

SPARK PLUG INDEXING



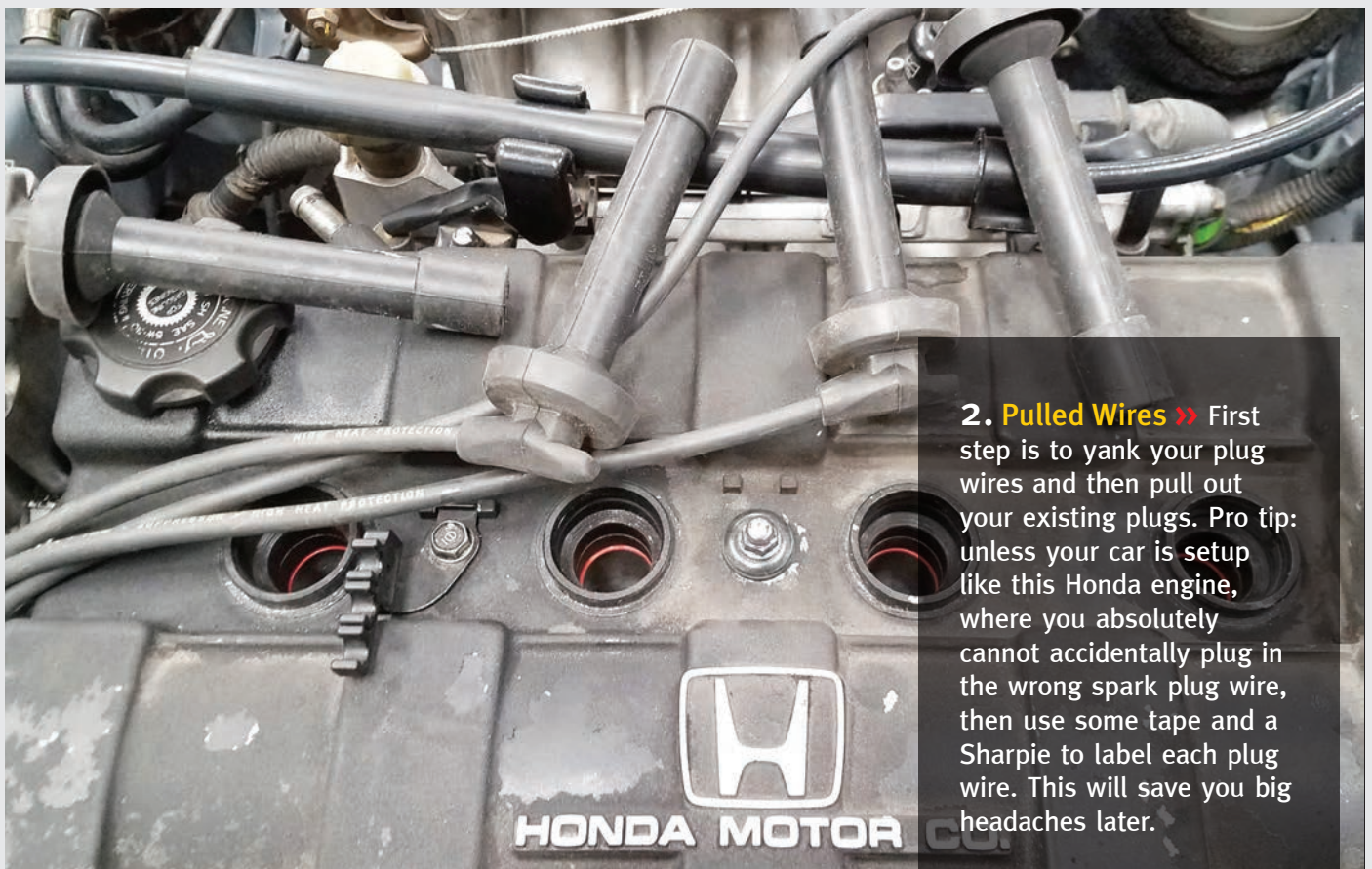
Indexing a spark plug in a cylinder head is the simple process of aligning the ground electrode on the spark plug to a specified direction inside the combustion chamber. This is done via one of two methods: parts bin indexing or special washers of different thicknesses to bottom out the threads of a spark plug so it points in the preferred direction. That is spark plug indexing in a nutshell.

