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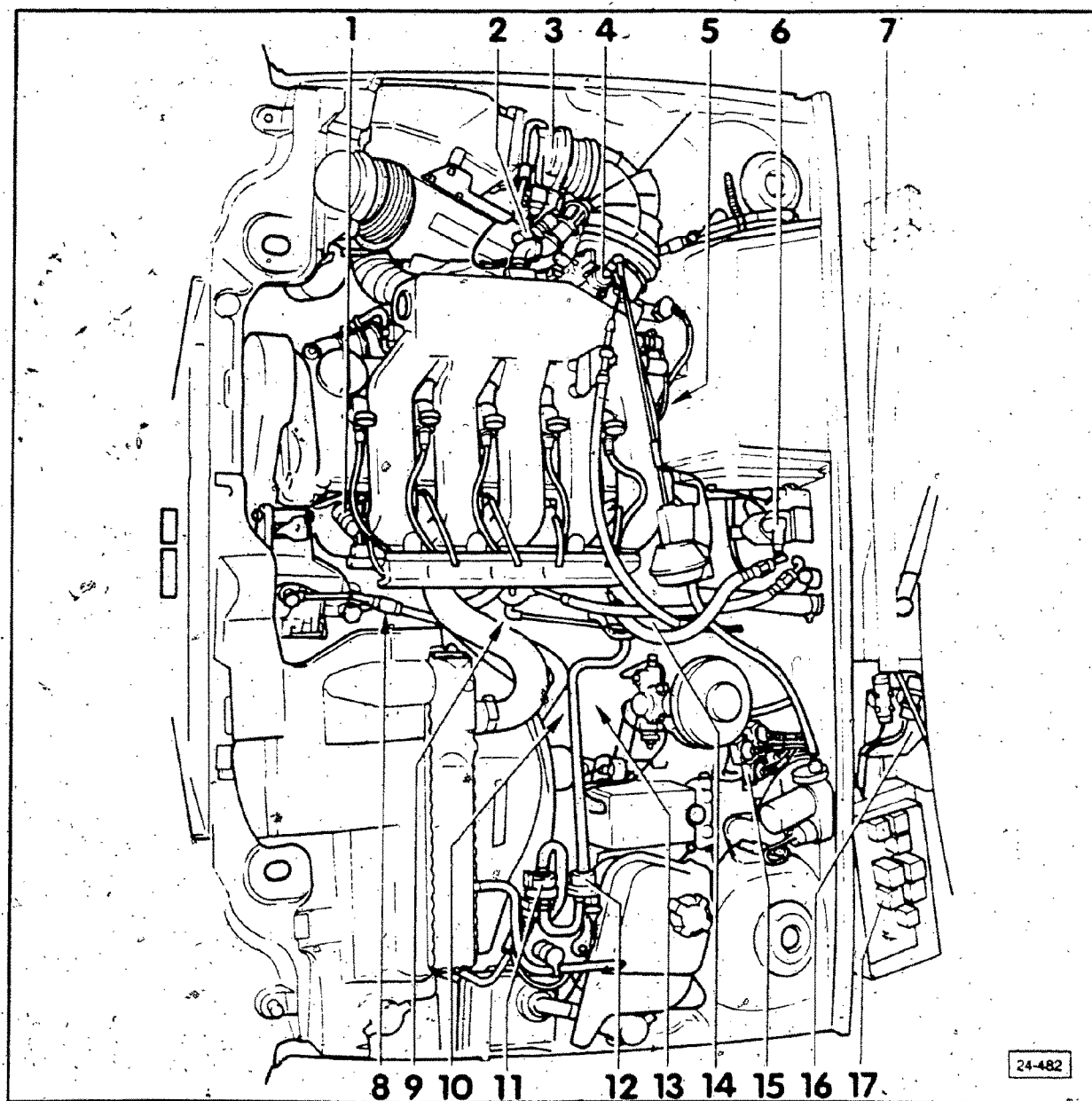
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1 — Fuel injector
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4 — Throttle body
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5 — Coolant temperature sender (G 62)
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7 — MPI control unit (J 192)
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8 — Knock sensor I (G 61)
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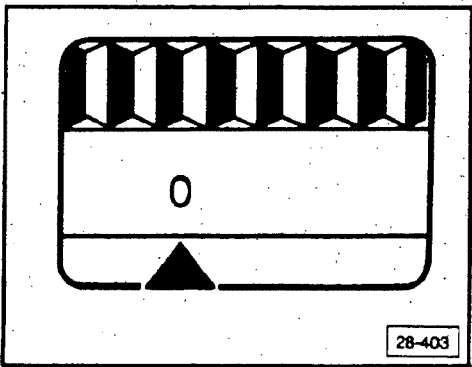
9 — Knock sensor II (G 66)
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10 — Ignition timing point sender
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11 — Solenoid valve II (N 115) (ON/OFF valve) for carbon canister system
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- 12 — Solenoid valve I (N 80) (frequency valve) for carbon canister system
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- 13 — Engine speed sender (G 28)
 - checking, section 28-320
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- 15 — Harness connector mounting bracket
- 16 — Resistor pack (N 34) for fuel injectors
 - checking, see Repair Group 24
- 17 — Fuel pump relay (J 17)
 - checking triggering, see Repair Group 24

