

## Index

**20-valve (up to 03/90 prod.)**

### Hall sensor

- checking 28-240

### Ignition coil

- checking 28-220

### Ignition distributor

- installing 28-250

### Ignition system

- technical data 28-200

### Ignition timing sensor

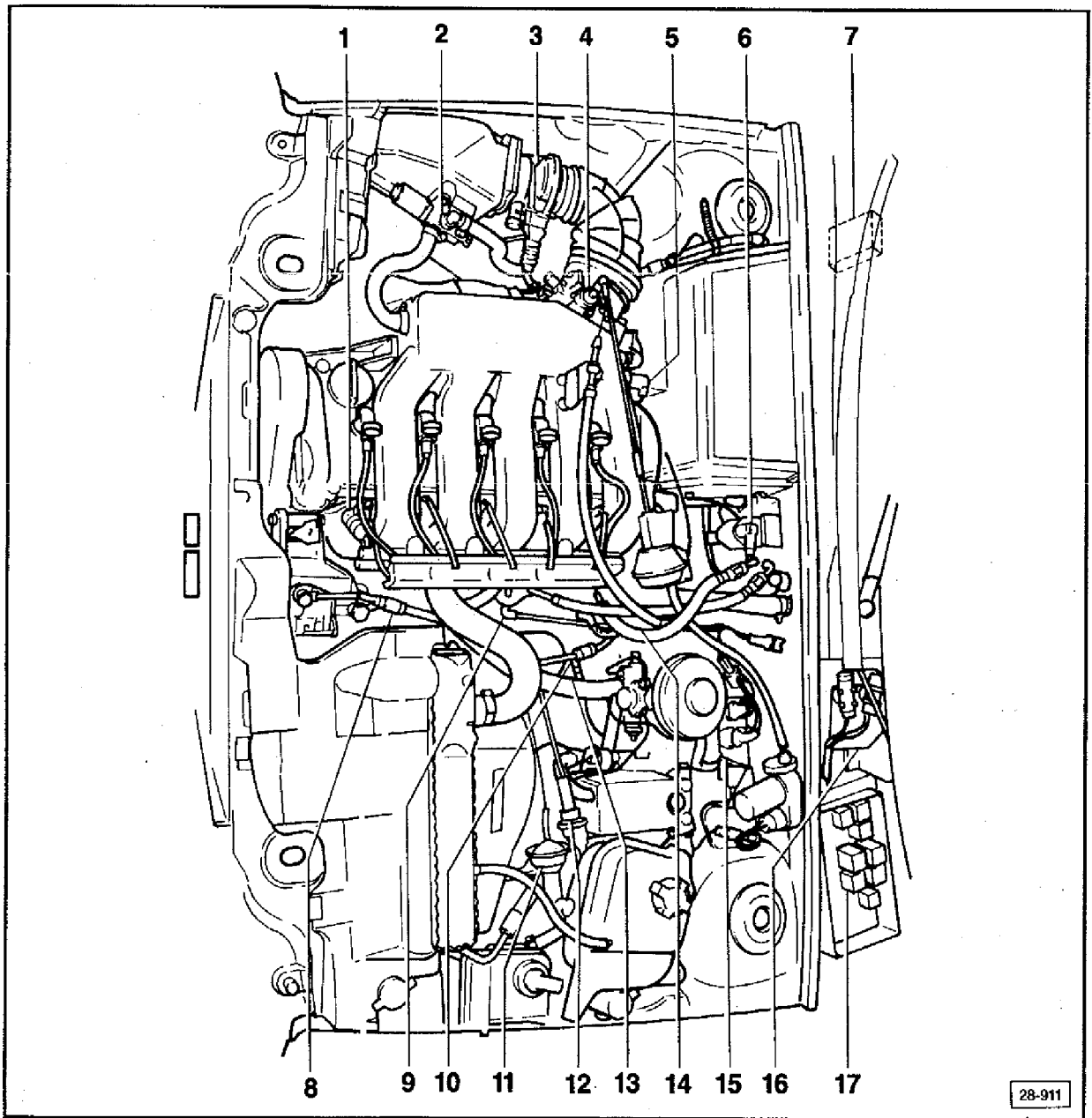
- checking 28-230

### MPI system

- component layout 28-190

### System precautions

- rules of cleanliness 28-210
- safety measures 28-210



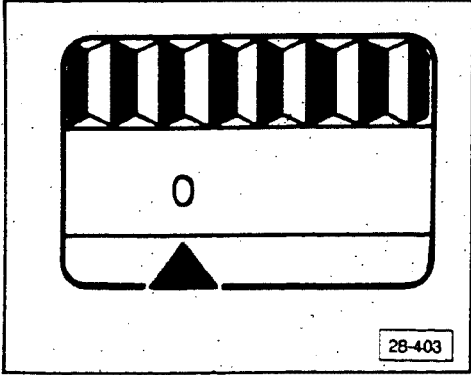
Multimeter US 1119, LED tester US 1115 and the VW 1594 adaptor kit are required for checking the following components.

- |   |  |
|---|--|
| <p><b>1 — Fuel injector</b><br/>• control, checking see Repair Group 24</p> <p><b>2 — Idle stabilizer valve</b><br/>• control, checking see Repair Group 24</p> <p><b>3 — Air mass sensor</b><br/>• checking see Repair Group 24</p> <p><b>4 — Throttle body potentiometer</b><br/>• checking see Repair Group 24</p> <p><b>5 — Coolant temperature sensor</b><br/>• checking see Repair Group 24</p> | <p><b>6 — Ignition coil with power output stage</b><br/>• checking see section 28-220</p> <p><b>7 — MPI control unit</b><br/>checking see Repair Group 24</p> <p><b>8 — Knock sensor I — 10 Nm (7 ft lb)</b></p> <p><b>9 — Knock sensor II — 10 Nm (7 ft lb)</b></p> <p><b>10 — Ignition timing sensor</b><br/>• checking, section 28-230</p> <p><b>11 — Carbon canister shut-off valve</b><br/>• checking see Repair Group 24</p> <p><b>12 — Carbon canister frequency valve</b><br/>• checking see Repair Group 24</p> |
|---|--|

- 13 — **Engine speed sensor**
  - checking see Repair Group 24
- 14 — **Ignition distributor with Hall sender**  
checking, see section 28-240
