



Ignition, servicing

Ignition system, general notes

Notes:

- ◆ *This section deals especially with components having to do with ignition. Other components of the injection and ignition system.*

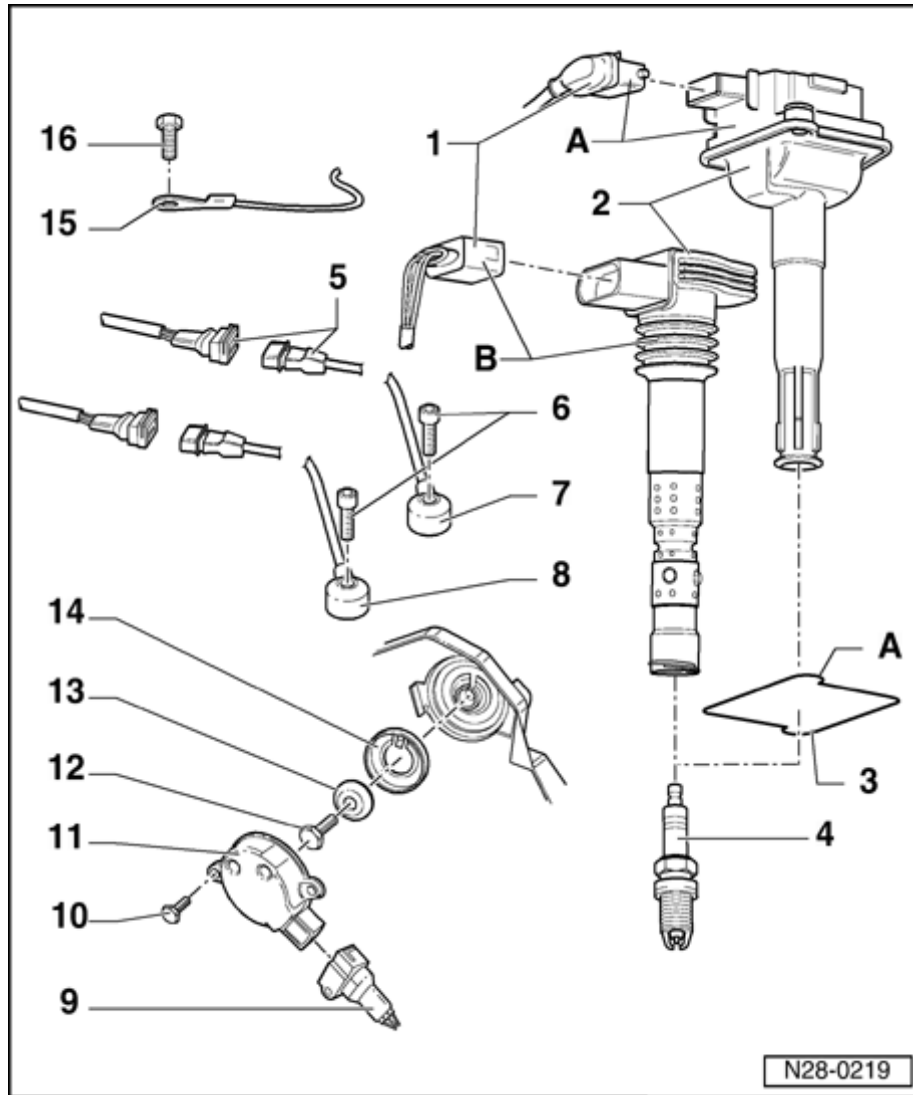
⇒ *Repair Group 24*

- ◆ *The Engine Control Module (ECM) is equipped with an On Board Diagnostic (OBD)*
- ◆ *Components marked with * are checked via On Board Diagnostic (OBD). ⇒ [Page 01-28](#) , checking DTC memory*
- ◆ *For the electric components to work properly, a voltage of at least 11.5 V is required.*
- ◆ *It is possible that the control module will recognize a malfunction and store a DTC during some tests. Therefore, after all tests and repairs have been performed, DTC memory should be*

checked and erased if necessary ⇒ [Page 01-28](#) , *Checking DTC memory*.

Safety precautions ⇒ [Page 28-5](#) .