Now, when it comes to the reason for indexing spark plugs, the debate has been raging

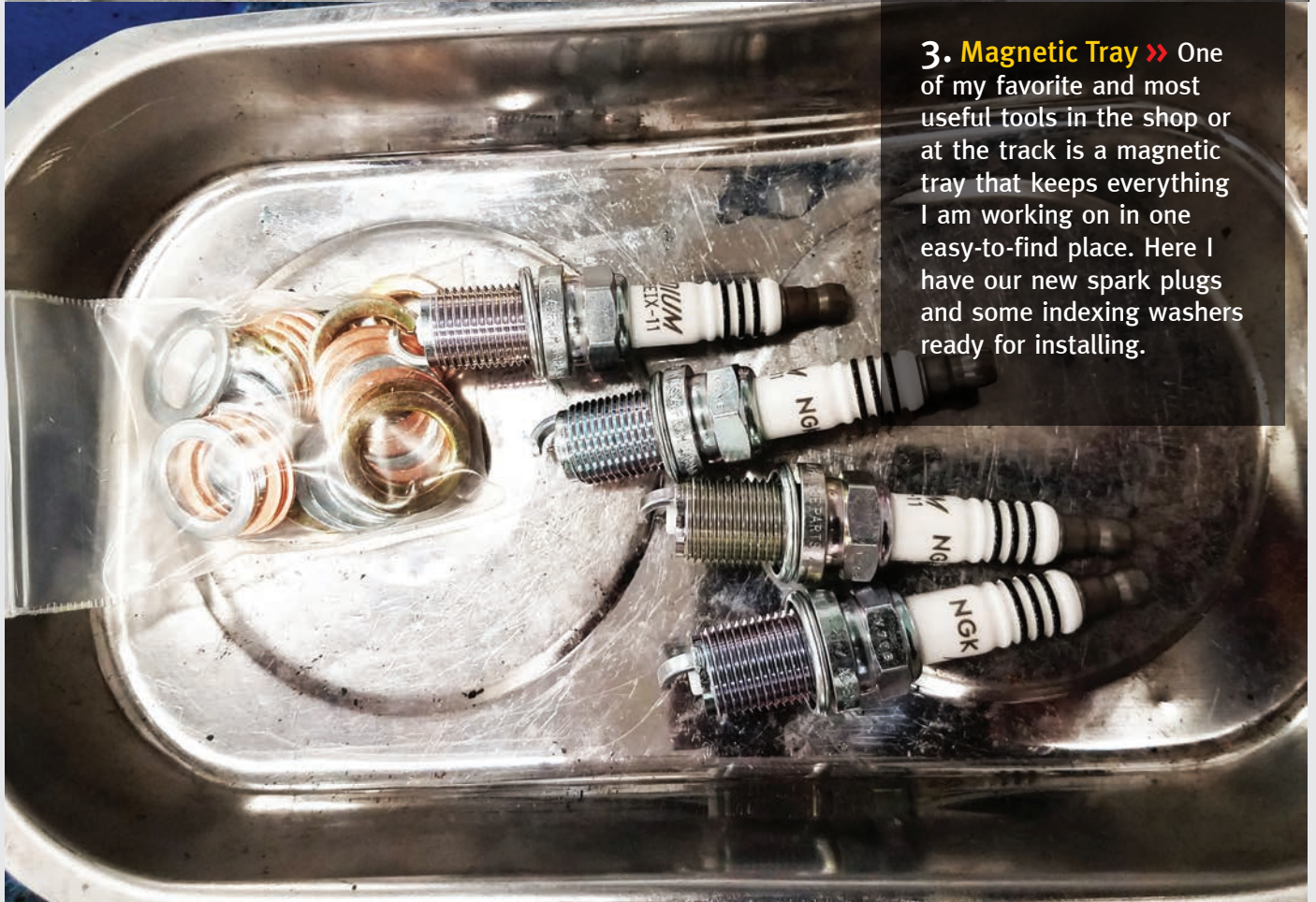
on for almost a century at this point. People debate whether the process is worthwhile. Some folks swear on their favorite race motor that it makes more horsepower. Others say with modern ignition systems and engine designs, it is a waste of time. Drag racers have been indexing spark plugs forever. Honda actually indexed spark plugs from the factory on its Insight hybrid for better fuel mileage. Spec racers in multiple classes index their plugs because they are always looking

1. Indexing Tools >>

Indexing spark plugs is a simple process. All you need is a spark plug socket, a ratchet, and some indexing washers. This specific spark plug socket is really helpful for Honda heads because it has a deep design, is magnetic, and can be marked to identify where the spark plug ground electrode is pointing.



2. Pulled Wires » First step is to yank your plug wires and then pull out your existing plugs. Pro tip: unless your car is setup like this Honda engine, where you absolutely cannot accidentally plug in the wrong spark plug wire, then use some tape and a Sharpie to label each plug wire. This will save you big headaches later.



3. Magnetic Tray » One of my favorite and most useful tools in the shop or at the track is a magnetic tray that keeps everything I am working on in one easy-to-find place. Here I have our new spark plugs and some indexing washers ready for installing.

4. Indexing Theory >> The whole point of this adventure is the theory that the ground electrode is blocking a portion of the spark when the spark plug fires. The concept is to align the plug to the most advantageous direction in the combustion chamber. Knowing where the ground electrode is in the socket will help us index the plug in the head where we want it.



