The Tractor Doctor

Readers' questions answered, plus a trip through Wico "C" magneto

From time to time, Ol' Doc likes to review for *Green Magazine* readers some of the past questions concerning old John Deere tractors that have been asked of me. Maybe the question was yours or maybe the inquiry and my answer is one that you may have had but were afraid to come out of the tall weeds and ask. At any rate, many of the questions are very legitimate ones and I feel that it would be a good thing if they were repeated in part of this month's article for all to read.

Jo Anne and I were amazed at the response that we received regarding sending anyone that asked a copy of the 24-12 wiring schematic from a past article. The mailman must have thought we were sending out Christmas cards early because some days his bag was stuffed full of self-addressed stamped envelopes going back to interested readers. We thank you for sending those requests with addresses and stamps (as we had asked). In a few cases, several individuals had even included in the envelope a few dollars for our "trouble"—we thank you for that, too. *Green Magazine* readers are good people and as I have stated in the past, education and/or knowledge should not be kept a secret and taken to the grave; it is my feeling that education costs way too much these days and we can learn some valuable lessons if we take the time to sit down and listen to those who have lived through numerous challenges in their lives (before they are no longer with us). But that's a whole other topic! It was also interesting to open an envelope and find the person's request regarding wiring, but for a different color tractor altogether. It's good to know that there are a few of you out there who are crossovers such as me; your concerns will be answered in due time.

So let's get right with the program; one of the hottest questions is always that of battery ground polarity in old tractors. It is so easy to get confused as to which side of the battery to put the ground cable on. Many times the question is asked of me AFTER the battery has been hooked up incorrectly. You have no second chances if you hook up your battery the wrong way. Picture 1 shows a voltage regulator from an old John Deere that has had the battery hooked up improperly—not a pretty sight! Often it will take out the generator also. Rather than attempt to tell you that your tractor should be a negative or a positive ground system, I am suggesting that you look it up for yourself. In any repair manual for the tractor, it will be stated so in the electrical section. If you cannot find it THAT way, look for the wiring schematic for the tractor; it will always show the battery or batteries and the proper hook up for them including the ground.

On this same subject, many of you are confused about which way to hook up your ignition coils regarding the two small wires. I have found and heard of countless ignition coils that have been hooked up backwards. The answer for this goes right back to and coincides WITH having the battery hooked up correctly; that is, which way that the battery is properly grounded, the ignition coil MUST follow the same polarity to the distributor. If, for instance, you have a positive ground system, the coil wire going to the distributor MUST be hooked to the positive (+) terminal of the coil. If you have a negative ground system, you must have the negative (-) side of the coil going to the distributor. To get your coil hooked up correctly, always start by knowing that you have the battery ground hooked up correctly and then follow that same pattern for the coil hook up. Are any of you out there having hard start problems? Think of the distributor as the ground and your wire from the coil to it the same as your battery ground. If you get this one WRONG, it's not going to burn anything up, BUT it does lessen your coil's spark output by about 30 percent. It's kind of like shooting off a few of your toes and trying to run—you can still do it, but just not as well.

On to the next matter. You are going to get rid of the old generator and regulator and put on an alternator; which one should you use? Many times the cost to keep an original generator in operation becomes very costly and you decide to replace it with an alternator. I just recently bought a new armature for a customer's generator and its cost to me was $94 just for the armature. Alternators, in many cases, do work better than generators and are much less pricey to buy and keep working. It's just that for old tractors, they are not original. My choice for an alternator conversion is the Delco 10 SI shown in Picture 2. This unit can be purchased new for about $50 or $60 and can be purchased with or changed to a self igniting internal regulator shown in the picture. This device controls the voltage output and was originally hooked to two small control wires. Changing the regulator to a self igniting unit elimi-

nates the need for the two small wires. All you need is the one main cable and the alternator does the rest.