Test data, spark plugs ⇒ [Page 28-7](#)



Ignition system components, removing and installing

A parts: Only for engine code ATW

B parts: Only for engines AUG, AWM

1 - Connector

- ◆ Black, 4-pin

2 - Ignition coil with power output stage (-N70-, -N127-, -N291-, -N292-)

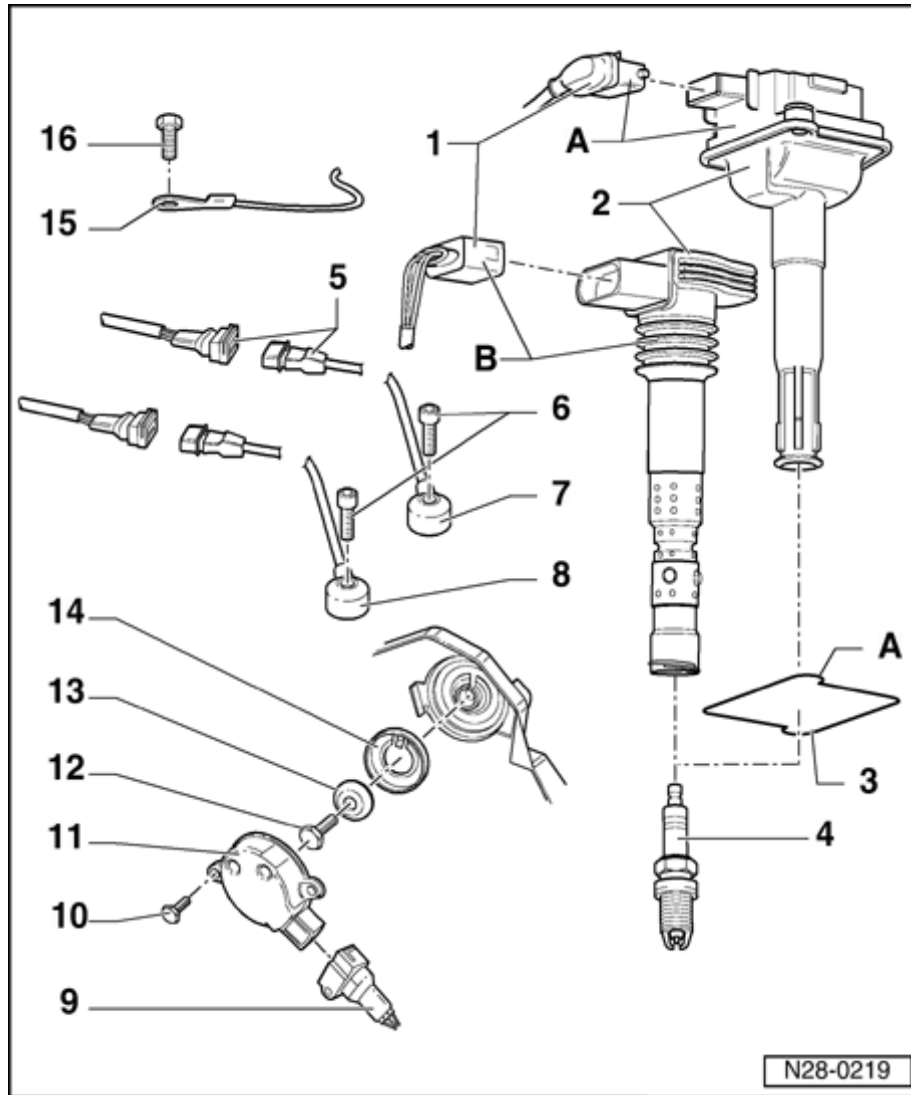
- ◆ Checking ⇒ [Page 28-10](#)
- ◆ Tighten mounting bolts to 10 Nm
- ◆ Use T10094 removal tool to remove

3 - Seal

- ◆ Replace if damaged

4 - Spark plug, 30 Nm

- ◆ Remove and install with 3122 B
- ◆ Type and spark plug gap ⇒ [Page 28-7](#), test data, spark plugs



5 - 3-pin harness connector

- ◆ Terminals are gold-plated
- ◆ Brown for Knock Sensor (KS) 1 -G61-
- ◆ Black for Knock Sensor (KS) 2 -G66-