5. Line It Up >> We can't see inside the combustion chamber when the plug is installed. We can only see where the spark plug socket is oriented, therefore we use the high-tech method of using a black Sharpie and drawing a line on the socket in reference to the ground electrode.



6. Aligned » The magnetic socket is nice because the plug won't fall out or change its orientation — one of six possible positions — inside the hex socket. Here you can see our black line on the ratchet end of the socket aligns with the ground electrode on the spark plug end of the socket.

7. Torque Spark Plugs » Drop the socket into the head and torque the spark plug to your specific vehicle's torque specs. Mine is "about yay tight with one hand on a 3/8ths ratchet." Once the plug is snug, see where your black line is.



8. Misaligned Spark Plug >>

Once this plug was tightened, we realized it was pointing in the wrong direction. The next step is to try this plug in every other cylinder to see if you get lucky and have a spark plug that indexes without using an index washer. Then come back to this cylinder with different spark plugs and see if they will index without a washer. If none of your plugs cooperates, then use the thinnest indexing washer and try again. If that doesn't work use the next thicker washer. Patience is key.



for the 100th of an advantage over their competitors. Should you bother to do it? Of course. You're a racer. You're crazy.

Regardless of whether you believe the snake-oil sales pitch on indexing spark plugs, here is how it is done. If you are parts-bin indexing, then buy 20 different spark plugs of the same part number. One by one, insert them into the different cylinders until you get lucky and your spark plugs line up just like you want them. Parts bin indexing is easy, but time-consuming and expensive.

If you don't have the budget to buy 20 spark plugs for four holes, then pick up a set of spark plug indexing washers. I found a set from Moroso with three different thickness washers, .043", .054" and .064" for less than \$20. The challenge to indexing a spark

plug is knowing where the ground electrode is pointing once the spark plug is seated in the cylinder head. I solve this problem with a simple black Sharpie. I mark the spark plug socket with the location of the ground electrode and then I know where the electrode is facing once I am done tightening the plug. Before using any washers, I will try my four spark plugs in each of the four cylinders just to see if I can get lucky with some parts bin indexing. If I am not that lucky, then I try different indexing washers starting with the thinnest until I get the ground electrode exactly where I want it.

"But where do I want the ground electrode to point?" This is probably the hardest part of indexing. Knowing is half the battle. Knowledge is power

and, in this case, horsepower. Where you want the electrode ground on your spark plug to face when the plug is fully seated into the cylinder head is determined by the design of your engine. Most people say to point the open face of the plug toward the intake valve. The best way to figure the optimal spark plug alignment setup is by dyno testing the engine using different directions with the plugs.

The problem with that process is indexing spark plugs usually only shows less than a one percent gain in horsepower. Anyone who has ever done extensive dyno testing can attest that the dyno will range beyond one percent between pulls. So how will anyone know if this crack-head idea works? Well, we may never know, which is why the debate

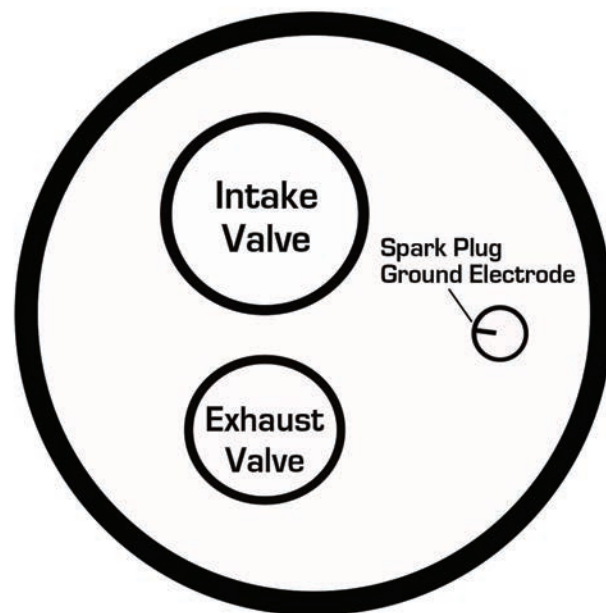


9. Aligned Spark Plug »

After trying different cylinders and different indexing washers, we found the perfect match. This plug is perfectly indexed in the direction we want for optimal engine efficiency and power.

10. Electrode Orientation

» Here you can see the spark plug's ground electrode is facing the intake and exhaust valve. Essentially, this spark plug will fire its igniter into the cylinder wall. A better choice would be to index the plug so the ground electrode is aligned with the wall of the cylinder, exposing the open face of the plug, and the spark, toward the valves and the incoming air/fuel mixture.



rages on. But I can tell you this: If you line up at the start next to me, I can attest my plugs are indexed. Are yours?

To read more from Rob Krider, or to contact him, go to www.robkrider.com SN

Figure 1
Interior of Combustion Chamber