- 15 — **Connector bracket**
- 16 — **Series resistor pack**
  - checking see Repair Group 24
- 17 — **Fuel pump relay**
  - checking see Repair Group 24

## Tuneup specifications

1990-1991 m.y.

Engine code letters	7A	
Ignition distributor	034 905 205 J	
Ignition distributor basic setting*	TDC	
Timing mark location		
Ignition timing sensor**	resistance	approximately 1000 ohms
Engine speed sensor***	resistance	approximately 1000 ohms
<b>CAUTION</b> It is <b>NOT</b> possible to adjust the ignition timing. Ignition timing is determined by the control unit ignition map.		
Spark plugs	part no.	191 905 450 J
		Bosch F 6 DTC
Electrode gap		0.8 + 0.1 mm (0.031 + 0.004 in)
Tightening torque		20 Nm (15 ft lb)
Firing order	1-2-4-5-3	
RPM limit (cutout)	starts at 7200 RPM, completes at 7400 RPM	
Ignition coil	secondary resistance	6500 to 8000 ohms
	primary resistance	approximately 0 to 1 ohm
Ignition distributor rotor	resistance	1000 ohms

\*see section 28-250

\*\*Ignition timing sensor, checking, section 28-230

\*\*\*Engine speed sensor, checking, see Repair Group 24

### CAUTION

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

## System precautions

### 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
- do **NOT** crank engine before high tension wire of ignition distributor (terminal 4) is connected to ground
- 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 suppressor, **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

## Rules of cleanliness

### CAUTION

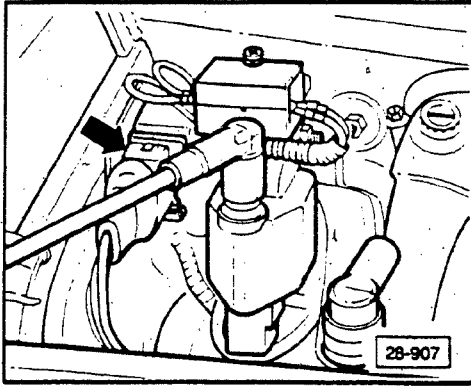
When working on the fuel supply/injection system, carefully observe the following rules:

- 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.