6 - 20 Nm

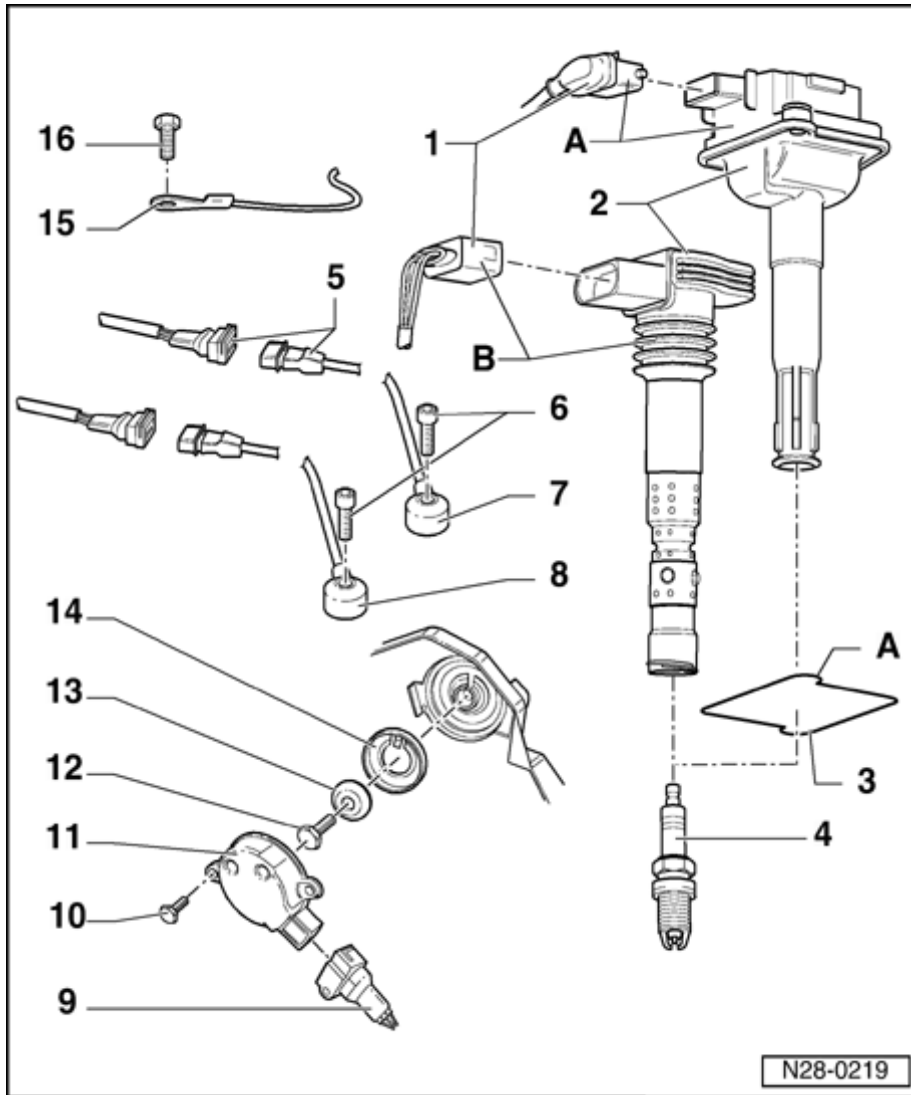
- ◆ Tightening torque affects function of Knock Sensor (KS)

7 - Knock Sensor (KS) 1 -G61-*

- ◆ Terminals of sensor and connector are gold-plated
- ◆ Checking ⇒ [Page 28-14](#)

8 - Knock Sensor (KS) 2 -G66-*

- ◆ Terminals of sensor and connector are gold-plated
- ◆ Checking ⇒ [Page 28-14](#)



9 - Connector

- ◆ Black, 3-pin

10 - 10 Nm

11 - Camshaft Position (CMP) sensor -G163-*

- ◆ Checking ⇒ [Page 28-8](#)

12 - 25 Nm

13 - Washer

- ◆ Conical

14 - Face plate

- ◆ For Camshaft Position (CMP) sensor 2 -G163-
- ◆ Note position when installing

15 - Ground (GND) wire

- ◆ Do not loosen or tighten unless ignition is switched off.

16 - 10 Nm

- ◆ Do not loosen or tighten unless ignition is switched off.



