

YMMS: 2006 Volkswagen Passat 2.0T

Jun 20,
2022

Engine: 2.0L Eng

License:

VIN:

Odometer:

Alternator, Charging System

Operation

The vehicle battery is responsible for supplying electrical current to the starter motor. It will also supply current to any electrical device switch on when the engine is not running. The alternator is used for charging the battery. It also supplies current to all electrical consumers when the engine is running.

The alternator is a three phase AC generator, which uses diodes to rectify the alternating current, or AC to direct current, or DC. The alternator has to create enough voltage and current to charge the vehicle battery and supply the electrical loads with the engine running.

Other than the alternator output, there are two signal wires at the alternator: L and DFM. An explanation of these two can be found below:

L

The L circuit is used by the vehicle electrical system control module (J519) to sense whether the alternator is charging or not. If the alternator is not charging, the indicator light in the instrument cluster will be illuminated.

DFM

DFM, or Digital Field Control is a signal supplied to the alternator by the engine control module (J623). In certain scenarios, such as high engine load or extreme temperatures, the engine control module can directly control the alternator field. This allows the engine control module to adjust charging voltage as it sees fit.

Location

Best Test Location:

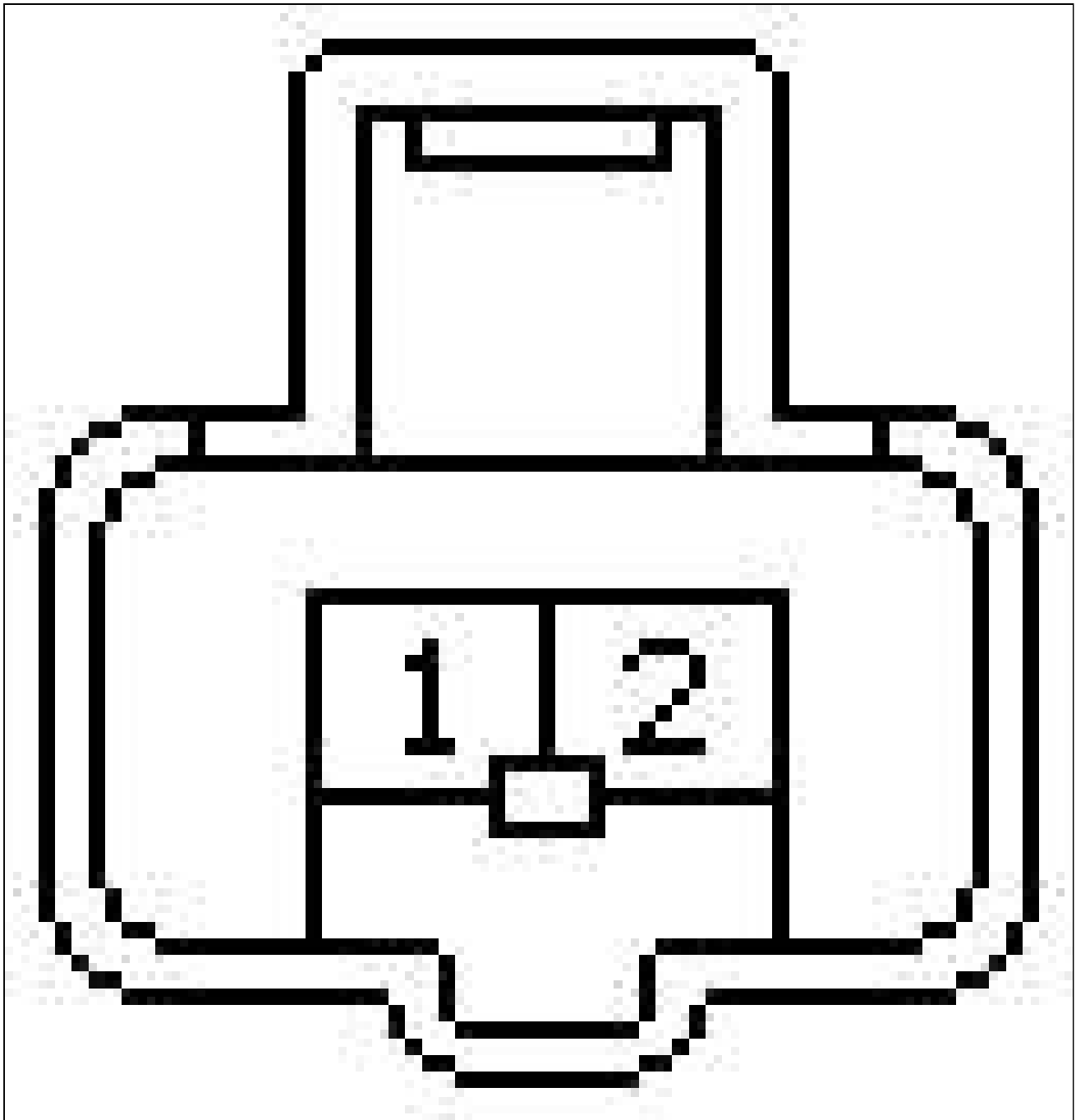
At either the one-pin or two-pin connector at the generator.