## Ignition coil (with power output stage), checking

### Control, checking

- remove harness connector (arrow) from power output stage of ignition coil



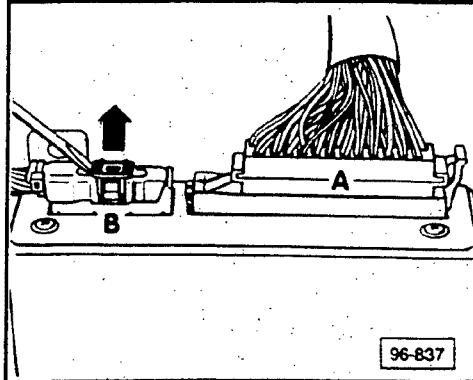
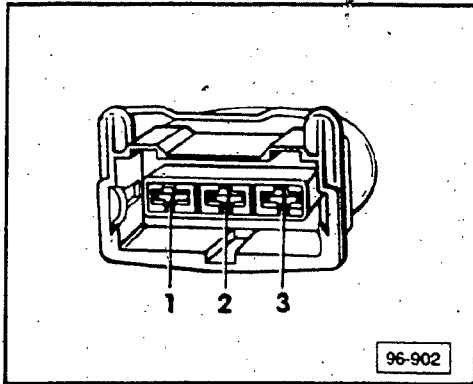
- switch multimeter **US 1119** to 20 volt range
- connect multimeter first between terminals 1 and ground then between terminals 1 and 3
- switch ignition **ON**
  - approximately 12 volts

If voltage value is **NOT** obtained

- check wiring using wiring diagram
- connect multimeter between terminals 2 and 3
- crank engine with starter
  - 0.2 volts minimum

If voltage value is **NOT** obtained

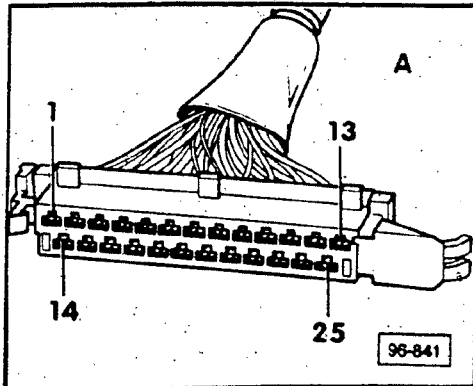
- remove foot-well cover under glove compartment
- remove (black) harness connector **A** from control unit

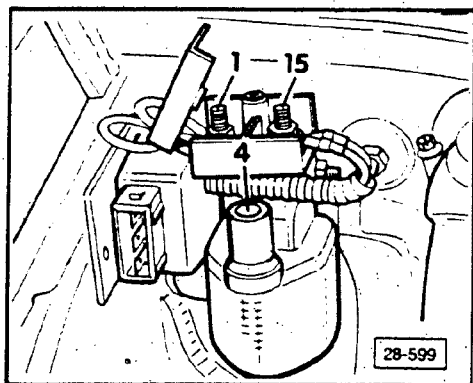
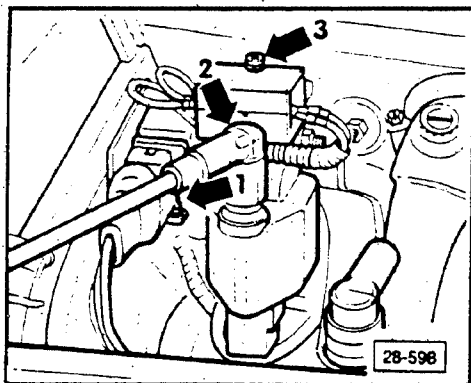


- check wiring between terminal 2 of power output stage harness connector and terminal 9 from harness connector **A** of control unit

If **NO** open circuits are found

- replace MPI control unit





## Ignition coil, checking

### Note

Check connectors and wiring between power output stage and ignition coil and between power output stage and engine for corrosion or insulation damage.

