28-1

Technical data, spark plugs

Engine code		AEB
Engine idle RPM • Idle RPM cannot be adjusted, is corrected by idle air control		820-900 RPM
RPM limit • Operates by shutting off fuel injectors		approx. 6500 RPM
Ignition timing • Ignition timing cannot be adjusted, is monitored by Engine Control Module (ECM)		
Firing order		1-3-4-2
Spark plugs	Tightening torque	30 Nm (22 ft lb)
	Part No. (Always check with your Parts Department for correct part numbers)	101 000 033 AB (NGK) 101 000 051 AB (BOSCH)
	Manufacturer's codes (if applicable)	BKUR 7 ET (NGK) F6 LTCR (BOSCH)
	Electrode gap - mm	0.7 to 0.9 mm
	Maintenance interval	See Owner's Manual
Spark plug connector resistance		approx. 2 kΩ

28-2

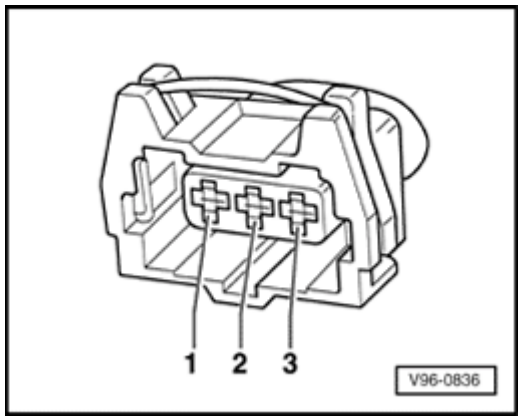
Camshaft Position (CMP) sensor -G40-, checking

Required special tools and test equipment

- VAG 1598/22 test box
- Multimeter US 1119 (Fluke 83 or equivalent)
- VW 1594 connector test kit
- Wiring diagrams

Checking

- Disconnect 3-pin connector from Camshaft Position -G40- sensor.



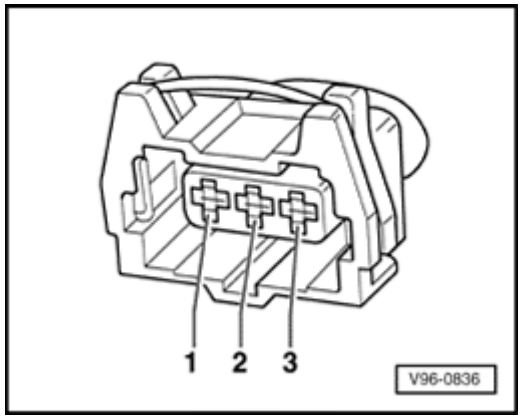
- Connect multimeter US 1119 (Fluke 83 or equivalent) to measure voltage across CMP connector terminals 1 (B+) and 3 (Ground), using adapter cables from VW 1594 connector test kit.
- Switch ignition on.
- Measure voltage between terminals 1 and 3.

  Specified value: 4.5 volts minimum
- Switch ignition off.

28-3

If voltage is OK:

- Connect VAG 1598/22 test box to Motronic ECM harness connector ⇒ Page 01-56 .



- Check wiring for open circuit between ECM/test box and 3-pin harness connector, according to wiring diagram.
  - Connector terminal 1 to ECM/test box socket 11
  - Connector terminal 2 to ECM/test box socket 76
  - Connector terminal 3 to ECM/test box socket 67
  - Specified value: max. 1.5 Ω
- Check wiring for short circuit between ECM/test box and 3-pin harness connector, according to wiring diagram.
  - Connector terminal 2 to ECM/test box socket 11
  - Connector terminal 3 to ECM/test box socket 11
  - Connector terminal 3 to ECM/test box socket 76
  - Specified value: ∞ Ω

28-4

If wiring is OK (and voltage across terminals 1 and 3 is OK):

- Replace Camshaft Position (CMP) sensor.

If wiring is OK (but still no voltage across terminals 1 and 3 :

- Replace Motronic ECM -J220- ⇒ Page 01-57 .
- Carry out adaptation of throttle valve control module to ECM ⇒ Page 24-119 .
- Check readiness code ⇒ Page 01-59 . If Diagnostic Trouble Code (DTC) memory has been erased, or ECM was disconnected, generate new readiness code ⇒ Page 01-62 .