Component Location:

The generator (C) is located at the front left of the engine compartment, underneath the engine cover.

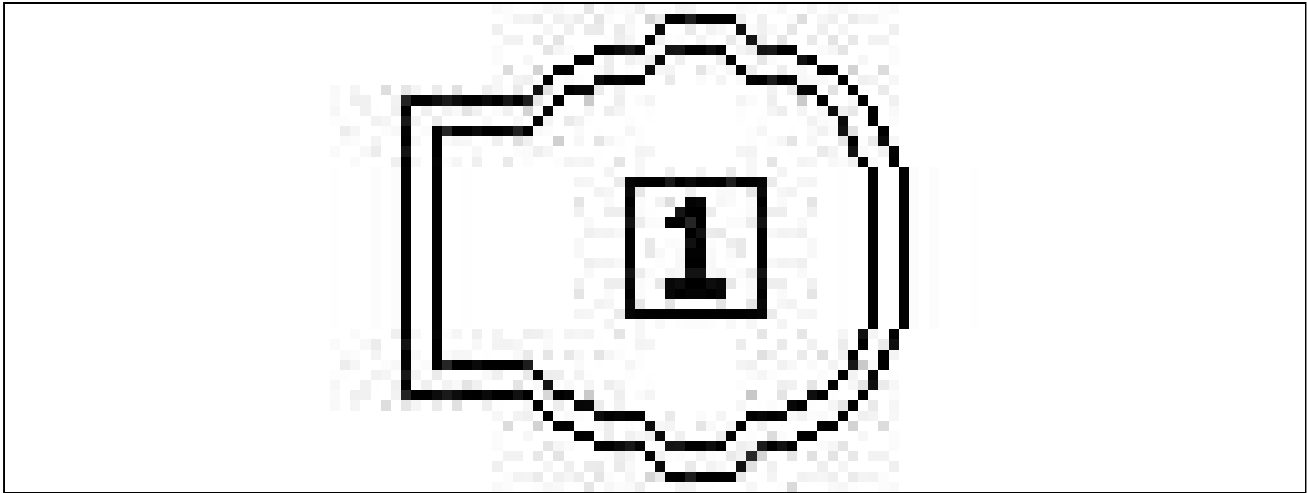
Connector

View: Harness Side, Backprobing Generator (C)



Pin Assignment	Wire Color
1=Battery Light Signal	Blue
2=Digital Field Monitor	Brown - White or Red

View: Harness Side, Backprobing Generator (C)



Pin Assignment	Wire Color
1=Alternator Output	Black

Tests

DC Voltage Test

Connect test leads:

Yellow=Alternator Output signal

Black=Known good ground

Engine running, check for the presence of correct charging voltage from the alternator.

Charging voltage should be within 13.5-15.5V at idle with no loads applied.

Signature Test

Connect test leads:

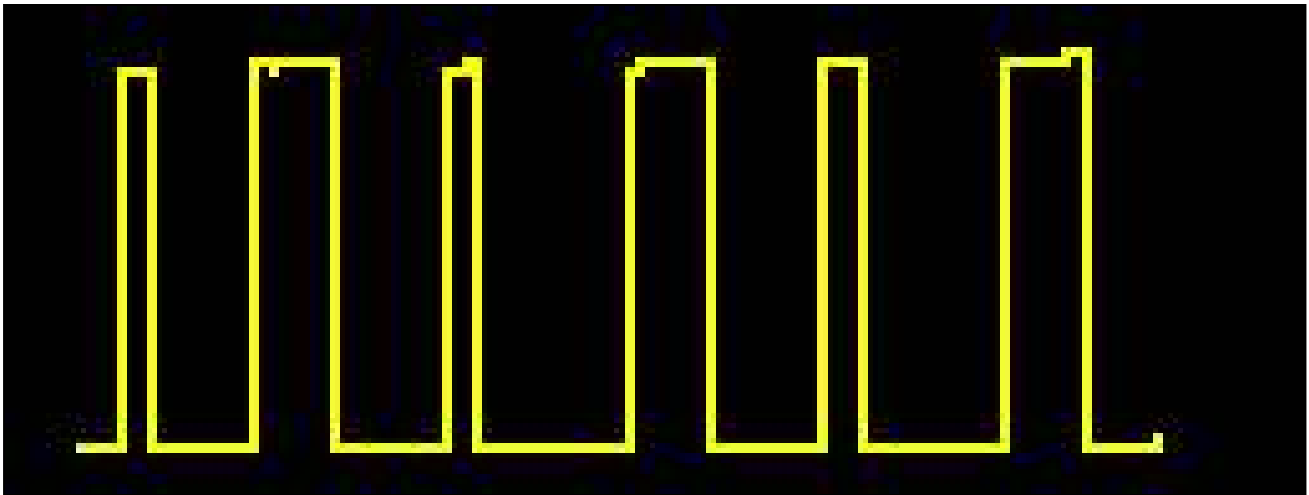
Yellow=DFM Signal

Black=Known good ground

Engine running, monitor the digital field monitor (DFM) signal coming from the alternator.

This signal will vary depending on engine load, as this is the ECM directly controlling the alternator field current.

See right for a sample waveform.



Alternator Diode Ripple Test, Charging System

Tests

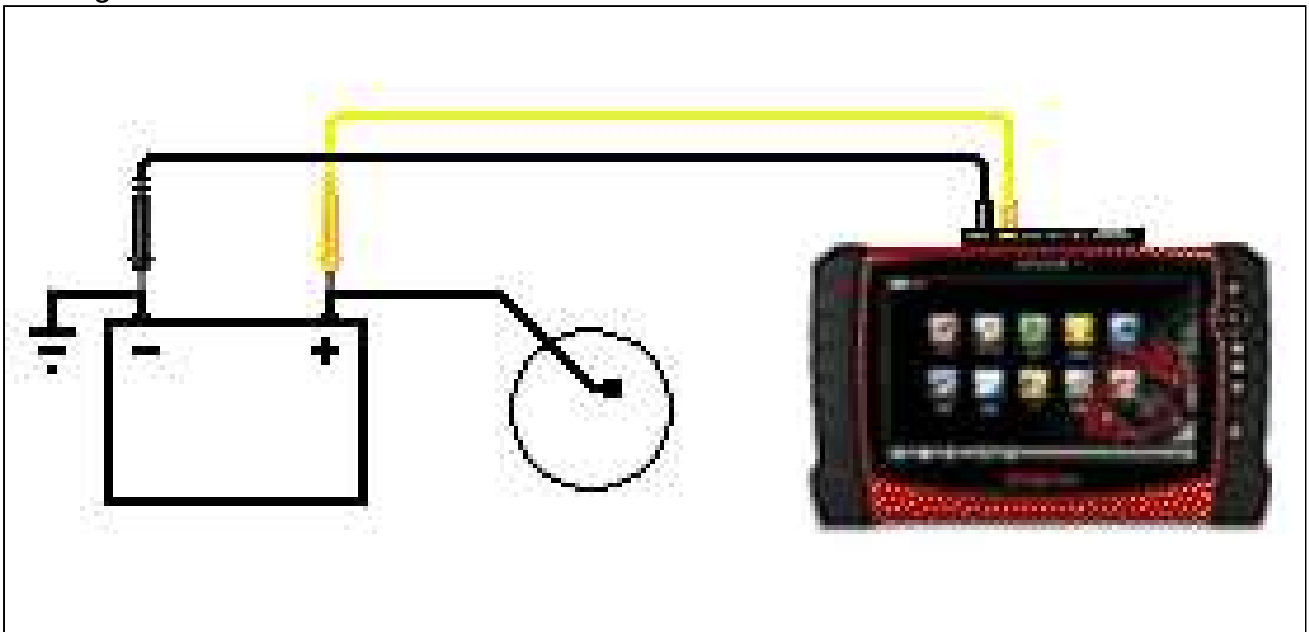
Alternator Diode Ripple Test

To view the alternator diode, connect test leads:

Yellow=Battery(+)

Black=Battery(-)

