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April 2024 $12.95



Nothing Stays the Same!

AUTO ELECTRIC CORNER

A John Deere Starter, 72V Pump Motors, Ford Fuse Box Challenge

Electrical Rebuilder's ERA ASSOCIATION FOUNDED 2001

A WORD FROM THE EXECUTIVE DIRECTOR
Nothing Stays the Same!



As we get older, one of the things that is hard to get used to is the fact that nothing stays the same as it was for years in the past! For us as rebuilders, our industry seems to change faster than the world spins! Competitor acquisitions seem to be an ongoing challenge for our suppliers. As these events transpire, we as rebuilders must adapt to the changes that brings to our supply chain. The new leadership of these companies have many challenges as well, probably their biggest challenge is to make the bottom line look good to their owners, along the way the needs and wants of the small rebuilder seem to fade into a dark hole.

To some of the other suppliers it must seem like a chess game, who makes and what is the next move that affects the "normal" flow of their products. We all look for "who or what is to blame" for upsetting the "status quo" if such a thing still exists! Many of us blame Covid, many of us blame Politics and I'm sure Climate Change falls in the list somewhere!

There are certainly a number of facts that have and will continue to affect all of us. The qualified workforce doesn't exist anymore! Timeliness and customer satisfaction have taken a backseat to "it's all about me now" and we just have to "deal with it"!

The remainder of this year will be certain to bring many more changes to our lives, the political scene will be in the forefront and will be interesting to say the least to see the outcome! Many more changes are going to take place, we just don't know what they may all be! Many of us will choose to retire and close our businesses, many of us will be doing what we've been doing, adjusting to the changes that we are dealt and will continue to "Roll with the Flow"! There is certainly one sure bet "Nothing Stays the Same"!

Mike Schroeder

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ABOUT THE COVER

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ERA EXCHANGE

Volume 41 Number 5

April 2024

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

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AUTO ELECTRIC CORNER —
A John Deere Starter, 72V Pump Motors, Ford Fuse Box Challenge



BY MOHAMMAD SAMII

Depending on your location, the farming season is about to start or already has started. In my area (the Midwest) we are gearing up for it and after decades of supplying my local customers in five surrounding counties, we more or less know what we need and stock up for it.

This preparedness of ours does not work well with the changing dynamics and design feature on newer AG and Industrial units. We cannot guess what John Deere, AGCO, CAT, Case IH and others would be using and prepare for it. The fact is the very new units have been traditionally handled under warranty by the dealer, and we wait to see what comes our way.

The fact of the matter is, no matter old or new, AG market in the peak of their planting season which is about now can be a very lucrative one given we charge properly for the market value of the unit we repair/ rebuilt. Their options can be limited as the independent small farmers are not the ones to go search the eBay or internet when their machines are down and is needed immediately, and that means a quick turnaround of a badly needed unit usually does not meet any price objection.



A John Deere Starter

I got this starter from a local construction company who needed it badly. What intrigued me was the OE tag (*Figure-1*) that said this starter was remanufactured in China for John Deere! This did not made sense [to me] that the great John Deere will collect and sort cores, ship it all the way to China, have them rebuilt and sent all the way back for distribution. (*Figure-2*)

A close inspection of the starter showed it to be totally new, all with the new parts. Nothing in it showed that it would be a Reman starter. A little cross referencing search showed this could be replaced by the 18954 starter which is Bosch with a 9-tooh drive. Our customer's starter had a 10-Tooth Drive, but we have seen this sort of differences between the brands which worked properly. So to expedite the work an 18954 was ordered for next-day delivery, which arrive and was handed to the customer. I have not heard of any complaint.

This gave me a little time to further investigate the units. Going through all the sources I could find, I realized this starter is actually clone of a Mahle MS221 which replaces the 18954 Bosch. Besides their difference in size and shape and the number of drive gear teeth (10 vs 9) they believed to be interchangeable albeit MS221 is a 2.6 KW but the 18954 (Bosch) is a 2.2 KW.