Tuneup specifications 1990-1991 m.y.

Engine code	7A	
Ignition distributor	034 905 205 J	
Timing mark location		
Ignition timing point	TDC	
Ignition timing sender checking, section 28-300	resistance checking	approximately 1000 ohms
Engine speed sender checking, see Repair Group 24	resistance checking	approximately 1000 ohms
Spark plugs	part number electrode gap tightening torque	Bosch F 6 DTC 101 000 004 AA 0.8 ± 0.1 mm 20 Nm (15 ft lb)
Firing Order	Cylinder number	1-2-4-5-3
RPM limit	7200 ± 200 rpm	
Resistance checking Ignition coil	Secondary resistance	6500 to 8000 ohms
	Primary resistance	0 to 1 ohm
Distributor rotor	approximately 1000 ohms	

Note

Ignition timing is determined by the control unit map and feedback signals. Ignition timing is NOT adjustable.

Basic distributor adjustment see section 28-360

CAUTION

Part numbers are for reference only. Always consult with the Parts Department for the latest information.

System precautions

Rules of Cleanliness

CAUTION

When working on the fuel supply/injection system, carefully observe the following rules:

- 1— Thoroughly clean connection and surrounding areas before loosening connection.
- 2— After removing components, place in clean area and cover with foil or paper. Avoid using rags!
- 3— Components which have been opened or disassembled must be carefully covered or sealed if repair cannot be carried out immediately.
- 4— Install clean parts only.
 - remove replacement parts from package just before installing
 - do **NOT** use spare parts that were stored loose or unpackaged (e.g. in tool boxes, etc.)
- 5— When fuel system is open:
 - avoid using compressed air whenever possible
 - avoid moving the vehicle whenever possible

Safety measures

CAUTION

Observe the following precautions to prevent personal injury as well as possible damage to the ignition system components.

- switch **OFF** the ignition before connecting or disconnecting components or test equipment
- connect and disconnect battery **ONLY** with ignition switched **OFF** otherwise the MPI control unit could be damaged
- if the engine must be cranked but not started (for compression testing etc.) disconnect power output stage of ignition coil and fuse 13
- do **NOT** use battery booster longer than one minute nor should 16.5 volts be exceeded
- do **NOT** wash engine unless ignition is switched **OFF**
- disconnect **BOTH** battery terminals whenever arc or spot welding
- before towing, vehicles with a defective ignition system (or where this is suspected) must have terminal 1 (green) of the ignition coil disconnected
- do **NOT** connect a condenser of any kind to terminal 1 of the ignition coil
- when installing noise suppressors, **ONLY** use 1000 Ohms for high tension wires and 5000 Ohms for spark plug connectors
- do **NOT** replace distributor rotor (marked **R1**) with a different type
- if the vehicle is heated up (e.g. in a painting booth) do **NOT** start the engine until it has had sufficient time to return to room temperature

Note

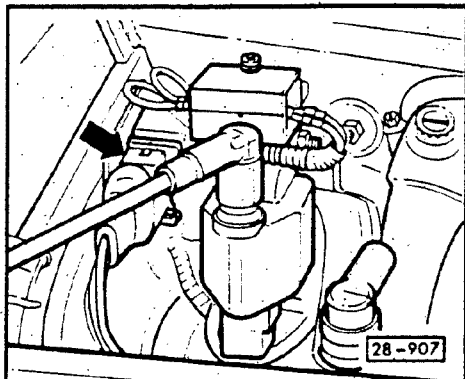
There are a wide variety of electrical connections used on this vehicle. **ALWAYS** use the **VW 1594** adaptor kit to connect test equipment to these connections.