Safety precautions

To reduce the risk of personal injury and/or damage to the fuel injection and ignition system, always observe the following:

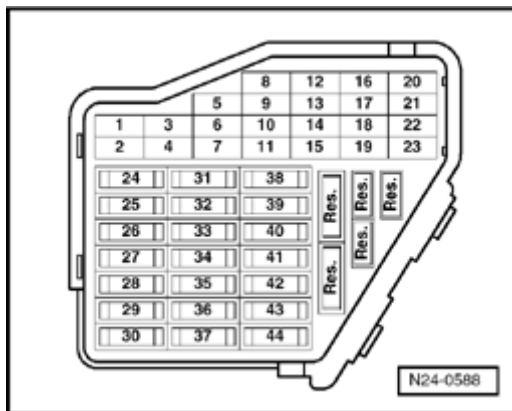
- ◆ Do not touch or disconnect ignition wires when engine is running or turning at starting RPM.
- ◆ Only disconnect and reconnect wires for injection and ignition system, including test leads, when ignition is turned off.
- ◆ If engine is to be cranked at starting RPM without starting:

A

- Remove fuses 29 and 32.

Notes:

- ◆ *By removing fuse 29, voltage supply to the ignition coils is interrupted.*
- ◆ *By removing fuse 32, voltage supply to the fuel injectors is interrupted.*





If special testing equipment is required during road test, note the following:

- ◆ Test equipment must always be secured to the rear seat and operated from there by a second person.

If test and measuring equipment is operated from the passenger seat, the person seated there could be injured in the event of an accident involving deployment of the passenger-side airbag.



Test Data, Spark Plugs

Engine identification	ATW	AUG, AWM
Firing sequence	1-3-4-2	1-3-4-2
Spark plugs¹⁾		
VW/Audi	101 000 063 AA	101 000 063 AA
Manufacturer code	PFR 6 Q	PFR 6 Q
Spark plug gap	max. 0.8 mm	max. 0.8 mm
Tightening torque	30 Nm	30 Nm

¹⁾ Use 3122B spark plug removal tool to remove and install spark plugs



Camshaft Position (CMP) sensor, checking

Special tools and equipment

- ◆ VAG1598/31 adapter cable
- ◆ VAG1526 multimeter or VAG1715 multimeter
- ◆ VAG1594 connector test kit
- ◆ Wiring diagram

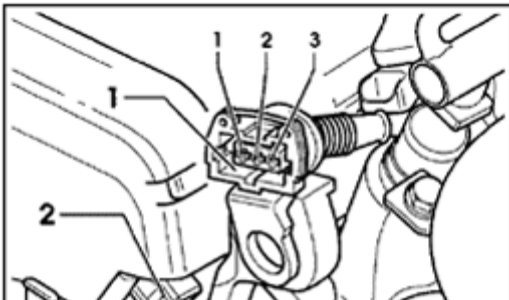
Test requirement

- Battery voltage must be at least 11.5 volts.

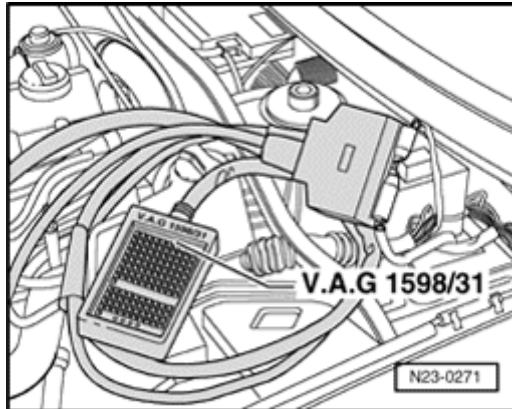
Test sequence

- A
- Disconnect 3-pin connector -1- from Camshaft Position (CMP) sensor -2-.
 - Use adapter cables from VAG1594 to connect multimeter to outer terminals of connector for voltage measurement.
 - Switch ignition on.

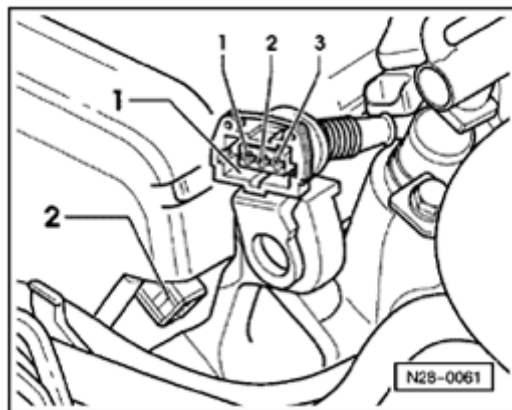
Specification: at least 4.5 V



- Switch ignition off.