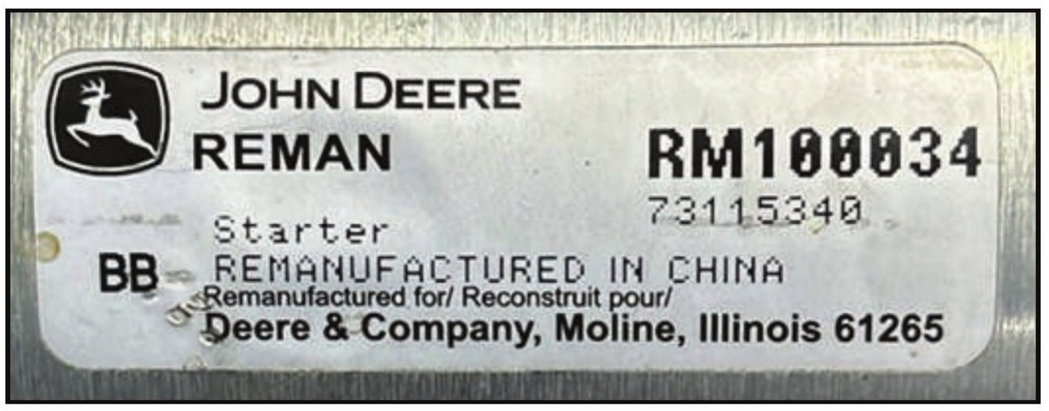

Figure 1 – John Deere Starter Reman Tag

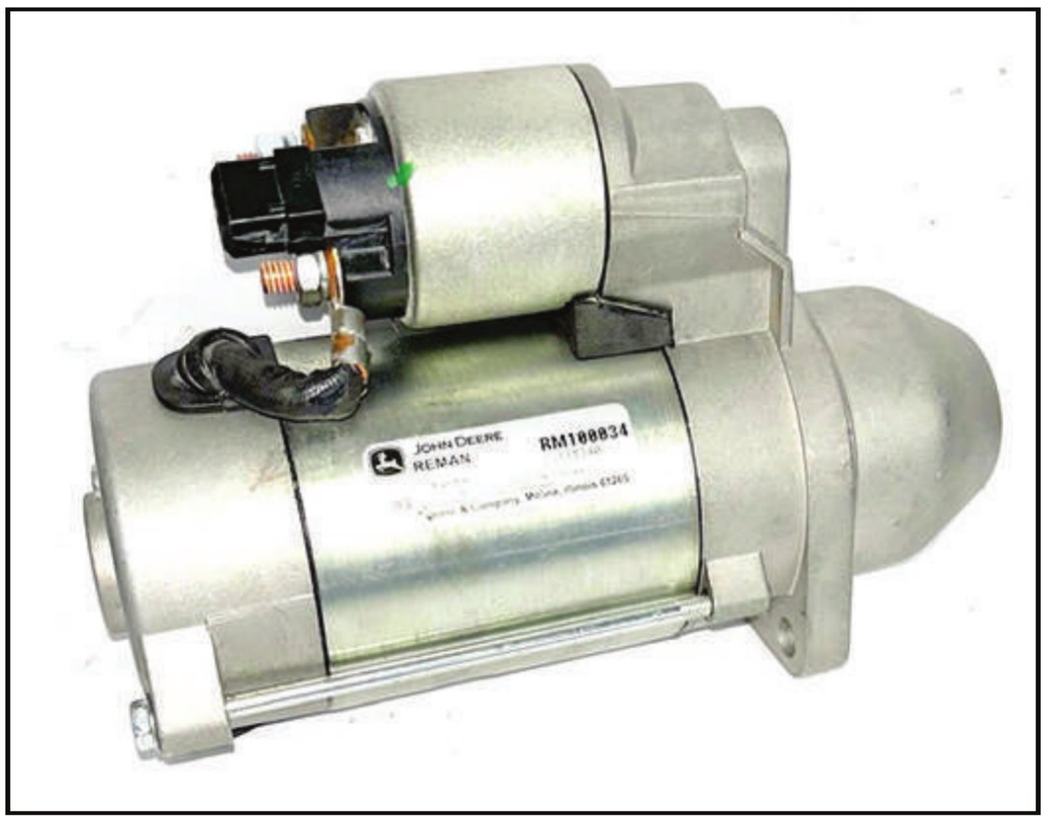

Figure 2 – RM100084 John Deere Starter

Teardown of the unit showed it's best to leave the armature inside the field coil as a whole assembly in case they do not need to be replaced. The brush–holder and brushes (*Figure-3*) are a very time consuming to be put back together if the brushes pop off the commutator. Brushes are kept in place with plastic caps with 3 small clips. Removing each one by pushing all 3 clips simultaneously and taking a chance as not to break a single one is tricky, unless you have a new brush holder kit on hand…which I did not. (*Figure-4*)

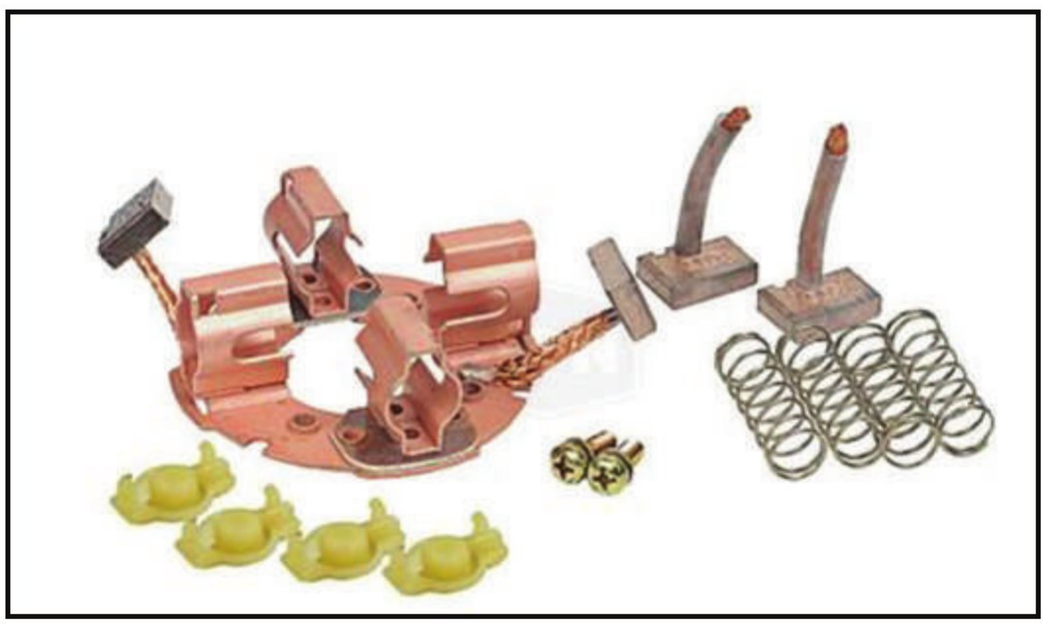

Figure 3 – Mahle MX-5 Brush-holder kit

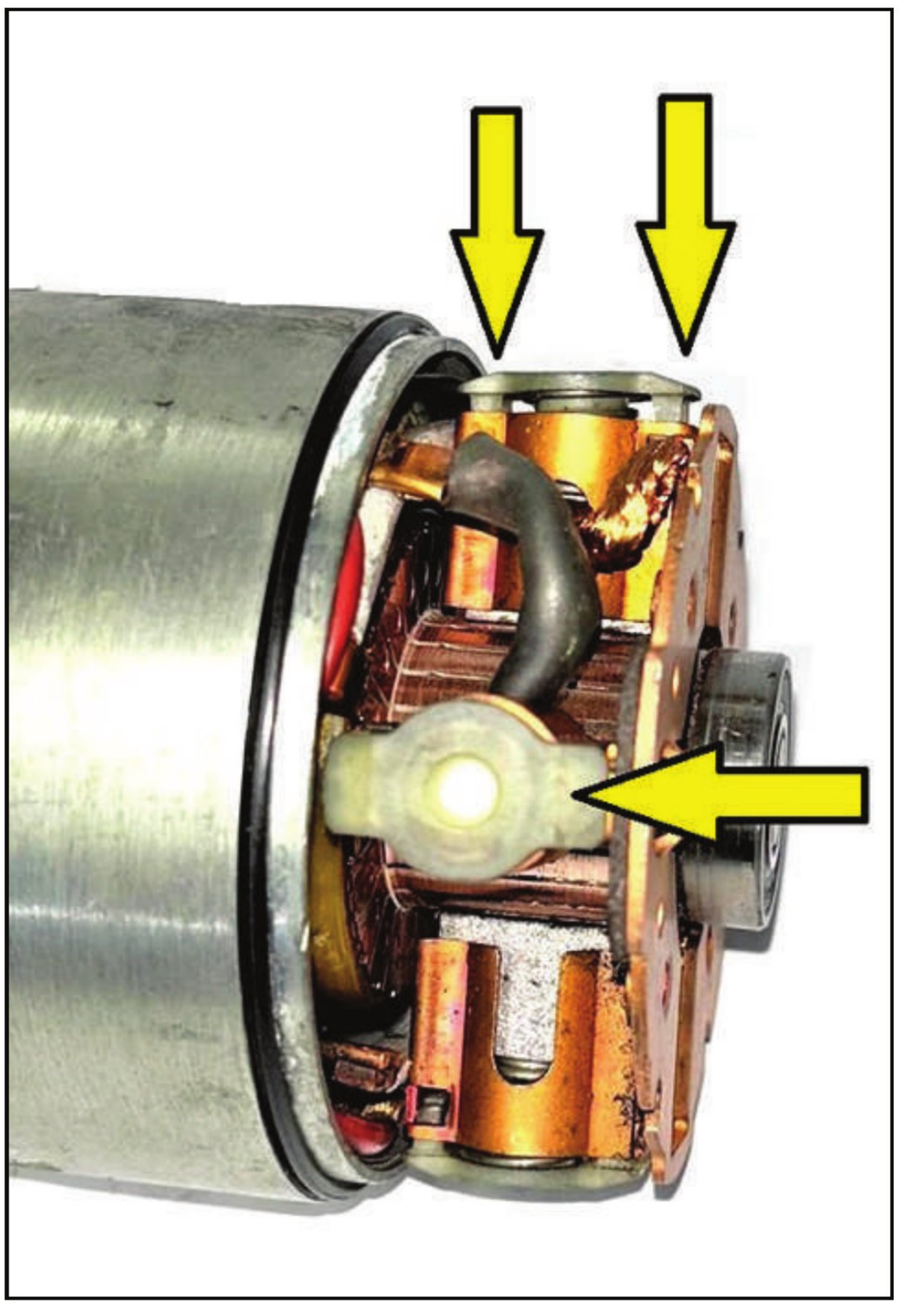

Figure 4 – Clips Holding Brushes In-place

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The reduction gear and the drive assembly are pretty well standard with plastic shift lever that clips over a protrusion off the ring gear housing (*Figure-5*). The plastic shift lever had deteriorated and had slipped off the drive, disabling the starter. The solenoid is common for the design and has the identical "S" post as the same one on the Bosch version. (*Figure-6*)

As the best I can guess, a clone version of the original Mahle was mass produced in China, tagged with a "Remanufactured" sticker for whatever reasons, and sold through John Deere distribution system as an OE reman. I would be interested to know of any further details you might have.