CAUTION

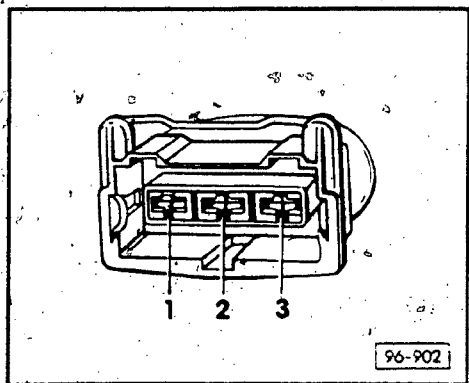
Before disconnecting a customers battery; **ALWAYS** ask for the radio code (if equipped with an anti-theft radio).

Ignition coil, checking

Power output stage (N 70) triggering, checking



- disconnect power output stage harness connector



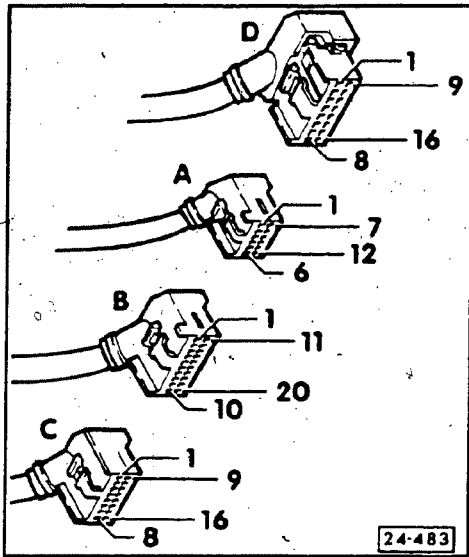
- switch multimeter **US 1119** to 20 volt range
- connect multimeter first between terminal **1** and ground then between terminals **1** and **3** after switching **ON** ignition
 - must be approximately 12 volts

If NO

- check for open circuit using wiring diagram, repair as necessary
- connect multimeter between terminals **2** and **3**
- crank engine
 - must be 0.2 volts minimum

If NO

- connect test box **VAG 1598** to control unit harness connector using adaptor cable **VAG 1598/11**
 - control unit is left disconnected
- switch multimeter **US 1119** to resistance range
- connect multimeter between terminal **2** of power output harness connector and terminal **37** of test box and check continuity or short to ground
 - must not be greater than 0.5 Ohms

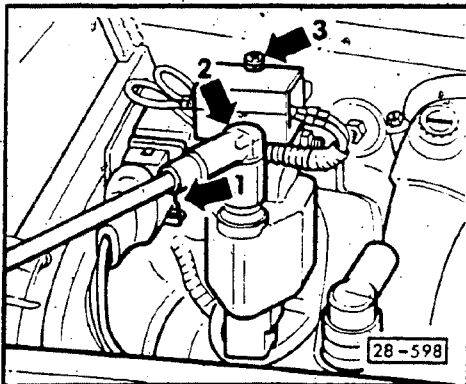


If NO

- replace or repair wiring between terminal 2 of power output stage harness connector and terminal 17 of control unit harness connector B

If wiring OK

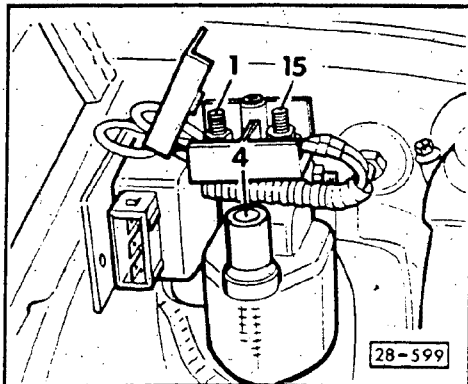
- replace MPI control unit



Ignition coil (N), checking

Requirement

- wiring between power output stage and ignition coil and between power output stage and ground must be OK
- disconnect power output stage harness connector 1 from ignition coil
- disconnect coil-wire 2
- remove screw 3



Secondary resistance, checking

- switch multimeter US 1119 to resistance range
- connect multimeter between terminals 1 and 4 of ignition coil
- must be between 5000 and 9000 Ohms

If NO

- replace ignition coil

Primary resistance, checking

- connect multimeter between terminals 1 and 15 of ignition coil
- must be between 0.5 and 1.5 Ohms

If NO

- replace ignition coil

If specified resistances are obtained but there is still no spark:

- replace ignition coil complete with power output stage

Note

Power output stage of ignition coil cannot be checked.