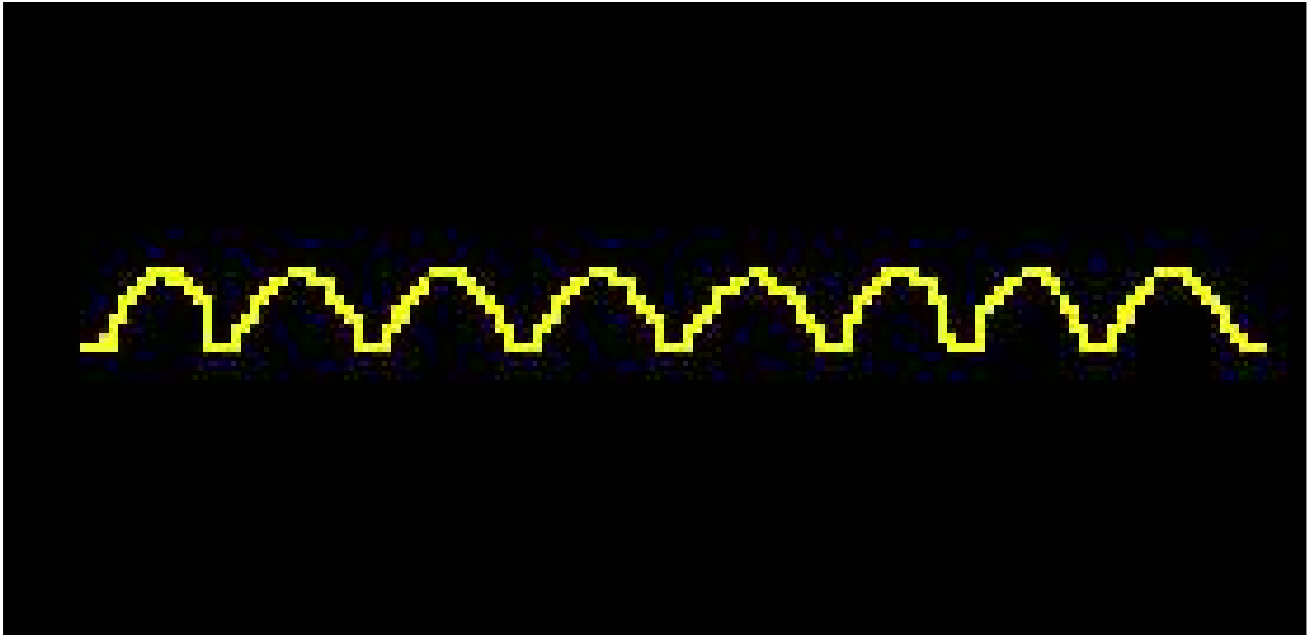
Note: Test at battery, testing at the jump start point under hood may lead to inaccurate readings.



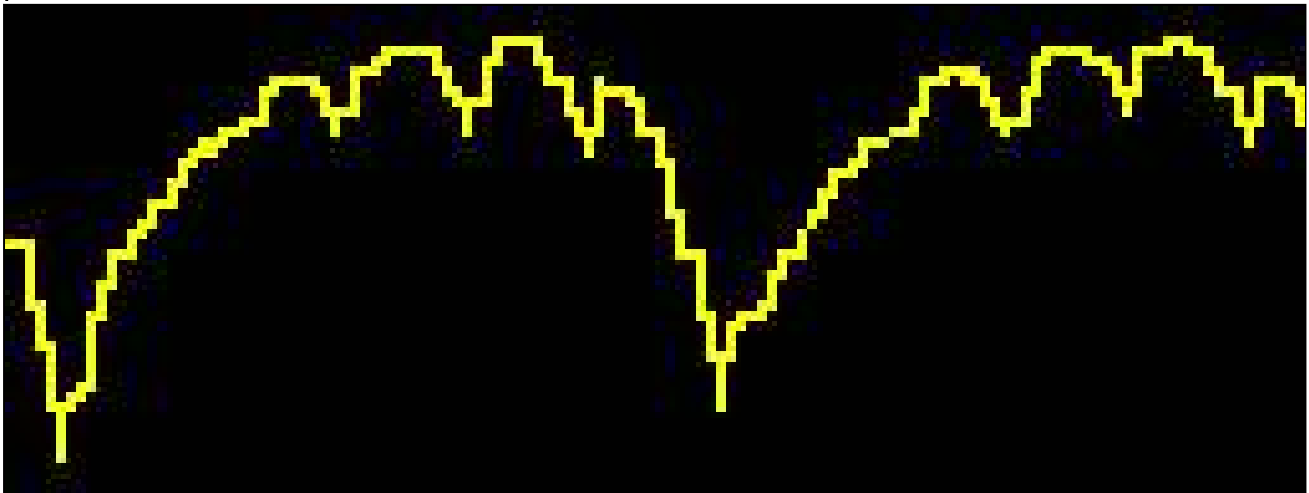
Humps that appear in waveform are normal and represent condition of diodes.

KOER, at fast idle, turn headlights on to increase load on alternator as it is charging the battery at a higher rate, It is typical to see the waveform gradually rise and fall, It may not stay at the zero line.

Small spikes that appear are a result of the voltage regulator and are normal.



The most common failures are shorted or open diodes. Notice how large one of the diode patterns is in relation to the others this alternator needs work.



Alternator Ground Test,Charging System

Tests

Alternator Ground Test

An alternator case not properly grounded will have negative voltage when charging.

Connect test leads:

Yellow=Battery(-)

Black=Alternator case

KOER, fast idle, turn on headlights. Voltage should be below 100mv with high charging rate.

