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20-valve engine (from 03/90 prod.)

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Technical data

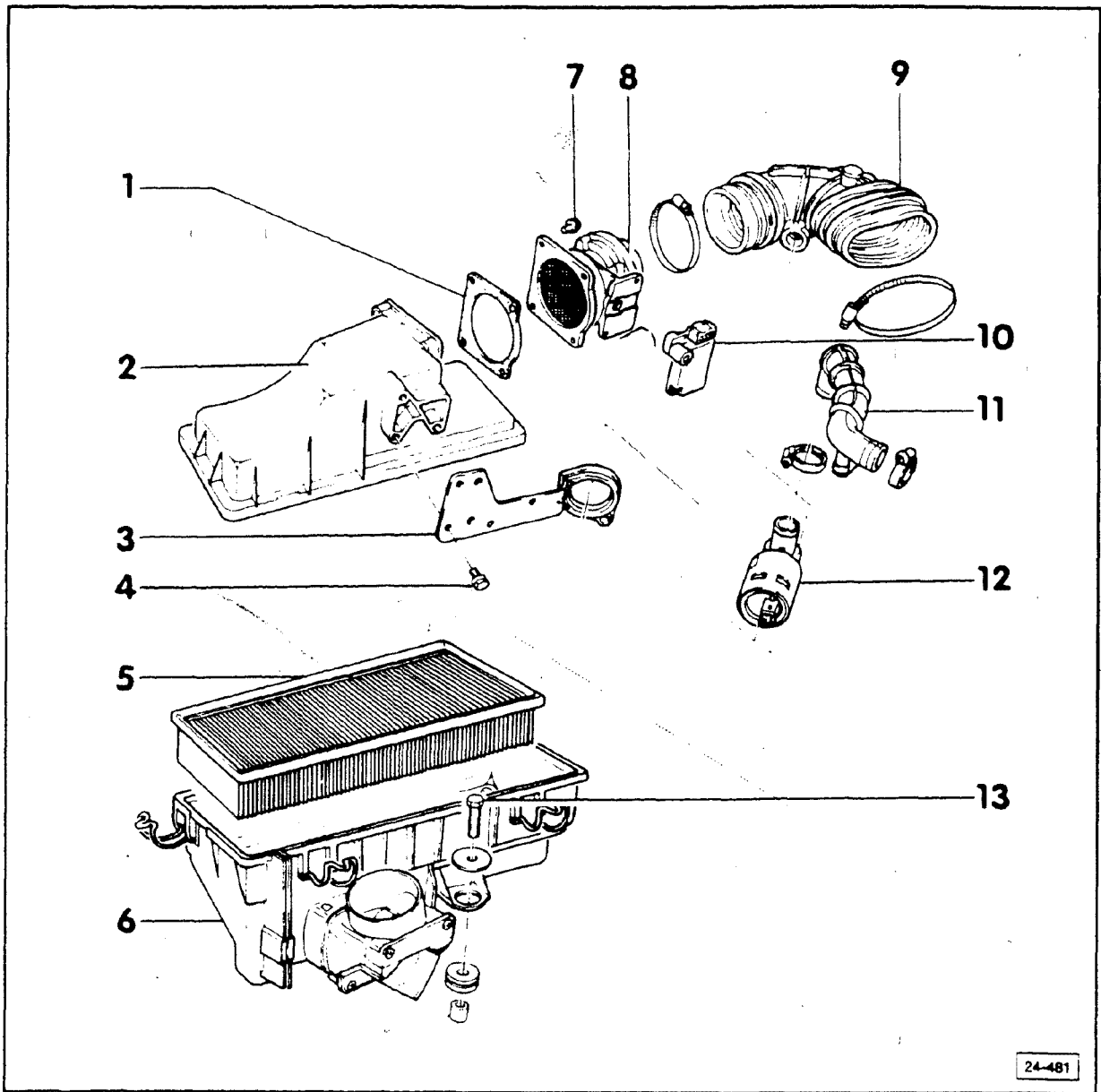
- fuel pressure
and settings 24-230

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- checking/adjusting 24-300

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- checking 24-340



Note

Replace gaskets as necessary

Before performing repair work on the fuel injection system, activate fault memory and perform output checks. See Repair Group D2 for additional information.

1 — Gasket

2 — Air filter housing, upper section

3 — Idle stabilizer valve bracket

4 — 10 Nm (7 ft lb)

5 — Air filter element

6 — Air filter housing, lower section

7 — 10 Nm (7 ft lb)

8 — Air mass sensor housing

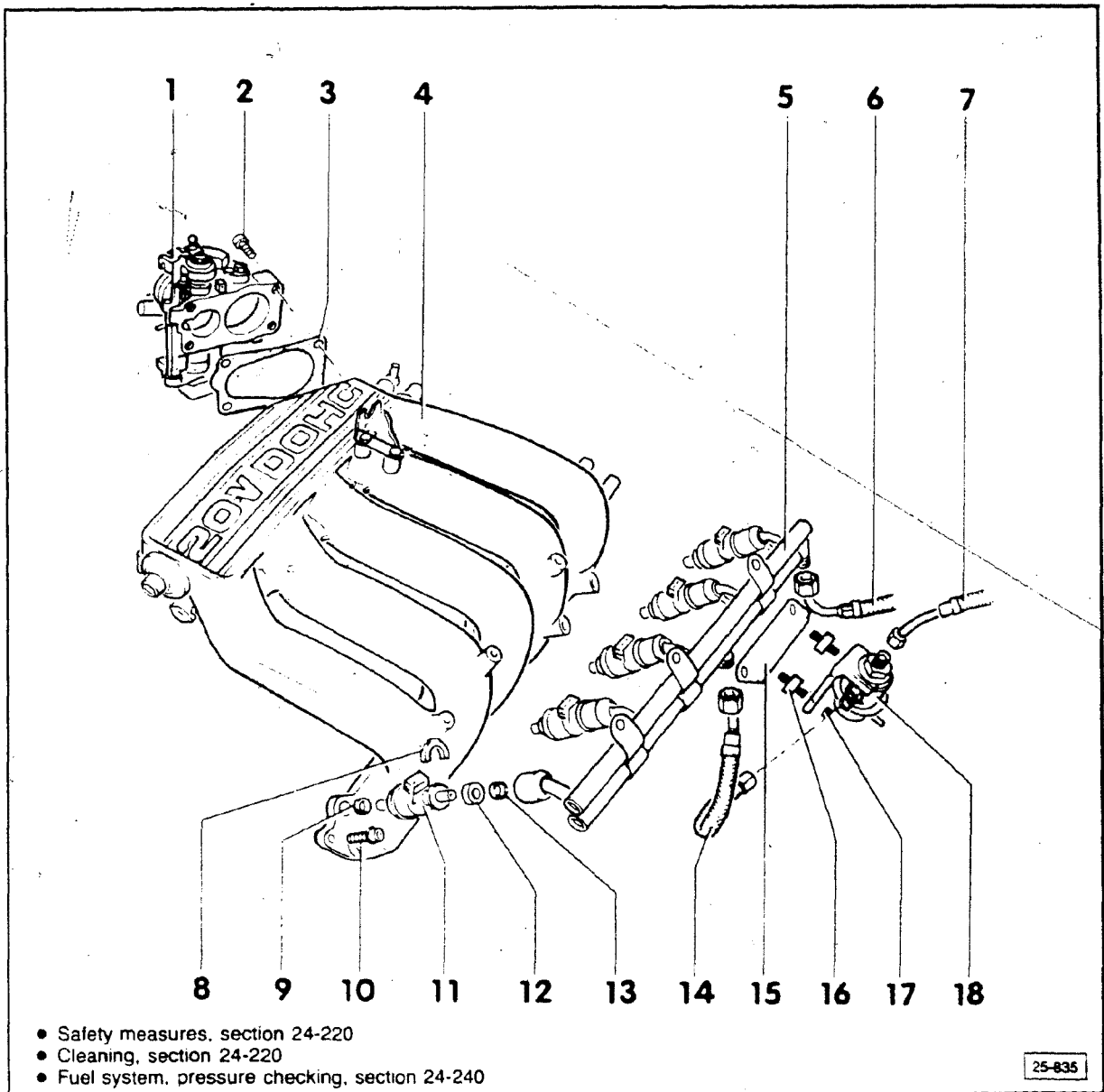
9 — Intake air boot

10 — Air mass sensor
• checking, section 24-260

11 — Hose

12 — Idle stabilizer valve
• checking, section 24-400

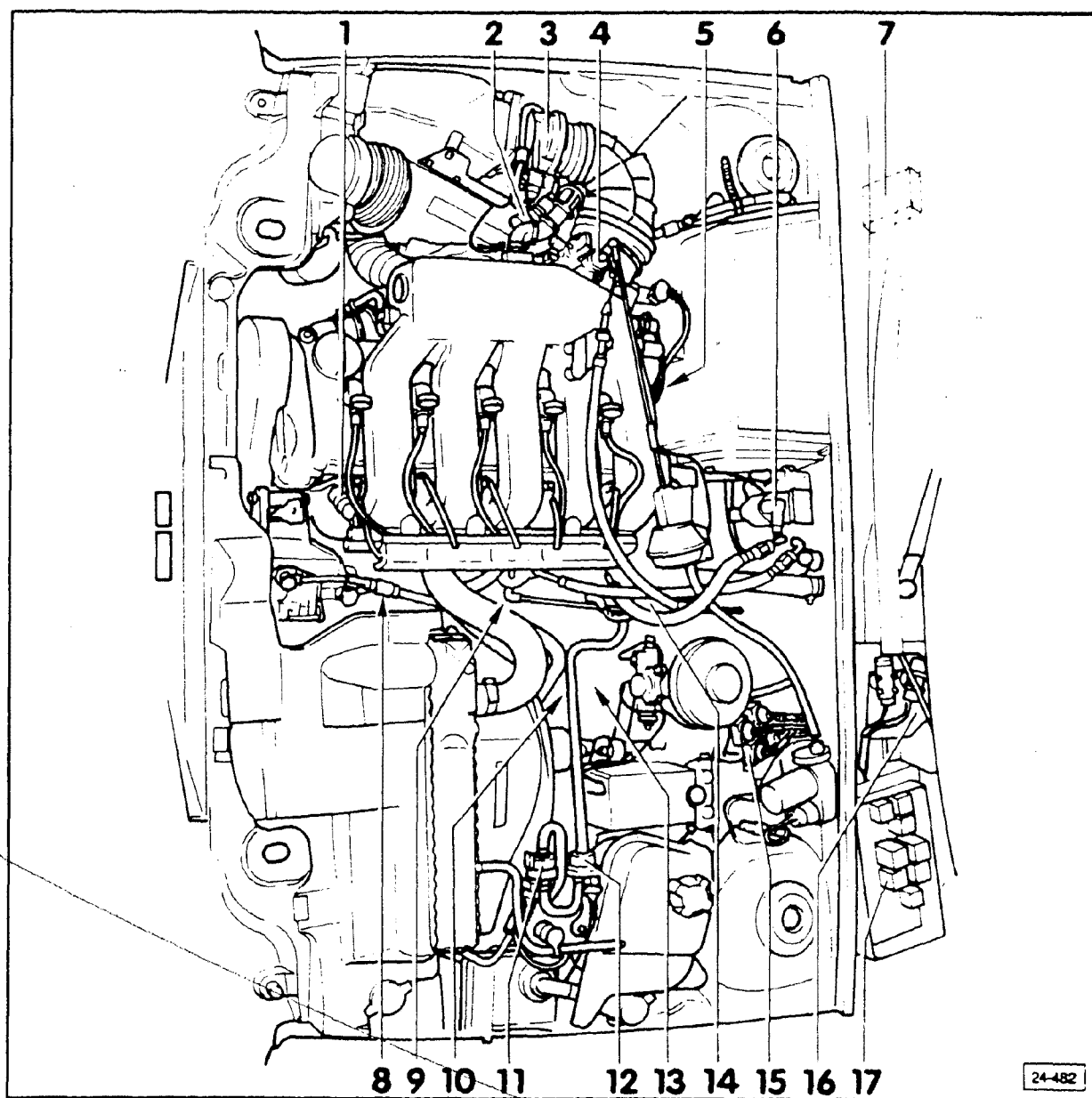
13 — 15 Nm (11 ft lb)



- Safety measures, section 24-220
- Cleaning, section 24-220
- Fuel system, pressure checking, section 24-240

25-835

- | | |
|---|---|
| <p>1 — Throttle body</p> <ul style="list-style-type: none"> • potentiometer, checking/adjusting, section 24-300 • Idle switch, checking/adjusting, section 24-310 <p>2 — 20 Nm (15 ft lb)</p> <p>3 — Gasket</p> <p>4 — Intake manifold</p> <p>5 — Fuel rail</p> <p>6 — Fuel supply line</p> <p>7 — Fuel return line (to control pressure regulator)</p> <p>8 — Retaining clip for fuel injector</p> <p>9 — Gasket</p> <ul style="list-style-type: none"> • replace | <p>10 — 20 Nm (15 ft lb)</p> <p>11 — Fuel injector</p> <ul style="list-style-type: none"> • checking, section 24-250 <p>12 — Fuel filter element</p> <p>13 — Gasket</p> <ul style="list-style-type: none"> • replace <p>14 — Fuel return line (to fuel tank)</p> <p>15 — Regulator mounting bracket</p> <p>16 — Rubber bonded mounting bushing</p> <p>17 — 10 Nm (7 ft lb)</p> <p>18 — Control pressure regulator</p> |
|---|---|