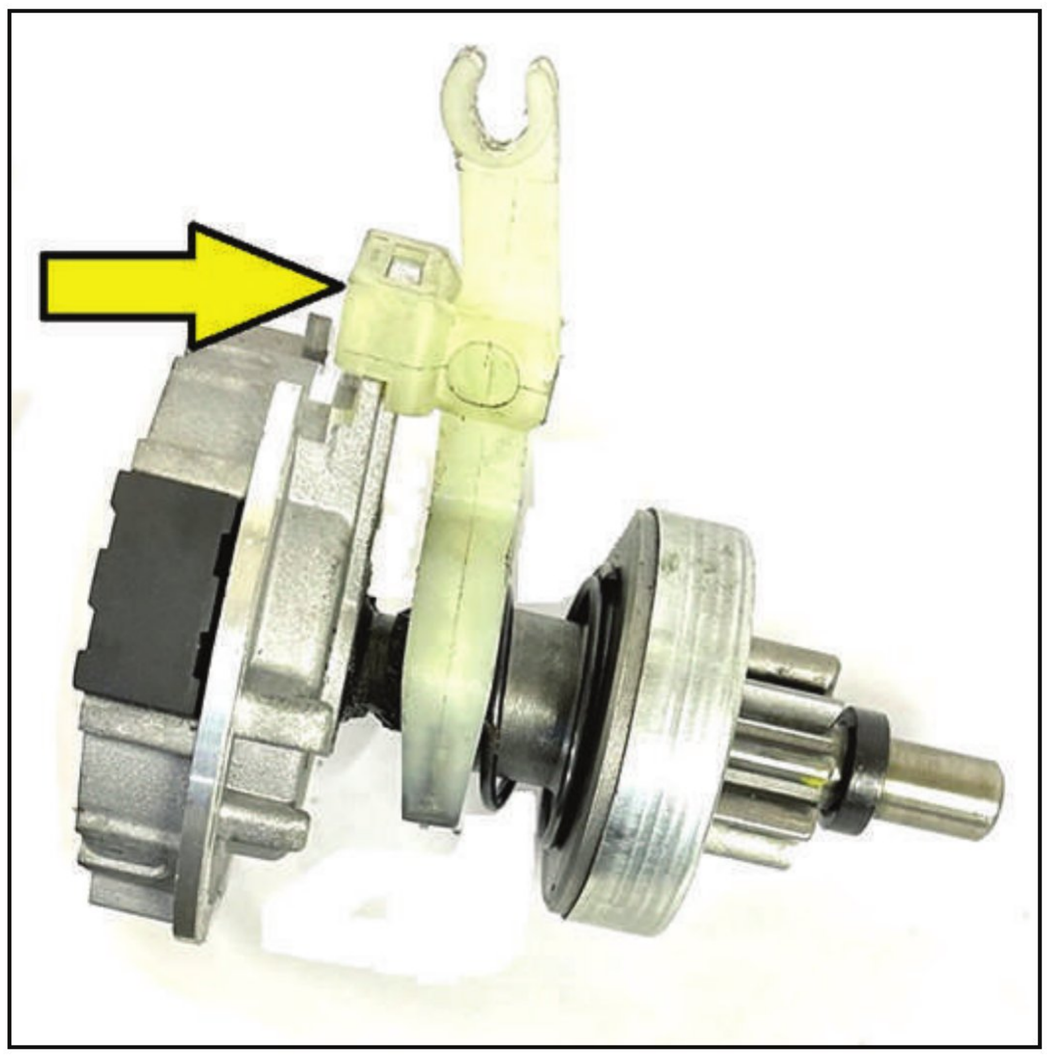


Figure 5 – Drive Assembly and the Tab Holding the Fork

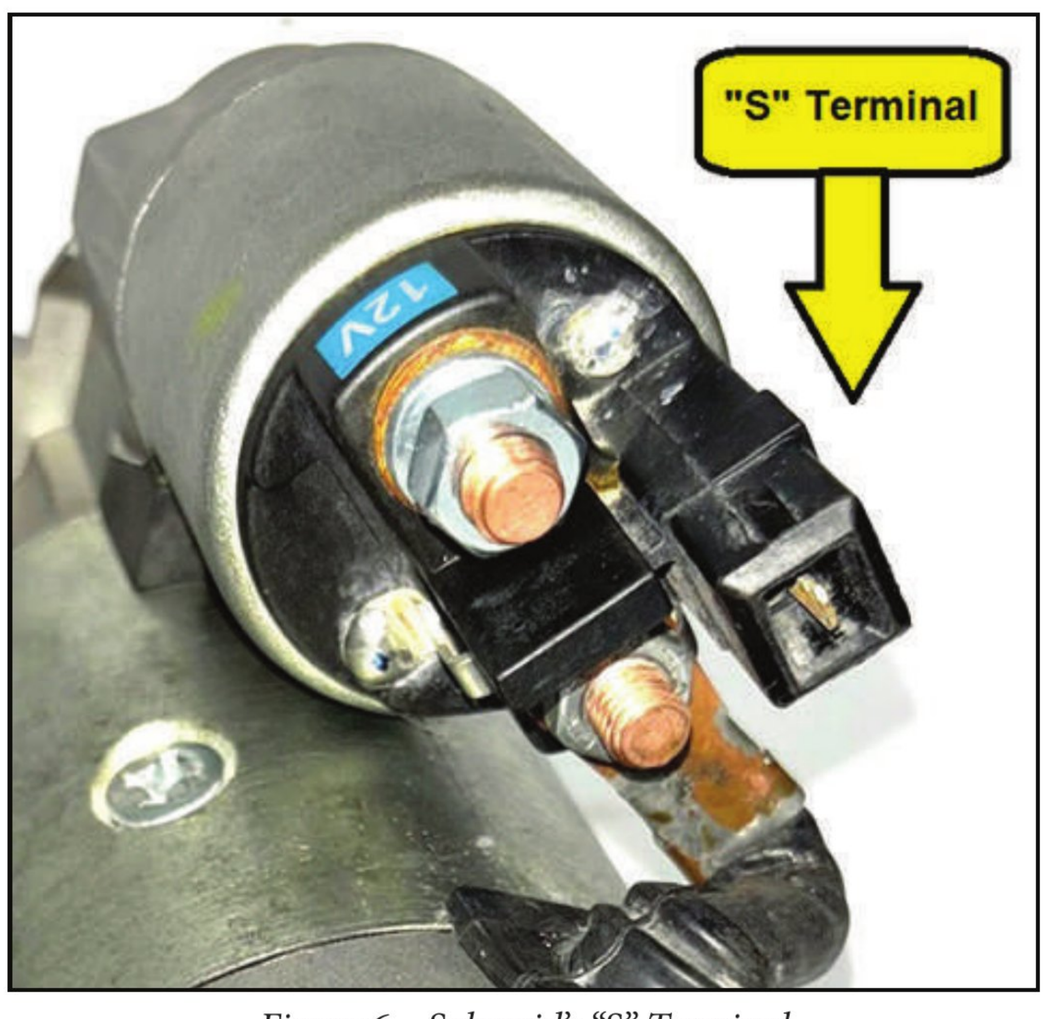


Figure 6 – Solenoid's "S" Terminal

72V Pump Motors

We received two different 72V pump motors from our local airport off of their ground handling machinery and belted luggage loader that repairing them became a challenging project and a good learning experience.