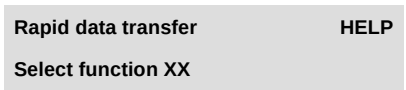
Knock sensor and knock sensor system, checking

Required special tools and test equipment

- VAG 1551/1552 Scan Tool (ST) with adapter cable VAG 1551/3
- VAG 1598/22 test box
- Multimeter US 1119 (Fluke 83 or equivalent)
- VW 1594 connector test kit
- Wiring diagrams

Checking

- Connect VAG 1551/1552 Scan Tool (ST) and press buttons -0- and -1- to insert "Engine Electronics" address word 01 (engine running at idle) ⇒ Page 01-7 .



Indicated on display

- Press buttons -0- and -8- to select "Read Measuring Value Block" function 08, and press -Q- button to confirm input.

Read Measuring Value Block	HELP
Input display group number XXX	

➢ Indicated on display

- Press buttons -0-, -2- and -0- to input display group number 20, and press -Q- button to confirm input.

28-6

Read Measuring Value Block 20 →

1 2 3 4

Indicated on display (1-4 = display groups)

Note:

The test must be carried out during a road test because the knock sensor system is only active as of a certain engine speed.

- Road test car and compare display with specified values for knock sensor system in display field 1-4.

WARNING!

A second technician is required to operate the VAG 1551 scan tool during the road test.

	Display groups			
	1	2	3	4
Display group 20: Knock sensor system				
Display	xx.x °	xx.x °	xx.x °	xx.x °
Indicates	Timing correction, cylinder 1	Timing correction, cylinder 2	Timing correction cylinder 3	Timing correction, cylinder 4
Range	0.0 °-15.0 ° (crankshaft)	0.0 °-15.0 ° (crankshaft)	0.0 °-15.0 ° (crankshaft)	0.0 °-15.0 ° (crankshaft)
Specified value	0.0 °-10.0 ° (crankshaft)	0.0 °-10.0 ° (crankshaft)	0.0 °-10.0 ° (crankshaft)	0.0 °-10.0 ° (crankshaft)

	If displayed values are NOT OK ⇒ Page 28-7 , Evaluating display group 20

28-7

If displayed values are OK:

- Check readiness code ⇒ Page 01-59 . If Diagnostic Trouble Code (DTC) memory has been erased, or ECM was disconnected, generate new readiness code ⇒ Page 01-62 .

- Press → button to advance program sequence.

- Press buttons -0- and -6- to select "End Output" function 06, and press -Q- button to confirm input.

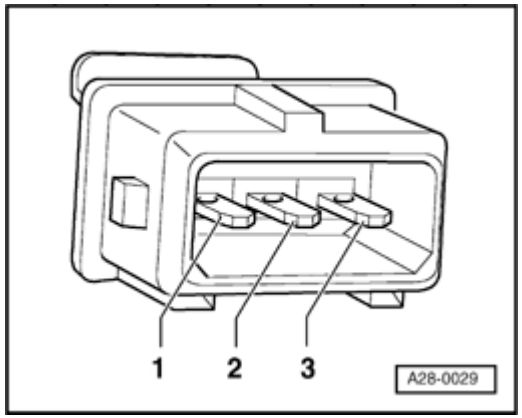
Evaluating display group 20

Display group: 20 Display fields: 1-4	Possible cause	Correcting action
All cylinders retarded more than 10° (crankshaft)	♦ Knock sensor faulty	- Continuation ⇒ Page 28-8
	♦ Connector corroded	
	♦ Knock sensor incorrectly torqued	- Loosen knock sensor and re-tighten to 20 Nm (15 ft lb)
	♦ Components loose on engine	- Tighten components

	♦ Poor fuel quality	- Change fuel
One cylinder reading is very different from the others	♦ Connector corroded	- Continuation ⇒ Page 28-8
	♦ Engine failure	- Check compression ⇒ *Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Engine Mechanical, Engine Code(s): AEB, ATW, Repair Group 15*
	♦ Components loose on engine	- Tighten components

Continuation

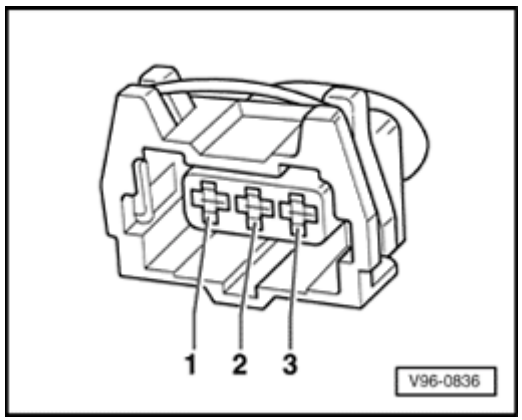
- Disconnect 3-pin connector from Knock Sensor (KS) 1 -G61-.