It's almost too simple; these units DO work. Think of the wiring mess that you can eliminate if all you have to deal with to get your charge system working is one main hot wire to the alternator. The self igniting regulators cost about $10 and can be purchased almost anywhere, as can all the internal parts for this Delco 10 SI alternator. Recently, the regulators have been introduced to be six, eight, 12 or 24 volt and can even be set up for positive or negative ground operation. The units can be disassembled and the two halves rotated 90 degrees in four locations to accommodate mounting of the unit. Pulley sizes and the ability to change and match are endless for this unit. If it's an alternator conversion that I am faced with, this one is Ol' Doc's choice.

Next question—why am I always burning up ignition points? Seems they only last a short time and I have to replace them again. The answer here is too much primary current in the ignition system. This is the voltage and current that runs through the coil's external small wires and to the distributor and through the points. In most cases, the voltage is restricted somewhat before it reaches the points. This is done before the coil with an external block resistor or with a coil that has a built in internal resistance in its primary windings. If the points run hot and burn, it's because one of these units are bad or not of the proper value. I have had instances of a charge system that was overcharging the battery to a voltage much higher than it should have been and thereby caused even the coil or the external resistor to not restrict the voltage. The points would run hot and burn because of it. So keep an eye on your ammeter when the tractor is running; it should charge heavy at first when the tractor is started, but soon after, it should come back to near zero as the voltage of the battery is brought up.

Of course, points burning can be the fault of improper installation. The two contact tips of the points must be parallel with one another after the point gap is set. If, when the points close, the two surfaces are not flat on each other but tipped one way or another, the lack of contact surface on the point tip will cause it to burn, get hot and eventually lose contact. These days, the point tip's composition is not the soft conductive tungsten material that it was in years past. It is now made of a much harder aluminum material that needs the total surface of the point tip to run at a normal temperature.

DO NOT assume that because you have installed a new set of points and have set the gap that your job is done. Look at the points when closed with a flashlight and a magnifying glass; many times you will find that the points are not parallel with one another and must be bent and tweaked slightly to correct this condition. I often spend more time making the points parallel to each other than I do in setting the point gap. I hope these tips "point" you in the right direction.

At this time, Ol' Doc has to clear the air in regards to the comments from R.B. in the August 2010 Mr. Thinker column (pages 88-89). My rebuttal is in regards to my handling of the pair of '38 Deeres and their restoration and repair in the article that I had written for the June 2010 issue of *Green Magazine*. Mr. RB, you are getting way ahead of Ol' Doc in bashing me for what I do or shouldn't do to these or ANY old tractors to refurbish them. As stated in the article, my intent to free up the engines and get them running was NOT THE PROJECT'S END. Rather, I find in any project of restoration, it is a valuable tool to first get the tractor running and then evaluate what will be needed to make the tractor run and operate at a reliable level. For instance, does the tractor's engine hold its oil pressure, where and how many places does it leak oil, does the transmission work in all its gears, is it noisy, does the engine hold coolant and on and on. There are many reasons why I feel that it is important with projects such as these to first get the tractor running and then systematically disassemble it in the direction that needs the work.

Also, getting the engine running allows me to run a light fresh oil and kerosene mixture in the crankcase for a short time before tearing the engine down; this to help get some of the old oily sludge out of the engine before I tear into it. If Mr. RB would take the time to re-read the article, I clearly stated that future articles WILL be written regarding the rebuilding of the tractors, but for now, they both run and the current owners can get a look at them in a running state or even go for a short drive with them. This year on July 4, we had a get together, providing a place that parade tractors from the area could come and park their tractors and enjoy looking at those that had been brought there by others after the local parade. We enjoyed some refreshments and camaraderie; I must say that the event was well attended and everyone who came seemed to enjoy themselves. Picture 3 shows the 4th of July gathering at our place and a few of the tractors that participated.