Ignition timing sender, checking

Note

For installation location see section 28-260.

- disconnect ignition timing sender harness connector (black)
- switch multimeter **US 1119** to resistance range
- connect multimeter between terminals 1 and 2 of ignition timing sender terminals
 - must be approximately 1000 Ohms

If NO

- replace ignition timing sender

If YES

- connect multimeter between terminals 1 and 3
 - must be open (infinite Ohms)

If NO

- replace ignition timing sender

If YES

- connect multimeter between terminals 2 and 3
 - must be open (infinite Ohms)

If NO

- replace ignition timing sender

If YES

- check wiring between ignition timing sender harness connector and MPI control unit as follows
- connect **VAG 1598** test box to MPI control unit harness connector **C** using adaptor cable **VAG 1598/11**
 - MPI control unit is left disconnected

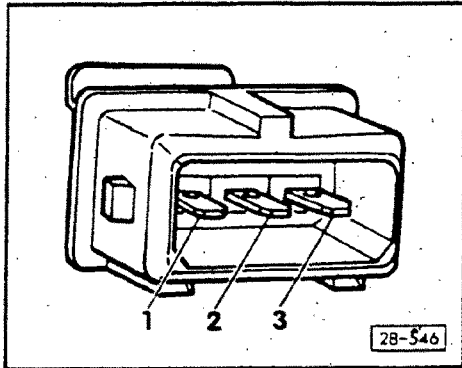
- check wiring between following terminals for continuity or short

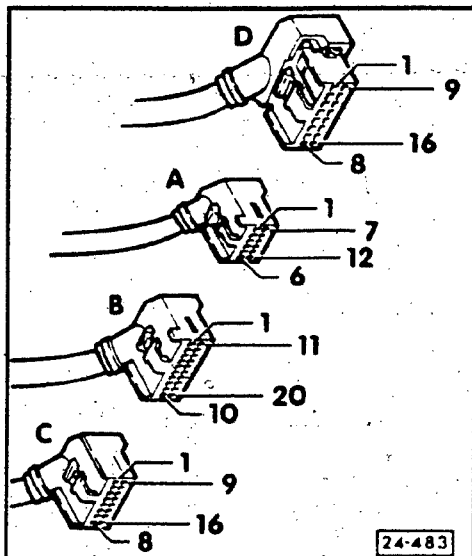
Ignition sender harness connector terminal number	↔	VAG 1598 Test Box terminal number
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1 (signal)	↔	4 (4)*
2 (ground)	↔	5 (5)*
3 (shield)	↔	6 (6)*

- must not be greater than 0.5 Ohms

* Number in parentheses is the number of the terminal in the MPI control unit harness connector **C**.





If a short or open circuit is detected between the ignition timing sender harness connector and the test box:

- replace or repair the actual wiring between control unit harness connector **C** and the ignition timing sender harness connector as necessary

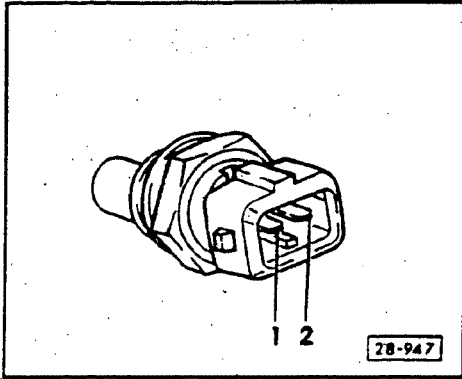
If wiring **OK**

- check ignition timing sender pin on flywheel
- remove ignition timing sender mounting bracket from bell housing to expose pin on flywheel
- turn engine over slowly by hand until pin appears in opening
- check condition of pin (damaged or bent), check for secure fit, replace if necessary

If all wiring checks **OK** and pin is **OK**:

- replace MPI control unit

Coolant temperature sender (G 62), checking



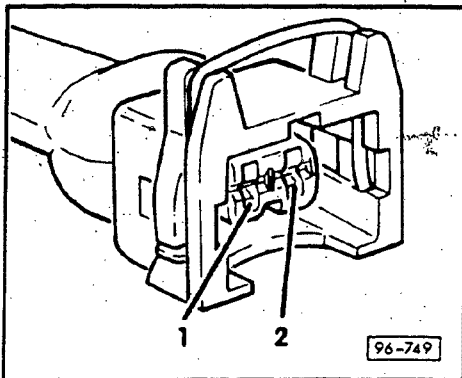
- disconnect harness connector from coolant temperature sender
- switch **US 1119** multimeter to resistance range
- connect multimeter between terminals 1 and 2 of coolant temperature sender
 - at approximately 20°C (68°F) coolant temperature, sender resistance must be approximately 2500 Ohms
 - at approximately 80°C (176°F) coolant temperature, sender resistance must be approximately 330 Ohms

If **NO**

- replace coolant temperature sender

If **YES**

- check wiring from sender to MPI control unit as follows:
- connect **VAG 1598** test box to MPI control unit harness connector **C** using adaptor cable **VAG 1598/11**
 - control unit is not connected during this check



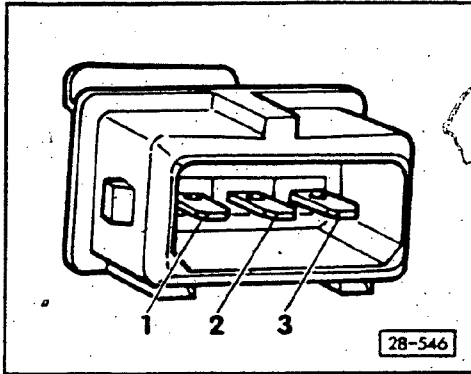
- check continuity between terminal 1 of harness connector and terminal 15 of test box
 - must not be greater than 0.5 Ohms
- check continuity between terminal 2 of harness connector and terminal 16 of test box
 - must not be greater than 0.5 Ohms
- check both wires for shorting, repair or replace as necessary

If wiring **OK** but a short or open still exists:

- replace MPI control unit

Engine speed sensor (G 28), checking

- disconnect gray harness connector from engine speed sensor (mounted on bracket on left side of engine)
- switch multimeter **US 1119** to resistance range
- connect multimeter between terminals 1 and 2 of speed sensor
 - must be approximately 1000 Ohms



If NO

- replace engine speed sensor

If YES

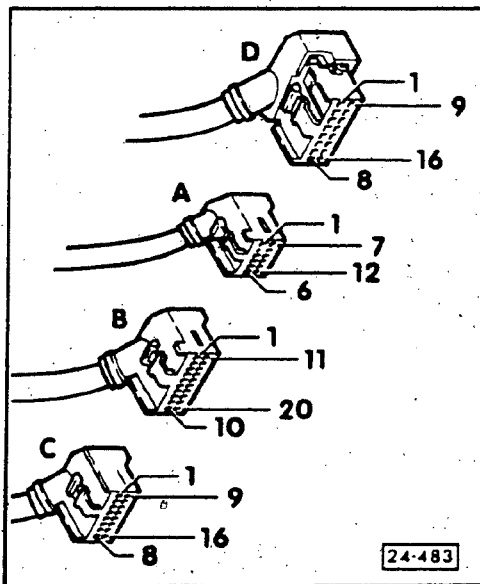
- connect multimeter between terminals 2 and 3
 - must be open (infinite Ohms)

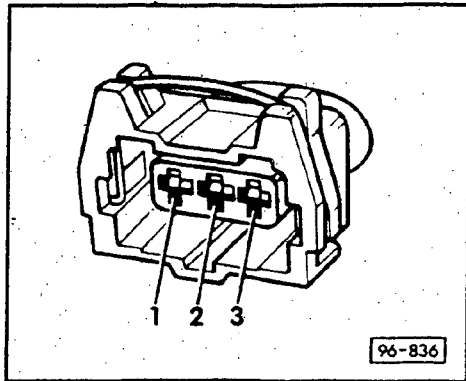
If NO

- replace engine speed sensor

If YES

- connect **VAG 1598** test box to MPI control unit harness connector **C** using adaptor cable **VAG 1598/11**
 - control unit is not connected during this check





- check wiring between engine speed sensor harness connector and test box for continuity or short circuits using wiring diagram as follows:

Engine speed sender harness connector terminal **VAG 1598 test box terminal**

1	←	→	1 (1)*
2	←	→	2 (2)*
3	←	→	3 (3)*

* Number in parentheses is the number of the terminal in the MPI control unit harness connector C.