- A**
- Connect VAG1598/31 adapter cable to control module wiring harness. Engine Control Module (ECM) is not connected.



- A**
- Check for open circuits in wires between test box and connector according to wiring diagram.

Terminal 1 + socket 98

Terminal 2 + socket 86

Terminal 3 + socket 108

Wire resistance: max: 1.5 Ω

- Check wires for shorts between one another.

If no malfunctions are found in the wires and there was voltage between terminals 1 + 3:

- Replace Camshaft Position (CMP) Sensor 2 -G163-.

If no errors are found in wires and there was no voltage between terminals 1 + 3:

- Replace Engine Control Module (ECM) ⇒ [Page 24-120](#) .



Ignition coils with power output stages, checking

Special tools and equipment

- ◆ VAG1598/31 adapter cable
- ◆ VAG1526 multimeter or VAG1715 multimeter
- ◆ VAG1594 connector test kit
- ◆ VAG1527 voltage tester
- ◆ Wiring diagram

Test requirements

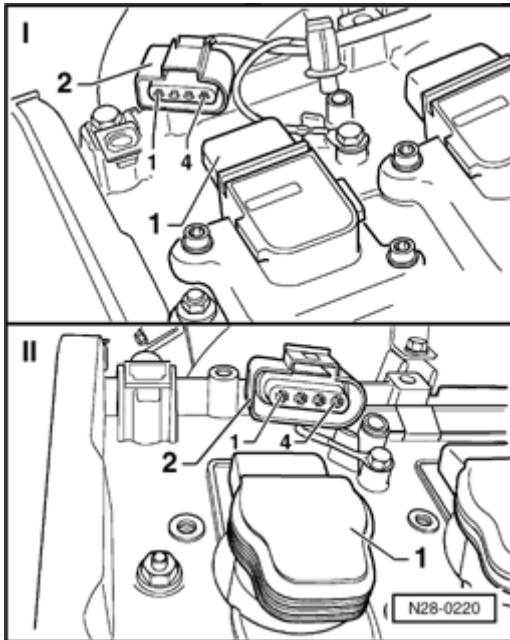
- Battery voltage must be at least 11.5 volts.
- Camshaft Position (CMP) sensor must be OK, checking ⇒ [Page 28-8](#) .
- Engine speed (RPM) sensor must be OK, checking ⇒ [Page 24-57](#) .



Test sequence

I - Engine code ATW

II - Engine codes AUG, AWM



A

- Disconnect 4-pin connector -2- from ignition coil -1- to be checked.
 - Measure supply voltage between terminals 1 + 2 and 1 + 4 of disconnected connector using the multimeter and adapter cables from the VAG1594 connector test kit.
 - Switch ignition on.
- Specification: at least 11.5 V
- Switch ignition off.

If there is no voltage:

- Check wire between 4-pin connector terminal 1 and relay carrier for open circuits according to wiring diagram.
- Wire resistance: max: 1.5 Ω
- Check wires between 4-pin connector and Ground (GND) for open circuits according to wiring diagram.

Terminal 2 and Ground (GND)

Terminal 4 and Ground (GND)

Wire resistance: max: 1.5 Ω



If there is no malfunction in voltage supply:

- Check activation ⇒ [Page 28-12](#)

Checking activation

A

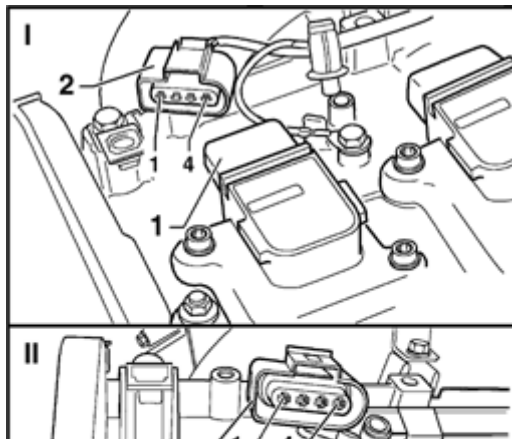
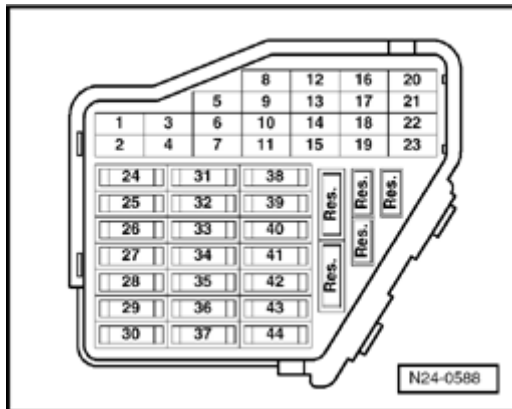
- Remove fuse 32.