- | | |
|--|--|
| <p>1 — Fuel injector
• checking, section 24-250</p> <p>2 — Idle stabilizer valve (N 71)
• checking, section 24-400</p> <p>3 — Air flow sensor (G 70)
• checking, section 24-260</p> <p>4 — Throttle body
• potentiometer checking, section 24-300</p> <p>5 — Coolant temperature sender (G 62)
checking, section 24-290</p> <p>6 — Ignition coil (N) with power output stage
• checking, see Repair Group 28</p> | <p>7 — MPI control unit (J 192)
• voltage supply, checking section 24-410</p> <p>8 — Knock sensor I (G 61)
• 10 Nm (7 ft lb)</p> <p>9 — Knock sensor II (G 66)
• 10 Nm (7 ft lb)</p> <p>10 — Ignition timing point sender
• checking, see Repair Group 28</p> <p>11 — Solenoid valve II (N 115) (ON/OFF valve) for carbon canister system
• checking, section 24-280</p> |
|--|--|

- 12 — Solenoid valve I (N 80) (frequency valve) for carbon canister system
 - checking, section 24-280
- 13 — Engine speed sender (G 28)
 - checking, section 24-320
- 14 — Ignition distributor with Hall sender
 - basic adjustment, see Repair Group 28
- 15 — Harness connector mounting bracket
- 16 — Resistor pack (N 34) for fuel injectors
 - checking, section 24-250
- 17 — Fuel pump relay (J 17)
 - checking triggering, section 24-270

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 customer's battery; **ALWAYS** ask for the radio code (if equipped with an anti-theft radio).

Technical data

System pressure	3.8 to 4.2 bar (55 to 61 psi)
Residual pressure minimum after 10 minutes minimum after 20 minutes	3.2 bar (46.4 psi) (gauge pressure) 3.0 bar (43.5 psi) (gauge pressure)
Fuel injector delivery volume (per 20 seconds)	100 to 120 ml
*Idle speed adjusting	800 ± 50 rpm
*CO content	0.75 ± 0.25 % volume

CAUTION

Idle speed and CO content are inter-related and **MUST** be checked and adjusted together.

* Requirements for checking/adjusting

- perform vehicle self-diagnosis. see Repair Group D2 for additional information
- engine warm, oil temperature 80°C (176°F) minimum
- throttle valve in idle position
- all electrical consumers switched **OFF**
- pressure measuring equipment **NOT** connected
- radiator fan **NOT** running while taking measurements

Fuel pressure, checking

CAUTION

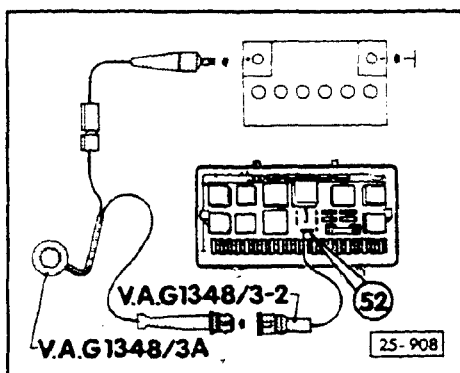
Fire hazard. Do **NOT** have anything in area that can ignite fuel.

Requirements

- fuse 13 OK
- correct fuel filter installed
- battery voltage 12 volts minimum

Remote control VAG 1348/3A, connecting

- remove fuel pump relay from fuse/relay panel (position 10)
- insert male connector from adaptor **VAG 1348/3-2** into terminal 52 of relay socket
- connect alligator clip terminal of remote control **VAG 1348/3A** to positive battery terminal
- connect mating connectors of **VAG 1348/3A** remote control and **VAG 1348/3-2** adaptor



System pressure

- connect pressure gauge **VAG 1318** between fuel rail and fuel supply line, with pressure gauge lever in **OPEN** position
- remove vacuum line from control pressure regulator to intake manifold (at control pressure regulator) and plug line

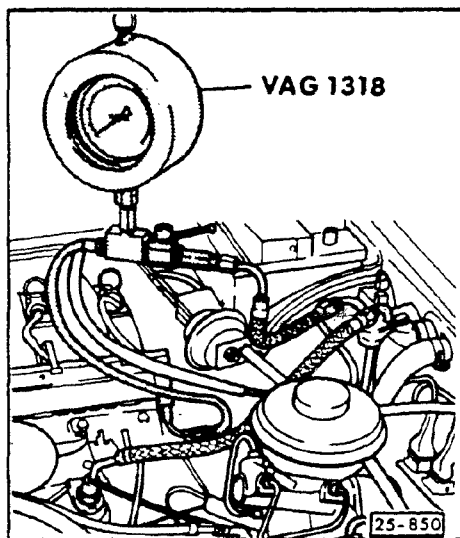
Note

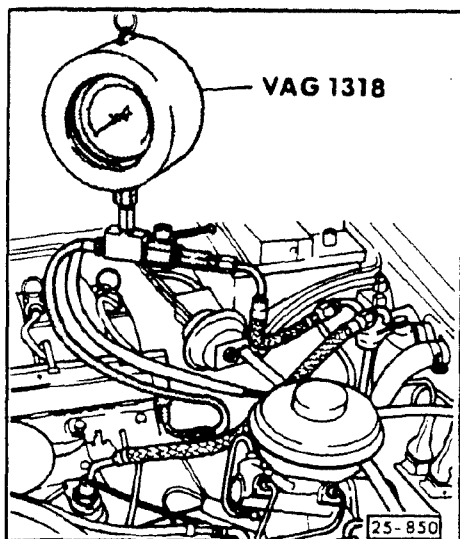
If fuel leaks from the vacuum connection of the control pressure regulator after performing the following test, replace the control pressure regulator.

- briefly activate remote control **VAG 1348/3A**
- fuel pump must run

If NO

- check fuel pump, see Repair Group 20





- activate remote control until pressure stabilizes
 - 3.8 to 4.2 bar (55 to 61 psi) with pump running
 - 3.0 to 3.5 bar (44 to 51 psi) immediately after switching OFF remote

If specified pressure **NOT** obtained

- trial replace control pressure regulator and repeat test

If specified pressure still **NOT** obtained

- check fuel pump or fuel supply line for damage (pinched) or blockage, repair or replace as necessary

If specified pressure exceeded

- connect **VAG 1318** pressure tester between fuel rail and control pressure regulator (substituting short return line)
- repeat test
 - 3.8 to 4.2 bar (55 to 61 psi) with fuel pump running

If pressure value obtained

- replace fuel rail

If pressure value obtained is **LOW**

- replace pressure regulator

If pressure value obtained is **HIGH**

- check return line for pinching or blockage, replace or repair as necessary
- disconnect **VAG 1348/3A** remote control and re-insert fuel pump relay

CAUTION

Higher than specified fuel pressure can weaken or tear the pressure regulator diaphragm which in turn can allow fuel to enter the engine through the vacuum line.

Note

During the following check the engine should not be run with the vacuum hose removed for any longer than necessary.

Higher fuel pressure (with vacuum hose removed) causes an enrichment of the fuel air mixture which under the circumstances causes it to exceed the Oxygen sensor control limits thereby causing a fault to register in fault memory.

- start engine and let idle
- switch OFF all electrical consumers
- connect vacuum hose to pressure regulator and observe pressure drop on gauge
 - must drop by 0.5 bar (7.3 psi)

If **NO**

- check vacuum hose for leaks (cracks, pinching, chafing etc.) repair or replace as necessary
- check vacuum connection on intake manifold for flow by blowing through it

If **OK**

- replace pressure regulator

Residual pressure, checking

- shut off engine and observe pressure gauge
 - after 10 minutes minimum pressure must be:
engine cold: 2.2 bar (31.9 psi)
engine hot: 3.0 bar (43.5 psi)

Note

The hot engine fuel pressure increase is due to fuel expansion and is normal.

If minimum pressure is **NOT** obtained

- check **VW 1318** pressure tester for leaks
- check fuel lines for leaks
- check fuel pump check valve (see Repair Group 20)
- inspect fuel injectors for leaks, see section 24-250

If **NO** leaks are found and fuel pump check valve is **OK**

- replace fuel pressure regulator and repeat test

Fuel injectors, checking

CAUTION

Fire hazard. Do **NOT** have anything in area that can ignite fuel.

- activate Fault memory (for additional information see Repair Group D2)
 - if a fault is indicated for the fuel injectors continue with the following procedures

CAUTION

The fuel injectors are operated via a series resistor network which limits the amount of current to the fuel injectors.

DO NOT TRY to check the fuel injectors by applying battery voltage!

- remove harness connector from fuel injector to be tested
- switch multimeter **US 1119 (VAG 1526)** to resistance range
- measure resistance of injector(s) under test
 - must be from 1 to 3 ohms

If **NO**

- replace injector(s)
- perform Output checks diagnosis, see Repair Group D2 for additional information

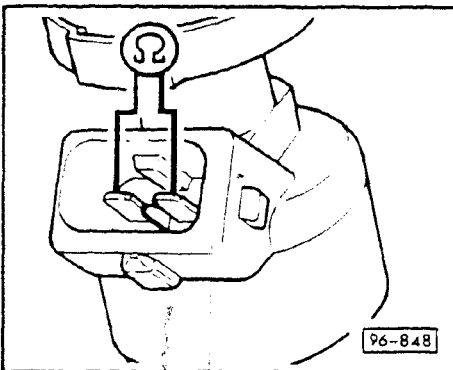
If during diagnosis one or more injectors are **NOT** triggered

- perform the following

Fuel injectors voltage supply, checking

Requirements

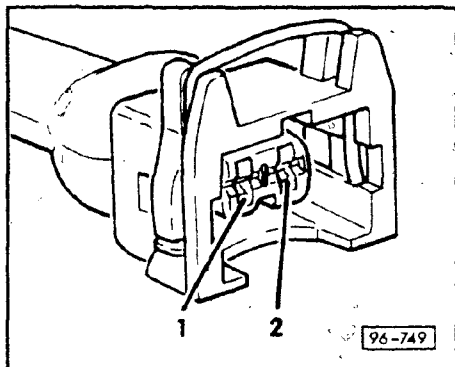
- fuel pump relay OK
- fuel pump triggering OK
- fuse 13 OK



CAUTION

The fuel injectors are operated via a series resistor network which limits the amount of current to the fuel injectors.

DO NOT TRY to check the fuel injectors by applying battery voltage!



- disconnect harness connector from fuel injector(s) under test
- connect **US 1115 (VAG 1527B)** LED tester between terminal 2 of harness connector and ground
- briefly operate starter
 - LED tester must light up

If **YES**

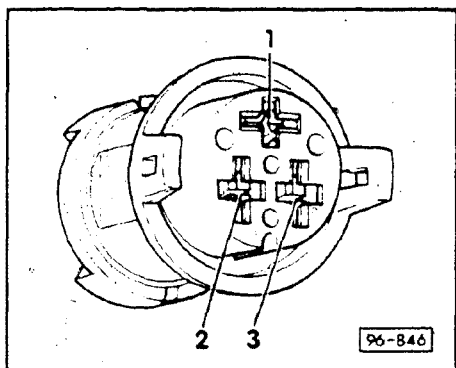
- check fuel injector triggering in this section

If **NO**

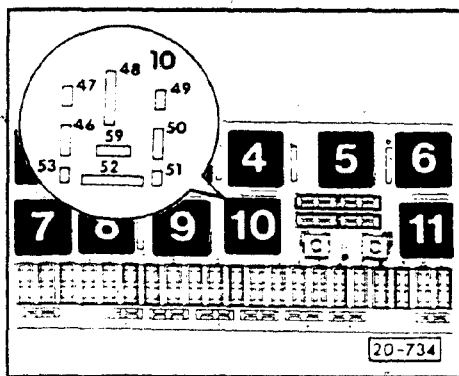
- check resistor pack in this section

Fuel injector wiring, checking

- switch multimeter **US 1119 (VAG 1526)** to resistance range
- check continuity between harness connector of fuel injector under test and...



