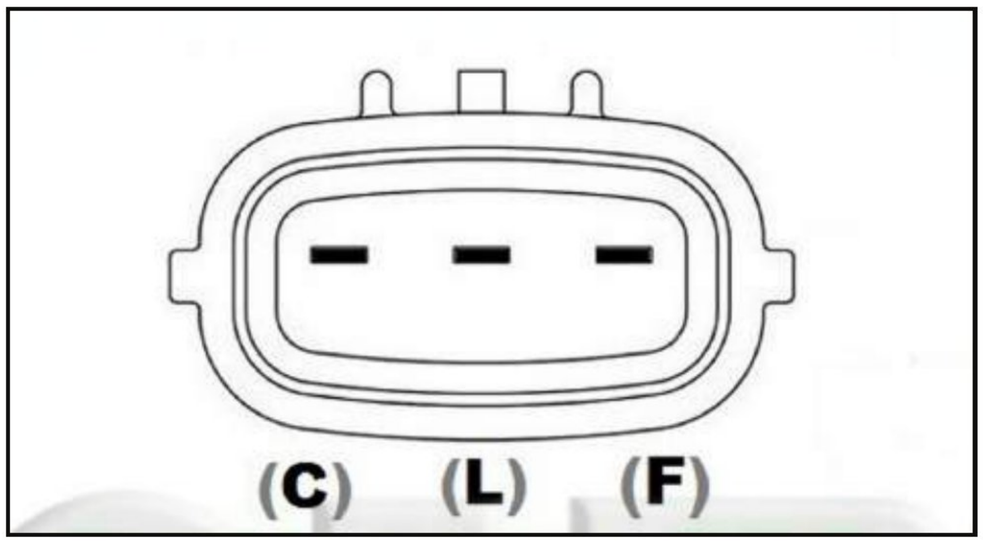

Figure 6 – Plug Code 468 used on Hyundai and Kia

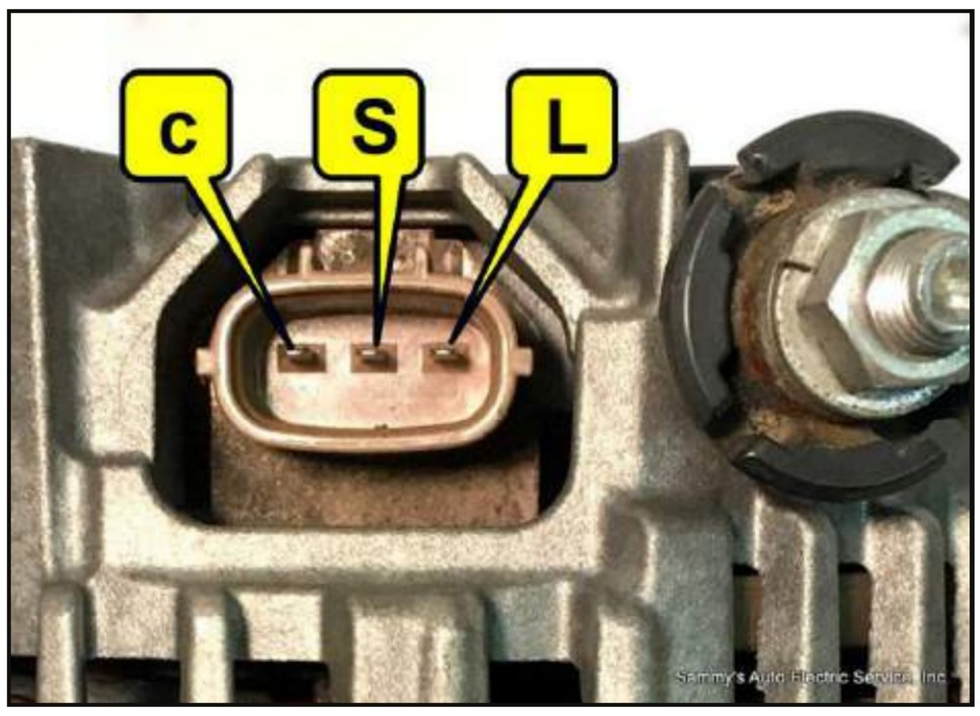

Figure 7 – Plug Code 9151 used on Nissan/Infinity



AUTO ELECTRIC CORNER

Using our WAI-1000, when the voltage knob is about 13.3V, the Vset and Vread numbers are the same. As you turn the knob clockwise to raise the Vset figure, you will notice the Vread (top number) and the alternator output drops, and as you decrease it, will notice that the alternator output increases. Short of having a specific test box, this is an easy way to determine if the alternator will respond to the PCM signal, thus qualify it for installation, that in some case are very much labor intensive (*see Figure 8*).

Well, that's all for this issue. Until I see you again, 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 8 – Testing a PWM alternator for voltage response, using WAI-1000

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ERA TECH TIP — Sprinter Van No Charge



BY LARRY HAGEMEISTER

Here is one that we came across that was a real problem to locate. If you ever run into this in your shop, you will know where to look first. The vehicle was a 2007 Freightliner van with the Mercedes diesel engine. These vans were also sold as Dodge Sprinter vans. This vehicle was a service van with over 200k miles on it. The alternator had been changed before and it was brought in to us for not charging.

The group 49 battery was so dead that it took 2 days to bring it back up. We found that we were not getting any battery power to the B+ terminal of the alternator. The 4 gauge alternator cable was routed from the alternator on the lower passenger side of the van, under the engine and tied into the 2 gauge starter cable at the solenoid. The 2 gauge cable went from the solenoid to the battery, which was located under the driver side floorboard.

This was most definitely a factory made cable. While following the cable under the engine, between the oil pan and cross member, we found a heat shrink looking wad of something. After pulling it out, this is what we found (*see Figure 1*), a melted 300 amp mega-fuse. This looked to be a non-serviceable positive battery cable covering both the starter and the alternator.