- Connect multimeter US 1119 (Fluke 83 or equivalent) to measure resistance between connector terminals, using adapter cables from VW 1594 connector test kit.
  - Connector terminal 1 to terminal 2
  - Connector terminal 1 to terminal 3
  - Connector terminal 2 to terminal 3
  - Specified value: ∞ Ω

If resistance is OK (no continuity):

- Connect VAG 1598/22 test box to Motronic ECM harness connector ⇒ Page 01-56 .



- Check wiring for open circuit between ECM/test box and 3-pin harness connector, according to wiring diagram.
  - Connector terminal 1 to ECM/test box socket 68
  - Connector terminal 2 to ECM/test box socket 67
  - Connector terminal 3 to ECM/test box socket 2
  - Specified value: max. 1.5 Ω

28-9

- Check wiring for short circuits between terminals of 3-pin connector, and between connector and ECM/test box.

  - Connector terminal 2 to ECM/test box socket 68
  - Connector terminal 3 to ECM/test box socket 68
  - Connector terminal 3 to ECM/test box socket 67
  - Specified value: $\infty\ \Omega$

If the wiring is OK:

- Loosen knock sensor and re-tighten to 20 Nm (15 ft lb).

If the malfunction still exists (stored in DTC memory):

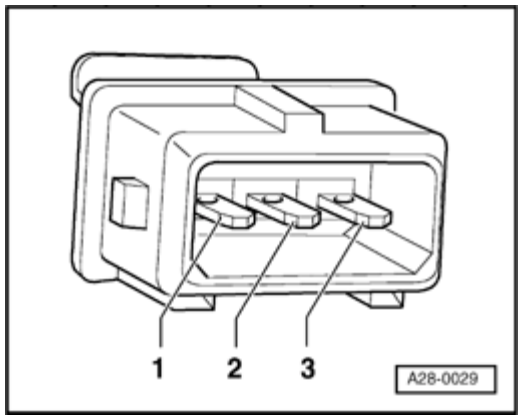
- Replace Knock Sensor (KS) 1 -G61-.

- Check readiness code ⇒ Page 01-59 . If Diagnostic Trouble Code (DTC) memory has been erased, or ECM was disconnected,

generate new readiness code ⇒ Page 01-62 .

28-10

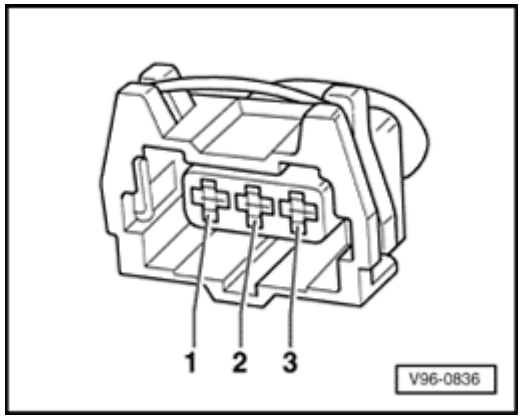
- Disconnect 3-pin connector from Knock Sensor (KS) 2 -G66-.



- Connect multimeter US 1119 (Fluke 83 or equivalent) to measure resistance between connector terminals, using adapter cables from VW 1594 connector test kit.
  - Connector terminal 1 to terminal 2
  - Connector terminal 1 to terminal 3
  - Connector terminal 2 to terminal 3
  - Specified value: ∞ Ω

If resistance is OK (no continuity):

- Connect VAG 1598/22 test box to Motronic ECM harness connector ⇒ Page 01-56 .



- Check wiring for open circuit between ECM/test box and 3-pin harness connector, according to wiring diagram.
  - Connector terminal 1 to ECM/test box socket 60
  - Connector terminal 2 to ECM/test box socket 67
  - Connector terminal 3 to ECM/test box socket 2
  - Specified value: max. 1.5 Ω

28-11

- Check wiring for short circuits between terminals of 3-pin connector, and between connector and ECM/test box.