If a short or open circuit is detected between the engine speed sender harness connector and the test box:

- replace or repair the actual wiring between control unit harness connector C and the engine speed sender harness connector as necessary

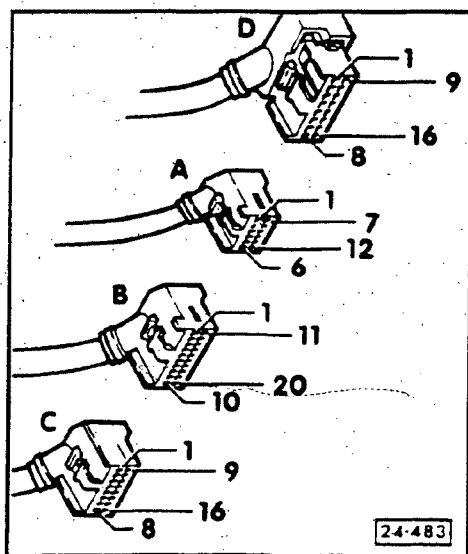
If wiring OK

- check teeth on flywheel ring gear as follows:
- remove engine speed sender mounting bracket which will expose a portion of the ring gear
- slowly rotate engine and observe condition of ring gear, checking for:
 - out of roundness
 - broken teeth

- replace ring gear if necessary

If ring gear OK:

- replace MPI control unit



MPI (Multi Point Injection) control unit, voltage supply checking

- connect **VAG 1598** test box to MPI control unit harness connector **D** using adaptor cable **VAG 1598/12**
 - control unit is not connected during this check
- switch **ON** ignition
- connect **US 1115 (VAG 1527B)** LED tester between terminal **8** (+ via ignition) of test box and terminals **1, 2, 3** and **16** (ground connections)
 - LED tester must light up for each measurement

If **NO**

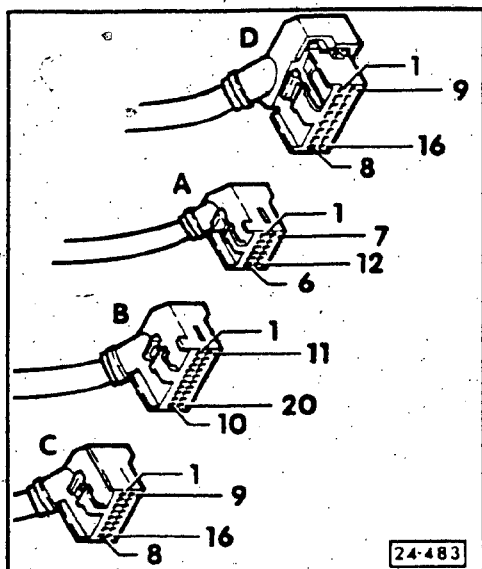
- check for open circuit between ground wire connections at stud on intake manifold and MPI control unit harness connector **D** using wiring diagram, replace or repair as necessary

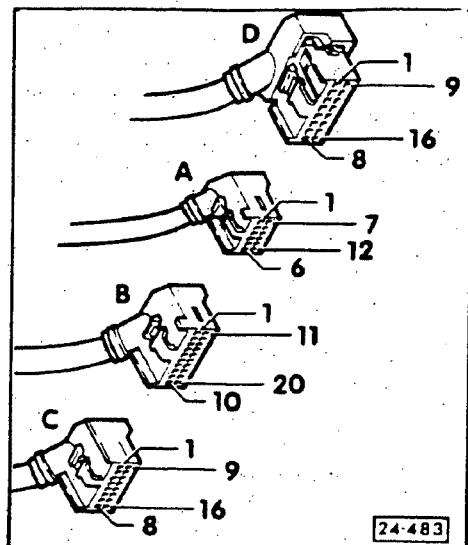
CAUTION

Inspect the grounding stud on the intake manifold for looseness, dirt and corrosion. Stud must be clean and tight. Avoid using non conductive locking compounds on the stud threads because they could prevent a good ground which in turn could introduce serious electrical problems.

Note

Terminals **1, 2, 3** and **16** of the harness connector correspond to terminals **1, 2, 3** and **16** of the test box.





- connect **VAG 1598** test box to MPI control unit harness connector **C** using adaptor cable **VAG 1598/11**
 - control unit is not connected during this check
- connect LED tester between terminal **40** of test box and engine ground
 - LED tester must light up

If NO

- check for open circuit between terminal **20** of MPI control unit harness connector **B** and central electric, using wiring diagram
- repair or replace as necessary

Knock sensors (G 61 and G 66), checking

Note

The knock sensors cannot be electrically checked.

