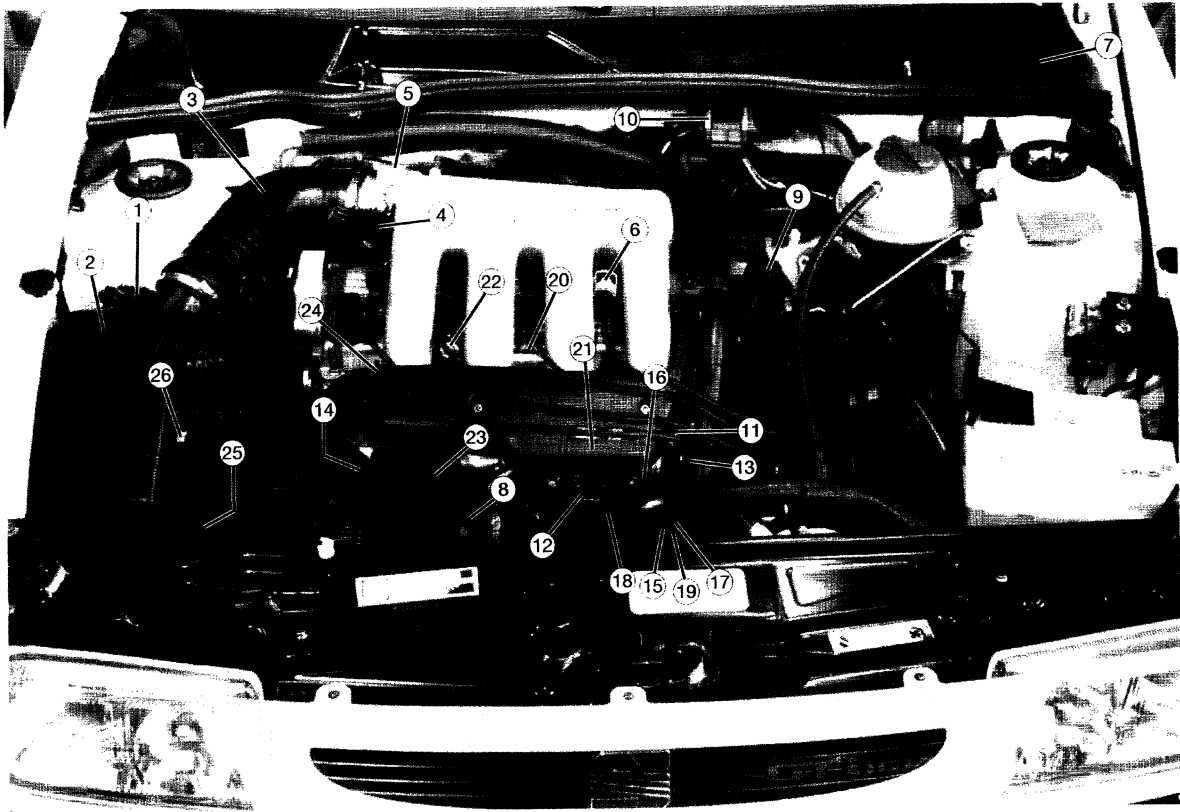


Engine 24

Fuel preparation: 2.0 I 16 V engine

DIGIFANT 2.0 I 16 V INJECTION SYSTEM: COMPONENTS LOCATION



24B100

1. Intake air temperature transmitter.
2. Active carbon tank magnetic valve.
3. Lambda probe connector.
4. Throttle valve potentiometer.
5. Idle speed switch.
6. Spark plugs. 20 Nm.
7. Digifant injection and ignition system control unit.
8. Earth connection.
9. Ignition distributor.
10. Ignition transformer.
11. Cooling liquid temperature transmitter.
12. Injector power supply connection.
13. Central connector.
- *14. Pinking sensor 1.
15. Three-pin connector for pinking sensor 1.
 - Brown.
 - On top of bracket.

