Ignition system, servicing

General notes:

- *Only components specifically related to the ignition system are contained in this Repair Group. For the other Fuel injection components ⇒ page 24-1 .*

- *Always switch OFF the ignition when disconnecting and connecting the battery, otherwise the Engine Control Module (ECM) could be damaged.*

- *The Engine Control Module is equipped with an On Board Diagnostic system.*

- *Components marked with an * are checked via On Board Diagnostic. ⇒ Page 01-11 , Check DTC memory*

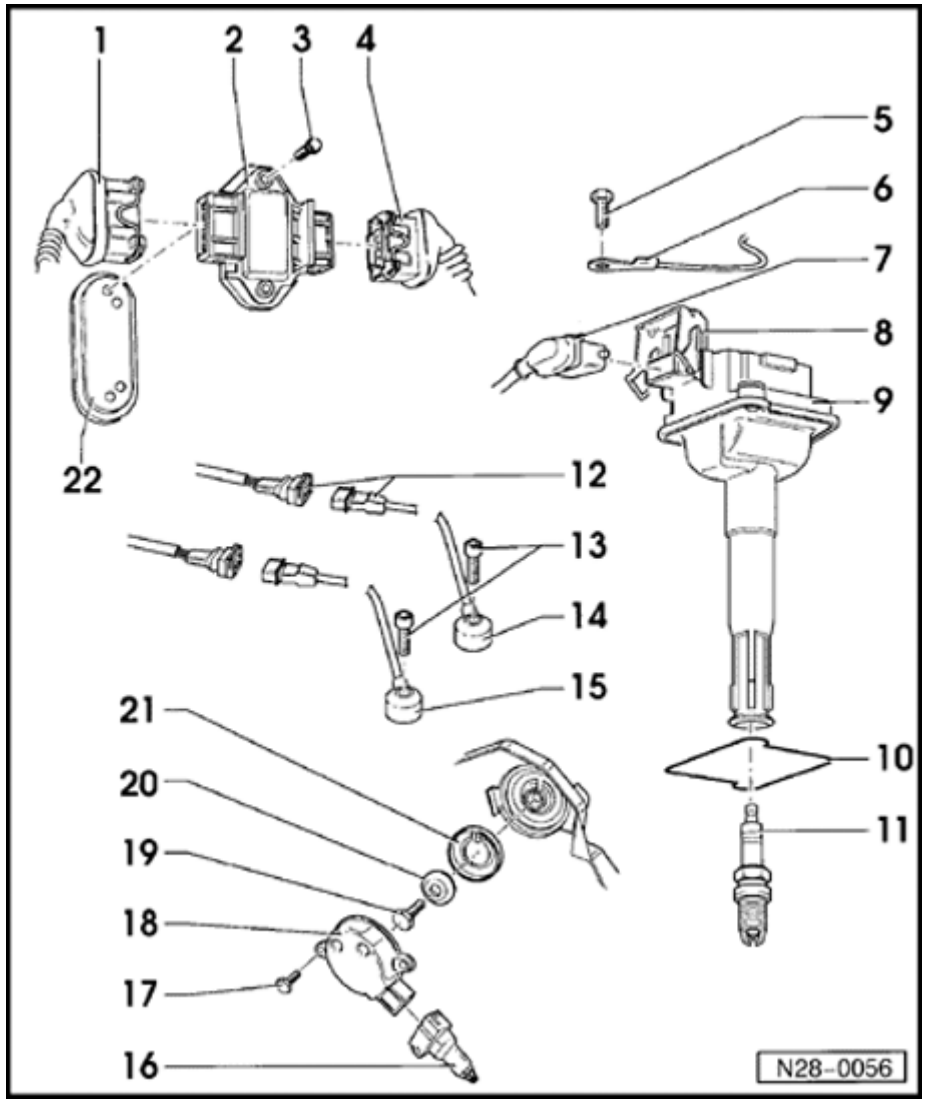
- *11.5 Volts minimum is required for trouble-free operation of the electrical components.*