Note:

By removing fuse 32, voltage supply to the fuel injectors is interrupted.

I - Engine code ATW

II - Engine codes AUG, AWM



A

- Use auxiliary wires from VAG1594 to connect diode test lamp VAG1527 to terminals 2 and 3 of disconnected connector.
- Operate starter and test ignition signal from Engine Control Module (ECM).
LED should flicker.
- Switch ignition off.



If LED flickers and voltage supply is OK:

- Replace ignition coils with power output stage

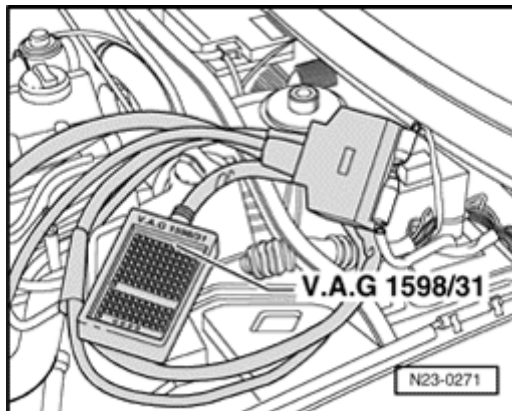
If LED does not flicker:

- Check wires ⇒ [Page 28-13](#) .

Checking wiring

A

- Connect VAG1598/31 adapter cable to control module wiring harness. Engine Control Module (ECM) is not connected.



I - Engine code ATW

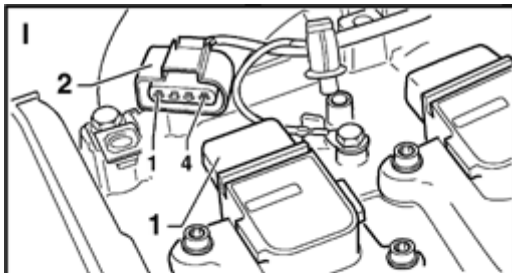
II - Engine codes AUG, AWM

A

- Check wires between test box and 4-pin connector for open circuits according to wiring diagram.

Cylinder 1 terminal 3 + socket 102

Cylinder 2 terminal 3 + socket 95



Cylinder 3 terminal 3 + socket 103

Cylinder 4 terminal 3 + socket 94

Wire resistance: max: 1.5 Ω

- Check wires for shorts among one another.

If there is no malfunction in wire connections:

- Replace Engine Control Module (ECM) \Rightarrow [Page 24-120](#) .



Knock sensors, checking

Notes:

- ◆ *For the Knock Sensors to function properly, it is important for tightening torque to be exactly 20 Nm.*
- ◆ *Use only gold-plated terminals when servicing terminals in harness connector of knock sensors.*

Special tools and equipment

- ◆ VAG1598/31 adapter cable
- ◆ VAG1526 multimeter or VAG1715 multimeter
- ◆ VAG1594 connector test kit
- ◆ Wiring diagram

Test requirement

- On Board Diagnostic (OBD) must have recognized a malfunction at one or both of

the Knock Sensors (KS).



Test sequence

Engine code AWM

- Connect V.A.G1551 scan tool (VAG1552). Start engine and select Engine Control Module (ECM) using address word 01. (connecting scan tool and selecting ECM ⇒ [Page 01-20](#))

Rapid data transfer
Select function XX

HELP



Indicated on display:

- Press buttons -0- and -4- to select "Basic Setting" function 04. Press -Q- button to confirm input.

Basic setting

HELP

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -2- and -8- to select "Display group number 28". Press -Q- button to confirm input.