We cut the 4 gauge cable just past the burned area near the mega fuse, and repaired it with an inline 300 amp mega fuse and a new cable leading back to the alternator. The mega fuse holder was spliced into the good section near the solenoid. This allowed us to restore the factory cable without touching the 2 gauge cable leading back to the battery.

Once that problem was solved, we found that the alternator, Lester 11306 (*see Figure 2*), was still not working. It turned out that the clutch pulley was worn out and not locking up completely, even though it looked like it was spinning normally with the engine running. We changed the whole alternator any way because of the abuse it had been through.

Once the location of the mega fuse was known, it was a fairly straightforward and profitable repair.

Larry Hagemeister is the owner of Hagemeister Enterprises Inc in Lebanon, OR. You can reach him by email at: hei@usa.com or by phone at: (541) 259-2262.



Figure 1 – Burned out original 300 amp mega fuse.



Figure 2 – 180A Valeo alternator used on many Sprinter Vans from 2007 to 2015.

PERMANENT MAGNET MOTOR
Is It AC or DC?



BY BOB THOMAS

When an old friend called last month to ask if I could work on an AC motor for him, my answer was "maybe", not knowing much more about the motor.

It was used on a portable boat lift, a contraption of which I had never seen or hear of until he called (*see Figure 1*). The large wheel on the left in the photo is normally used to manually raise and lower the boat on this type of lift, which has been out of production for over a decade. But his lift, bought second-hand, had been modified by the previous owner. The manual wheel was removed and replaced with a motor that was powered by household electric current – 120 volts AC.

I was informed that prior to buying it, he had watched the previous owner plug the motor into a standard 110 volt outlet and run the motor in both directions using a toggle switch. Yet after he got it home, he had been unable to duplicate the same results. The original owner has somehow attempted to "clean up" the wiring in the meantime. Both my friend and the seller were at loss to figure out why it quit, and wanted me to determine if it was wired correctly or if it was, which part had failed. His natural assumption was that some of the wires had been re-connected wrong and/or the motor had been somehow damaged as a result.