- *While performing certain checks it is possible that the ECM will recognize and store a Diagnostic Trouble Code (DTC). Therefore after*

completing all checks and repairs,Check and erase the DTC memory as necessary. ⇒ Page 01-11 , Check DTC memory

Safety precautions ⇒ Page 28-5

Test data, spark plugs ⇒ Page 28-6



Ignition system components, removing and installing

1 - 5-pin harness connector

- Black

2 - Ignition Coil Power Output stage N122

- Checking ⇒ Page 28-9
- Coat lower part with heat conductive paste G 052 170 A2

3 - 6 Nm (53 in. lb)

4 - 4-pin harness connector

- Black

5 - 10 Nm (7 ft lb)

- Only loosen or tighten with ignition switched off

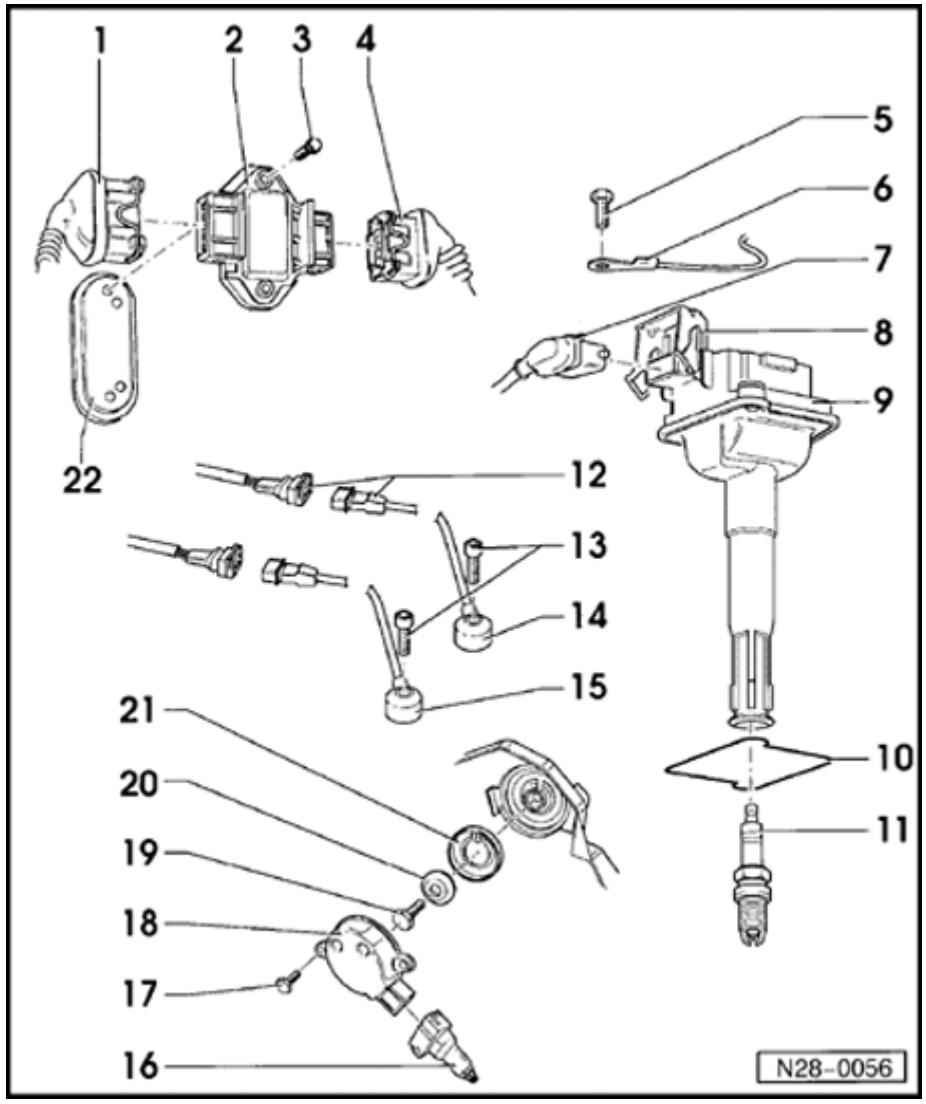
6 - Ground wire

- Only loosen or tighten with ignition switched off

7 - 3-pin harness connector

- Black

8 - Connector Lock



9 - Ignition coils N, N128, N158 and N163

- Spark plug connector can be pulled off
- Checking ⇒ Page 28-9

10 - Oil seal

- Replace if damaged

11 - Spark plug

- 30 Nm (22 ft lb)
- Remove and install using 3122B
- Type and electrode gap ⇒ Page 28-6 , test data, spark plugs

12 - 3-pin harness connector

- Gold plated terminals
- Green for knock sensor 1 G61
- Blue for knock sensor 2 G66

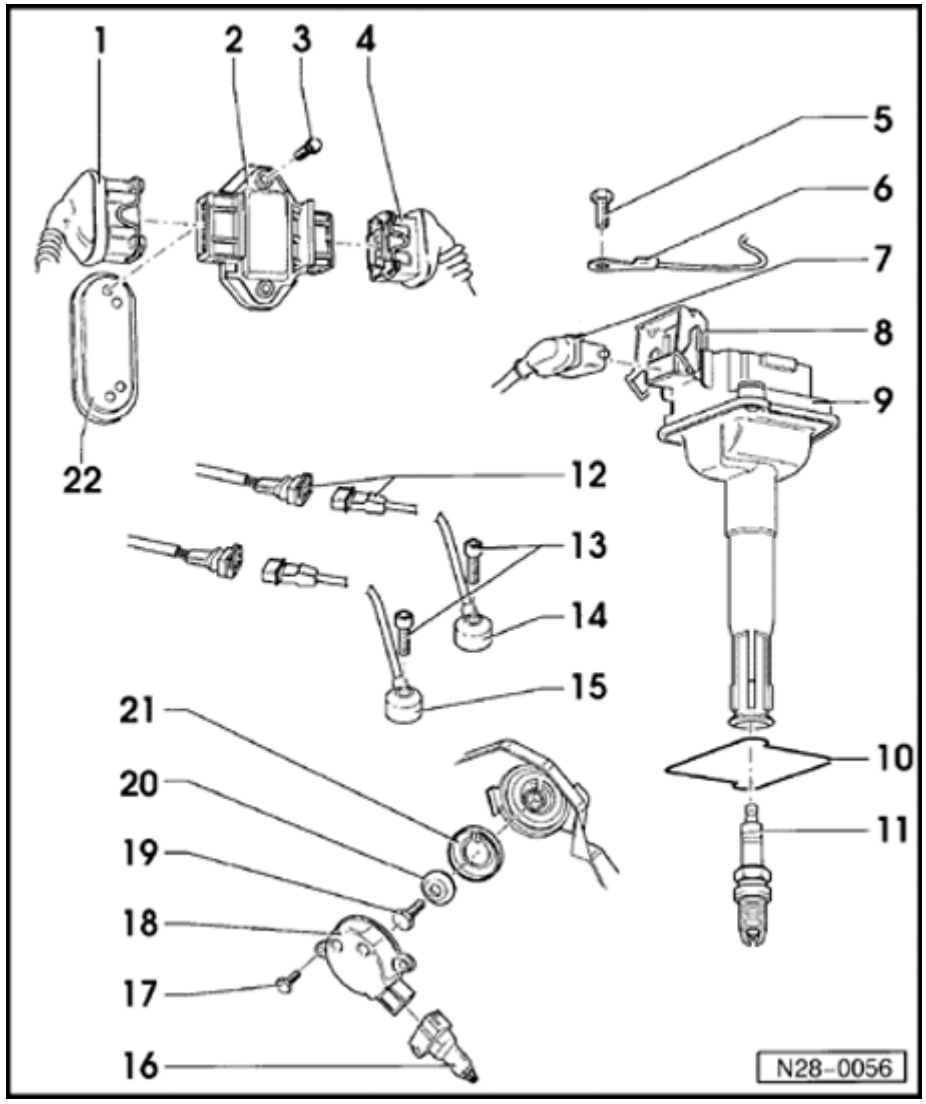
13 - 20 Nm (15 ft lb)

