 | 15. Juli 2002 | 1-4

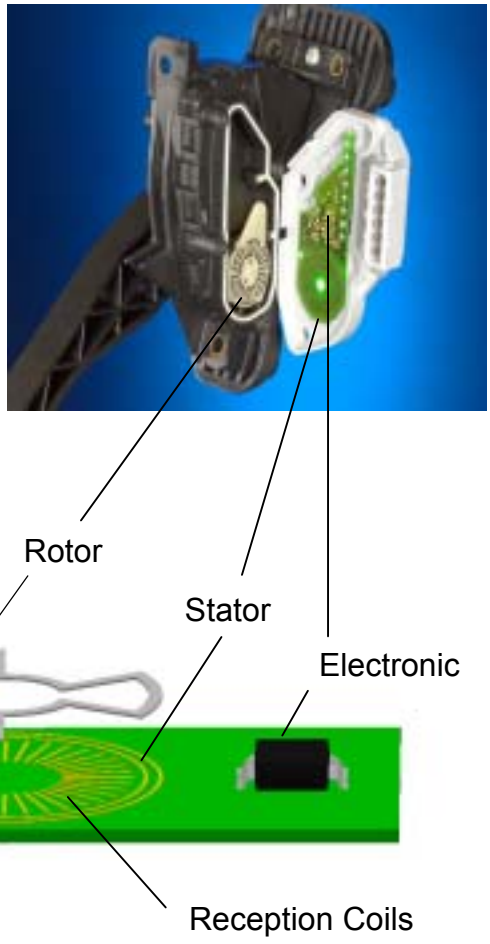
Accelerator pedal position sensor

General

On modern vehicles the percentage of electronic components is increasing. Reasons for this, are among others, the legal regulations, e.g. emissions and fuel consumption reduction, the increase of active and passive safety as well as driving comfort. Electronic components are always on the advance, the accelerator pedal position sensor is no exception. This information contains a short summary about function, construction, consequences of failure and diagnosis of the sensor.

Construction

In this application a contactless sensor is used, that is based on the inductive principle.
This sensor consists of a stator, that contains a field coil, reception coils as well as an electronic for evaluation (l. Fig.) and a rotor that is be formed from one or more closed conducting loops with a definite geometry.



Function

By supplying an alternating voltage to the field coil, a magnetic field is produced, which induces voltages in the reception windings. A current is also induced in the conduction loops of the rotor, which influences the exiter field.

Dependent upon the position of the rotor relative to the stator windings, A/C amplitudes are produced. These are rectified in the electronic rectification unit and sent as a D/C voltage to the control unit. The evaluated signal is sent to the throttle position motor as a pulsed signal. The characteristics of this signal is dependent upon the attitude of the accelerator pedal.

Consequence of failure

If the accelerator pedal sensor fails it can cause the following fault symptoms :

- Engine has only a slightly position idle position
- Engine doesn't react to movement of the accelerator pedal
- Vehicle goes into emergency running mode
- Malfunction indicator lamp illuminates

A failure can have different causes:

- Damaged wire or connection on the a accelerator pedal sensor
- Faulty earth / ground // faulty voltages supply
- Defective electronic rectification in the sensor
- Mechanical defect

Fault diagnosis

For fault diagnosis consider the following test instructions:

- Read fault code
- Visual check of the accelerator pedal sensor for mechanical damage
- Visual check of the relevant electrical connections and wires for correct seating and / or damage
- Check the sensor using an oscilloscope and multimeter

For example an MB A-class (168) 1.7 the following test steps, technical data and illustrations, are used to explain the fault diagnosis.

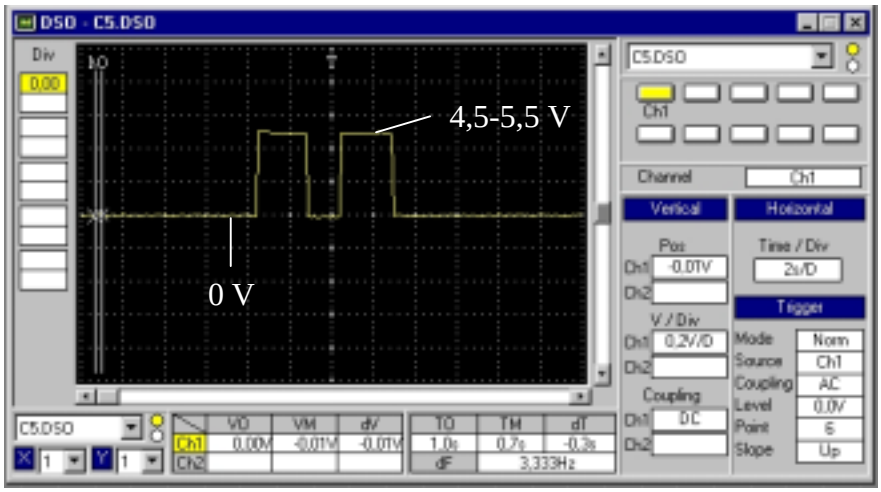
Technical data: pin definition / cable colours