- resistor pack harness connector per wiring diagram
 - must be continuity
- check continuity between terminal 1 of gray connector and fuse 13. repair as necessary



- check for open wire in fuse relay panel between fuse 13 and terminal 52 of relay location 10

If YES

- replace fuse/relay panel

Resistor pack connector, wiring identification

Gray connector

Terminal 1: voltage supply from fuse 13

Terminal 2: injector for cylinder 1

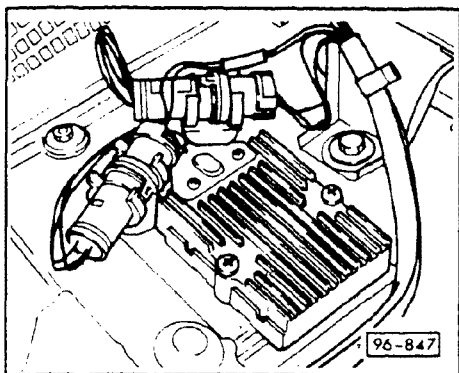
Terminal 3: injector for cylinder 2

Brown connector

Terminal 1: injector for cylinder 3

Terminal 2: injector for cylinder 4

Terminal 3: injector for cylinder 5



Resistor pack, checking

- disconnect both harness connectors at resistor pack
- switch multimeter **US 1119 (VAG 1526)** to resistance range
- measure resistance between the white wire and each of the black wires in the resistor pack connectors (not the wires in the harness connector!)
 - must be from 5.0 to 8.0 ohms from the entire set of measurements

If NO for one or more readings

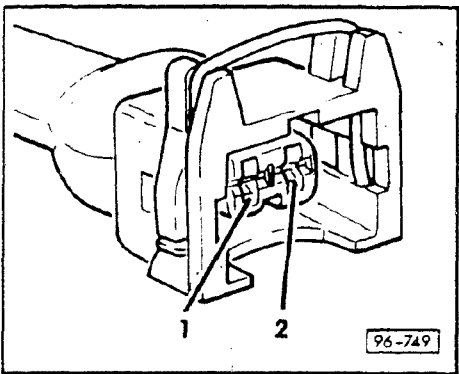
- replace resistor pack

Fuel injector triggering, checking

- disconnect harness connector for fuel injector under test
- using **VW 1594** adaptor set connect **US 1115 (VAG 1527B)** LED tester between terminal 1 and battery positive
- operate starter for a few seconds allowing engine to start
 - LED tester must flash

If NO

- connect **VAG 1598** test box to MPI control unit harness connector using adaptor **VAG 1598/12**
 - control unit is left disconnected



- connect **US 1115 (VAG 1527B)** LED tester between terminal **8** (power) of test box and terminal for the respective fuel injector as shown in chart below

Injector		VAG 1598 terminal
Cylinder 1	=	4
Cylinder 2	=	5
Cylinder 3	=	6
Cylinder 4	=	9
Cylinder 5	=	10

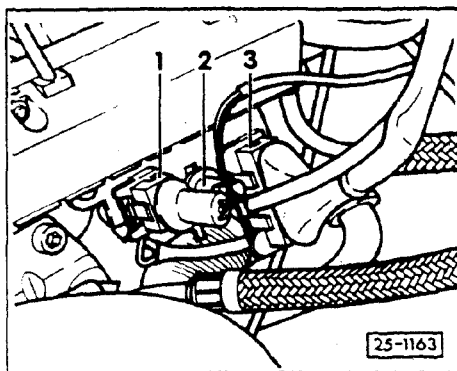
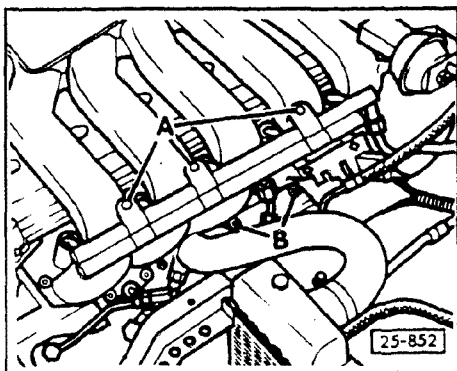
- operate starter for several seconds
 - LED tester must flash

If **NO**

- check voltage supply to MPI control unit, see section 24-410

If voltage supply **OK**

- replace MPI control unit



Injection quantity, comparative measurement

- remove fuel rail assembly (mounting bolts A) complete with injectors but do **NOT** disconnect fuel lines
- remove pressure regulator with bracket from manifold (mounting bolts B)
- remove hose clamp on rear of intake manifold and (if installed) bracket for cruise control vacuum reservoir
- disconnect harness connectors 1, 2 and 3 on intake manifold
- disconnect coil wire from distributor cap and connect to ground using **VW 1594** adaptor kit
- expose fuel injector connector terminals by pushing back rubber boots on fuel injector harness connectors (while leaving connected)
- insert fuel injectors into **VAG 1602** fuel analyzer (for volume measurement)
- perform Output checks diagnosis to trigger fuel pump relay (J 17), see Repair Group D2 for additional information
 - fuel pump must run

- with fuel pump running, visually inspect tip of fuel injectors for leakage
 - 1 to 2 drops per minute is permissible

If leakage is greater

- switch **OFF** ignition
- push back rubber boot on each injector
- connect brown wire of exposed fuel injector harness connector to ground using jumper from **VW 1594** adaptor kit

Note

This step is performed for each fuel injector in sequence for a duration of 20 seconds per injector.

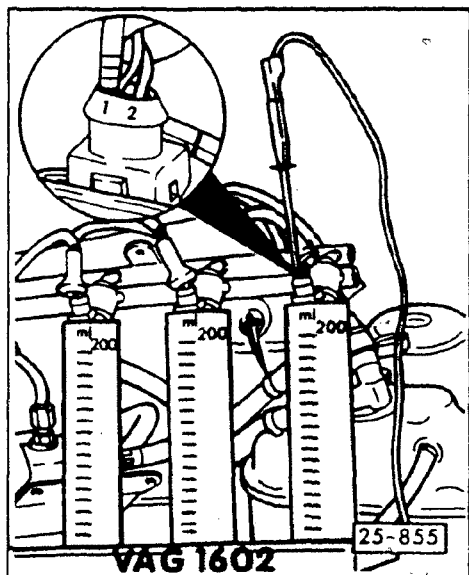
- after 20 seconds must be 100 to 120 ml of fuel in **VAG 1602**

If fuel quantity for one or more injectors is above or below specification

- replace defective injector(s)

If quantity of all five injectors is above or below specification

- check system pressure, section 24-240
- replace entire set of fuel injector O-rings before re-installing injectors



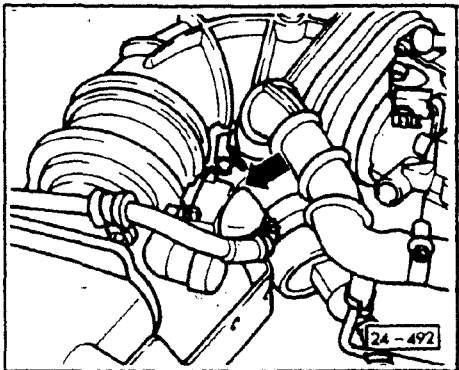
CAUTION

Ensure that the O-rings are **NOT** damaged during the fuel injector installation.

Air mass sensor (G 70) and CO potentiometer (G 74), checking

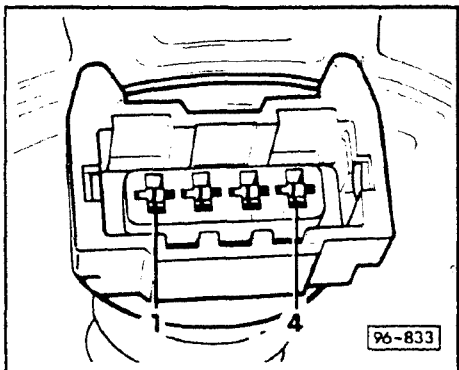
Requirement

- fuse 27 OK



Voltage supply, checking

- disconnect harness connector from air mass sensor (arrow)



- connect **US 1115 (VAG 1527B)** LED tester between terminal 3 of harness connector and ground
 - LED tester must light up

If NO

- connect **VAG 1598** test box to MPI control unit harness connector **A** using adaptor cable **VAG 1598/11**
 - harness connector **D** must remain connected to MPI control unit; either directly or via adaptor cable **VAG 1598/12**
- connect **US 1115 (VAG 1527B)** LED tester between terminals **41** and **43** (ground) of test box
- switch **ON** ignition
 - LED tester must light up

If YES

- using wiring diagram, determine break or disconnection in wiring between terminal 3 of MPI control unit harness connector **A** and terminal 2 of air mass sensor harness connector, replace or repair as necessary

If NO

- replace MPI control unit

Wiring, checking

- connect **VAG 1598** test box to MPI control unit* harness connector **A** using adaptor cable **VAG 1598/11**
 - control unit is **NOT** connected

- disconnect air mass sensor harness connector

- check wiring between following terminals for continuity or possible short circuit

Air mass sensor harness connector terminal number	Test box terminal number
---	-----------------------------

1	←————→	42 (2)*
2	←————→	45 (5)*
4	←————→	41 (1)*

- resistance must **NOT** be greater than 0.5 ohms (continuity)

* number in parentheses is the number of the terminal in the MPI control unit harness connector **A**

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

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

CAUTION

If air mass sensor harness connector requires replacement terminals, **ONLY** use gold plated terminals.

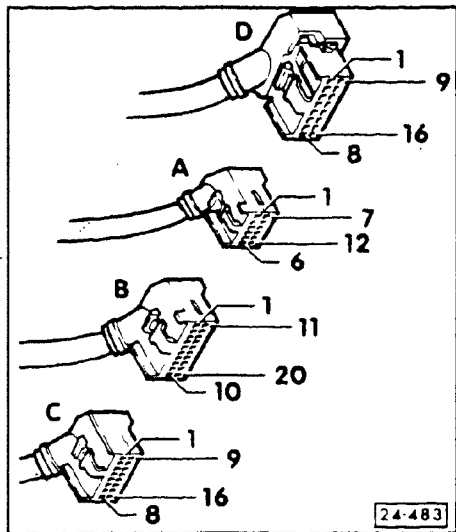
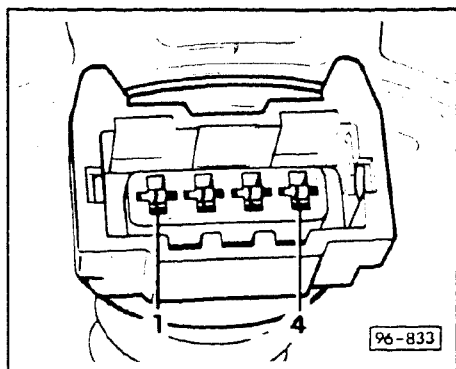
Air mass sensor and CO potentiometer, functional check

- expose wiring of air mass sensor harness connector by peeling back the rubber boot but leaving it connected

Note

The terminal numbers are molded onto the back side of the connector.

- switch **ON** ignition
- switch multimeter **US 1119** to 2 volt range



- connect multimeter between terminals 2 and 4
 - must be between 1.0 and 1.5 volts

If **NO**

- CO potentiometer in air mass sensor assembly is defective
- replace air mass sensor assembly
- switch **OFF** ignition
 - must be 0.3 to 1.1 volts
- switch **OFF** all electrical consumers
- start engine and let idle
- observe engine RPM's (while radiator fan is **NOT** running)
 - must fluctuate between idle spec and 400 RPM
 - depending on engine speed; multimeter must indicate between 0.3 and 1.1 volts

If **NO**

- replace air mass sensor assembly

Fuel pump relay, checking

- remove fuses 13 and 28
- connect **US 1115 (VAG 1527B)** LED tester between ground and rear terminal for fuse 13
- briefly operate starter
 - fuel pump relay must activate. LED tester must light up

If fuel pump is **NOT** operating

- check triggering, in this section

If LED tester does **NOT** light up

- check electrical connections, in this section
- connect **US 1115 (VAG 1527B)** LED tester to ground and left terminal for fuse 28
- briefly operate starter
 - LED tester must light up

If **NO**

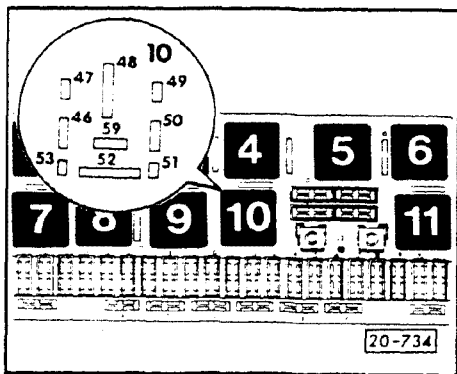
- connect **US 1115 (VAG 1527B)** LED tester to right terminal for fuse 28
 - LED tester must light up

If **NO**

- check wiring and connections, in this section

If **YES**

- re-insert fuses 13 and 28



Wiring, checking

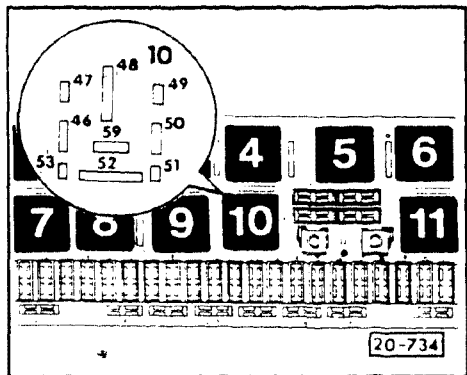
- remove fuel pump relay (**J 17**) from fuse relay panel, location 10
- switch **US 1119 (VAG 1526)** multimeter to resistance range
- check continuity between terminal 52 (of fuse relay panel socket 10) and fuse 13; then between terminal 59 and fuse 28
 - must not be greater than 0.5 ohms