The black one which had no ID tag (*Figure-7*) was supposed to be tested and touched up if doable, so I started with it first. The difficulty was the front support of the armature was inside the pump housing which was not supplied. So, the shaft and bearing needed to be supported and centered to be able to spin the motor.

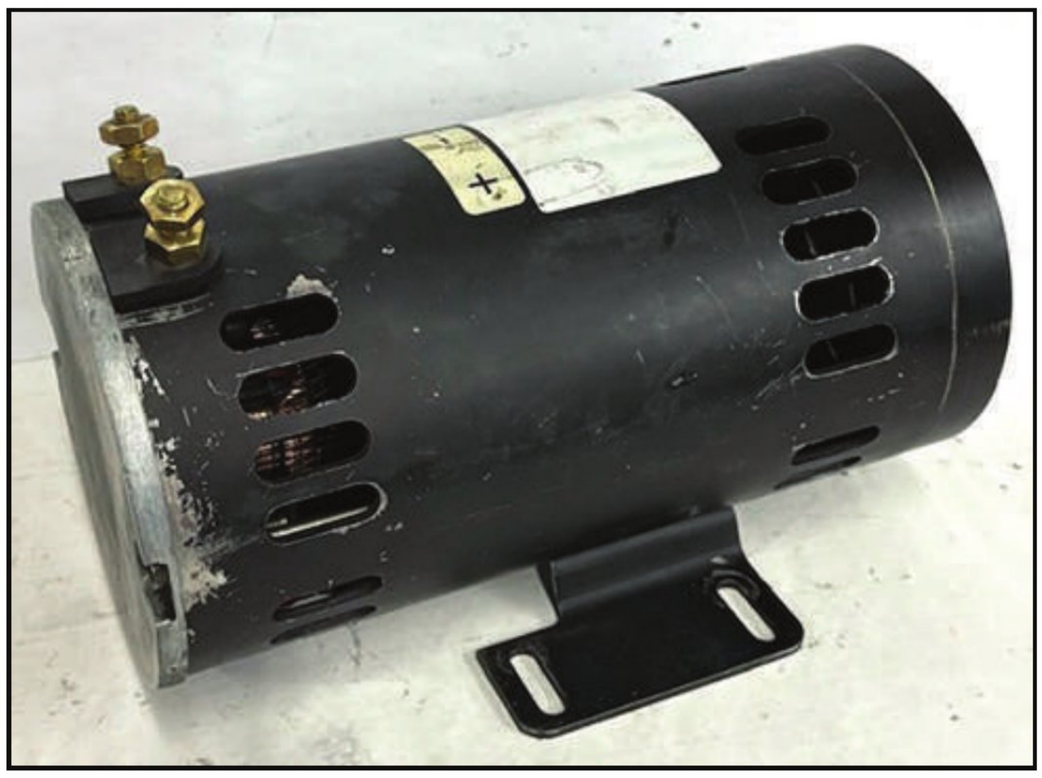
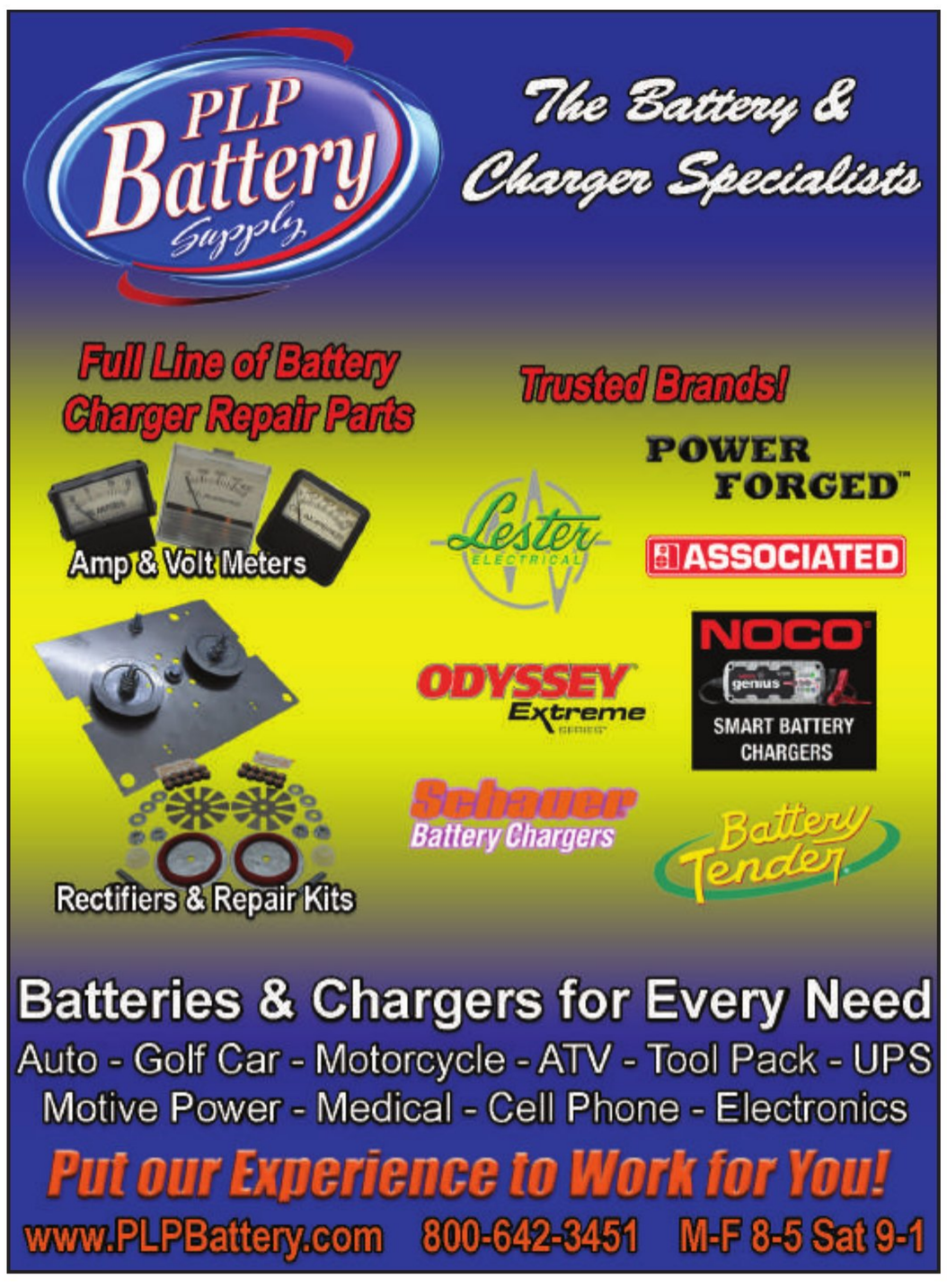