  - Connector terminal 2 to ECM/test box socket 60
  - Connector terminal 3 to ECM/test box socket 60
  - Connector terminal 3 to ECM/test box socket 67
  - Specified value: $\infty\ \Omega$

If the wiring is OK:

- Loosen knock sensor and re-tighten to 20 Nm (15 ft lb).

If the malfunction still exists (stored in DTC memory):

- Replace Knock Sensor (KS) 2 -G66-.

- Check readiness code ⇒ Page 01-59 . If Diagnostic Trouble Code (DTC) memory has been erased, or ECM was disconnected,

generate new readiness code ⇒ Page 01-62 .

Misfiring recognition, checking

Required special tools and test equipment

- VAG 1551 or VAG 1552 Scan Tool (ST) with VAG 1551/3 adapter cable

Checking

- Connect VAG 1551/1552 Scan Tool (ST) and press buttons -0- and -1- to insert "Engine Electronics" address word 01 (engine running at idle) ⇒ Page 01-7 .

Rapid data transfer HELP

Select function XX

Indicated on display

- Press buttons -0- and -8- to select "Read Measuring Value Block" function 08, and press -Q- button to confirm input.

Read Measuring Value Block HELP

Input display group number XXX

Indicated on display

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

Read Measuring Value Block 14 →

1 2 3 4

Indicated on display (1-4 = display groups)

28-13

- Compare displayed values with specified values for misfire recognition (display fields 3-4):

	Display groups			
	1	2	3	4
Display group 14: Misfire recognition				
Display	xxx RPM	xx.xx ms	xxx	activated deact
Indicates	Engine speed (in 40 RPM steps)	Engine load	Misfire harmful to emissions (total)	Misfire recognition status
Range	0-6800 RPM	0.00-8.50 ms	---	---
Specified value	760-960 RPM	0.5-1.5 ms	20	activated
	---	---	If displayed values are NOT OK ⇒ Page 28-14	

If displayed values are OK:

- Check readiness code ⇒ Page 01-59 . If Diagnostic Trouble Code (DTC) memory has been erased, or ECM was disconnected, generate new readiness code ⇒ Page 01-62 .

- Press → button to advance program sequence.

- Press buttons -0- and -6- to select "End Output" function 06, and press -Q- button to confirm input.

28-14

If displayed values are NOT OK:

- Press -C- button.

- Press buttons -0-, -1- and -5- to input display group number 15, and press -Q- button to confirm input.

Read Measuring Value Block 15 →

1 2 3 4

Indicated on display (1-4 = display groups)

- Compare displayed values with specified values for misfire recognition (display fields 1-4):

	Display groups			
	1	2	3	4
Display group 15: Misfire recognition				
Display	xxx	xxx	xxx	activated deact
Indicates	Misfire harmful to emissions, Cyl. 1	Misfire harmful to emissions, Cyl. 2	Misfire harmful to emissions, Cyl. 3	Misfire recognition status
Range	500	500	500	---
Specified value	0-5	0-5	0-5	activated
	If displayed values are NOT OK ⇒ Page 28-16 , Evaluating display groups 15 and 16			

28-15

If displayed values are OK:

- Press -C- button.

- Press buttons -0-, -1- and -6- to input display group number 16, and press -Q- button to confirm input.

Read Measuring Value Block 16 →

1 2 3 4

Indicated on display (1-4 = display groups)

- Compare displayed values with specified values for misfire recognition (display fields 1 and 4):

	Display groups			
	1	2	3	4
Display group 16: Misfire recognition				
Display	xxx			activated deact
Indicates	Misfire harmful to emissions, Cyl. 4			Misfire recognition status
Range	500			---
Specified value	0-5			activated
	If displayed values are NOT OK ⇒ Page 28-16 , Evaluating display groups 15 and 16			

28-16

Evaluating display groups 15 and 16

Display groups: 15 and 16 Display fields: 1-4	Possible cause	Corrective action
larger than 5	♦ Ignition coil faulty ♦ Spark plug connector faulty ♦ Spark plug faulty	- Check ignition coil ⇒ Page 28-17
	♦ Power output stage for ignition coil faulty	- Check power output stage for ignition coil ⇒ Page 28-21
	♦ Fuel injector faulty	- Check fuel injectors ⇒ Page 24-87
	♦ Not enough fuel	- Check fuel in tank