If **NO**

- eliminate open circuit using wiring diagram; repair as necessary

If **NO** open circuit is found

- check fuel pump relay triggering



Triggering, checking

- remove fuel pump relay (J 17) from fuse relay panel. location 10
- switch **ON** ignition
- switch multimeter **US 1119 (VAG 1526)** to 20 volts DC range
- connect multimeter first between terminals **46** and **50** then between terminals **48** and **50** (of fuse relay panel socket **10**)
 - must be approximately battery voltage

If specified value is **NOT** obtained

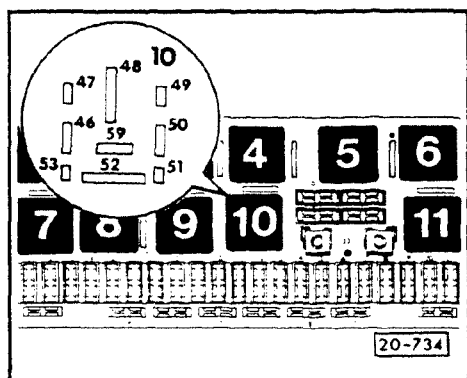
- eliminate open circuit using wiring diagram, repair as necessary
- switch **OFF** ignition
- connect **US 1115 (VAG 1527B)** LED tester between terminals **46** and **47** (of fuse relay panel socket **10**)
- switch **ON** ignition
 - LED tester must illuminate brightly for approximately 1 second and then become dim
- briefly operate starter
 - LED tester must become brighter

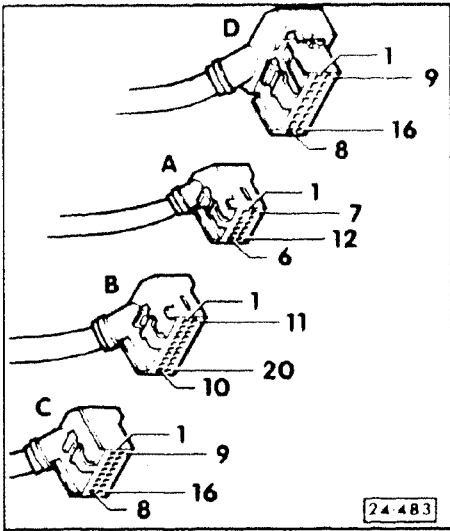
If LED tester remains dim while operating starter

- replace MPI control unit

If LED tester does **NOT** light up

- check wiring as follows:
- connect **VAG 1598** test box to MPI control unit harness connector using adaptor **VAG 1598/12**
 - control unit is left disconnected
- switch multimeter **US 1119 (VAG 1526)** to resistance range
- check continuity between terminal **47** of fuse relay panel socket **10** and terminal **15** on **VAG 1598** test box
 - must not be greater than 0.5 ohms





- using wiring diagram, eliminate open circuit between terminal 47 (of fuse relay panel socket 10) and terminal 15 of control unit connector D shown in illustration

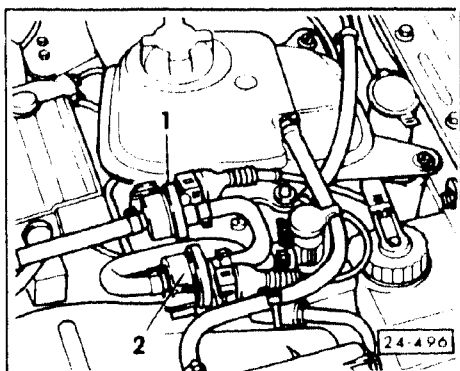
If there is **NO** open circuit AND LED tester does **NOT** light up

- replace MPI control unit

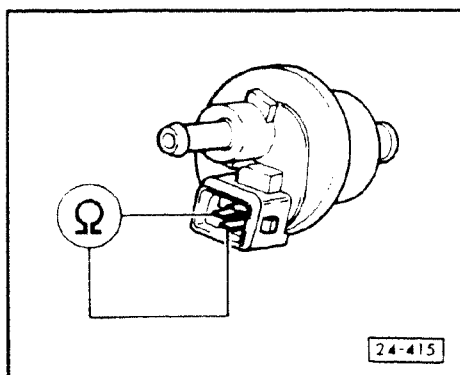
If fuel pump triggering AND wiring are **OK**

- replace fuel pump relay
- re-insert fuses 13 and 28

Carbon canister solenoid valves, checking



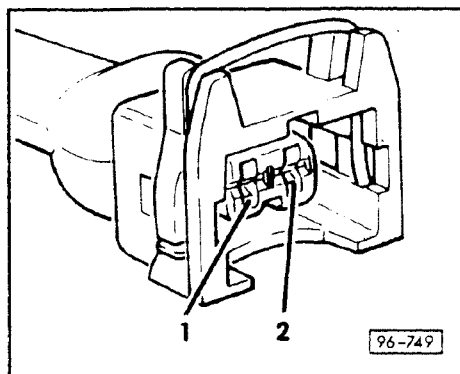
- disconnect harness connector from respective solenoid valve



- switch multimeter **US 1119 (VAG 1526)** to resistance range
- measure resistance of respective solenoid valve
 - must be between 40 and 50 ohms

If **NO**

- replace solenoid valve

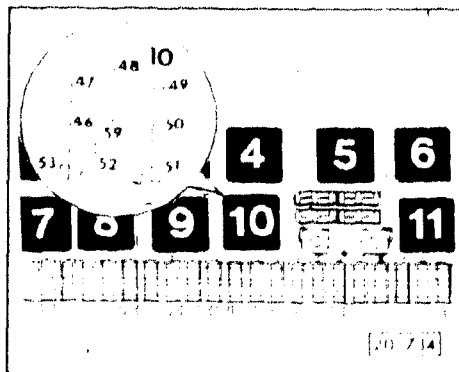


Voltage supply, checking

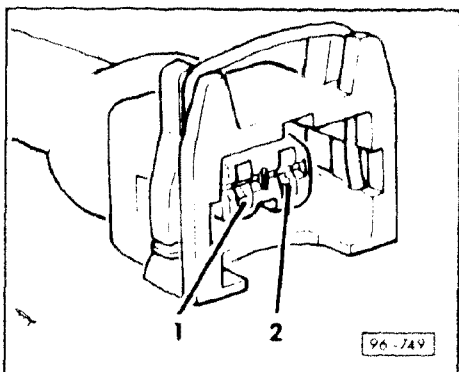
- remove harness connector from respective solenoid valve
- connect **US 1115 (VAG 1527B)** LED tester between terminal **1** of harness connector and ground, using adaptors from **VW 1594** kit
- activate starter for several seconds
 - LED tester must light up

If **NO**

- check fuse **28**

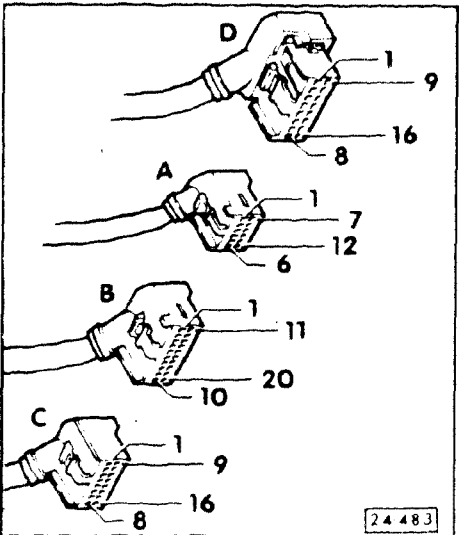


- using wiring diagram, check continuity between terminal 1 of harness connector (for respective solenoid valve) and fuse 28
 - must be less than 0.5 ohms
- check fuel pump relay and triggering (see section 24 270)



Solenoid valve 1 triggering, checking

- connect **US 1115 (VAG 1527B)** LED tester between terminals 1 and 2 of harness connector using **VW 1594** adaptor kit
- perform Output checks sequence (see Repair Group D2 for additional information)
 - LED tester must blink



If LED tester does **NOT** blink or remains **ON** constantly

- connect test box **VAG 1598** to MPI control unit harness connector **D** using **VAG 1598.12** adaptor cable
 - MPI control unit not connected

If LED tester is **ON** constantly

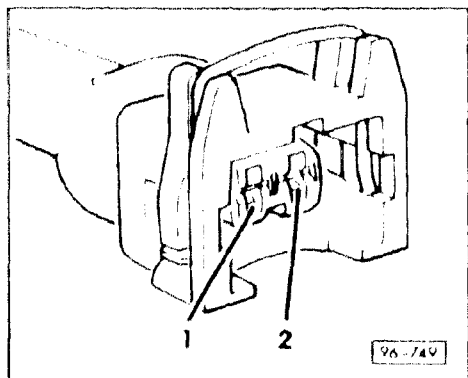
- check for an unwanted ground connection between terminal 2 of solenoid valve harness connector and terminal 12 of test box, repair as necessary

If LED tester does **NOT** blink

- check continuity between terminal 2 of solenoid valve harness connector and terminal 12 of test box, repair as necessary
 - must be less than 0.5 ohms

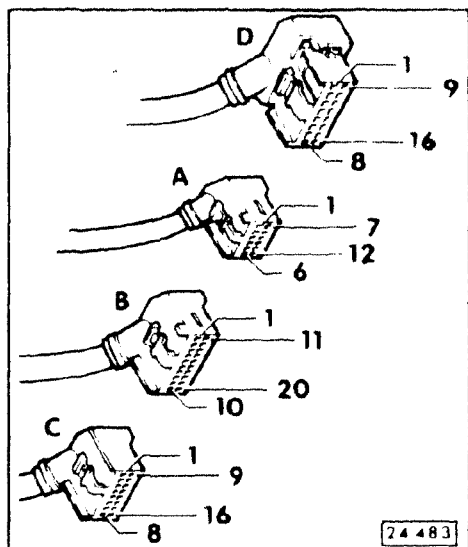
If wiring checks **OK**

- replace MPI control unit



Solenoid valve 2 triggering, checking

- connect **US 1115 (VAG 1527B)** LED tester between terminals 1 and 2 of harness connector using **VW 1594** adaptor kit
- perform Output checks sequence (see Repair Group D2 for additional information)
 - LED tester must blink



If LED tester does **NOT** blink or remains **ON** constantly

- connect test box **VAG 1598** to MPI control unit harness connector **B** using **VAG 1598/11** adaptor cable
 - MPI control unit not connected

If LED tester is **ON** constantly

- check for an unwanted ground connection between terminal 2 of solenoid valve harness connector and terminal 38 of test box (which is actually terminal 18 of harness connector **B**), repair as necessary

If LED tester does **NOT** blink

- check continuity between terminal 2 of solenoid valve harness connector and terminal 38 of test box (which is actually terminal 18 of harness connector **B**), repair as necessary
 - must be less than 0.5 ohms

If wiring checks **OK**

- replace MPI control unit

Coolant temperature sender (G 62), checking

- disconnect harness connector from coolant temperature sender
- switch **US 1119 (VAG 1526)** multimeter to resistance range
- connect multimeter between terminals 1 and 2 of coolant temperature sender
 - at approximately 20°C (68°F) coolant temperature must be approximately 2500 ohms
 - at approximately 80°C (176°F) coolant temperature must be approximately 330 ohms

If NO

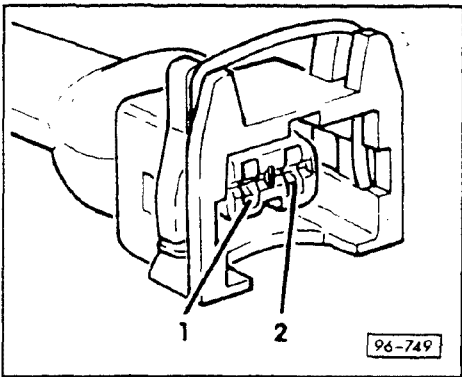
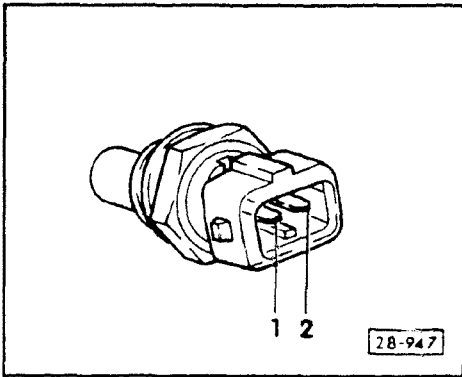
- replace coolant temperature sender

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

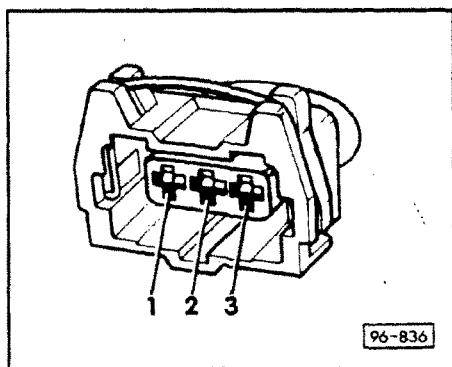


Throttle potentiometer (G 69), checking/adjusting

See section 24-210 for throttle potentiometer location.