Figure 7 – The 72V Pump Motor



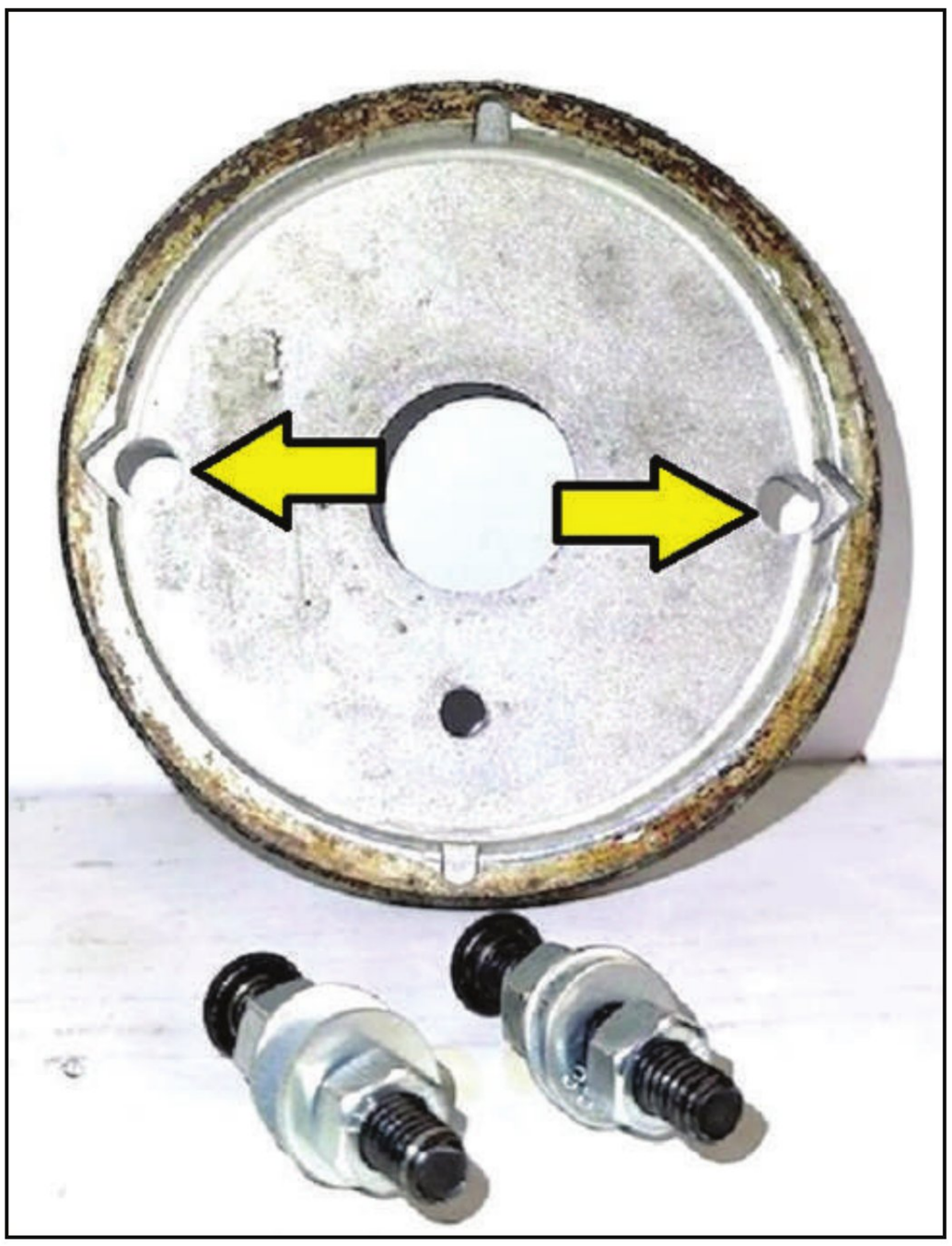


Figure 8 – Drilled DE Plate and Hardware

To do this, I used one of the front support housings of a typical snow plow motor. Enlarged the whole slightly (*Figure-8*), and tapped the two untapped and unused holes on the motor's DE housing (*Figure-9*). Once put together, the motor's shaft was became perfectly centered and free to spin. (*Figure-10*)