- Tightening torque influences knock sensor function

14 - Knock sensor 1 G61*

- Green

- Gold-plated sensor and connector terminals
- Checking ⇒ Page 28-13



15 - Knock sensor 2 G66*

- Blue
- Gold-plated sensor and connector terminals
- Checking ⇒ Page 28-13

16 - 3-pin harness connector

- Black
- for Camshaft Position sensor G40

17 - 10 Nm (7 ft lb)

18 - Camshaft Position sensor G40

- Checking ⇒ Page 28-7

19 - 25 Nm (18 ft lb)

20 - Conical washer

21 - Hood

- for Camshaft Position sensor G40
- When installing, note installation arrangement

22 - Heat sink

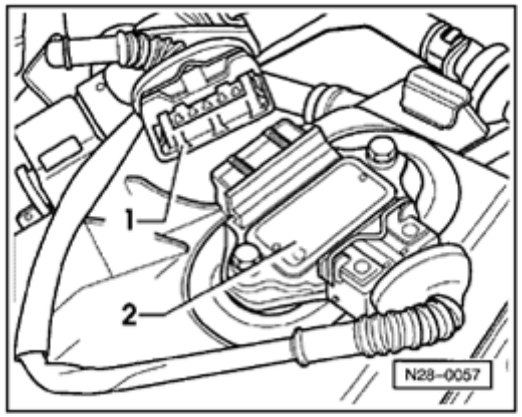
Safety precautions

To prevent injuries to persons and/or damage to the fuel injection and ignition system, the following must be noted:

- Do not touch or disconnect ignition wiring when the engine is running or being turned at starter speed.

- The ignition must be switched off before connecting or disconnecting injection or ignition system wiring or tester cables.

- If the engine is to be turned at starter speed, without starting:



- Disconnect 5 pin connector -1- off output stage for ignition coils -2-.

Observe following if test and measuring instruments are required during a test drive:

- Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

  If test and measuring instruments are operated from front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

Test data, spark plugs

Engine code	AEB
Firing order	1-3-4-2
Spark plugs	
VW/Audi	101 000 051 AA
Manufacturer's number	F 7 LTCR
Electrode gap	0.9 to 1.1 mm (0.35 to 0.43 in.)
Tightening torque	30 Nm 22 ft lb)

Camshaft position sensor, checking

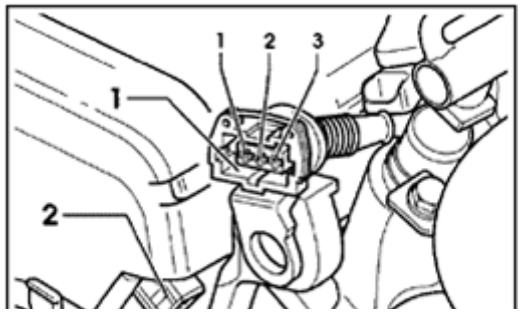
Special tools, testers, measuring instruments and auxiliary items required

- VAG 1598/22 Test Box
- Fluke 83 multimeter
- VW 1594 Adaptor kit
- Wiring diagram