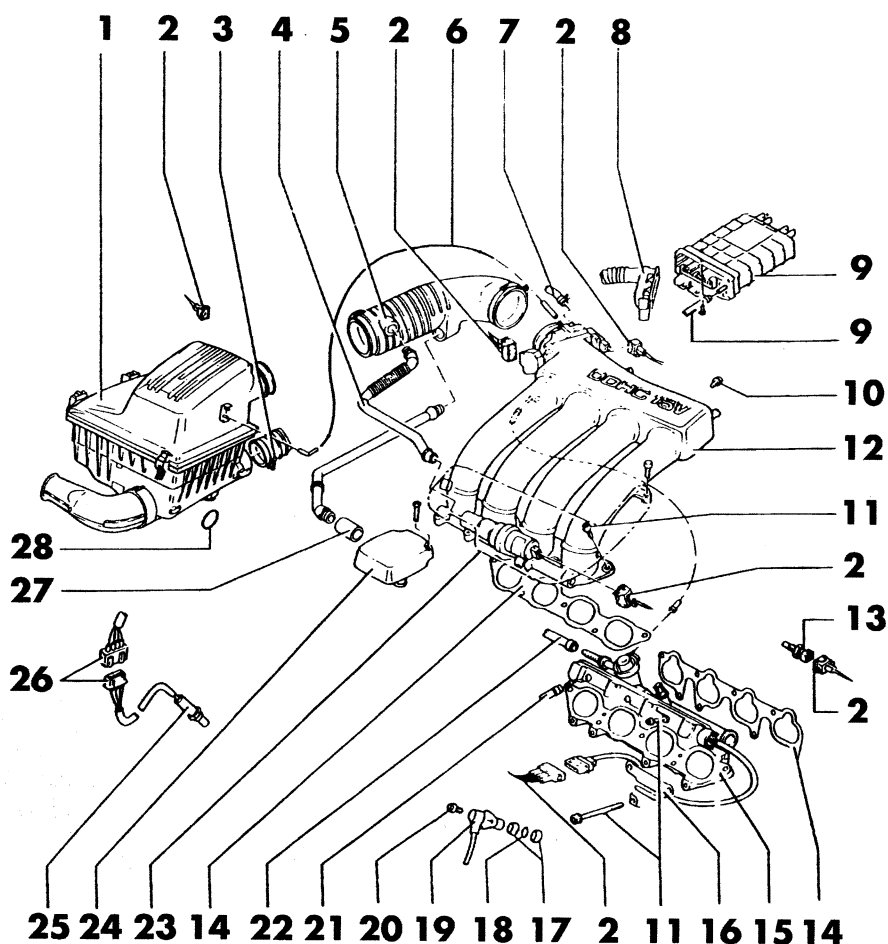
- *16. Pinking sensor 2.
17. Three-pin connector for pinking sensor 2.
 - Black.
 - On centre of bracket.
- *18. Engine speed transmitter.
19. Three-pin connector for engine speed transmitter.
 - At bottom of bracket.
20. Fuel pressure measurement take-off.
21. Idle speed stabilization valve.
22. Fuel pressure regulator.
23. Sump gases pressure regulator valve.
24. Fuel distributor with injectors.
25. Activated carbon tank.
26. Inlet air pre-heating temperature regulator.

* Observe positioning in Group 28.