Voltage supply, checking

- disconnect harness connector from throttle potentiometer
- switch **ON** ignition
- switch multimeter **US 1119** to 20 volt range
- connect multimeter between terminals 1 and 2, then 1 and 3
 - must be between 4.5 and 5.5 volts



If NO

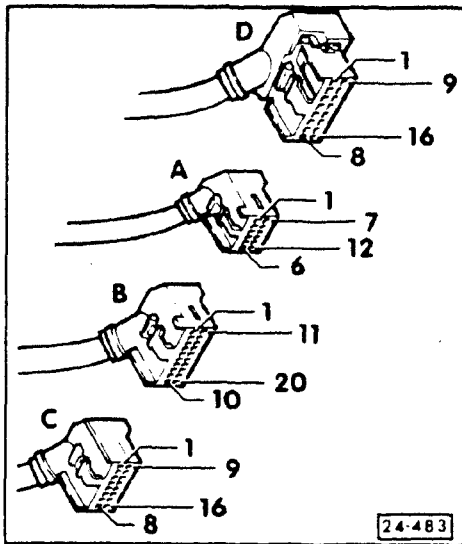
- check wiring between harness connector and control unit
- switch **OFF** ignition
- connect test box **VAG 1598** to control unit harness connector using adaptor **VAG 1598/11**
 - control unit is left disconnected
- switch multimeter **US 1119** to resistance range
- check wiring between following terminals for continuity or short, using wiring diagram

Throttle potentiometer harness connector terminal number	Test box terminal number
--	-----------------------------

1	←————→ 46 (6)*
2	←————→ 48 (8)*
3	←————→ 47 (7)*

- resistance must **NOT** be greater than 0.5 ohms (continuity)

* number in parentheses is the number of the terminal in the MPI control unit harness connector **A**



If a short or open circuit is detected between the throttle potentiometer harness connector and the test box

- replace or repair the actual wiring between control unit harness connector **A** and the throttle potentiometer harness connector as necessary

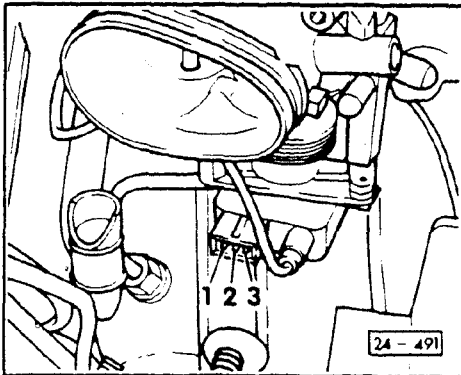
CAUTION

If the throttle potentiometer connector requires replacement terminals, **ONLY** use gold plated terminals.

- connect adaptor cable **VAG 1598/11** to MPI control unit
- switch **ON** ignition
- switch multimeter **US 1119** to 20 volt range
- connect multimeter between terminals **46** and **48** then between **46** and **47** of test box terminals
 - must be between 4.5 and 5.5 volts

If **NO**

- replace MPI control unit



Throttle potentiometer, resistance checking

- switch multimeter **US 1119 (VAG 1526)** to resistance range
- connect multimeter between terminals **1** and **2** of potentiometer
 - must be between 1500 and 2600 ohms
- connect multimeter between terminals **2** and **3**
 - must be between 750 and 1300 ohms
- operate throttle lever slowly until full throttle is obtained
 - must **NOT** be greater than 3600 ohms

If any of these values **NOT** obtained

- replace throttle potentiometer



Throttle potentiometer, adjusting

Note

throttle potentiometer and idle switch are in one housing

only the idle switch is adjustable

IF the idle switch is correctly adjusted **THEN** the potentiometer is also adjusted

Requirement

- idle switch properly checked and adjusted

Idle switch (F 60), checking/adjusting

Note

The idle switch is located in the throttle potentiometer.

Checking

- disconnect harness connector from throttle body (arrow)
- switch multimeter **US 1119 (VAG 1526)** to resistance range
- connect multimeter to terminals of harness connector using adaptor kit **VW 1594**
 - must be approximately 0 ohms (continuity)
- open throttle slightly
 - must be open (infinite ohms)

If **NO** or if infinite resistance only with large throttle opening

- adjust idle switch

If after adjusting idle switch infinite ohms still not obtained

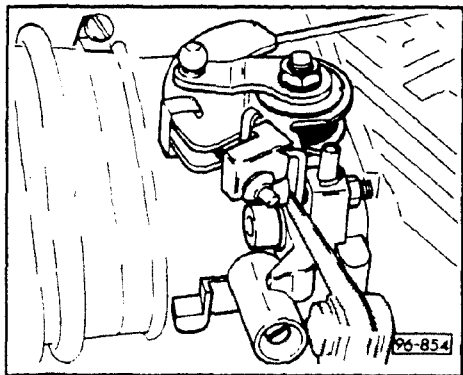
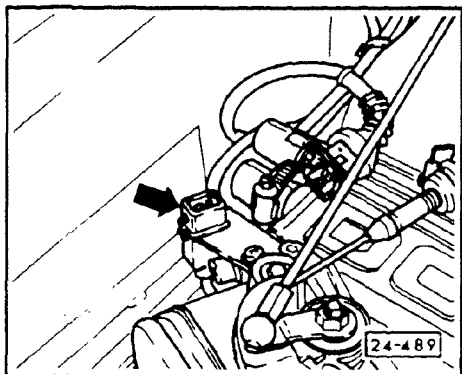
- replace throttle potentiometer

Adjusting

- switch multimeter **US 1119 (VAG 1526)** to resistance range
- connect multimeter to terminals of harness connector
- open throttle and insert 0.4mm feeler gage between throttle screw and throttle stop
 - must be infinite ohms (open)
- remove feeler gage
 - must be approximately 0 ohms (continuity)
- insert 0.3 mm feeler gage (do not open throttle any more than necessary to insert the gage)
 - must be approximately 0 ohms (continuity)

If **NO**

- loosen throttle potentiometer mounting screws
- adjust potentiometer via slots so that multimeter just begins to read infinite ohms when a 0.4 mm feeler gage is inserted



- tighten mounting screws
- repeat test

Wiring between MPI control unit and idle switch, checking

- connect test box **VAG 1598** to control unit harness connector using adaptor **VAG 1598/11**
 - control unit is left disconnected
- remove harness connector from throttle body
- check wiring between following terminals for continuity or short using wiring diagram

Idle switch harness connector terminal number **VAG 1598 test box terminal number**

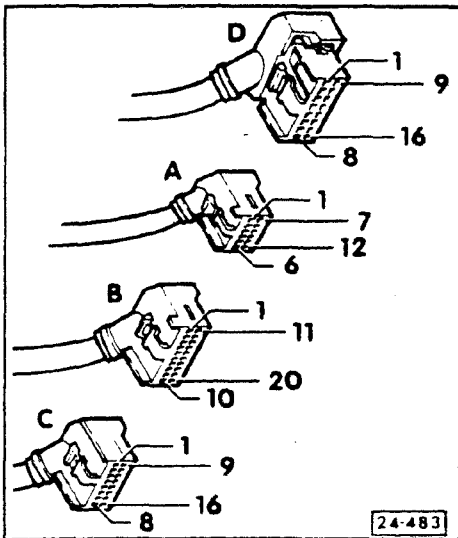
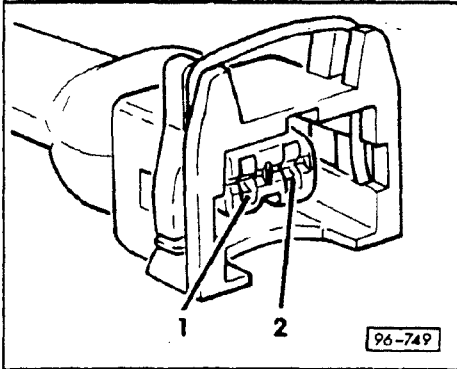
1 ← → 49 (9)*
2 ← → 48 (8)*

- resistance must not be greater than 0.5 ohms (continuity)

* number in parentheses is the number of the terminal in the MPI control unit harness connector **A**

If a short or open circuit is detected between the idle switch harness connector and the test box

- replace or repair the actual wiring between control unit harness connector **A** and the idle switch harness connector as necessary



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

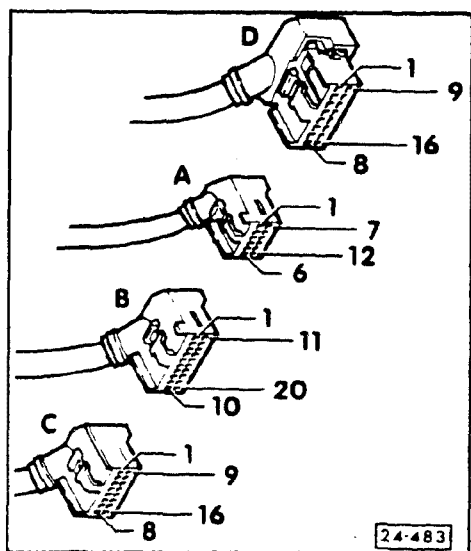
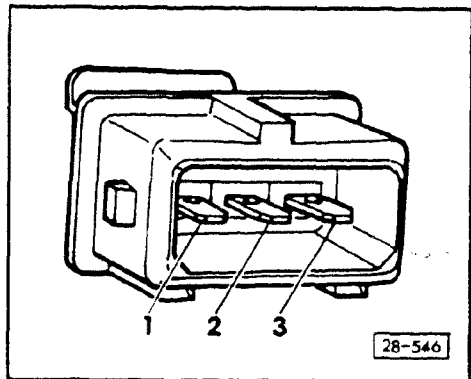
- connect multimeter between terminals 2 and 3
 - must be open (infinite ohms)

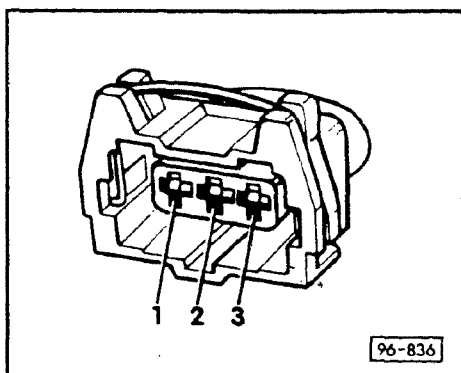
If NO

- 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 number	Test box terminal number
---	-----------------------------

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

- resistance must **NOT** be greater than 0.5 ohms (continuity)

* 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

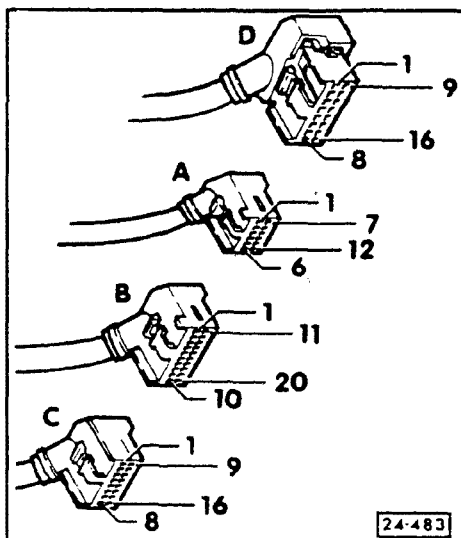
If wiring **OK**

- 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**

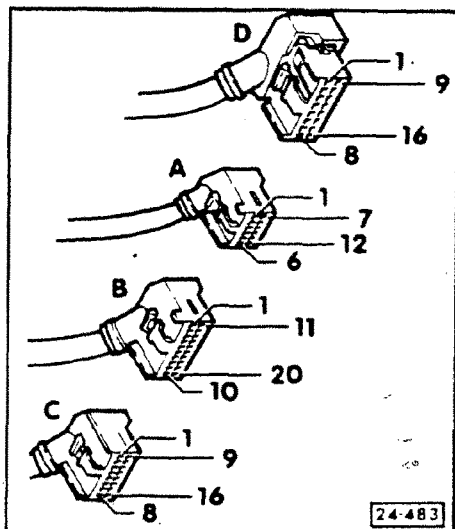
- replace MPI control unit



Tachometer triggering, checking

Note

Perform the following test only if tachometer does not indicate RPM. The tachometer is not triggered by the ignition coil but rather by a signal from the control unit.



If RPM is **NOT** indicated and their wiring is **OK**

- connect test box **VAG 1598** to MPI control unit using adaptor cable **VAG 1598/11**, see Repair Group D2 for additional information
- connect **VAG 1367** engine tester to measure engine RPM

Note

Connect green wire of **VAG 1367** to terminal **30** of test box rather than to ignition coil. Use **VW 1594** adaptor kit to make the connections.