Control unit-pin	Signal	Test condition	Guide value
C5 blue-yellow	⇒	Voltage supply off	0 V
C5	⇒	Voltage supply on	4,5-5,5 V
C8 violet-yellow	⊥	Voltage supply on	0 V
C9 blue-grey	←	Voltage supply on Pedal not pressed	0,15 V
C9	←	Voltage supply on Pedal pressed	2,3 V
C10 violet-green	←	Voltage supply on Pedal not pressed	0,23 V
C10	←	Voltage supply on Pedal pressed	4,66 V
C23 brown-white	⊥	Voltage supply on	0 V

Signal	Description
⇒	Output signal
←	Input signal
⊥	Control unit ground

Signal representation of pin C 5:

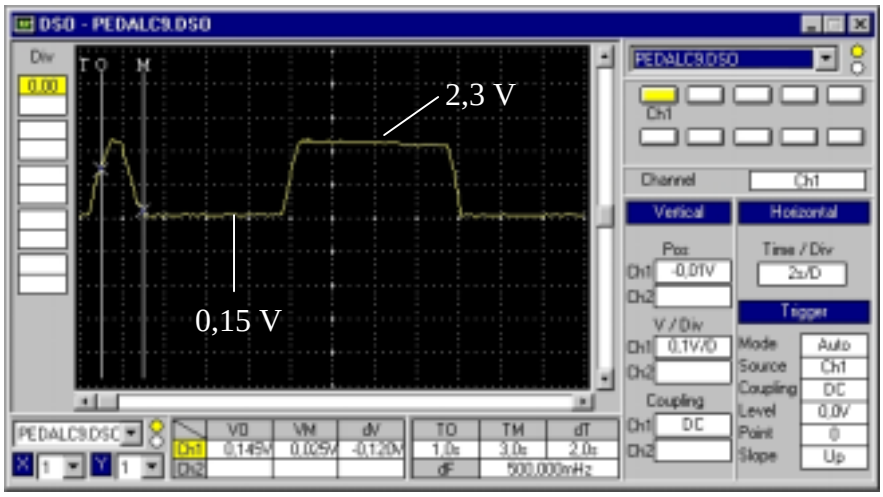
With this measurment the voltage supply of the sensor is checked.
Ignition on / off



Signal representation of pin C 9:

Ignition on, pressing pedal and releasing

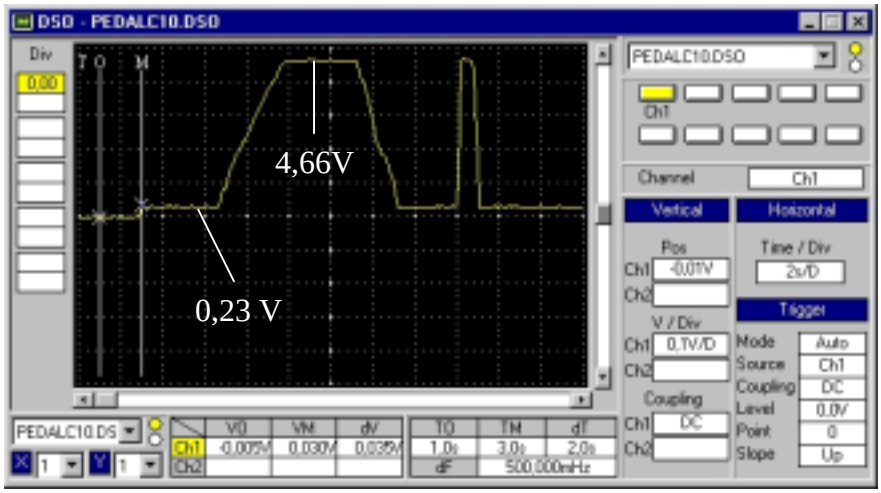
The increase and decrease of the signal are dependent on the speed, with which the pedal is pressed and released.



Signal representation of pin C 10:

Ignition on, pressing pedal and releasing

The increase and decrease of the signal are dependent on the speed, with which the pedal is pressed and released.
Recognisable on the diagram by the second signal.



Recommendation:
If possible the measuring should be carried out by two technicians, one to operate the pedal and the other to watch the signal, this can be avoided by using an oscilloscope with a memory function.