Engine 24

Fuel preparation: 2.0 I 16 V engine

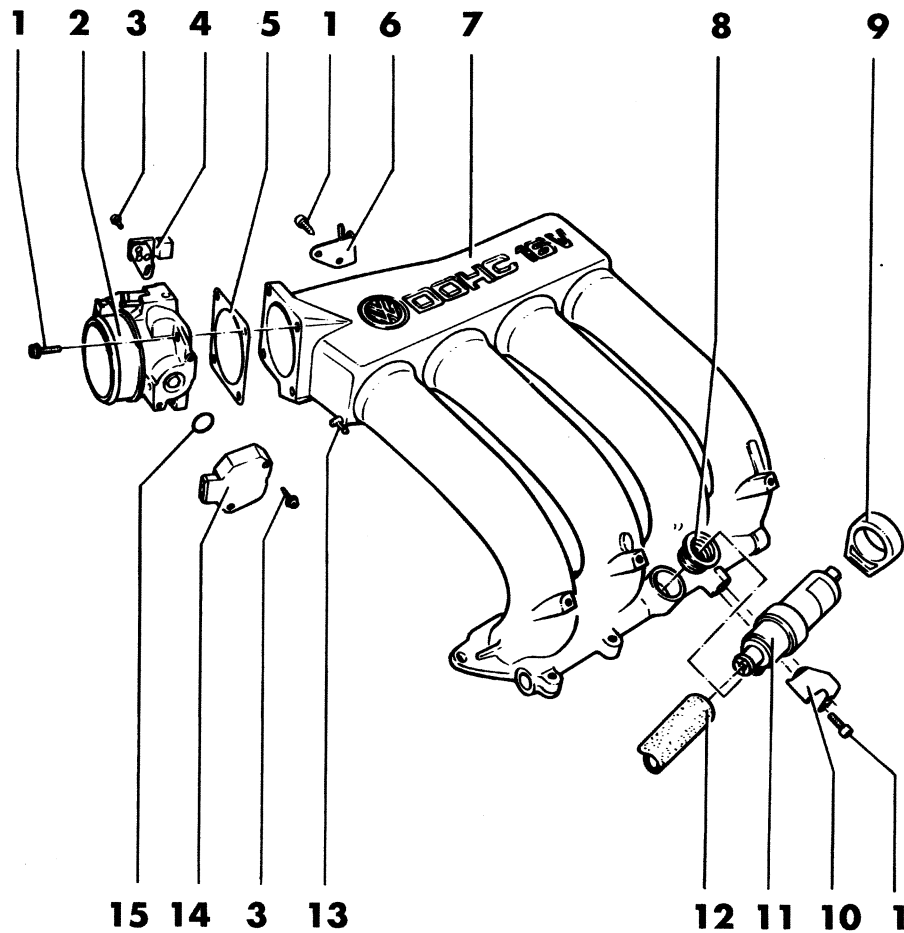
DIGIFANT 2.0 I 16 V INJECTION SYSTEM: REMOVAL



24AD21

- | | |
|--|---|
| 1. Air filter assembly. | 14. Gasket. |
| 2. Connector | 15. Manifold intake, bottom. |
| 3. Hot air inlet. | 16. Support. |
| 4. Joining tube. | 17. Support rings. |
| 5. Flexible inlet tube. | 18. O-ring. |
| 6. Vacuum pipe. | 19. Engine speed transmitter. |
| 7. To active carbon magnetic valve. | 20. Bolt. 10 Nm. |
| 8. Control unit connector. | 21. Fuel feed pipe. |
| 9. Digifant control unit. | 22. Fuel return pipe. |
| <ul style="list-style-type: none"> • For injection system, lambda regulation, pinking regulation, engine revs limiting, ignition and self-diagnosis. • With inlet manifold pressure transmitter. • If replaced, check the idling speed. | 23. Cover. |
| 10. Flexible suction tube to inlet manifold. | 24. Sump gases vent pressure regulating valve. |
| 11. Bolt. 10 Nm. | 25. Lambda probe. 50 Nm. |
| 12. Manifold intake, top. | <ul style="list-style-type: none"> • Grease the thread with "G5" only; do not allow it to reach the slots in the probe body. • Power supply to lambda probe heating, via probe heating relay. |
| 13. Cooling liquid temperature transmitter. | 26. Connector for lambda probe and probe heating. |
| | 27. Joining tube. |
| | 28. Drive ring. |