Test conditions

- Battery voltage must be 11.5 Volts minimum

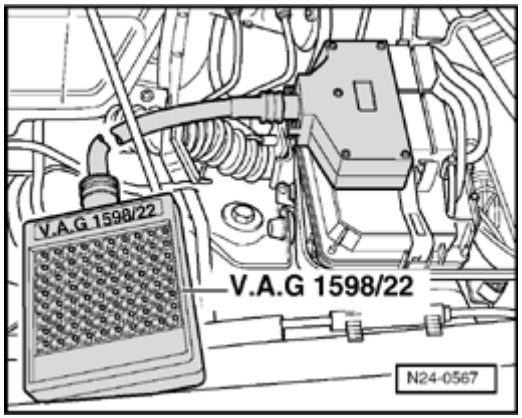
Test sequence



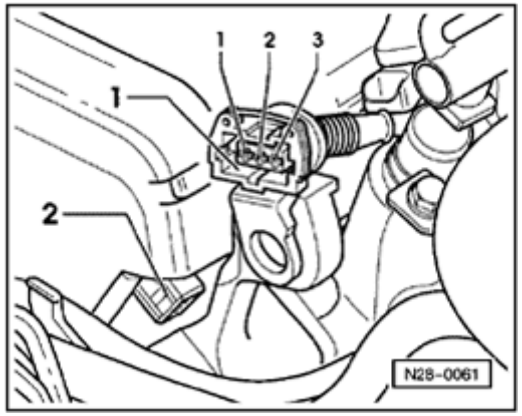
- Disconnect 3-pin harness connector -1- off Camshaft Position sensor -2-.
- Switch multimeter to Voltage measurement range
- Connect multimeter between outer terminals of connector using jumper wires from VW 1594
- Switch ON ignition.

- Specification: min. 4.5 Volts

- Switch OFF ignition.



- Connect test box VAG 1598/22 to Engine Control Module harness connector.



- Check wiring between Test Box and harness connector using wiring diagram Terminal 1 + socket 11 Terminal 2 + socket 76 Terminal 3 + socket 67 Wire resistance: Max. 1.5 Ω
- Check wires for shorting to one another.
  - Specification: ∞ Ω

If wiring OK and voltage present between terminals 1 + 3

- Replace Camshaft Position sensor G40.

If wiring OK and no voltage present between terminals 1 + 3

- Replace Engine Control Module ⇒ Page 24-128 .

Ignition coil power output stage, checking

Special tools, testers, measuring instruments and auxiliary items required

- VAG 1598/22 Test Box
- Fluke 83 multimeter
- VW 1594 Adaptor kit
- VAG 1527 B Voltage tester
- Wiring diagram

Checking requirements

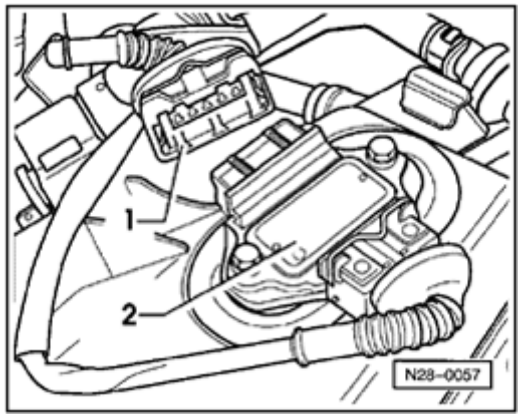
- Battery voltage must be 11.5 Volts minimum
- Camshaft Position sensor must be OK, checking ⇒ Page 28-7 .
- Engine Speed sensor must be OK, checking ⇒ Page 24-69 .

- Fuse 32 OK.

- Ground connections ⇒ Page 28-2 (item 6 must be OK).

Activation, checking

- Disconnect harness connector from all fuel injectors.



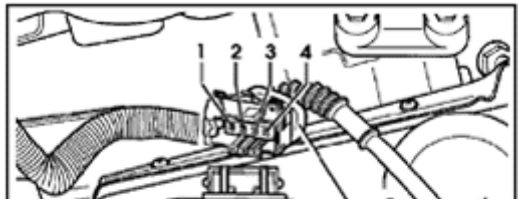
- Disconnect 5-pin harness connector -1- from Power Output Stage for ignition coils -2-.
- Connect VAG 1527 B Voltage tester to terminals 1 + 3 using jumper wires from VW 1594 adaptor kit.
- Operate starter and check ignition signal from ECM.
  - LED must flicker
- Repeat check between terminals 2, 4, 5 and 3 (Ground).