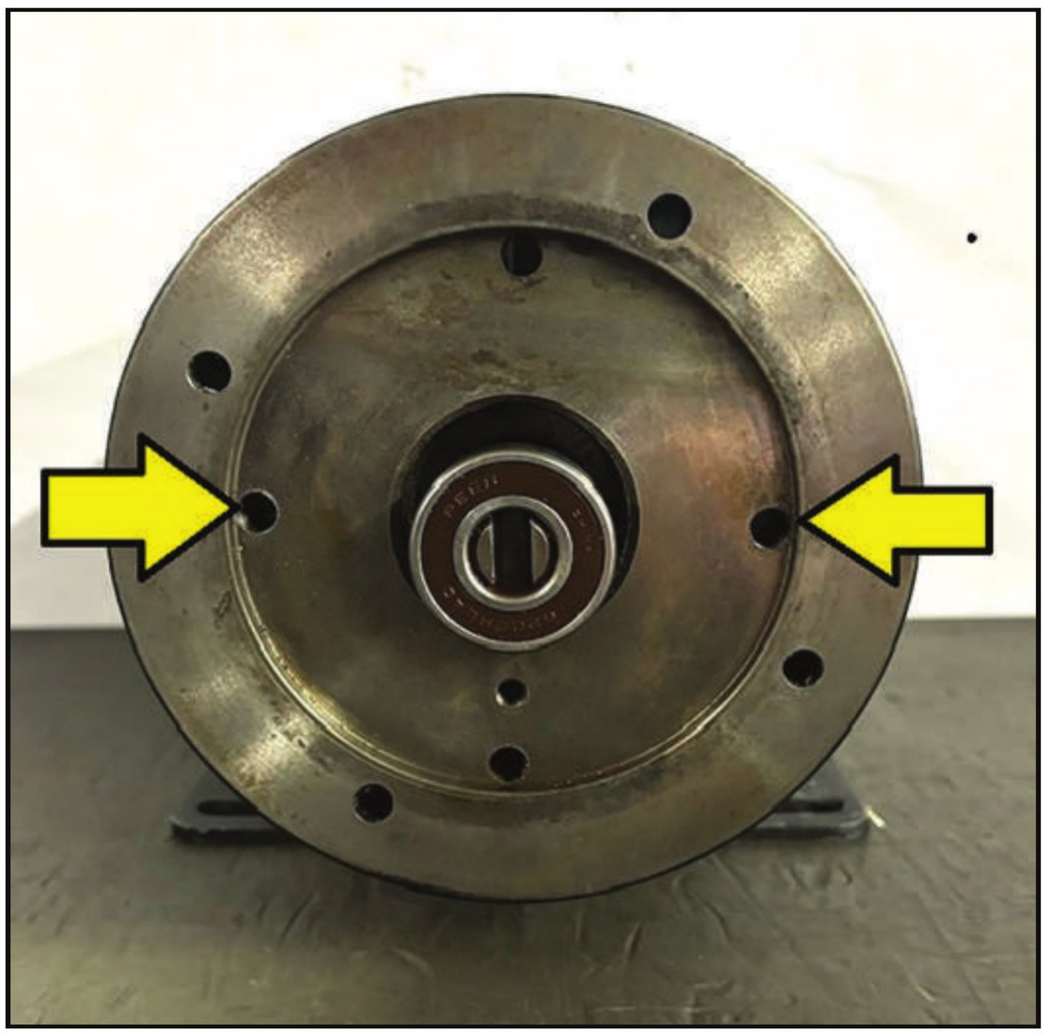


Figure 9 – Armature needing to be centered



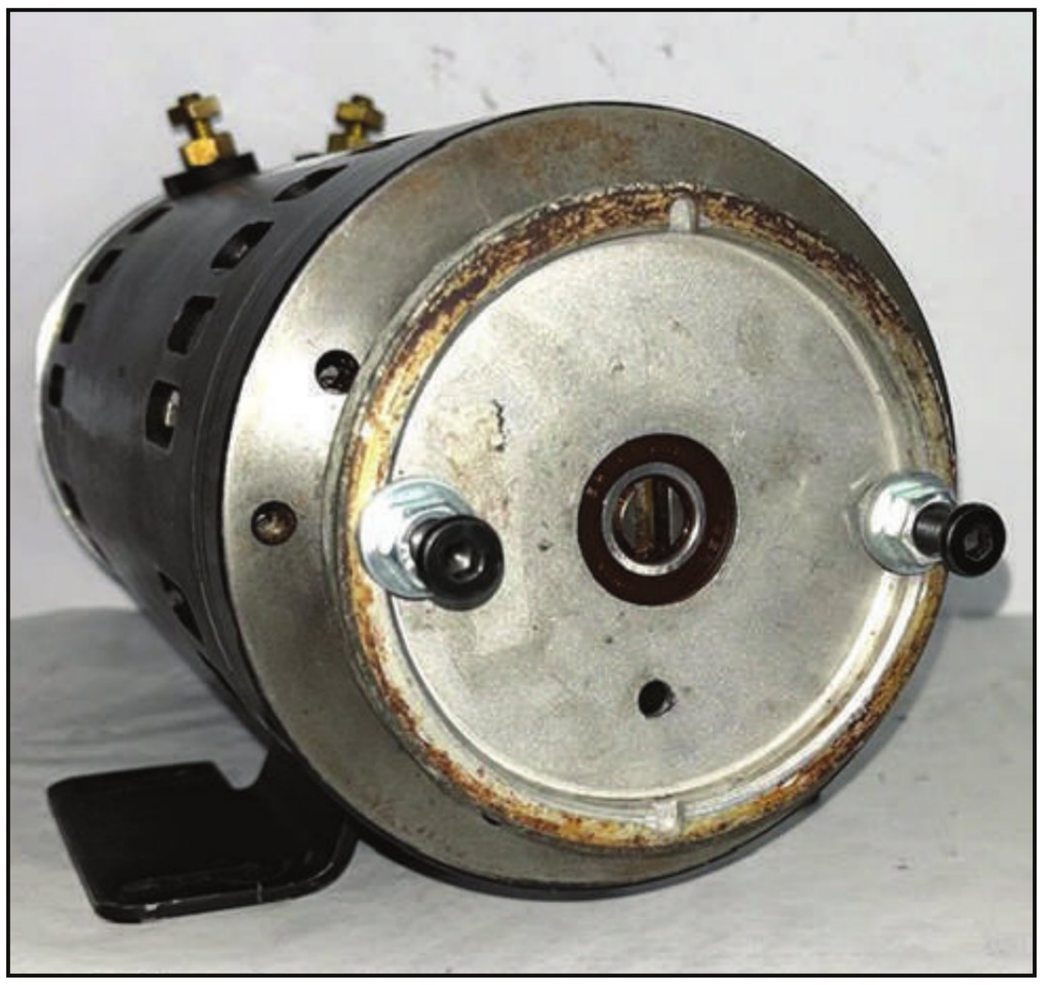


Figure 10 – Supported and Centered Armature

Next challenge was how power the motor. Rather than full 72 Volts which required cumbersome attachment of multiple batteries, I used the 24V feature of the test bench, added 2 more batteries in series with the output cable to get a 48V power supply. Mind you, at this point on, I was wearing protective gloves for the fear of getting electrocuted as 48 Volts DC can give you a shock that may ruin your whole day…!

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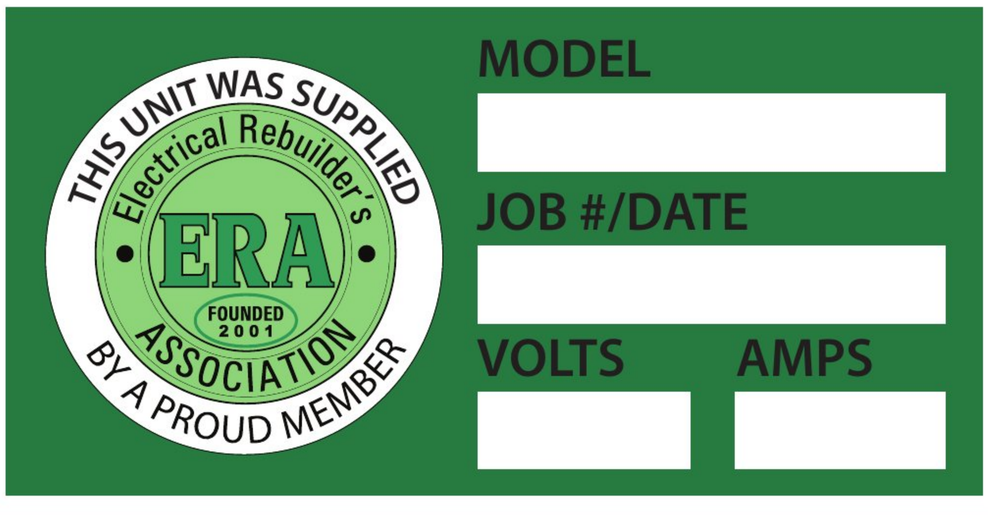

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The motor ran very smoothly but with a little arching at the commutator. It was disassembled, the armature polished for better brush seating, brushes that had plenty of length remaining were freed from the accumulated dirt in the brush holder for free travel, and the motor was assembles. A final testing of it showed practically no sparking at clean commutator and this motor was done.

The second motor, which was slightly larger (longer), came with the pump body and the reservoir tank. It was made by Monarch Hydraulics and centering the armature was of no concern. A quick test showed sluggish RPM and heavy arching at the commutator.

After disassembly it was obvious that the armature was beyond any service and needed to be replaced. Luckily the airport service tech, hoping to do the repair in-house had ordered a set of the brushes from the equipment manufacturer and had sent them in with the pumps. Actually a brush replacement was their initial request when the pumps were brought in but now we needed more than just brushes.

A call to International Winding and explaining what I had on hand was helpful for them to come up with the right armature. The new armature arrived in a few days ($350+), the motor was cleaned, bearings changed and assembled (*Figure-11*). For final testing I used the same 48V system and am confident that the motor will perform properly at 72V. I believe these motors were specially made for the application by Dayton but I could not find any part number. These 4-pole motors use very strong magnets. This is a point of caution when positioning the armature inside the motor. Fingers must be well protected as the strong snap and pull of the magnets can cause injuries.