### Secondary resistance, checking

- remove harness connector 1 from power output stage
- remove coil wire 2 from ignition coil
- remove screw 3
- switch multimeter **US 1119** to resistance range
- connect multimeter between terminals 1 and 4 of ignition coil
  - 5000 to 9000 ohms

If resistance value is **NOT** obtained

- replace ignition coil

### Primary resistance, checking

- connect multimeter between terminals 1 and 15 of ignition coil
  - 0.5-1.5 ohms

If resistance value is **NOT** obtained

- replace ignition coil

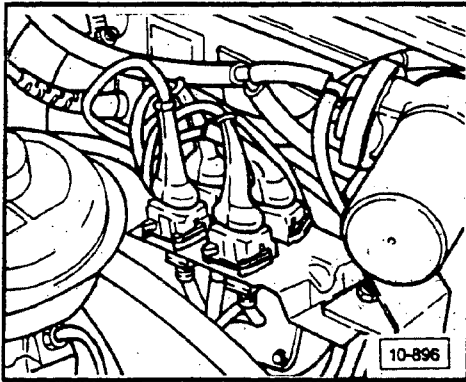
If coil resistance values are obtained but ignition pulse is still **NOT** present; power output stage is defective

- replace ignition coil assembly

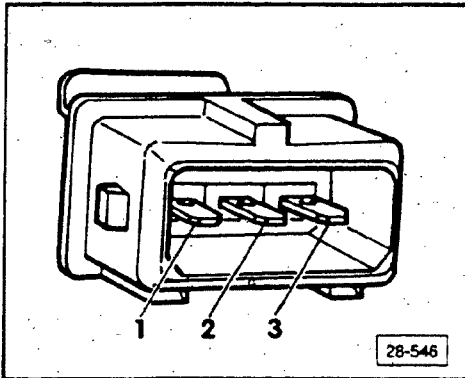
### CAUTION

The function of the power output stage **CANNOT** be checked.





- separate black connector (left side engine compartment near plenum) and remove from bracket (sensor side of cable is color marked)
- switch multimeter **US 1119** to resistance range



- switch multimeter **US 1119** to resistance range
- connect multimeter between terminals 1 and 2
  - approximately 1000 ohms

If resistance value is **NOT** obtained

- replace ignition timing sensor

If resistance value **IS** obtained

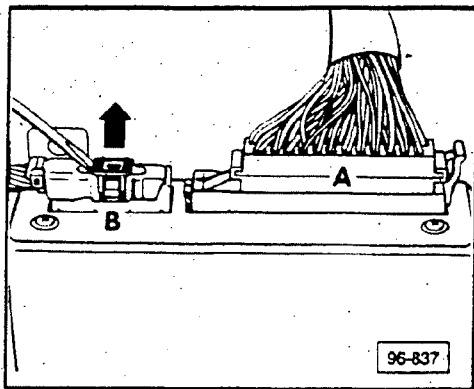
- connect multimeter between terminals 1 and 3 then 2 and 3
  - infinite ohms (open)