System in basic setting 28

→

1 2 3 4



Indicated on display:

- Use VAG1788/10 speed adjuster tool to adjust engine RPM to at least 2600 RPM:
- Maintain engine speed until indication in display field 4 jumps from "Test OFF" to "Test ON".



- Continue to maintain engine speed until display field 4 indicates specified value: "Syst. OK".

If specified values are obtained:

- Press → button.
- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.
- Switch ignition off.

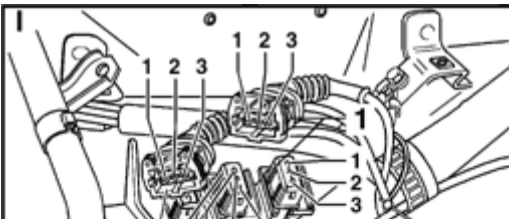
If specified values are not obtained:

- Check resistances and wiring:

Checking resistances and wires

I - Engine code ATW

II - Engine codes AUG, AWM



A

- Disconnect 3-pin harness connector to Knock Sensor (KS) 1 -G61- (green, item no. 1) and/or 3-pin harness connector to Knock Sensor (KS) 2 -G66- (blue, item no. 2).
- Measure resistance between terminals 1 + 2, 1 + 3, and 2 + 3 at connectors to

knock sensors.

Specification: $\infty \Omega$

If specified value is not obtained:

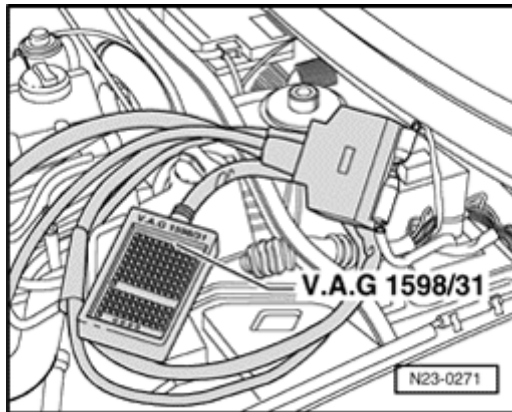


- Replace Knock Sensor(s)

If specified value is obtained:

A

- Connect VAG1598/31 adapter cable to control module wiring harness. Engine Control Module (ECM) is not connected.
- Check wiring between test box and 3-pin connector for open circuit according to wiring diagram.



G61: G66:

Terminal 2 + socket 106 107

Terminal 2 + socket 99 99

Terminal 3 + socket 108 108

Wire resistance: max: 1.5 Ω

- Check wires for shorts between one another.

If no malfunctions are found in wires:

- Loosen Knock Sensor (KS) and then retighten to 20 Nm.
- Perform a road test.

The following operating conditions must be obtained during road test:

- ◆ Coolant temperature must rise to above 80° C.



- ◆ Once the temperature is reached, the operating conditions

Idle

Partial throttle

Wide Open Throttle (WOT)

Deceleration

must be reached several times each.

- ◆ Engine speed must be increased to above 3500 RPM during Wide Open Throttle (WOT).

- Check control module DTC memory again.

If complaint persists:

- Replace Knock Sensor(s)



Misfire recognition, checking

Special tools and equipment

- ◆ V.A.G1551 scan tool (or VAG1552 mobile scan tool) with VAG1551/3B cable

Test sequence

- Connect V.A.G1551 scan tool (VAG1552). Start engine and select Engine Control Module (ECM) using address word 01. (connecting scan tool and selecting ECM ⇒ [Page 01-20](#))

Rapid data transfer

HELP

Select function XX



Indicated on display:

- Press buttons -0- and -8- to select "Read measuring value block" function 08. Press -Q- button to confirm input.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -1- and -4- to select "display group number 14" and then press -Q- button to confirm input.

Read measuring value block 14 →

1 2 3 4



Indicated on display: (1 to 4 = display fields)

- Check total number of misfires in display field 3:

Specification: 0 to 5



- Check status of misfire recognition in display field 4:

Specification: activated

If specified values are obtained:

- Press → button.
- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.
- Switch ignition off.

If specified values are not obtained:

- Check spark plugs ⇒ [Page 28-2](#) , Parts of ignition, removing and installing
- Check ignition coils with power output stage ⇒ [Page 28-10](#)
- Check fuel injector ⇒ [Page 24-61](#)