The motor, from the photo in his email (*see Figure 2*), was obviously a permanent magnet type attached to a gear reduction box with a sprocket on the drive end. There was nothing on the motor to identify its manufacturer or its part number and no sign that there ever was. I suggested over the phone that he try putting 12 volts DC directly to the motor as a test – feeling that it could not hurt a motor designed to operate on 120 volts. I was also already suspecting that it was really a DC motor, simply because it appeared to have permanent magnets for the field. The response back was that it turned, but slowly with very little torque. He could stop it with his hand. When polarity was reversed it did the same thing but in the opposite direction.

The switch (*see Figure 3*) was a standard momentary three-position DPDT type, commonly

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Figure 1 – The portable boat lift being towed across a lake on plastic drums.



Figure 2 – The permanent magnet 120 volt gear motor.

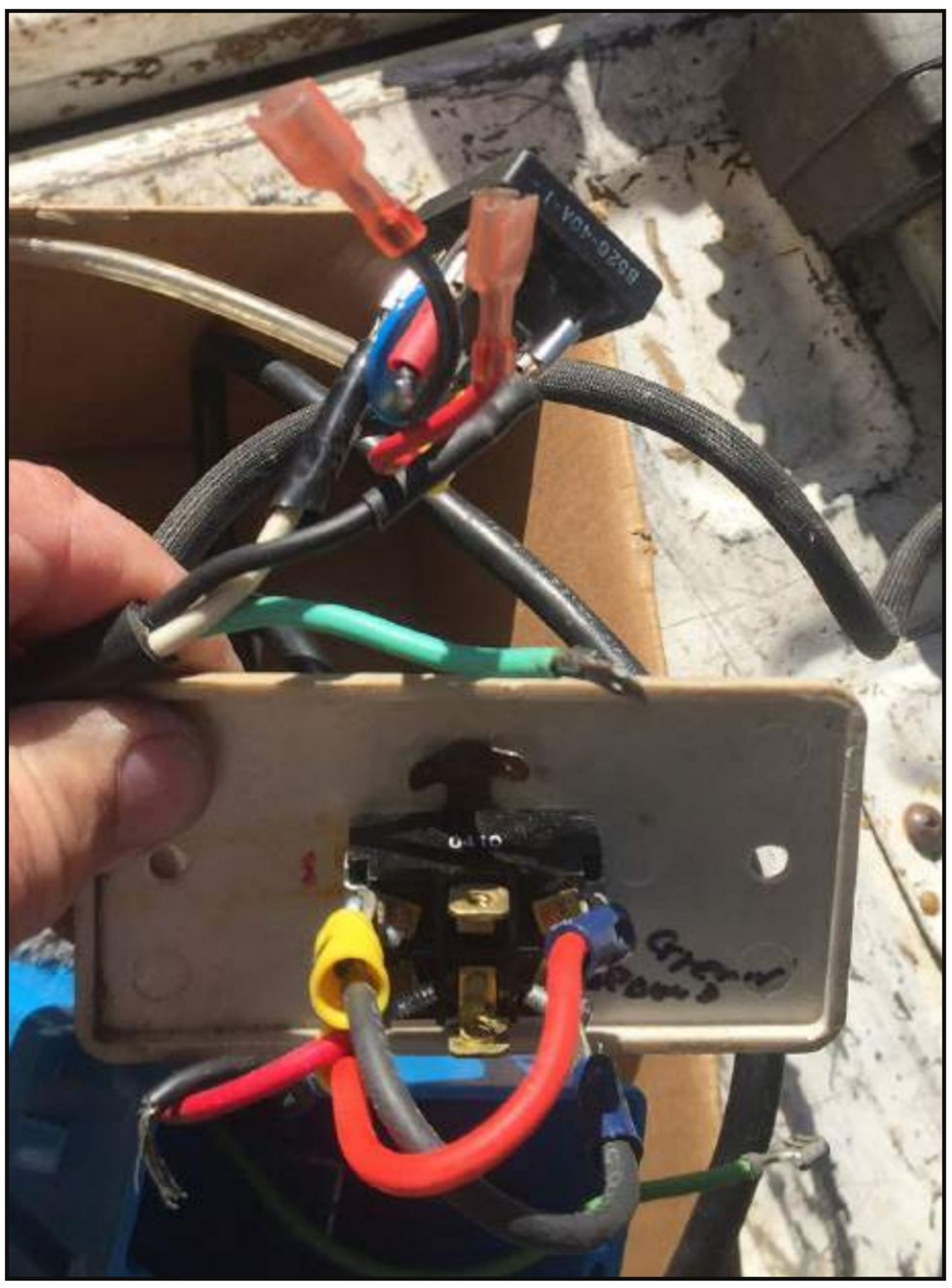

Figure 3 – Common DPDT momentary switch and the wiring that came with the motor.