If resistance values are **NOT** obtained

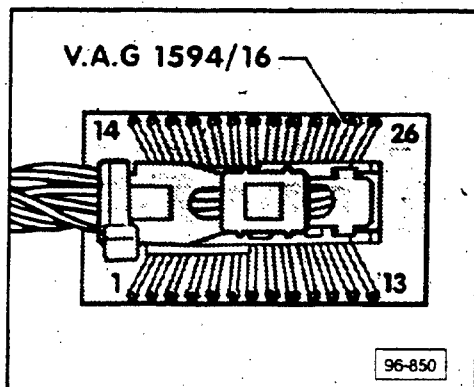
- replace ignition timing sensor

If resistance values **ARE** obtained

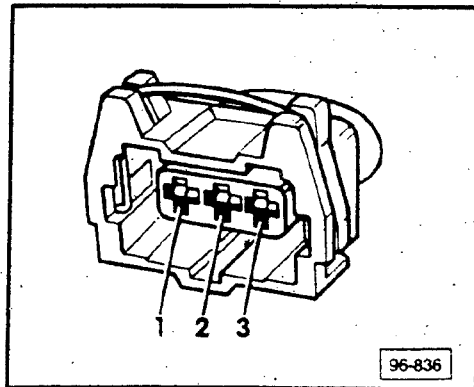
- check wiring between ignition timing sensor harness connector and control unit harness connector **B** as follows:
  - remove foot-well cover under glove compartment



- pry open secondary lock (black) of control unit harness connector **B** and remove



- attach harness connector **B** to test adaptor **VAG 1594/16**
- check continuity between sensor connector and measuring adaptor



Harness connector B	Test adaptor
1	←————→ 12
2	←————→ 24
3	←————→ 24

- approximately 0 ohms (continuity)

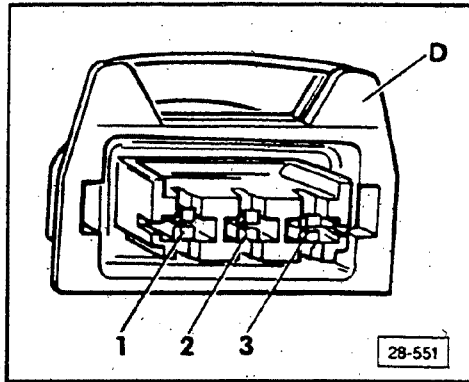
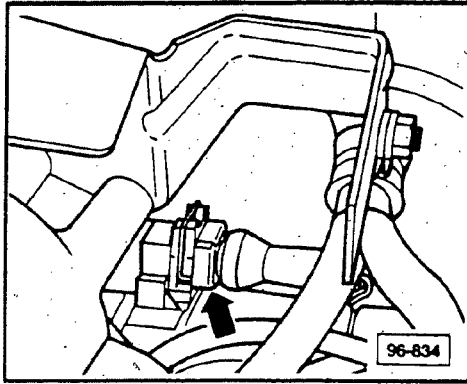
If resistance values are **NOT** obtained  
 ■ check wiring using wiring diagram

If resistance values **ARE** obtained  
 ■ check gap between pin and ignition timing sensor (see group 13)

If gap is **OK**

- replace MPI control unit

## Hall Sensor, checking



### CAUTION

To check Hall Sensor, remove wiring (terminal 4) from ignition distributor and connect to ground using jumper and clip.

- remove Hall Sensor harness connector (on ignition distributor, see arrow)
- switch multimeter **US 1119** to 20 volt range
- connect multimeter to outer terminals (1 and 3) and connector **D**
- switch **ON** ignition
  - 9 volts minimum

If voltage value is **NOT** obtained

- check wiring using wiring diagram
- switch **OFF** ignition

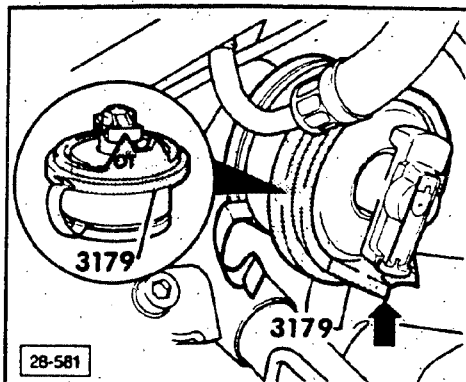
### Note

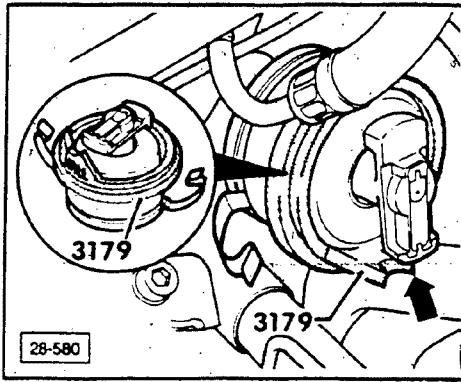
The connector cavities are correspondingly numbered on the rear side of the connector.