Two of the tractors that were parked that day were the pair of '38s. I must say that of all of the restored tractors that came that day, the pair of '38s (still in their work clothes) probably held the most interest. Even the owners stopped in to see their old tractors and to hear them run again. It gave me a chance to now begin to tell them what I intend to do with the tractors and the extent of repair I feel will be needed, all to the owners' approval. Mr. RB, put yourself in the owners' position. After trusting me to restore these old tractors, they come to me to see how I am doing on them only to find thousands of parts and pieces scattered all over the shop with a staggering amount of money as the estimate and already invested in labor. What would YOU think? The tractors do need internal engine work, but it will be done logically and in due time.

And by the way, a dial bore gauge is what I use to determine a cylinder's wear; this is an instrument that requires proper set up and use to measure cylinder taper and out-of-round. I will be showing you this gauge in future articles. As far as your "Mota Nu"—I've never seen it, never used

it, but I guess you have. Please don't hide in the tall weeds and bother Mr. Thinker with your back stabbings; he's busy with more important matters. My phone number is clearly included at the end of each and every article; use it—everyone else does!

Now then, let's move on to a more important matter—a Wico model "C" magneto from a 1934 "D" John Deere. This came to me from a *Green Magazine* reader some distance away in an effort to get a better spark from it. So here we go; let's take a trip through this magneto and get some man sized spark out of it again.

Picture 4 shows our customer's model "C" magneto. Do you see anything wrong with it that would inhibit its spark output? Well, I do; it's the spark plug wires. Stamped on the outside of the spark plug wires, it says "suppression wire." If you look in on the connector ends, you will see that they are not copper or steel core spark plug wires, but rather a carbon fiber thread (Picture 5) used to carry the current to the spark plugs. Carbon core spark plug wires were introduced years ago with the introduction of HEI (high energy ignitions) in the automotive field. They were meant to be used with these HEI systems and the purpose was to suppress the noise in radios and also to stop the funny lines of interference in televisions as a vehicle drove down the road with steel core spark plug wires. They work with HEI systems because their voltage output can easily peak at 60,000 volts. This is, in part, why many automotive engines run a spark plug gap of .060 or .070 versus the .025 or .030 of old cars or our old tractors. These carbon wires were produced to work with these high energy systems and stop the interference in radios and televisions and they do their job in the right place.

But now if we take these carbon core wires and install them in a conventional ignition system or a magneto whose peak voltage output is somewhere around 12,000 volts, we now have the potential of a spark output problem; maybe not at first, but as time goes on, the wires get old, the resistances build up on the cable ends and other places putting even more demand on higher voltage to push the spark through the wires, you will have spark trouble with these kind of wires on your old tractor. In my shop, my shelf is piled high with only STEEL or COPPER core spark plug wires for tractors. My garbage can overflows with carbon core wires brought to me from everyone who owns anything from an 8N Ford that doesn't start well in the winter to a 620 John Deere that is a cranky starter. I have seen many a tear in customers' eyes when I am asked to get their tractor to start properly and I hold their newly purchased carbon core wires in my hand on their way to the garbage can and I tell them that their new wires are no good on a tractor. Many custom sold wire sets sold explicitly for tractors even down to the make and model are carbon core, not metal core wires, and when they get in front of me they end up in the garbage can. As for the minor radio static or the lines across your TV when you run your old tractor past your house, at least your wife knows what you are doing and that you're keeping busy and should be happy with that!

Back to the magneto—this unit wasn't sent to me to just change the spark plugs' wires, so let's open her up, go through the workings and see what else needs to be done to regain a hot blue one-half inch spark on this model "C." Picture 6 shows the outer cap removed. It is evident that the rotor and cap terminals are badly worn and corroded and need to be retired and replaced with new pieces. Picture 7 shows the rotor removed and the general condition of the points and condenser again worn badly and full of corrosion. Due to the coil assembly's general outward corroded condition and because of the customer's complaint of the No. 2 cylinder being lazy to fire properly, the coil will be replaced.