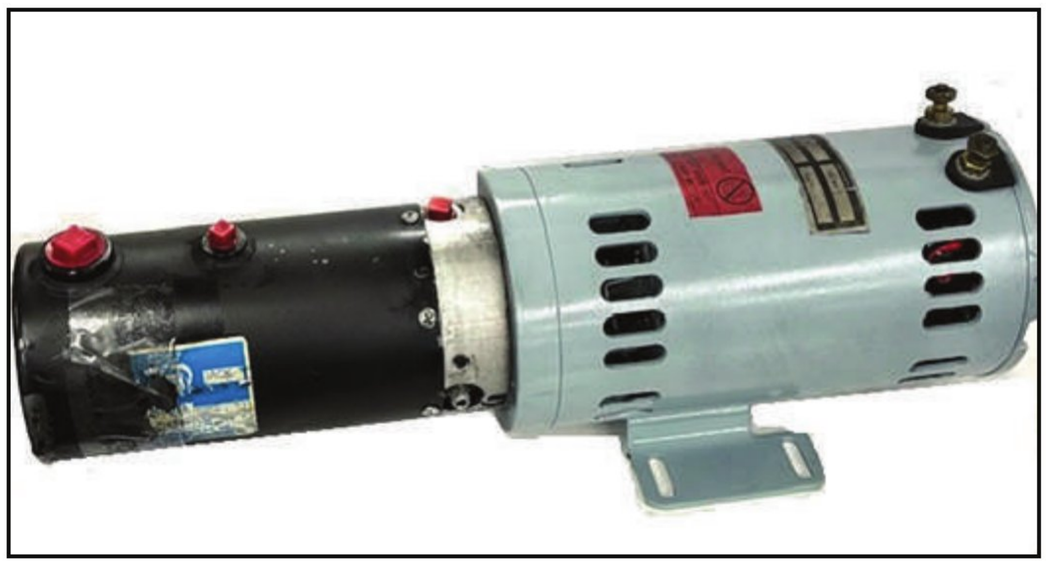

Figure 11 – The Second Motor with the Pump Attached

Ford Fuse Box…!

We received this 2019 Ford Transit 250 van (*Figure-12*) from another shop to diagnose for wipers not working. They had replaced the wiper motor to no avail and were now stuck. I am not sure why certain shops accept electrical work where their knowledge is limited to changing parts…but that's another story.



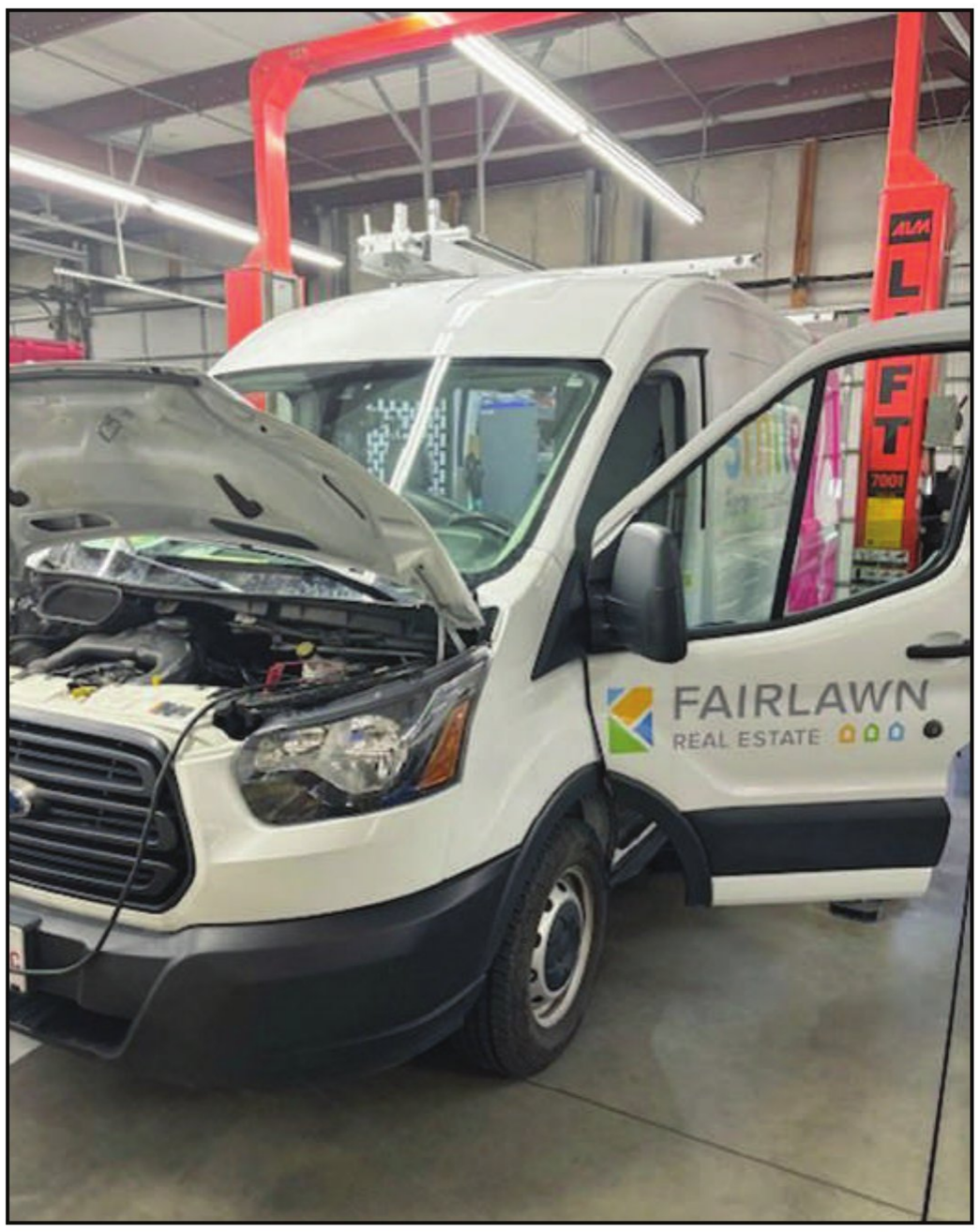

Figure 12 – A 2019 Ford Transit with Wiper Problem

The wipers of today on most cars/trucks have become a lot more complicated and mostly are driven by BCM via data bus for operation and/or speed control. Like any other device or module they need Power and Ground to operate. So, our first step in troubleshooting this system was to insure if the Power and Ground are sound.

After removing some panels to get to the wiper motor connector, we realized although the Ground is connected but the Ignition Power is not there. So we set out to find the power routing. If you have dealt with more modern vehicles of these days and their schematics, you'd how confusing this can be, especially on the vehicle that has 3 fuse boxes.

After narrowing it down to where we needed to go these steps were needed and were taken:

- Remove the driver's seat for access to the battery under the seat. (*Figure-13*)
- Disconnect and fully remove the battery.
- Partially disassemble the battery box to get to a fuse panel behind the battery box. (*Figure-14*)
- Locate the strip containing multiple fuses and check for power
- This is of course done by using a set of jumper cables to power up the vehicle temporarily as the battery was removed.