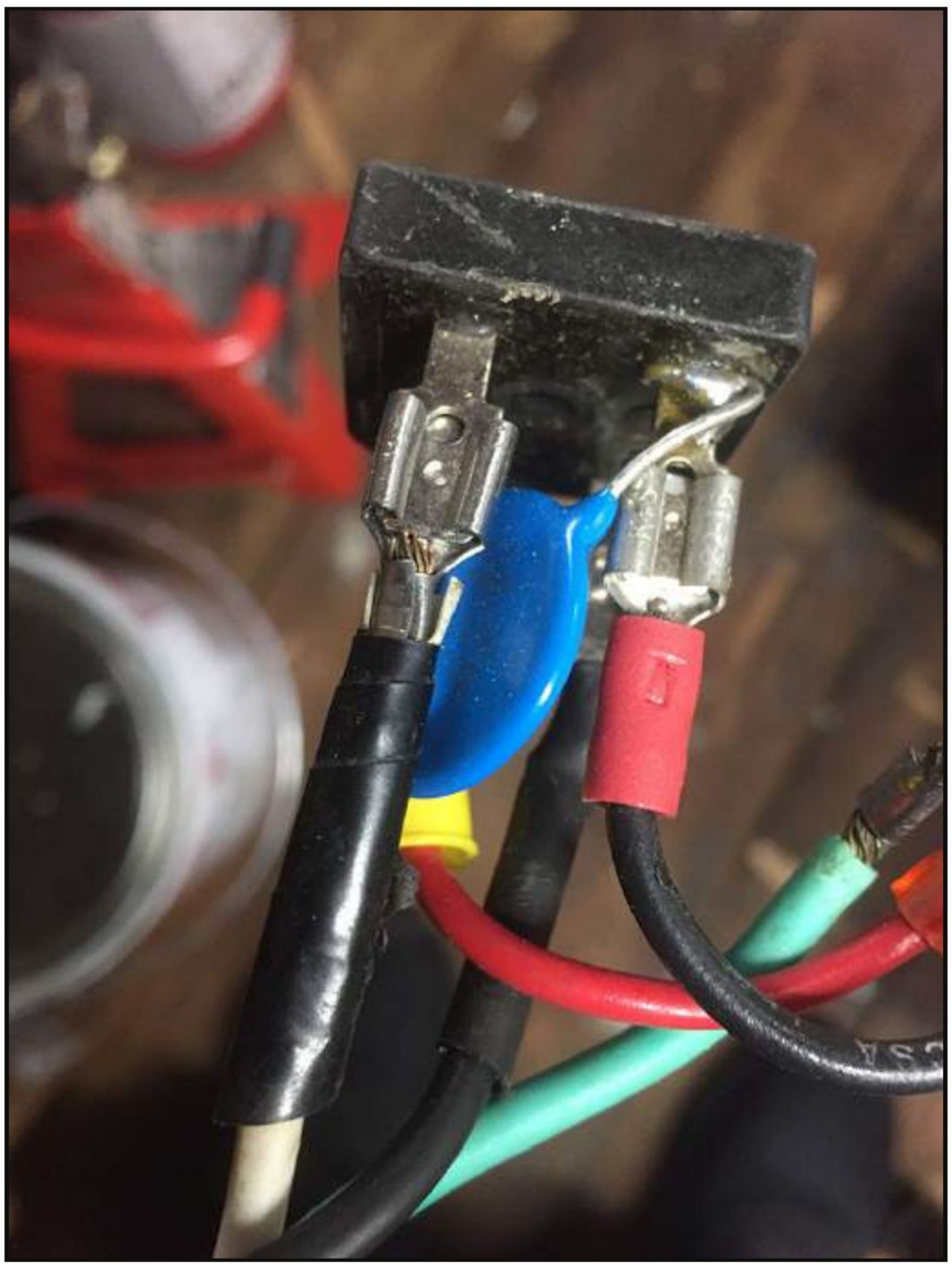

Figure 4 – This mystery component is actually a two phase rectifier.

used to reverse DC motors in intermittent applications, such as electric power windows. You can also see a small square black piece with a part number "B528-40A-1" on it. Right away, I assumed that this was a circuit beaker of some type, based on the "40A". A Google search was of no help using the part number. A closer look (*see Figure 4*) revealed a blue disk shaped component that was obviously a capacitor connected to the mystery part. All of the photos and information up to this point were provided by email.

Not one to turn down a challenge or an old friend in need, I told him to bring me everything that he had – motor, switch, mystery part and wiring. Online searches were of little help because I did not really know exactly what he had.

The motor (after looking inside) proved to be a two brush permanent magnet DC motor with an armature that was wound with very small gauge wire. The mystery part was a two phase rectifier bridge comprised of four diodes, two positive and two negative. The capacitor served the same purpose as