- start engine and let idle
 - **VAG 1367** must show an RPM value, the actual number is not important, you are looking for the presence of an RPM signal at this time

If **YES**

- switch **OFF** ignition
- remove instrument panel
- switch multimeter **US 1119 (VAG 1526)** to resistance range
- check continuity between MPI control unit and instrument panel harness connector, using wiring diagram

If wiring **OK**

- eliminate fault in instrument panel harness connector

If there is **NO** RPM display on **VAG 1367**

- switch **OFF** ignition
- remove instrument panel
- disconnect **26** pin harness connector (yellow)
- start engine and let idle

If RPM is now displayed on **VAG 1367**

- fault is within instrument panel

If RPM is now displayed on **VAG 1367**

- fault is within instrument panel
 - see Repair Group 90 for additional information

If **NO** RPM display on **VAG 1367**

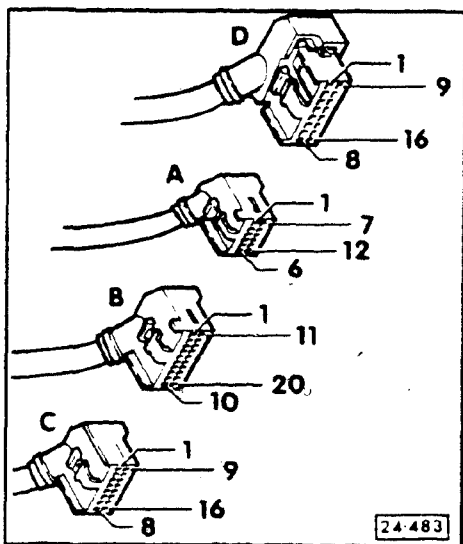
- check for disconnection between MPI control unit and instrument panel harness connector, using wiring diagram

If RPM is **NOT** indicated and their wiring is **OK**

- replace MPI control unit

Wheel speed signal, checking

- connect **VAG 1598** test box to MPI control unit using adaptor cable **VAG 1598/11**
 - control unit harness connector B is not connected
- connect **US 1115 (VAG 1527B)** LED tester to terminals **29** (signal) and **40** (plus) of test box
- raise front left wheel off the ground
- switch **ON** ignition
 - LED tester should light up (dimly)
- slowly rotate left wheel by hand
 - LED tester must become brighter (flash)



If LED tester does **NOT** flash or increase in brightness

- check for an open circuit between terminal **9** of MPI control unit harness connector **B** and instrument cluster, using wiring diagram

If wiring **OK**

- see Repair Group 91 for additional troubleshooting information

If LED tester flashes or increases in brightness

- switch **OFF** ignition
- connect harness connector **B** to **VAG 1598/11** adaptor cable
 - this puts the **VAG 1598** test box in parallel to the MPI control unit which is now "connected" to the system
- connect **US 1115 (VAG 1527B)** LED tester to terminals **20** (signal) and **40** (plus) of **VAG 1598** test box
- switch **ON** ignition
 - LED tester should light up (dimly)
- rotate left wheel slowly by hand
 - LED tester must become brighter (flash)

If **NO**

- replace MPI control unit

Fuel consumption rate indicator (On Board Computer), checking

Note

Perform the following test only if the fuel consumption display on the board computer is faulty or missing.

- connect **VAG 1598** test box to MPI control unit using adaptor cable **VAG 1598/11**, see Repair Group D2 for additional information
- switch multimeter **US 1119 (VAG 1526)** to 20 volt range
- connect multimeter between terminals **51** (ground) and **31** (signal) of test box
- start engine and let run while varying engine speed between 1000 and 4000 RPM
 - voltage must be between 0.3 and 6.0 volts depending on RPM

If voltage spec is obtained (even though board computer does **NOT** display a fuel consumption signal)

- switch **OFF** ignition
- remove instrument cluster

- switch multimeter **US 1119 (VAG 1526)** to resistance range
- check for continuity between wires of MPI control unit and black 10 pin harness connector for board computer

If wiring **OK**

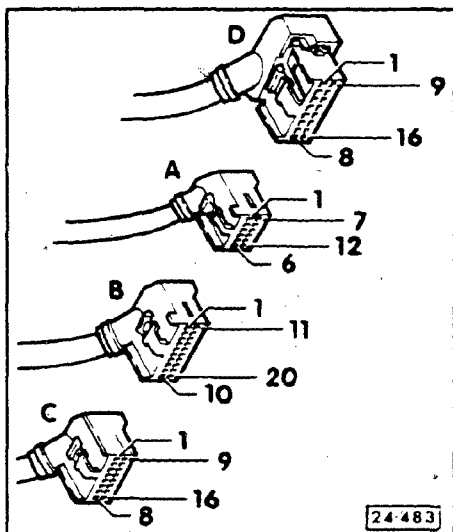
- board computer faulty, repair or replace as necessary, see Repair Group 91 for additional information

If board computer **OK**

- troubleshoot instrument cluster, see Repair Group 90 for additional information

If voltage specification **NOT** obtained

- switch **OFF** ignition
- remove instrument cluster
- disconnect board computer harness connector
- start engine and let idle
 - must be between 0.3 and 0.6 volts depending on engine RPM



If **YES**

- board computer faulty, replace or repair as necessary

If **NO**

- check for a short to plus or ground between MPI control unit and board computer harness connector using wiring diagram

If wiring **OK**

- replace MPI control unit

A/C compressor cut-out, checking

When accelerating from a standing start or at low speeds, the A/C compressor cut-out causes the compressor clutch to de-energize momentarily thus removing a significant load from the engine at a time when additional power is needed.

Requirements

- A/C function **OK**
- **NO** faults in Fault Memory
- connect **VAG 1598** Test box to MPI control unit using **VAG 1598/11** adaptor cable, see Repair Group D2 for additional information
- connect **US 1115 (VAG 1527B)** LED tester between terminals **10** (signal) and **51** (ground)
- switch **ON** ignition
- switch **ON** A/C, operating mode "AUTO", temperature "LO" and blower speed "LO"
 - after 1 to 6 seconds LED tester must light up

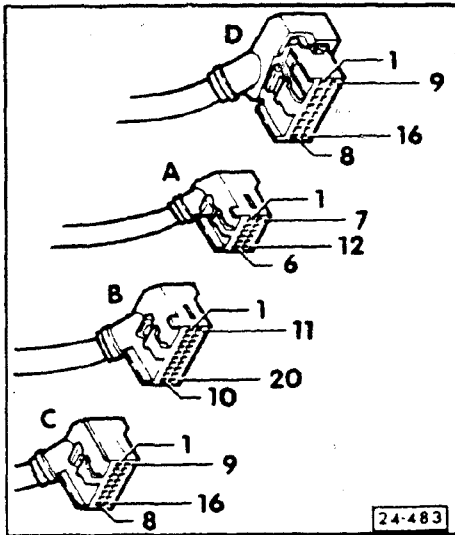
Note

Some LED testers are more current sensitive than others resulting in dim illumination when the ignition is switched **OFF**, they should become noticeably brighter with the ignition switched **ON**.

- depress accelerator pedal to floor and hold in position
 - LED tester must shut off for approximately 12 seconds

Note

If the accelerator pedal is not held down long enough, the time that the LED tester is shut off could be reduced by a minimum of 3 seconds.



If NO

- remove harness connector C from VAG 1598/11 adaptor cable
- switch **ON** ignition
- connect **US 1115 (VAG 1527B)** LED tester between terminals 40 (signal) and 10 (plus)
- completely depress accelerator pedal and hold in position
 - LED tester must shut off for approximately 12 seconds

Note

If the accelerator pedal is not held down long enough, the time that the LED tester is shut off could be reduced by a minimum of 3 seconds.

If NO

- replace MPI control unit

If YES

- check for disconnection of terminal 10 in control unit harness connector C using wiring diagram

If wiring OK

- check control unit function for solenoid operation (J 32/J 153)

A/C auxiliary signal, checking

Note

The MPI control unit boosts the idle speed, an amount proportional to load, when it senses that the A/C system is in operation.

- connect **VAG 1551**, see Repair Group D2 for additional information
- select "Basic Adjustment" option for the **VAG 1551**
- display indicator blocks on **VAG 1551**
- start engine and let idle
- switch **ON** A/C system, operating mode AUTO, temperature on high and blower speed on high
 - when switching A/C **ON** indicator field 7 must increase by at least 64

If NO

- switch **OFF** ignition and connect **VAG 1598** test box to MPI control unit using adaptor **VAG 1598/11**
- connect **US 1115 (VAG 1527B)** LED tester between terminals 11 and 51 of test box using **VW 1594** adaptor kit
- switch **ON** ignition
- switch **ON** A/C as described above
 - LED tester must light up

If NO

- disconnect harness connector **C** from MPI control unit

If LED tester lights up

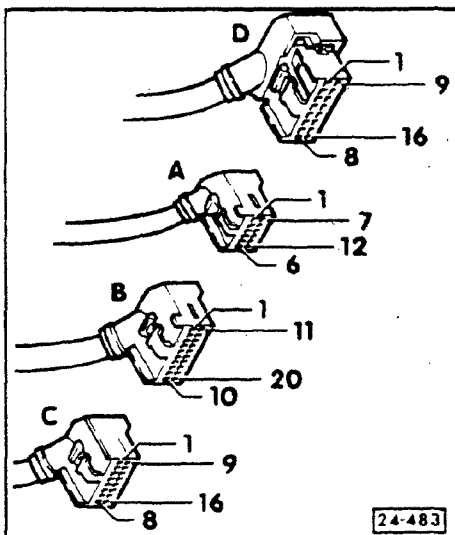
- replace MPI control unit

If LED tester does **NOT** light up

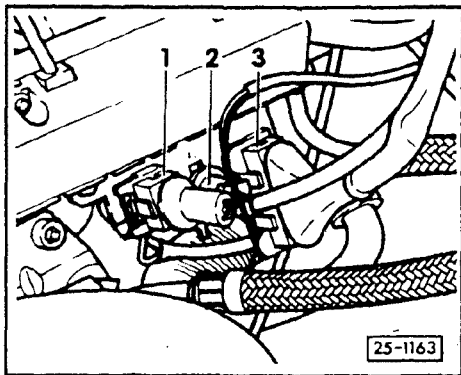
- check for disconnection at terminal 11 of harness connector **C** using wiring diagram

If **NO** faults are found

- check A/C wiring using wiring diagram

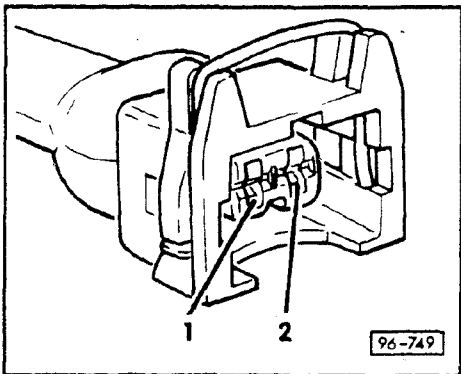


Oxygen sensor, checking



Control, checking

- disconnect harness connector 1 (next to intake manifold)
- switch multimeter **US 1119 (VAG 1526)** to 20 volt range

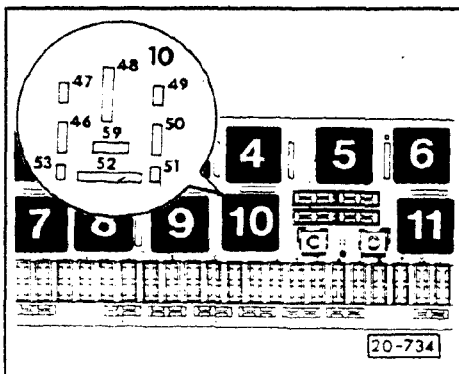


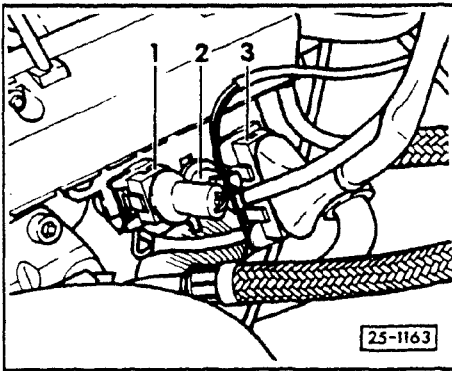
- connect multimeter between terminals 1 and 2 of harness connector
- start engine and let idle
 - must be between 12 and 14 volts

If NO

- proceed as follows
- check fuse 28
- check continuity between terminal 2 of harness connector and fuse 28 using wiring diagram (if necessary check if wires are correctly installed in connector shell)
 - must be less than 0.5 ohms
- check continuity between terminal 1 of harness connector and ground
 - must be less than 0.5 ohms
- check continuity between terminal 59 of fuel pump relay socket (in fuse relay panel, location 10) and fuse 28
 - must be less than 0.5 ohms