CAUTION

Correct knock sensor torque is critical to proper function of the knock sensors!

- must be 10 Nm (7 ft lb)
- check condition of connection at knock sensor connector and harness connector for corrosion, replace or repair as necessary
- activate Fault memory, see repair Group D2
 - if any knock sensor faults stored in memory, replace or repair as necessary

Knock sensor wires, checking

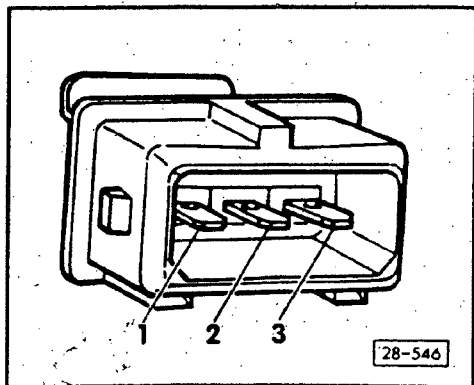
- disconnect knock sensor harness connector, see section 28-260 for location
- check resistance between all 3 terminals of knock sensor
 - must be open (infinite Ohms) between all measurements

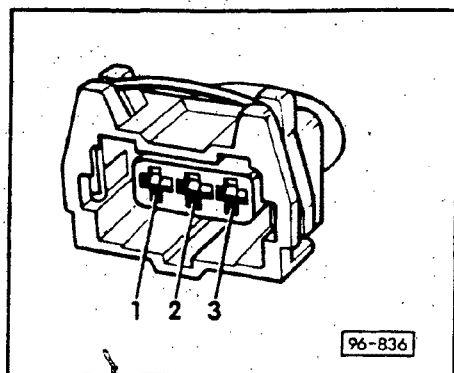
If NO

- replace knock sensor

Knock sensor wiring, checking

- connect **VAG 1598** test box to MPI control unit harness connector **B** using **VAG 1598/11** adaptor cable
 - control unit is left disconnected
- check following combinations of wires for continuity or short to one another





Knock sensor 1 (front, green) connector terminal number		Test box terminal number
--	--	--------------------------------

1 (signal)	←→	22 (2)*
2 (ground)	←→	21 (1)*
3 (shield)	←→	23 (3)*

Knock sensor 2 (rear, blue) connector terminal number		Test box terminal number
--	--	--------------------------------

2 (signal)	←→	25 (5)*
2 (ground)	←→	24 (4)*
3 (shield)	←→	26 (6)*

* Number in parentheses is the number of the terminal in the MPI control unit harness connector **B**.

If a short or open circuit is detected between the knock sensor harness connector and the test box:

- replace or repair the actual wiring between control unit harness connector **B** and the sensor harness connector as necessary

Hall sender (G 40), checking

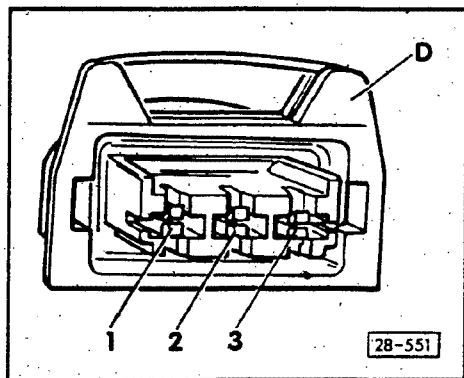
Note

The Hall sender is mounted inside of the ignition distributor.

- connect test box **VAG 1598** to MPI control unit by connecting adaptor **VAG 1598/11** between MPI control unit and MPI control unit harness connector **C**
- connect LED tester **US 1115 (VAG 1527B)** to terminals 8 and 9 of test box
- activate starter for several seconds
 - LED tester must flash briefly at every second engine revolution

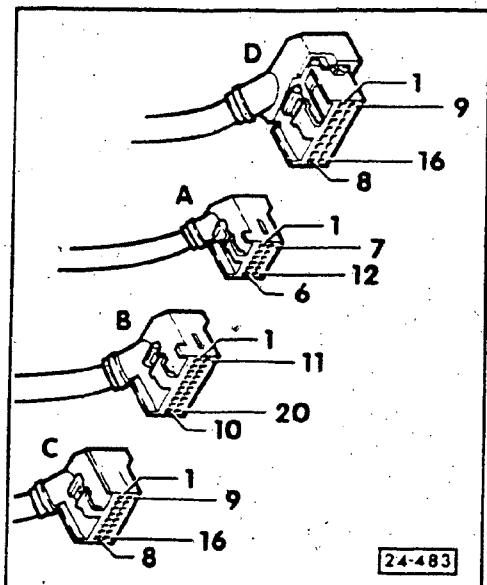
If NO

- switch **OFF** ignition
- disconnect Hall sender harness connector at ignition distributor
- using wiring diagram, check following wires for continuity or short to one another