Due to the two cylinder John Deere's firing order and crankshaft degrees of rotation between firing No. 1 and No. 2, it is a common problem for a weak coil to fire No. 1 cylinder OK, but the spark left for firing No. 2 is now weak. Let's disassemble the rest of the magneto and get down to the origin of its spark, the rotating magnet assembly. Picture 8 shows the magnet rotor removed and a gauge that shows the magnet's strength. The origin of spark for any magneto is from the magnets on the rotating shaft. The magnetic field from the magnets is then increased many times in current and voltage by the winding in the coil. If the origin of spark (the magnets) become weak, over time the magneto's output at the spark plugs will be lessened to whatever degree, regardless of the condition of the coil, the points and the condenser; then add to this a set of carbon core spark plug wires! It is for this reason in my camp that when a magneto needs to be sparked up, I start with the magnet rotor. All that is done here is to run the magnets through a magnet charger to bring their strength back to full power. This procedure will be discussed in a future article with more space for words to explain than I have left in this article. But again, one must start with a magnet rotor that is up to full strength.

We now begin to reassemble and lubricate the rotating shafts as needed, cleaning and lubricating the impulse dogs and assembling the impulse spring and drive lug assembly. After this, a new coil assembly and points and condenser are installed. Picture 9 shows the assembly of the iron core through the center of the new coil before installation. Part of the job is the removal of all rust from any metal cores in the magneto to aid in the full flow of current. I also recommend a light coating of a dielectric compound anywhere an iron contact is made, thereby enhancing the contact. In Picture 10, we now have the rotor assembled in the magneto case, as well as the new coil. At this point, one can understand that the current flow from the magnet rotor will flow from it, up the two outside iron cores and through the internal iron core of the coil. When the magnetic rotor spins past the iron cores, current flows through the iron core of the coil. When this current is stopped by the opening of the points, the current inducts into the coil windings and

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

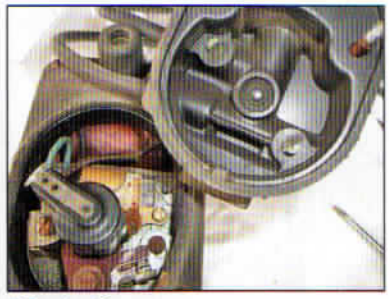

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

the voltage is increased thousands of times for a millisecond. The increased voltage and current from the coil are now directed to the rotor, cap and then to the spark plugs.

A note here about setting the point gap in magnetos; you will usually find a recommended point gap smaller than that of a battery ignition system. This is a very important setting because magnetos need a millisecond longer for coil saturation from having a smaller point gap. All magnetos have an impulse mechanism built into their input drive. This device is used during cranking to hold the rotor from turning momentarily and then to quickly spin the magnet rotors past the iron cores. This speed is necessary at cranking to create a spark. This is what is going on when you crank the tractor with a magneto ignition and you hear a clicking sound. After the tractor starts, centrifugal force pulls the impulse dogs away from their latch and the speed of the rotor turning from the engine running does the trick. Here is a final picture of our Wico model "C" after a trip through its insides (Picture 11). It now snaps a nice blue spark and I'm sure it'll run the model "D" just fine.

Magneto parts aren't real cheap these days, but I guess one should be glad that we can still get them. The coil costs $76, the points and condenser set $40, the rotor $11, the magneto cap $40—all of this plus labor. You can sort of see what you are in for.

Much more to be said about magnetos; that to include testing for spark, a subject I did not touch on this time. Do you want more stuff about magnetos from Ol' Doc? Just say so; maybe we'll take a trip through your magneto next.

Photo 11

We hope that you have enjoyed our article; much more to come.

Until we meet again, happy trails.

This column is written by Ron and Jo Anne O'Neill, who live at Oshkosh, Wisconsin. Their phone number is 920-233-1250.