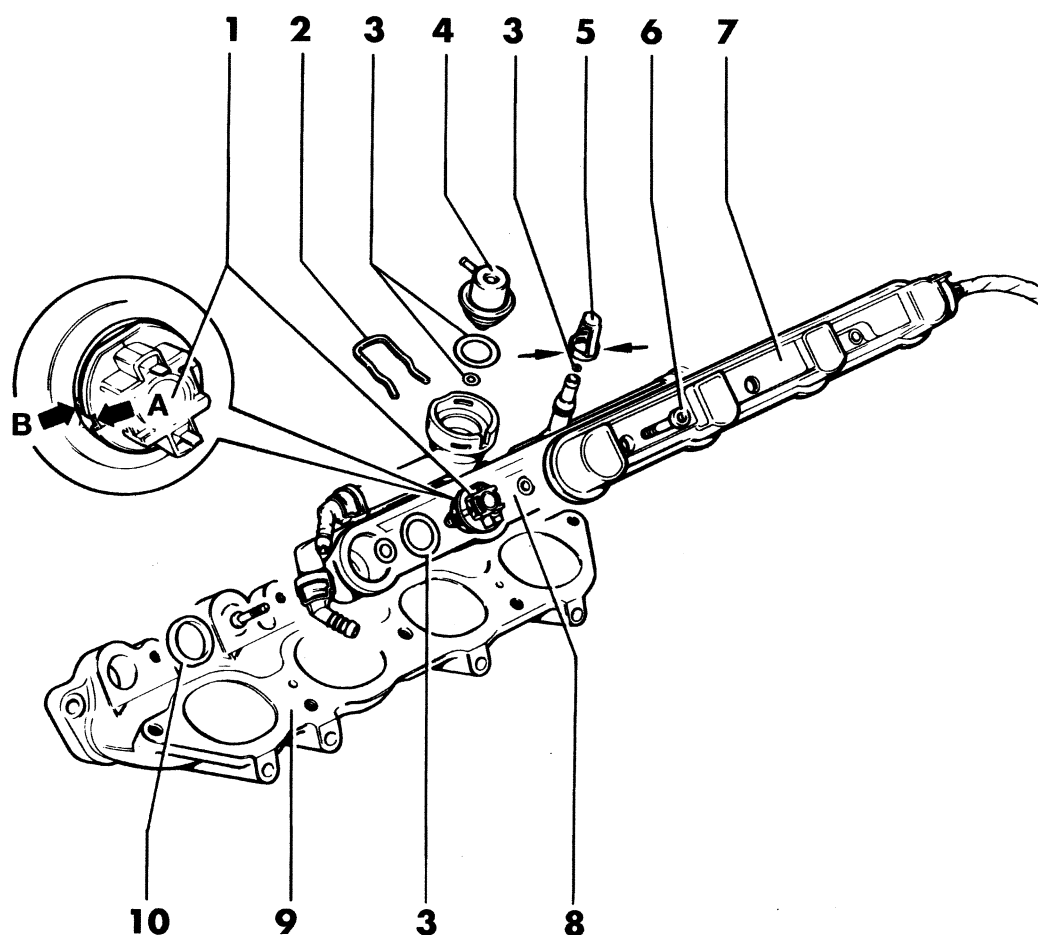
UPPER PART OF INLET MANIFOLD: EXPLODED VIEW



24BD23

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Bolt. 10 Nm. 2. Throttle valve tubing. 3. Bolt. 3 Nm. 4. Idle speed switch. 5. Gasket.
Replace. 6. Accelerator control cable bracket. 7. Manifold intake, top. 8. Rubber bushing. | <ol style="list-style-type: none"> 9. Support ring. 10. Stabilizer valve bracket. 11. Idle speed stabilization valve. 12. Flexible connecting tube. 13. Suction take-off connection.
• For regulating fuel pressure. 14. Throttle valve potentiometer. 15. O-ring.
• Replace if damaged. |
|---|---|