Hall sender harness connector terminal number		Test box terminal number
1 (ground)	←→	9 (9)*
2 (signal)	←→	8 (8)*
3 (plus)	←→	7 (7)*

* Number in parentheses³ is the number of the terminal in the MPI control unit harness connector **C**.



If a short or open circuit is detected between the Hall sender harness connector and the test box:

- replace or repair the actual wiring between control unit harness connector **C** and the Hall sender harness connector as necessary

If wiring **OK**

- switch **ON** ignition
- switch multimeter **US 1119** to 20 volt range
- connect multimeter between terminals 7 and 9 of test box using adaptors from **VW 1594** kit
 - must be 9 volts minimum
- connect multimeter between terminals 8 and 9 of test box
 - must be 4 volts minimum

If voltage **NOT** obtained:

- replace MPI control unit

If voltage obtained:

- replace ignition distributor/Hall sender assembly

Note

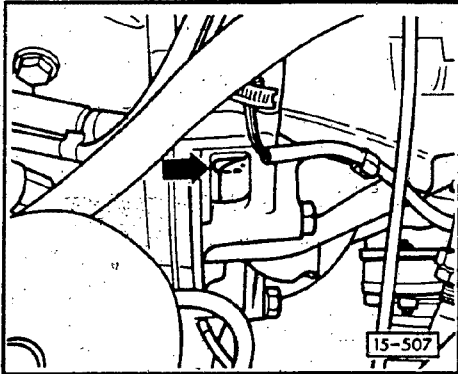
The ignition rotor is bonded to the distributor shaft and cannot be removed. If the ignition rotor is damaged, replace the distributor assembly.

Ignition distributor, installing^o

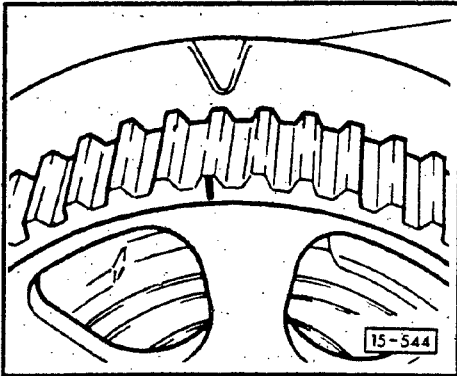
Note

The distributor rotor is bonded and cannot be removed.

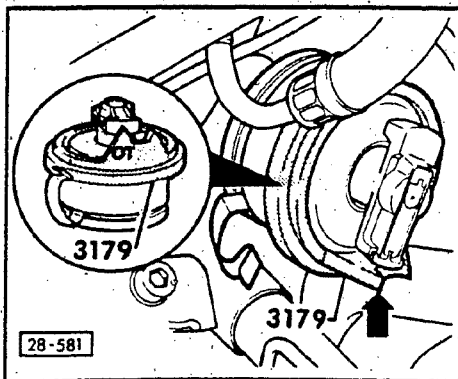
- turn crankshaft to TDC using special tool 2079



- marking on camshaft wheel must align with arrow on cylinder head cover



- position special tool 3179 on distributor as shown in illustration
- place center of distributor on TDC mark
- install distributor as follows
- turn distributor housing so that center of distributor rotor points exactly at TDC mark on special tool 3179
- tighten distributor base mounting bolt
- check basic adjustment of ignition distributor



Basic adjustment

Note

The basic adjustment should only be performed if the distributor has been removed or if the test values observed in field 9 of the **VAG 1551** Diagnostic tester deviate from specification.

- connect **VAG 1551** diagnostic tester, see Repair Group D2 for additional information
- select basic setting function
- display basic setting values
- loosen ignition distributor and carefully turn as far left or right as is necessary to cause **254**, **255**, **0**, **1** and **2** to appear in field 9, then turn distributor until a median value of 0 remains
- tighten distributor while observing field 9
 - 0 median value must be maintained

If NO

- repeat adjustment and tightening procedure until 0 median value is stable