If wiring is OK

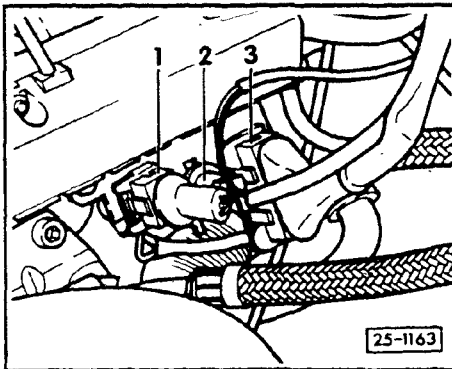




- connect test adaptor **VAG 1315 A/1** to harness connector
- switch multimeter **US 1119 (VAG 1526)** to 10 amp range
- connect multimeter to **VAG 1315 A/1** adaptor
- start engine and let idle
 - must be 0.5 to 3.0 Amps

If **NO**

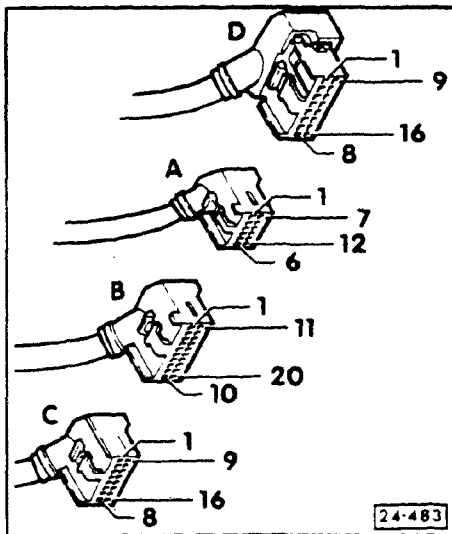
- replace oxygen sensor



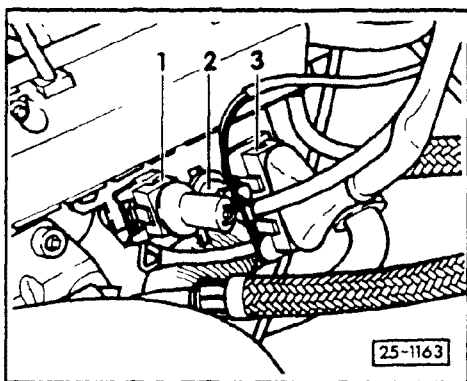
Triggering, checking

- disconnect oxygen sensor harness connector 2 (signal wire)
- switch multimeter **US 1119 (VAG 1526)** to 2 volt range
- connect multimeter between terminal of harness connector 2 and ground
- switch **ON** ignition
 - must be 400 ± 50 mV

If **NO**



- disconnect harness connector **A** from MPI control unit
- connect **VAG 1598** test box to connector **A** using **VAG 1598/11** adaptor cable
 - control unit **NOT** connected
- switch multimeter **US 1119 (VAG 1526)** to resistance range



- check continuity between harness connector 2 and terminal 50 of VAG 1598 test box
 - must be less than 0.5 ohms

If NO

- eliminate open circuit or disconnection between terminal 10 of MPI control unit harness connector A and signal wire 2 in engine compartment

If wiring and connections are OK

- switch OFF ignition
- disconnect harness connector A from MPI control unit
- connect VAG 1598 test box to MPI control unit using VAG 1598/11 adaptor cable
 - control unit harness connector A NOT connected
 - ensure that harness connector D is connected to the control unit; this can either be directly or by means of adaptor cable VAG 1598/12 which was attached to harness connector D in an earlier step
- switch multimeter US 1119 (VAG 1526) to 2 volt range
- connect multimeter between terminals 50 and 51 of VAG 1598 test box
 - must be 400 ± 50 mV

If NO

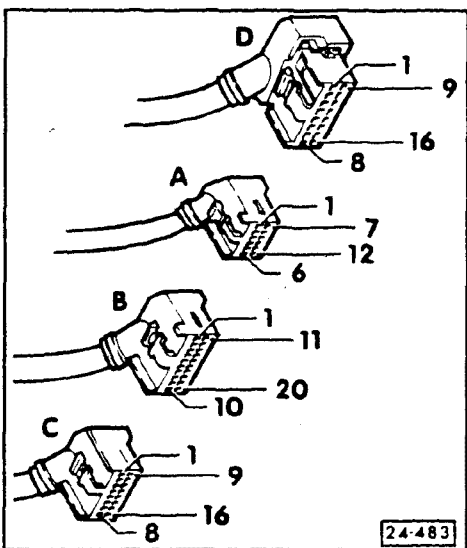
- replace MPI control unit

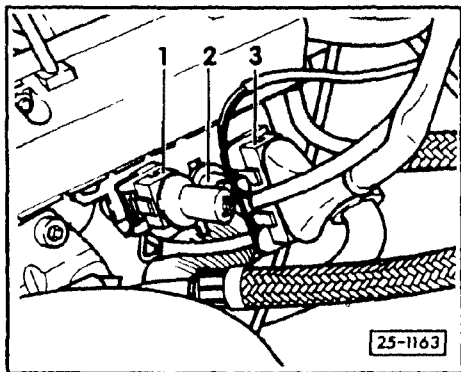
To functionally check the oxygen sensor

- read test value block 8 of VAG 1551
 - must fluctuate around a value of 128; should NOT stay at a constant 128!

Note

For additional information regarding "Reading Test Block Values" see Repair Group D2.

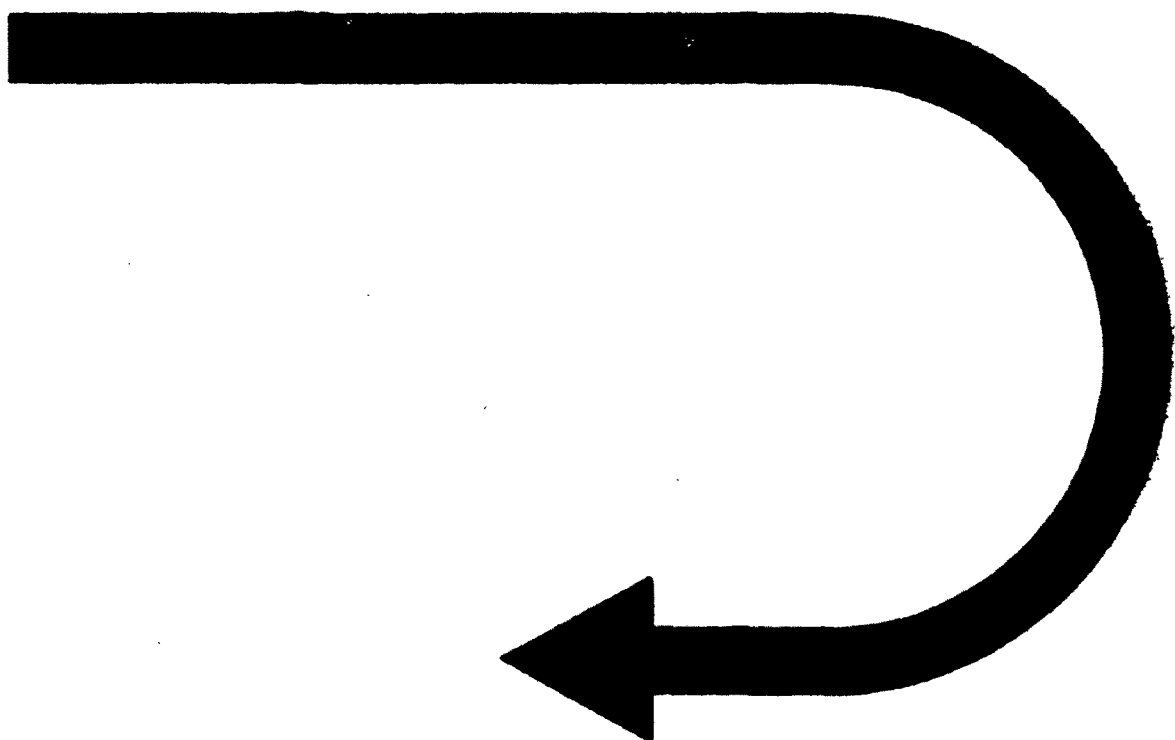




Removing/installing

- disconnect connectors 1 and 2
- cut tie wrap
- unscrew oxygen sensor, for installation location and tightening torque see Repair Group 26
- when installing the oxygen sensor, note the following:
 - a new tie wrap must be installed in the exact location as the old one to prevent the oxygen sensor wire from contacting the exhaust
 - the oxygen sensor threads must be coated with an anti seize paste (if not already coated) ensure though,* that this paste does **NOT** come in contact with the sensor slits

CONTINUED IN THE
BEGINNING OF NEXT ROW



Idle speed and CO content, checking/adjusting

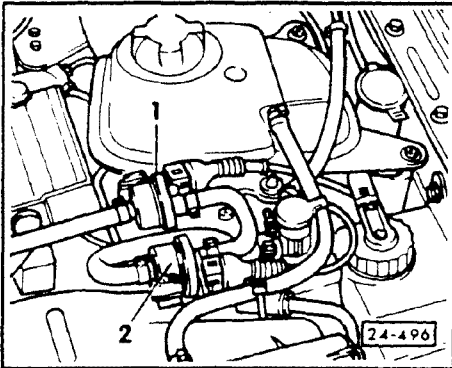
(Preferred method using VAG 1551 Diagnostic Tester)

CAUTION

Idle speed and CO content are inter-related and **MUST** be checked and adjusted together.

Requirements

- perform vehicle self diagnosis, eliminate or repair any faults, see Repair Group D2 for additional information
 - engine warm, oil temperature 80°C (176°F) minimum
 - throttle valve closed against stop
 - all electrical consumers switched **OFF**
 - A/C switched **OFF**
 - fuel pressure measuring equipment **NOT** connected
 - radiator cooling fan **NOT** running while taking measurements
- disconnect crankcase ventilation hose and plug off hose using 32 mm plug
 - disconnect harness connector 1 from carbon canister shutoff valve (N 115)



Idle speed, checking/adjusting

- select **VAG 1551** function **08** "read measuring value block" (For additional information see Repair Group D2)
- observe values in channels **4**, **5**, **6** and **8**, use chart (next page) for specifications and conversions

If **NO**, adjust idle speed as follows

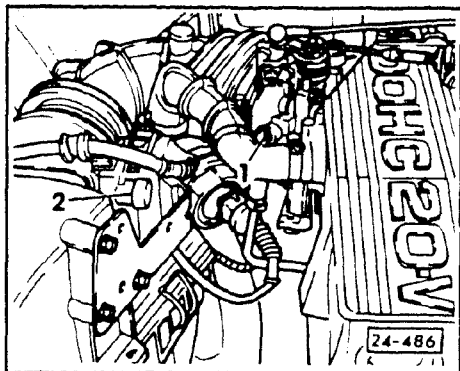
- select function **04** "Introduction of basic setting" (For additional information see Repair Group D2)

Note

When function **04** is selected the following conditions will be initiated

- ignition timing will be fixed at 12°
- idle stabilizer current will be fixed at 540 ± 50 mA
- oxygen sensor control will be switched **OFF** (system will be in open loop)
- the adaptive or learned value of the idle stabilizer valve will be erased and reset to 0
- carbon canister shutoff valve (N 115) is switched **OFF**
- engine coolant temperature value is fixed at 130 (80°C)

Channel	Specification value	Corresponding test value	Description and calculation into physical values
1	135...160	+85°C...110°C	instantaneous coolant temp., displayed value minus 50 = ____°C
2	1...255		instantaneous engine load, a displayed value of 255 = Full load (theoretical) a lower value indicates less load
3	30...34	750...850 rpm	instantaneous engine speed, displayed value times 25 = ____ rpm
4	0...7 or 249...255	—	idle stabilization learning value, with Manual Trans. in neutral position or with Automatic selector in position P or N (Learning value average = 0)
5	0...7 or 249...255	—	Learning value of idle stabilization system with Automatic in D position (Learning value average = 0)
6	126...130	—	Repeat idle stabilization signal (average value = 128)
7	See Repair Group D2 for a complete description of this channel.		
8	118...138	—	Oxygen sensor control (average value = 128)
9	254, 255 0, 1, 2	—	Ignition distributor adjustment
10	—	—	From MPI-control unit calculated spark advance angle, indicator times 1.33 = ____° from TDC.



- while observing channel 3 turn idle adjustment screw 1 until a value of 31 to 33 appears
- re-select function 08 and observe channel 3 to verify that idle speed value is within specification, repeat procedure if necessary

CO content, checking/adjusting

Note

CO is affected by the Oxygen sensor control.