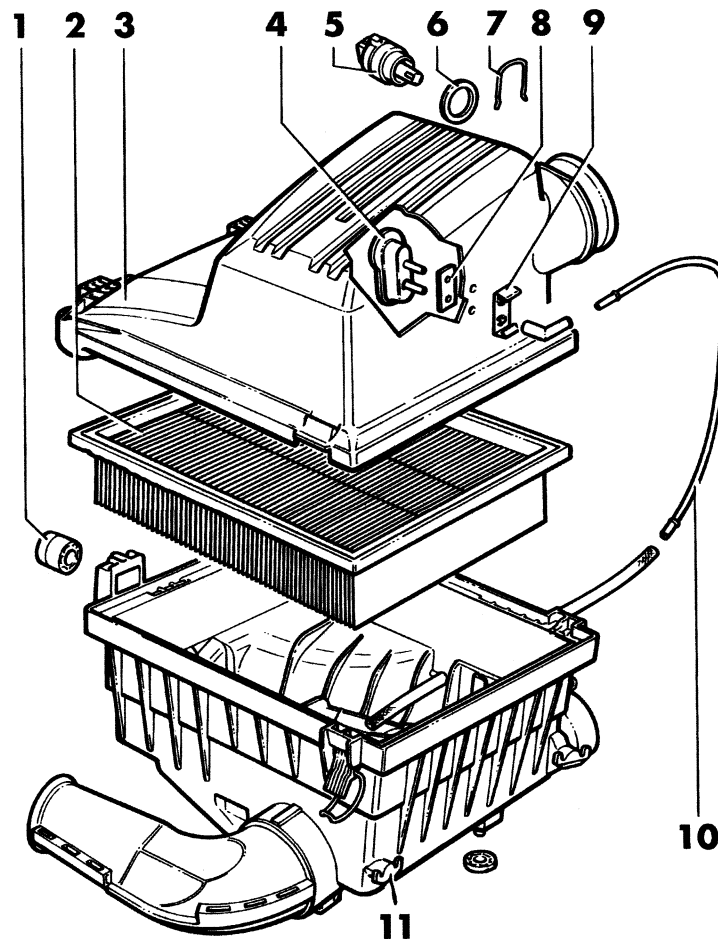
FUEL DISTRIBUTOR: EXPLODED VIEW



24BD24

- | | |
|---|--|
| <p>1. Injector.</p> <ul style="list-style-type: none"> ● Resistance: $15 \div 20 \Omega$. ● Mounting position: the injector's notch (arrow A) must align with the fuel distributor pivot (arrow B). <p>2. Staple to hold fuel pressure regulator.</p> <p>3. O-ring.</p> <ul style="list-style-type: none"> ● Replace if damaged. <p>4. Fuel pressure regulator.</p> | <p>5. Plug.</p> <ul style="list-style-type: none"> ● Fuel pressure measurement connection. ● Squeeze sideways to remove (arrows). <p>6. Distributor fixing bolt. 10 Nm.</p> <p>7. Top of fuel distributor.</p> <p>8. Lower part of fuel distributor.</p> <p>9. Manifold intake, bottom.</p> <p>10. O-ring.</p> <ul style="list-style-type: none"> ● Replace if damaged. |
|---|--|

AIR FILTER AND CASE: EXPLODED VIEW



24BD25

- | | |
|---|-------------------------------|
| 1. Rubber hose. | 6. Gasket. |
| 2. Filter cartridge. | • Replace if damaged. |
| 3. Upper part of air filter. | 7. Fixing plate. |
| 4. Temperature controller. | 8. Gasket. |
| • For pre-heating inlet air. | 9. Fixing plate. |
| • Connecting tube of metal or grooved to the regulating flap. | 10. Suction tube. |
| 5. Intake air temperature transmitter. | 11. Lower part of air filter. |
| • Press-fitted into the inlet manifold. | |

SAFETY PRECAUTIONS TO BE TAKEN INTO ACCOUNT WHEN HANDLING THE INJECTION AND IGNITION SYSTEMS

To prevent personal injuries and damages to the injection and ignition system, take the following into account:

- Connect and disconnect the injection and ignition system cables with the ignition turned off only (including the measuring device cables).
- If the starter motor is to be operated without starting up the engine, unplug the Hall generator connector from the ignition distributor.
- The starting help with a quick battery charger is only allowable during 1 minute and at 16.5 V maximum.
- Washing of the engine must be carried out with the ignition disconnected only.
- When performing electric welding or spot welding, fully disconnect both battery terminal leads.
- When the vehicle is subject to temperatures in excess of 80 °C (i.e. paint cabins), the vehicle must be let to cool down before starting up the engine.

CLEANING REGULATIONS

When working on the fuel feed and injection systems, the following cleanliness rules must be strictly observed:

- Clean thoroughly the clamps before loosening them.
 - Place the removed parts on a clean base and cover them with plastic or paper sheets. Never use clothes which may release fibers.
 - Carefully cover all exposed parts when the repair is not to be carried out immediately.
 - Fit clean parts only.
 - Remove the spare parts from the packing just before fitting them.
- (Do not use parts which have been stored unpacked.)
- When the system is opened:
Avoid working with compressed air.
Do not move the vehicle

IMPORTANT CONSIDERATIONS REGARDING INJECTION

- The injection and ignition control unit is equipped with a faults memory. Before carrying out repairs and for fault-finding, the suction connections must be checked.
- Always replace the friction clamps with screw clamps.
- A minimum voltage of 11.5 V is required for the correct operation of the electrical components.
- Do not use silicone-based sealants. Silicone particles ingested by the engine do not burn inside the cylinders and prevent the correct functioning of the lambda probe.
- Whenever the control unit remains disconnected for more than one hour, carry out a "Basic Adjustment" as described in this repair group.

Engine 24

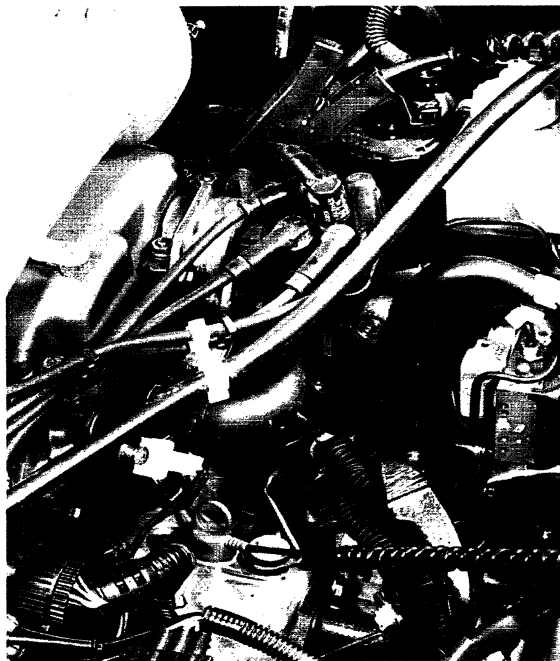
Fuel preparation: 2.0 l 16 V engine

CARRY OUT BASIC ADJUSTMENT

Checking conditions

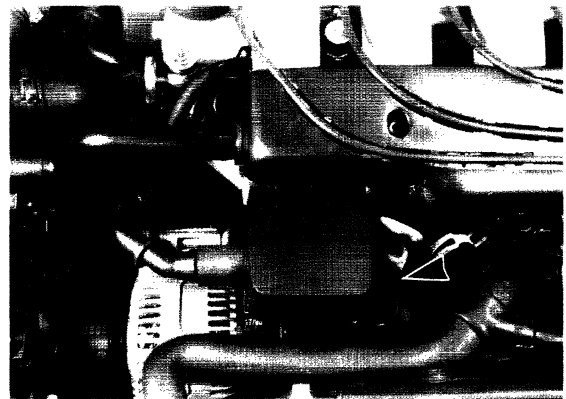
- Engine oil temperature 80 °C minimum.
- Electrical devices disconnected (the radiator fan must not operate during the test).
- Air conditioner disconnected.
- Air tight exhaust system.
- Idling switch closed.
- Accelerator control cable correctly adjusted.
- Correct ignition timing.
- **VAG 1551** fault-finder connected (no fault memorized).