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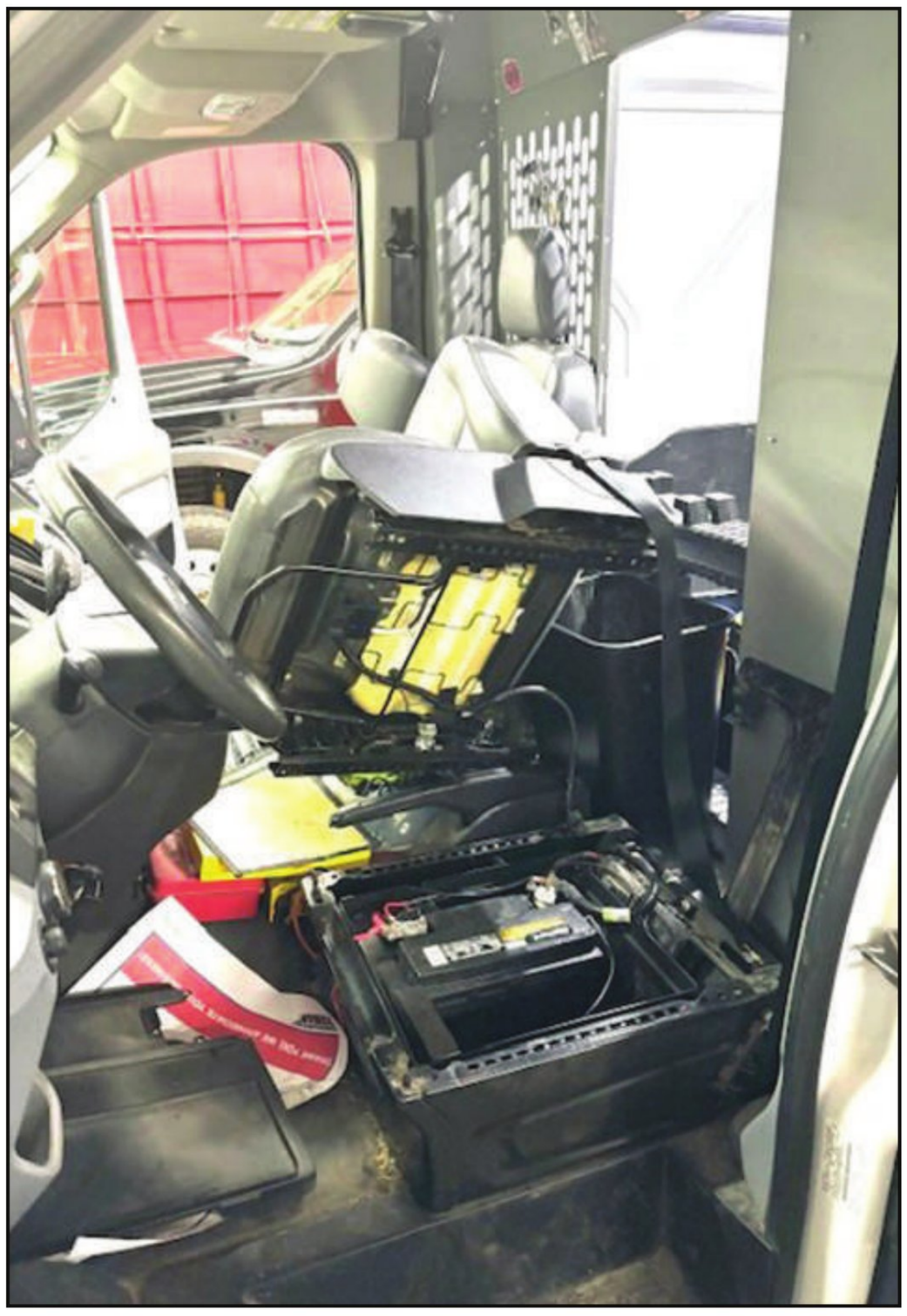

Figure 13 – Drivers Seat Fully Removed for Access

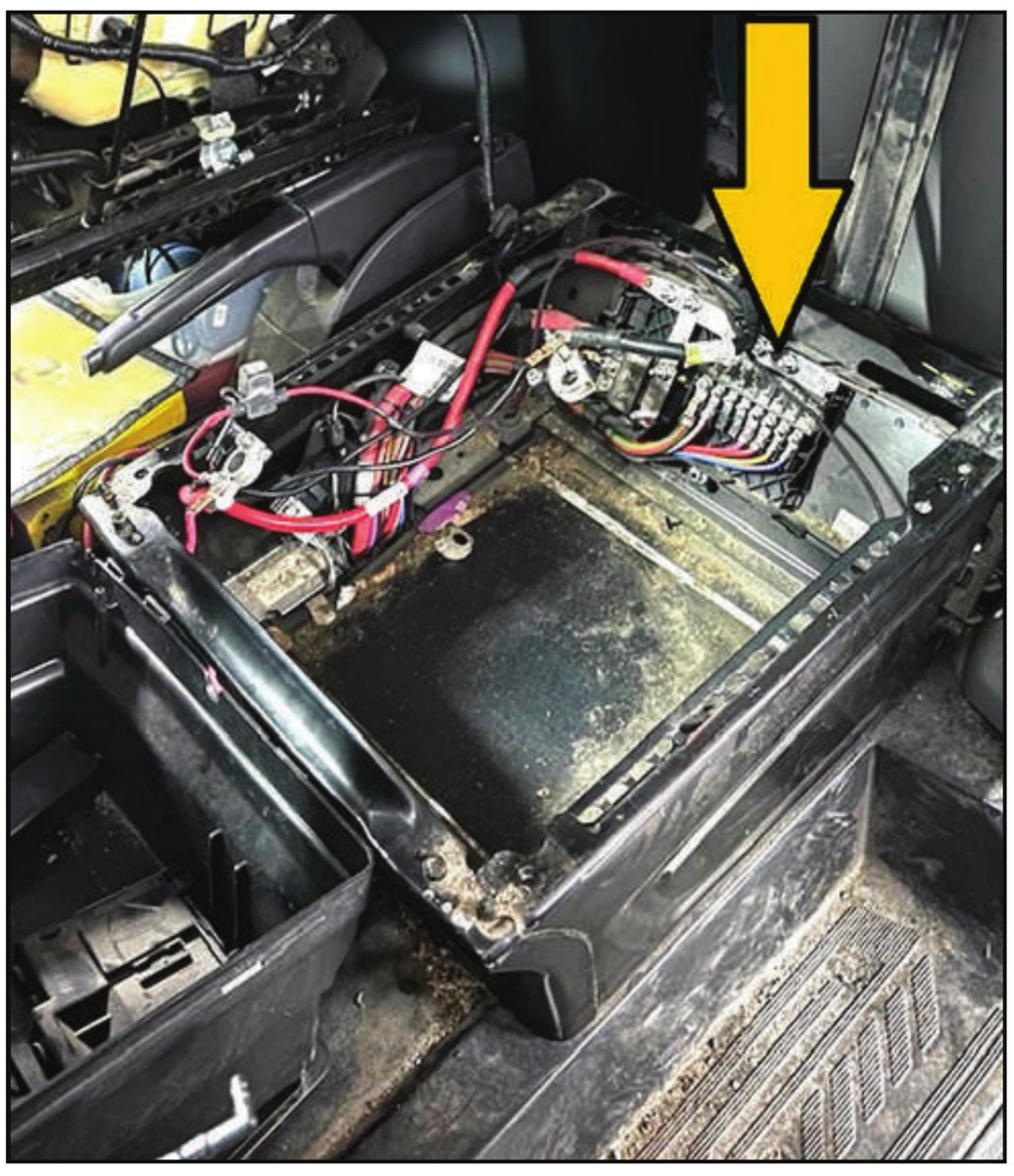

Figure 14 – Disassembled Battery Box for Fuse Access

After a little checking, we found one fuse on the fuse strip that powers the wiper was blown. That required that the entire fuse strip to be replaced even if only one fuse is out.

Our Ford dealer was called, only for them to tell us those fuse strips are on a long term back order!

Luckily there was another unused fuse on the strip with the same rating. We used this spare (!) fuse to route the power for the wiper and got the system going.

The point is the things like fuses, fuse boxes and the wiring that are were accessible and comprehensible a decade or two ago, now have become very challenging to find, test and diagnose. I believe this is a trend that will continue for years to follow. Good luck to all of us…!

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

You can contact Mohammad Samii by email at: sammyselectric@sbcglobal.net, or by calling the ERA Tech Help Line at 217-398-3864

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