Motorcycle Parts and Accessories

Vance & Hines, Drag Specialty, Power Commander, Kuryakyn, Mikuni, Custom Chrome, Custom Motorcycle

Vacuum Operated Electrical Switch

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What is the Vacuum Operated Electrical Switch (VOES)? What does it do and why is it there?

All Harley Davidson motorcycle carbureted models since the 1984 model year have used the VOES to improve throttle response, increase MPG, and meet EPA requirements for emissions.

The VOES is a motorcycle part described as a vacuum ignition retard device. That is, under low vacuum conditions the switch is open and has no effect on ignition timing. Under high vacuum, the switch closes and advances ignition timing. Essentially, the VOES is like the vacuum advance in older type automotive distributors.

The VOES is a normally open vacuum operated switch that closes under 3-5" of vacuum. The switch is connected to a lead from the ignition module. Under high vacuum, 3-5 inches or higher, the switch closes. A lead from the switch to ground closes a circuit in the ignition module. This circuit advances the timing of the spark. The advance increases throttle response and decrease fuel consumption and emissions.

The vacuum hose is usually connected to a port on the carburetor or intake manifold depending on motorcycle year and carburetor. There are several different VOES switches used the mounting bracket style and operating vacuum being the main differences. The FLHT models have a different vacuum range than the other models. However, just about any VOES can be adapted for use by adjusting the point at which the switch closes.

The point at which the switch closes.

The switches can be adjusted by removing the potted plug and adjusting the setscrew. You will need an accurate vacuum gauge and vacuum hand pump. We have been able to set the operating point as low as 2 inches and as high as 7 inches.

Why would you want a VOES?

We have experimented with converting 1972 and later ignitions from points to electronic ignition. We have used Dyna 'S' conversions for H-D's. We have used Crane, Compufire, Spyke and other Harley Davidson conversion kits. With some of these such as the Dyna 'S', you still have to use the mechanical advance system. This requires service and routine maintenance.

Others work very well having digital advances and provisions for a VOES switch. We experimented with installing a VOES in a 1983 FX and found we have improved throttle response and better mileage. We also routinely install the VOES in custom built Harley Davidsons and even our own Kenny Boyce framed Harley FXR's use VOES with a Crane HI4 module. During Dyno runs, we found that part throttle roll on power was increased as was throttle response.

We believe that most street ridden Harley Davidson motorcycles will benefit from a VOES.

For racing applications or supercharged, turbo-charged or bikes using Nitrous Oxide, we do not recommend using a VOES. This is due to the possibility of a sudden timing change causing a backfire which can be a bad thing under these conditions!

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