If LED does not flicker:

- Check wiring ⇒ Page 28-12

Power Output stage, checking

- Re-connect 5-pin harness connector on Power Output stage.



- Disconnect 4-pin harness connector -1- from Ignition coil Power Output Stage -2-
- Connect VAG 1527 B Voltage tester to terminal 1 of Ignition coil Power Output Stage -2- and battery positive (+) using jumper wires from VW 1594 adaptor kit.

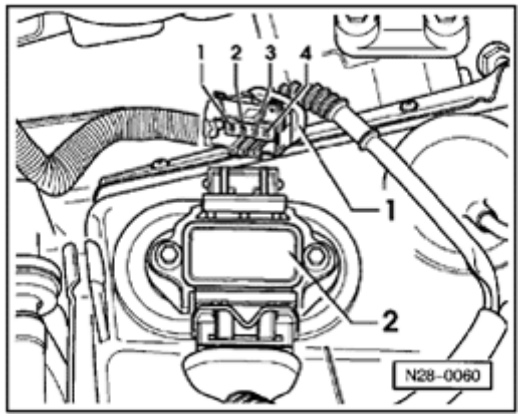
- Operate starter.
  - LED must flicker
- Repeat check between terminals 2, 3 and 4.

If LED does not flicker

- Replace Power Output stage ⇒ Page 28-2 (item 2)

Checking ignition coils

- Switch ON ignition.

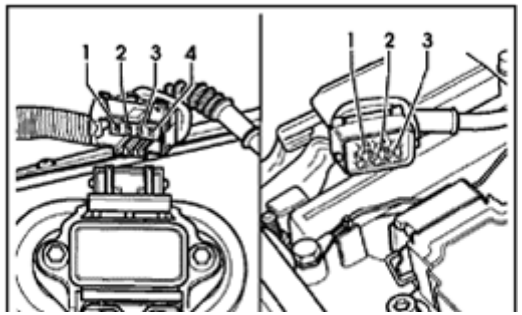


- Connect diode test lamp VAG 1527 with aux. cables from VAG 1594 to terminal 1 of 4 pin connector and to battery negative (-)

  • LED must light up

- Repeat check between terminals 2, 3 and 4.

If LED does not flicker on one terminal:



- Check for open circuit between 4-pin harness connector and (relevant ignition coil) 3-pin harness connector (terminal 1) using wiring diagram.

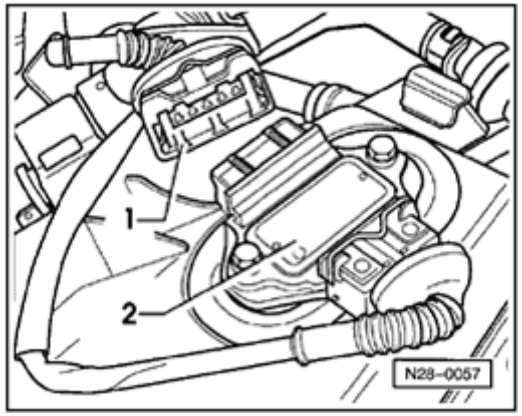
  • Wire resistance: Max. 1.5 Ω

If wiring OK

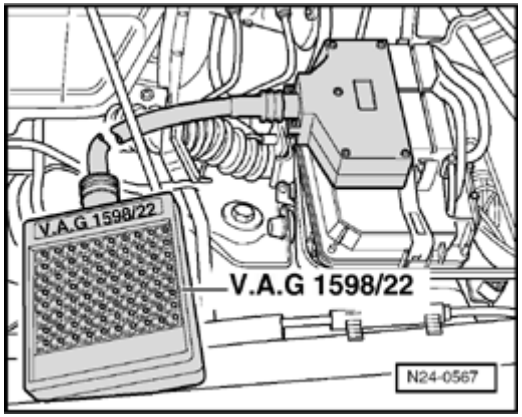
- Replace ignition coil.