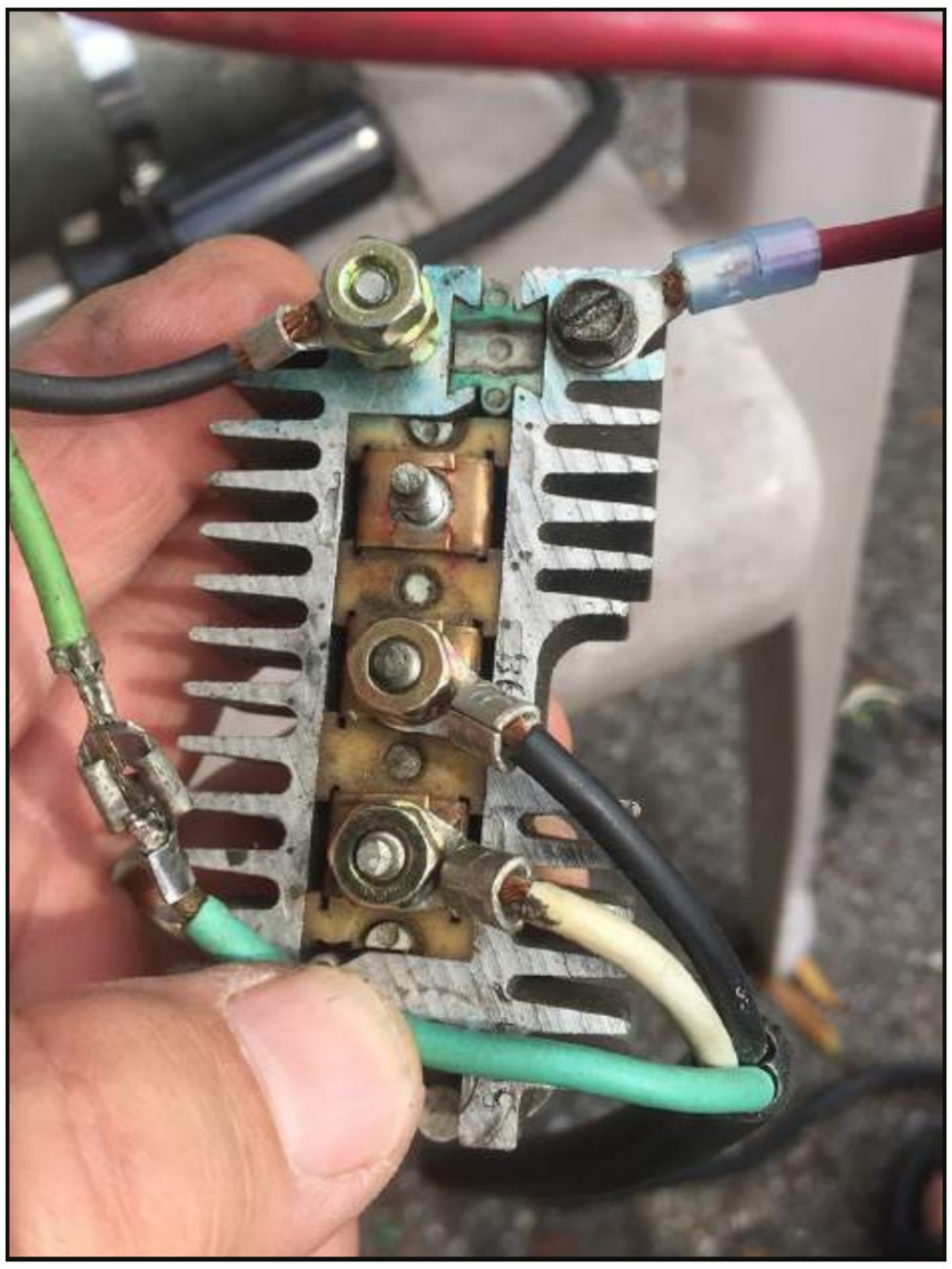

Figure 5 – The 10SI rectifier that we used to replace the original defective rectifier.