Checking



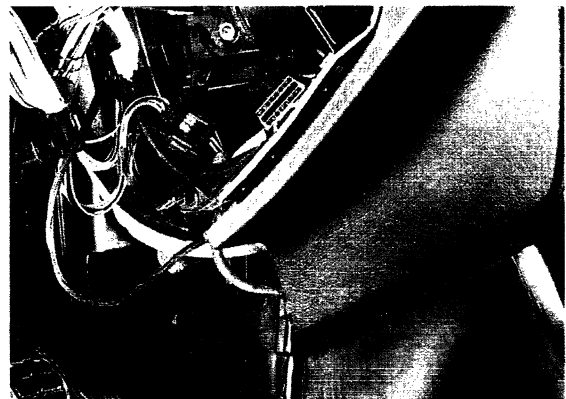
24A128

- Connect the ignition timing and engine speed checking equipment **VAG 1367** using the pick up clamp **1367/8** or connect directly the equipment **VAG 1767**.



24A143

- Remove the sump gases breather tube from the pressure regulation valve and hang it so that it breathes only fresh air.



24B004

- Connect the fault detector equipment **VAG 1551** to the 16 pin connector located at the right of the steering column on the dashboard lower part, using the cable **VAG 1551/3**.
- Read and erase the fault memory as indicated in this Group.
- Start up the engine and let it run at the idle speed.

Engine 24

Fuel preparation: 2.0 I 16 V engine

Use the fault detector equipment **VAG 1551** in the following way:

- Press the key **1** to enter the operating mode "Quick data transmission".
- Press the keys **0** and **1** for the address code "Engine electronics" and confirm by pressing the key **Q**.
- Press the key **→**.
- Press the keys **0** and **4** to enter the function "Begin basic adjustment" and confirm by pressing the key **Q**.
- Enter **01** for the "Group indication number" and confirm the selection by pressing the key **Q**.

The display will show:

System in basic adjustment				1				→
1	2	3			0	0	0	0

Continue with the check only when the 8 digits of indication field 4 are 0.

Note

If a 1 appears in one or several positions of indication field 4 it means that the checking conditions are not met.

Meaning of the digits in display field 4:

	X	X	X	X	X	X	X	X
	Faults stored in memory	Automatic gearbox	Air conditioning compressor	Idle speed switch	Lambda adjustment	Throttle valve position	Engine speed	Engine temperature
0	No faults	Lever in "P" or "N" position	Disconnected	Closed	Correct	Closed	> 2500 rpm	> 80 °C
1	Faults memorized	A gear is engaged	Connected	Open	Not correct	Open	> 2500 rpm	< 80 °C

— Check the ignition timing:

Test value: approx. 6°, oscillating before TDC.

Adjustment value: No adjustment is necessary in this engine since the distributor has a fixed position and the ignition timing is varied according to calculations made by the control unit.

When the ignition timing is correct, check that:

Idle speed **770 ÷ 870 rpm**

- Allow the engine to idle for at least one minute.
- Read the lambda probe signal in display field 3. The value should oscillate by more than 0.3 V.

After the checking procedure is over, proceed as follows with the fault detector equipment **VAG 1551**:

- Press the key **→**.
- Press the keys **0** and **6** to enter the function "End data transfer" and confirm by pressing the key **Q**.

IMPORTANT NOTE: Never disconnect the **VAG 1551** fault-finder from the power connector after terminating a function without first pressing the 06 keys for "End of transmission". This could block the control unit, preventing the engine from starting. If this problem occurs, disconnect the battery for at least 30 seconds, then re-connect it. Then connect the **VAG 1551** fault-finder and consult the faultsmemory.