Wiring, checking

- Switch OFF ignition.



- Disconnect 5-pin harness connector -1- from Ignition coil Power Output stage -2- .



- Connect VAG 1598/22 Test Box to Engine Control Module harness connector.
- Check wiring between Test Box and 5-pin harness connector for open circuit using wiring diagram. Terminal 1 + socket 70 Terminal 2 + socket 78 Terminal 3 + socket 2 Terminal 4 + socket 77 Terminal 5 + socket 71 Wire resistance: Max. 1.5 Ω

Knock sensor, checking

Notes:

- *Knock sensor torque must be maintained at 20 Nm (15 ft lb) to ensure the knock sensors function correctly.*
- *Only gold-plated terminals may be used when servicing the knock sensor connector terminals.*

Special tools, testers, measuring instruments and auxiliary items required

- VAG 1598/22 Test Box
- Fluke 83 multimeter
- VW 1594 Adaptor kit
- VAG 1527 B Voltage tester
- Wiring diagram

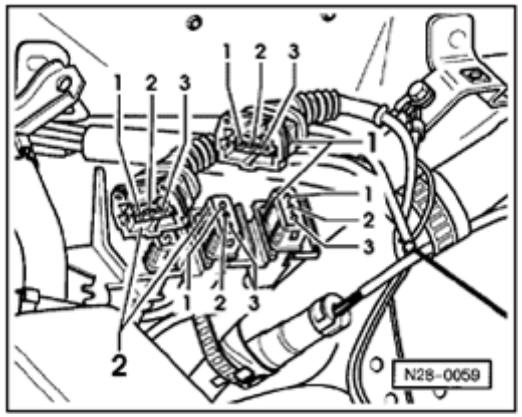
Test conditions

- On Board Diagnostic must have recognized a DTC for one or both knock sensors.

Checking function

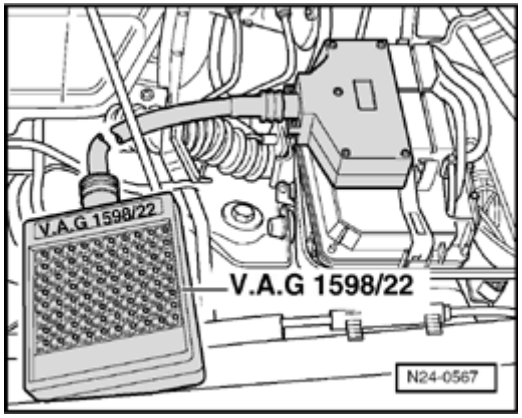
- Functional check of knock control and knock sensors ⇒ Page 01-60 "Read measuring value block"display groups 14 to 16 and 24

Checking resistances and wiring



- Disconnect 3-pin harness connector (green) to knock sensor 1 G61 -1- and / or 3-pin connector (blue) to knock sensor 2 (G66) -2-.
- Measure resistance between the terminals 1+2, 1+3 and 2+3 at connections to knock sensors.

• Specification ∞ Ω



- Connect test box VAG 1598/22 to Engine Control Module wiring harness.
- Check wiring for open circuit between Test Box and 3-pin harness connector using wiring diagram.

	G61:	G66:
Terminal 1 + socket	68	60
Terminal 2 + socket	67	67
Terminal 3 + socket	2	2

Wire resistance: Max. 1.5 Ω

- Check wiring at socket 67 for short to sockets 60 and 68.

• Specification: ∞ Ω

If wiring OK

- Loosen knock sensor and tighten again

  - 20 Nm (15 ft lb) CRITICAL TORQUE

- Perform road test.

  During road test following operating conditions must be fulfilled:

  - Engine Coolant temperature must exceed 80 °C .
  - After Engine Coolant Temperature is reached, the following operating conditions must be attained several times: Closed throttle (idle) Partial throttle Wide Open Throttle Overrun
  - At Wide Open Throttle, engine speed must exceed 3500 rpm.