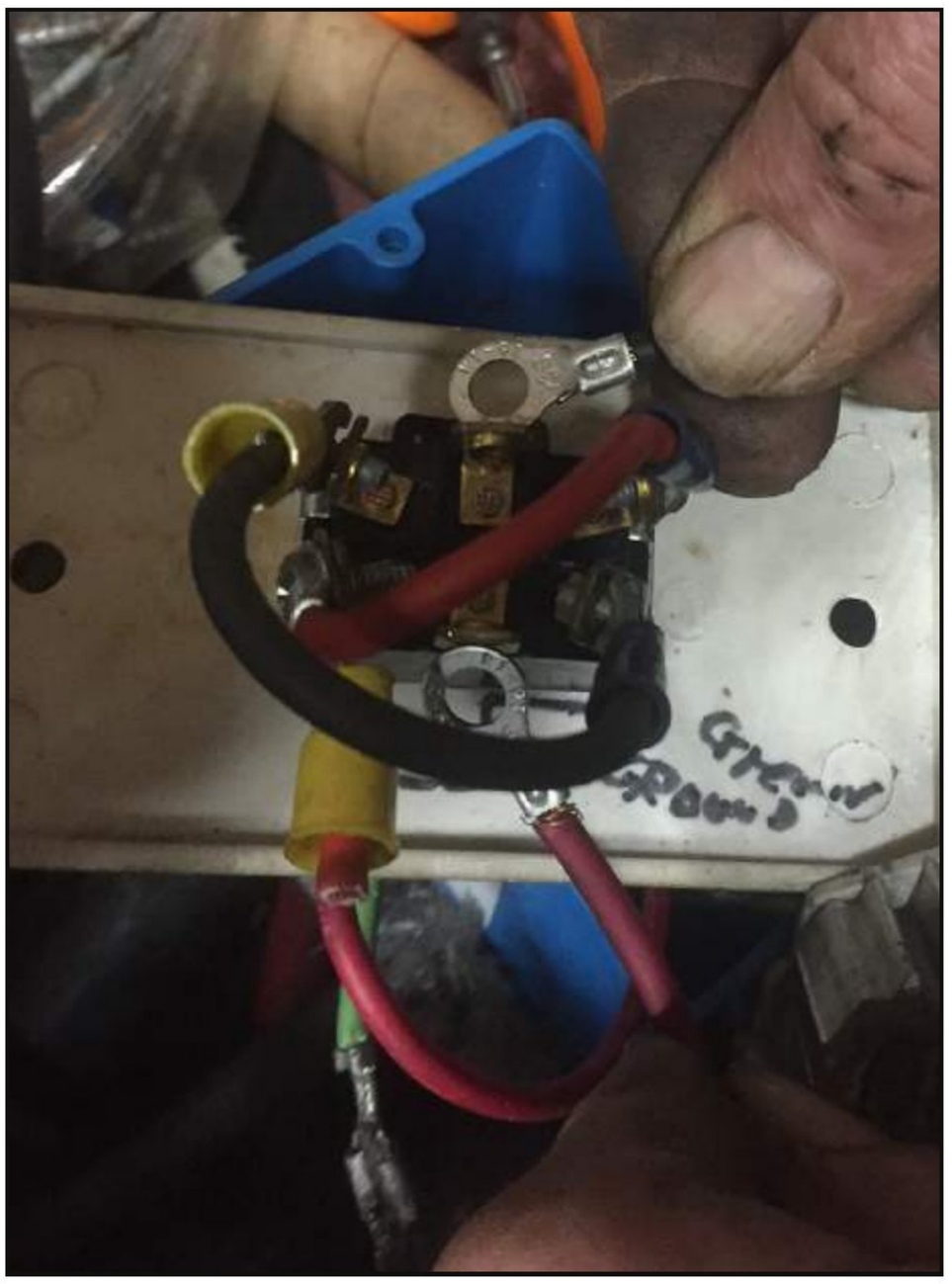

Figure 6 – The sealed plastic box that is strapped to the motor now houses the switch and rectifier.



those found on alternators – to stabilize voltage when the motor was switched on and off. AC current powered two of the rectifier's terminals. DC current came out the other two and then on to the switch. The switch powered the motor in both directions by reversing polarity. Both of the diodes on the positive side of the original rectifier were open, which in turn opened the power supply to the switch.

My friend's immediate response was relief that the motor was OK. But to be absolutely sure we needed to actually test it. I pulled a used 10SI rectifier out of a scrap bucket that had one bad positive diode and explained we would only need the two good ones.

I ran his 120v AC lines (black and white) to the stator terminals going to the good diodes (*see Figure 5*) and connected the positive and negative heat sinks to the switch terminals on one end of the switch. A pair of jumper wires cross over to the other side of the switch to provide reverse polarity to the other end (*see Figure 6*). The load is connected to the middle terminals when using this type of switch. As expected, the motor ran smoothly in both directions.

Although we found many replacements for the original rectifiers online for less than twenty bucks, I believed that the 10SI rectifier with 25 amp ceramic button diodes would be able to handle the load of the motor more easily. I cautioned him to mount the rectifier inside an insulated box for safety reasons. He sent me one last photo before installing the motor on the lift (*see Figure 7*).

A little bit of research after the fact, revealed that 120v DC gear motors similar to this one are commonly used on a lot of industrial applications. The prices of these new motors varies, but many of them were in $1,000 range. Unless the magnets are broken, these motors could be rebuilt or repaired, with plenty of room for profit. Testing is also easy to do using AC and practically any rectifier that you might have laying around.

Bob Thomas is available at 904-673-7301
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Figure 7 – The finished motor with rectifier and switch inside a plastic electrical box