### CAUTION

The distributor rotor is bonded to the shaft and cannot be removed. Replace distributor assembly if there is damage.

- push back rubber boot on Hall Sensor harness connector and reconnect
- connect multimeter between terminals 2 and 1
- remove ignition distributor cap
- install special tool **3179** on ignition distributor and engage in groove
- switch **ON** ignition
- turn crankshaft using special tool **2079** until rotor marking is precisely lined up with TDC mark on **3179**
  - 4.0 volts minimum





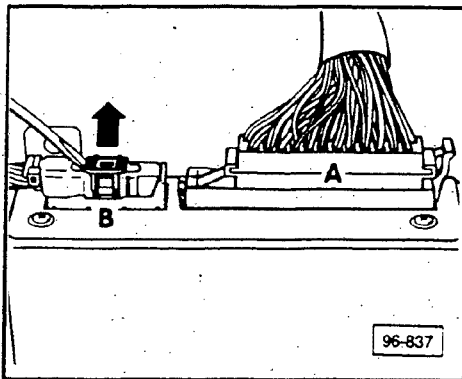
- turn crankshaft until rotor mark is precisely lined up with Hall mark
  - 0-0.5 volts

If voltage value is **NOT** obtained

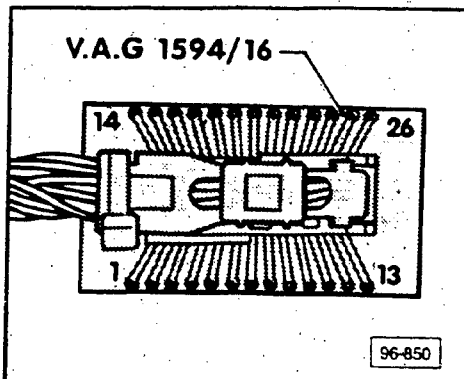
- replace distributor assembly

If voltage value **IS** obtained

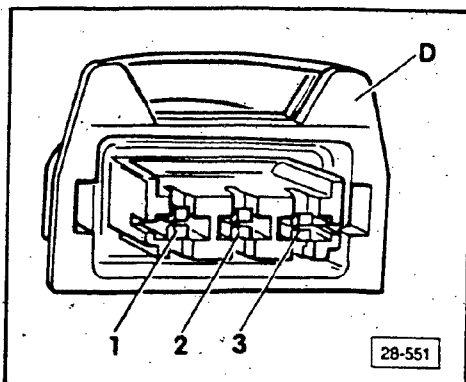
- check wiring between Hall Sensor and control unit as follows
- remove foot-well cover under glove compartment



- pry open secondary lock (black) of control unit harness connector B and remove



- connect measuring adaptor VAG 1594/16 to control unit harness connector B



- switch multimeter US 1119 to resistance range
- check continuity between Hall Sensor connector D and measuring adaptor

Connector D                      Measuring adaptor

1                      ←                      →                      23

2                      ←                      →                      11

3                      ←                      →                      1

- approximately 0 ohms (continuity)