- Check ECM Diagnostic Trouble Code memory.

If knock sensor DTC still stored

- Replace knock sensor(s)

Misfiring detection, checking

Special tools, testers, measuring instruments and auxiliary items required

- VAG 1551/1552 Scan Tool with VAG 1551/3 cable

Test sequence

- Connect VAG 1551/1552 Scan Tool ⇒ Page 01-8 .

- Start engine and let idle

- Press 0 and 1 buttons to select Address word 01: "Engine electronics"

Rapid data transfer **HELP**

Select function XX

Display will appear as shown:

- Press 0 and 8 buttons to select Function 08: "Read measuring value blocks
- Press Q button to enter input

Read measured value block **HELP**

Input display group number XXX

Display will appear as shown:

- Press 0, 1 and 4 buttons to select "Display group 014"

- Press Q button to enter input

Read measured value block 14 →

1 2 3 4

< Display will appear as shown (1 to 4 = Display zones)

- Check specification for misfire detection (display zones 3 to 4):

	Display zones			
	1	2	3	4
Display group 14: Misfiring recognition				
Display	xxx rpm	xx.xx ms	xxx	Active Blocked
Indicated	Engine speed (in 40 steps)	Engine load	Misfiring adversely affecting exhaust (total)	Misfiring recognition status
Working range	0 to 6800 rpm	0.00 to 8.50 ms	0 to 500	---
Specific.	820 to 900 rpm	0.5 to 1.5 ms	0 to 20	Activated

Note:

If DTC memory has been erased or the Engine Control Module was disconnected from its Voltage supply, the Readiness Code must be created again ⇒ Page 01-46 .

If specification is attained:

- Press → button.

- Press 0 and 6 buttons to select Function 06: "End data transfer"

- Press Q button to enter input

If specifications are not obtained:

- Press C button.

- Press 0, 1 and 5 buttons to select "Display group 015"

- Press Q button to enter input

Read measured value block 15 →

Display will appear as shown: (1 to 4 = Display zones)

1 2 3 4

- Check specification for misfire detection (display zones 1 to 4):

	Display zones			
	1	2	3	4
Display group 15: Misfire recognition				
Display	xxx	xxx	xxx	Active Blocked
Indicated	Misfiring adversely affecting No. 1 Cyl.	Misfiring adversely affecting No. 2 Cyl.	Misfiring adversely affecting No. 3 Cyl.	Misfire recognition status
Working range	0 to 500	0 to 500	0 to 500	---
Specification	0 to 5	0 to 5	0 to 5	Activated
	If specification not obtained ⇒ Page 28-22 , evaluating display groups 15 and 16			

If specification attained:

- Press C button.
- Press 0, 1 and 6 buttons to select "Display group 016"
- Press Q button to enter input

Read measured value block 16 →

1 2 3 4

Display will appear as shown: (1 to 4 = Display zones)

- Check specification for misfire recognition,display zones 1 and 4

	Display zones			
	1	2	3	4
Display group 16: Misfiring recognition				
Display	xxx	---	---	Active Blocked
Indicated	Misfiring adversely affecting No. 4 Cyl.	---	---	Misfire detection status
Working range	0 to 500	---	---	---
Specification	0 to 5	---	---	Active
	If specification not obtained ⇒ Page 28-22 , evaluating display groups 15 and 16			

Evaluating display groups 15 and 16

Display groups: 15 and 16 Display zone: 1 to 4	Possible cause of malfunction	Malfunction elimination
More than 5	♦ Ignition coil faulty ♦ Spark plug connector faulty ♦ Spark plug faulty ♦ Ignition coil output stage faulty	- Check ignition coil Power Output stage ⇒ Page 28-9
	♦ Injector faulty ♦ Fuel shortage	- Check fuel injectors ⇒ Page 24-75 - Check quantity of fuel in tank