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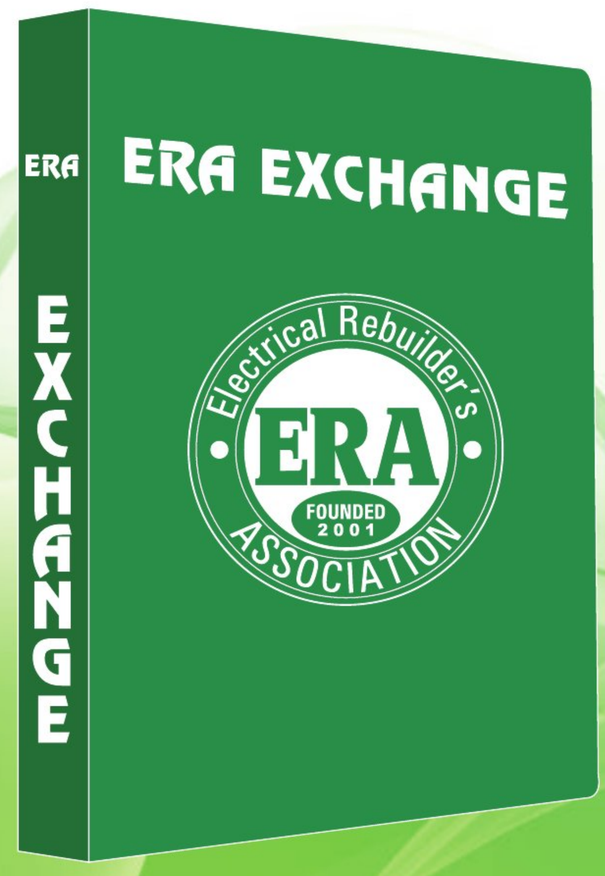

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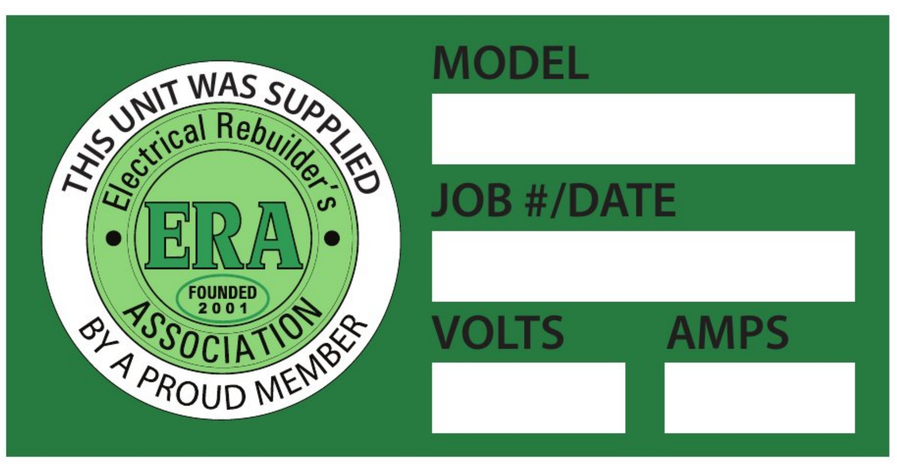

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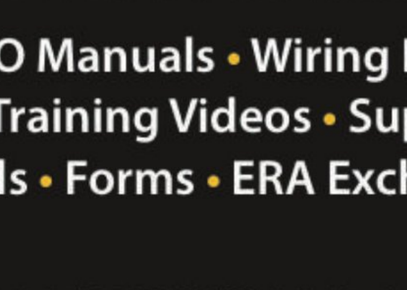
BOSCH IRIF, 12 VOLT, 70AMP
6-GROOVE, CW



10938N
KOKUSAN P/M, EREF
12 VOLT, 14 AMP



18549N
DENSO DD, 12 VOLT, 0.6KW
9 TOOTH, CCW



10819N
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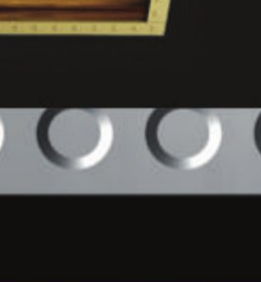
12 VOLT, W/O PUMP



12176N-100A
MANDO IREF, 12 VOLT, 100 AMP
1-GROOVE PULLEY



15422N
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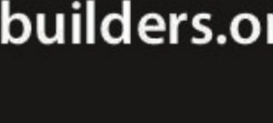

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