- select **VAG 1551** function 08 "read measuring value block" (For additional information see Repair Group D2)
- observe channel 8
 - value must average between 118 and 138

If **NO**, adjust CO content as follows

- switch OFF ignition
- remove protective cap 2 covering CO plug
- **lightly** center punch alloy plug covering CO set screw
- carefully drill hole in plug
- insert machine screw into drilled hole and withdraw screw/plug using pliers
- start engine and let idle
- re-select function 08 on **VAG 1551** and observe value on channel 8
- rotate the CO adjustment screw in whichever direction necessary to obtain specification
 - channel 8 must average 128
- connect **SUN EPA 75** CO tester (or EPA approved equivalent) to CO tap tube
- observe CO on meter
 - must be 0.3 to 1.2 volume %

If CO value is less than 0.3% but the channel 8 value is **OK**

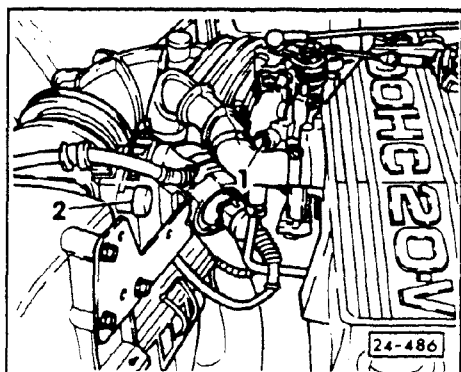
- eliminate air leak in CO sampling line or line connections at CO tap and/or analyzer

If CO value is greater than 1.2 volume %

- eliminate air leak between engine and oxygen sensor

If specification has been successfully obtained

- install new "tamper-proof" cap over CO adjustment screw



Idle speed and CO content, checking/adjusting

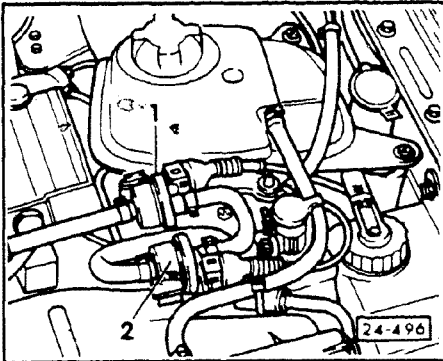
(Alternate method to be used if VAG 1551 Diagnostic Tester not available)

CAUTION

Idle speed and CO content are inter-related and **MUST** be checked and adjusted together.

Requirements

- perform vehicle self diagnosis, eliminate or repair any faults, see Repair Group D2 for additional information
 - engine warm, oil temperature 80°C (176°F) minimum
 - throttle valve closed against stop
 - all electrical consumers switched **OFF**
 - A/C switched **OFF**
 - Fuel pressure measuring equipment **NOT** connected
 - Radiator cooling fan **NOT** running while taking measurements
 - **VAG 1367** (or equivalent) connected to measure engine rpm
- remove crankcase ventilation hose and plug off using a 32 mm plug

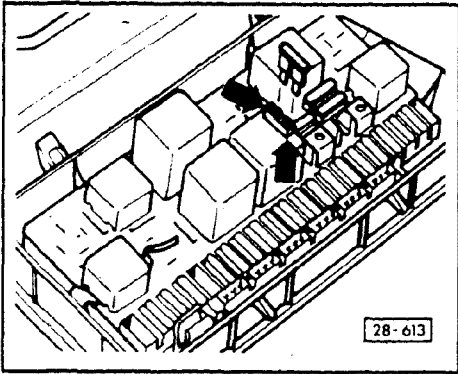


- disconnect harness connector 1 from carbon canister shutoff valve (N 115)
- remove cap from CO tap tube
- connect **SUN EPA 75** CO tester (or **EPA** equivalent) to CO tap tube

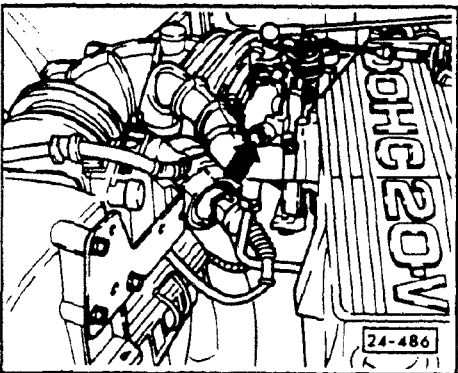
Idle speed, checking/adjusting

- start engine and observe engine speed on **VAG 1367**
 - must be 750 to 850 rpm

If NO, adjust as follows



- with engine idling (must be less than 2000 RPM), install spare fuse in top of fuel pump relay (**arrows**) to initiate following conditions
 - ignition timing will be fixed at 12°
 - idle stabilizer current will be fixed at 540 ± 50 mA
 - oxygen sensor control will be switched **OFF** (system will be in open loop)
 - adaptive (learned) value of idle stabilizer valve is erased and reset to 0
 - engine coolant temperature value is fixed at 130 (80°C), regardless of actual temperature

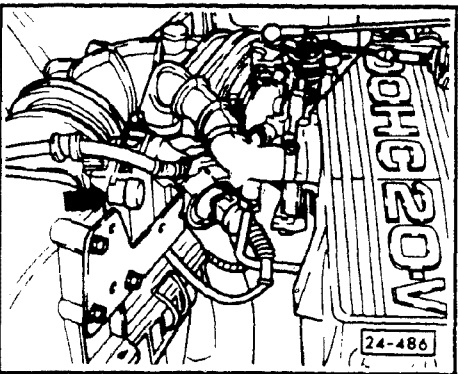


- rotate idle adjustment screw (**arrow**) until specification is obtained
 - must be 800 ± 25 rpm

CO content, checking/adjusting

- with engine at idle observe CO content
 - must be between 0.3 and 1.2 volume %

If NO, adjust as follows



- remove protective cap (**arrow**) covering CO plug
 - **lightly** center punch alloy plug covering CO set screw
- carefully drill hole in plug
- insert machine screw into drilled hole and withdraw screw/plug using pliers
- start engine and let idle
- rotate CO adjustment screw (**arrow**) until specification is obtained
 - must be 0.75 ± 0.25 volume % CO
- re-check idle speed, readjust if necessary
- after idle speed and CO have been satisfactorily adjusted, remove fuse from top of fuel pump relay
- briefly raise engine speed over 2000 rpm and let idle
 - idle and CO content must be within checking specifications

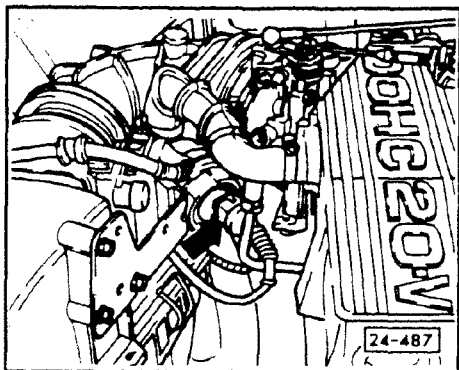
If **NO**

- perform vehicle self diagnosis and correct as necessary

If **OK**

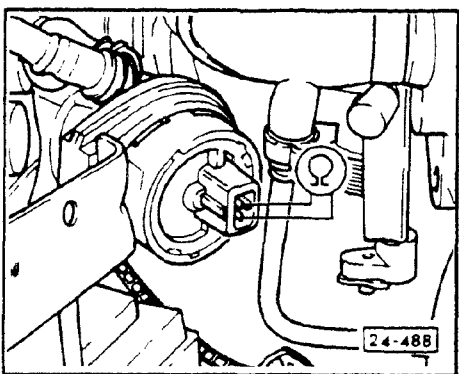
- disconnect test equipment
- install new "tamper-proof" cap over CO adjustment screw

Idle stabilization, checking



Electrical check

- disconnect harness connector from idle stabilizer valve (N 71) (arrow)



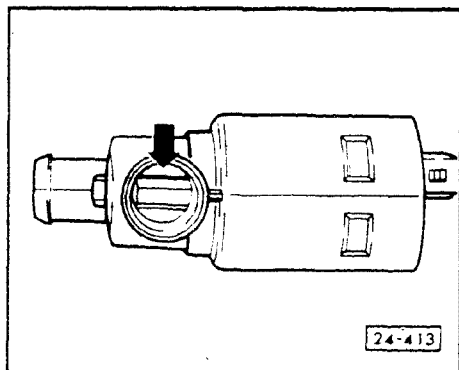
- switch multimeter **US 1119 (VAG 1526)** to resistance range
- measure resistance between idle stabilizer valve connector terminals
 - must be from 7.5 to 8.5 ohms

If **NO**

- replace idle stabilizer valve

Mechanical check

- remove idle stabilizer valve
- check rotating valve for ease of movement and visible wear or scratches



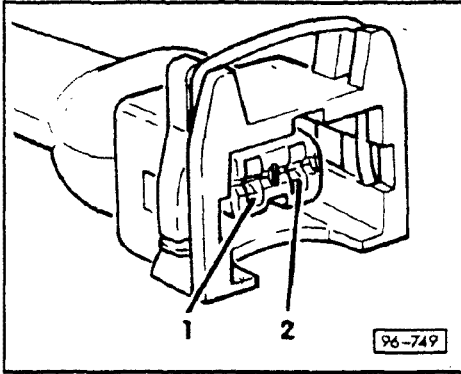
CAUTION

Do **NOT** use a screwdriver (or any tool) to rotate the idle stabilizer valve during visual inspection.

- re-connect idle stabilizer valve harness connector (valve removed)
- perform Output check diagnosis, see Repair Group D2 for additional information
 - when diagnosis reaches step for idle stabilizer valve observe whether valve runs properly from stop to stop

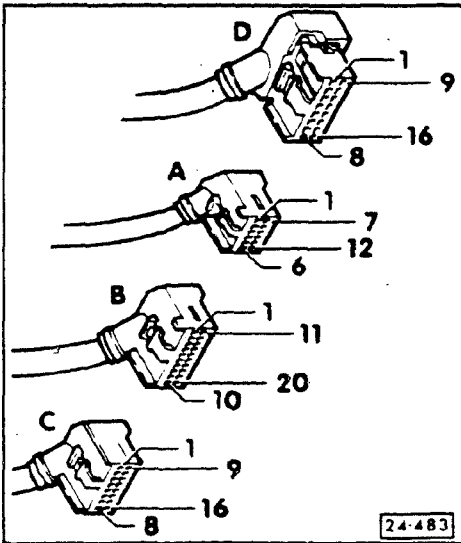
If there is visible wear or rough movement

- replace idle stabilizer valve



Idle stabilizer valve wiring, checking

- disconnect idle stabilizer valve harness connector



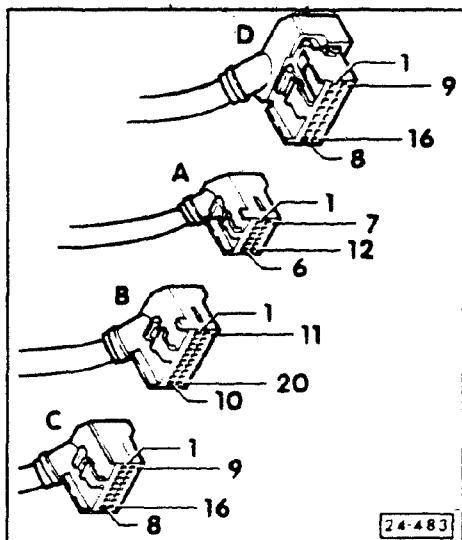
- disconnect harness connector **D** from MPI control unit
- connect **VAG 1598** test box to connector **D** using **VAG 1598/12** adaptor cable
 - control unit **NOT** connected
- switch multimeter **US 1119 (VAG 1526)** to resistance range
- check continuity between terminal 1 of idle stabilizer harness connector and terminal 11 of **VAG 1598** test box
 - must be less than 0.5 ohms
- check continuity between terminal 2 of idle stabilizer harness connector and terminal 7 of **VAG 1598** test box
 - must be less than 0.5 ohms
- check idle stabilizer harness connector wires for short to each other or to - (terminal 8 of **VAG 1598**) or to ground (terminal 3 of **VAG 1598**)
- if necessary; eliminate short circuit or disconnection by repairing or replacing as necessary

If Idle stabilizer valve AND related wiring **OK** but valve will **NOT** energize

- 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**

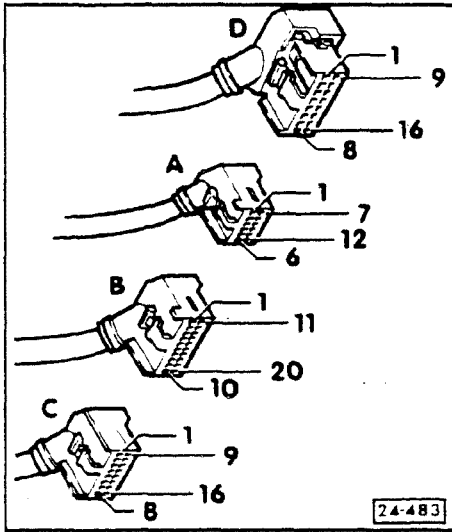
- check for open circuit between ground wire connections at stud on intake manifold and MPI control unit harness connector **D** using wiring diagram, replace or repair as necessary

CAUTION

Inspect the grounding stud on the intake manifold for looseness, dirt and corrosion. Stud must be clean and tight. Be careful when 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