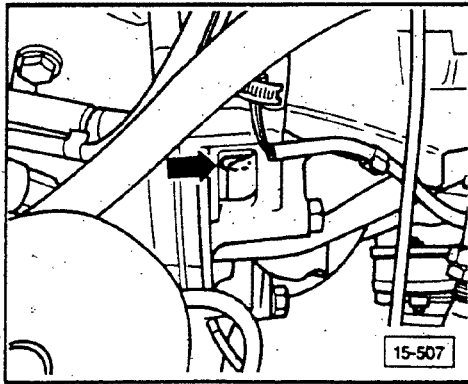
If continuity is **NOT** obtained

- check wiring using wiring diagram

If continuity **IS** obtained

- replace MPI control unit

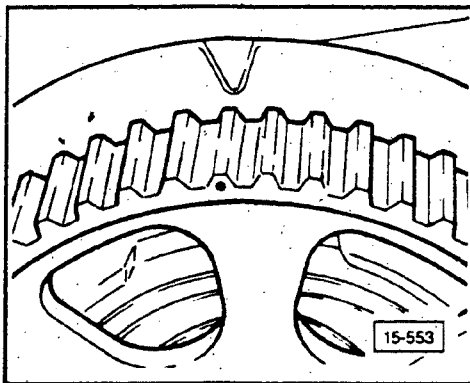
## Ignition distributor, installing



### Note

The distributor rotor is bonded to its shaft and cannot be removed without being destroyed.

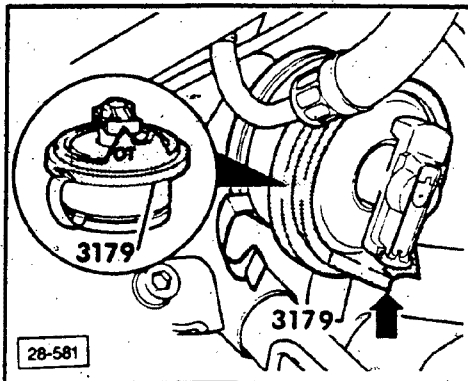
- turn crankshaft to TDC (**arrow**) with tool 2079



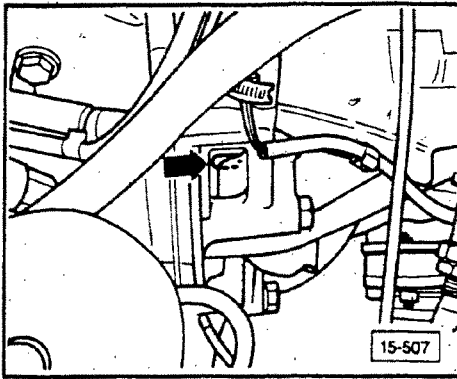
- dot on camshaft must line up with marking on cylinder head cover

### Note

Basic setting is required because final position of distributor is limited by ignition wire lengths.

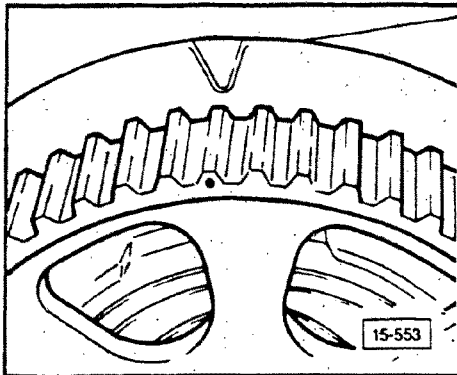


- install tool 3179 on distributor and position in groove (**arrow**)
- align rotor mark with TDC mark
- insert distributor then turn housing until rotor mark precisely aligns with TDC mark on tool 3179
- tighten distributor base clamp



Ignition distributor, basic setting (engine not running)

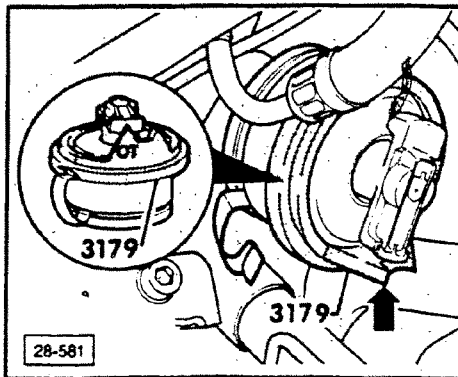
- turn crankshaft to TDC (arrow) using tool 2079



- dot on camshaft must line up with marking on cylinder head cover
- remove distributor cap

### CAUTION

Distributor rotor is bonded to shaft, and cannot be removed. Replace distributor assembly if damaged.



- install tool 3179 on distributor and position in groove
- loosen distributor base clamp
- turn distributor housing until rotor mark is precisely aligned with TDC mark on 3179 (arrow)
- tighten distributor base clamp