If a fault has been memorized, consult the table in this repair group.

If this problem occurs, disconnect the battery for at least 30 seconds, then re-connect it. Then connect the **VAG 1551** fault-finder and consult the faultsmemory.

If a fault has been memorized, consult the table in this repair group.

If the theoretical values are not obtained:

- Check the sealing of the inlet system (unwanted air).
- Check for leaks in the exhaust system between the cylinder head and the catalytic converter.
- Check the lambda regulation and probe.
- Carry out a test cycle, re-check the faults memory and repeat the idling verification.

CHECKING THE NO. 1 CYLINDER IDENTIFICATION TRANSMITTER/HALL TRANSMITTER

Check values:

- Transmitter fault recognized by self diagnosis.

Checking process:

- Remove the Hall transmitter connector (ignition distributor).



24A138

- Connect the **VAG 1526** digital multi-meter to the outer contacts of the connector using the **VAG 1594** auxiliary cables.

- Turn on ignition.

Theoretical value: at least 10 V.

- Turn the ignition off.

- Connect the **VAG 1598/18** tester to the control unit cable harness.

- Check the continuity of the cables between the tester and the Hall transmitter triple connector.

Hall transmitter connector	VAG 1598/18 terminal
1	33
2	44
3	45

- Also check the cables for a short circuit between them.

Theoretical value: $\infty \Omega$.

If no fault is found in the cables and there is voltage between contacts 1 and 3:

- Replace the transmitter.

If no fault is found in the cables and there is no voltage between contacts 1 and 3:

- Replace the Digifant control unit.

CHECKING THE LAMBDA PROBE AND REGULATION

Conditions for checking:

- Idling speed adjustment correct.
- No leaks in exhaust system between catalytic converter and cylinder head.

Checking process:

- Connect the fault detector **VAG 1551**.
- Start the engine and leave it idling.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **01** for the "Display group number" and confirm with **Q**.

The display shows:

Read the measurement value block 1				→
1	2	3	XXXXXXXX	

- Continue with the check when the display in field 2 is over 80 °C.

- Allow the engine to idle for 2 minutes.

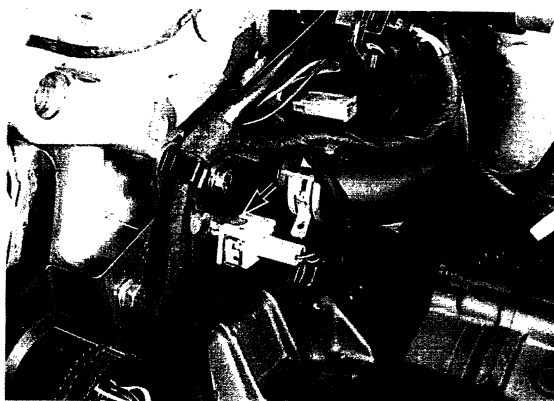
- Connect the **VAG 1363A** CO tester to the end of the exhaust pipe.

- Check the CO contents:

Theoretical value: < 0.5 % in volume.

- Watch the lambda probe voltage in display field 3; it should oscillate at least 30 times a minute in the range: 0 ÷ 1.0 V.

If the oscillation is slower, the cause of the fault must be investigated.



24B069

- Remove the connector from the coolant temperature transmitter. The probe's voltage must increase and then decrease within the range of the previous adjustment.

- Insert the connector. The probe's voltage must decrease and then increase to the previous regulation margin.

Note

During the test, the engine speed must not exceed 1500 rpm, otherwise the control unit will interpret the detached connector as a fault.

- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.

If the probe has not regulated:

- Check the lambda probe with the **VAG 1598/18** tester, following the table given in this group.

If no fault is found:

- Replace the lambda probe.

Possible causes of a probe regulation frequency that is too low:

- The slots or holes in the probe's head are blocked.
- The probe's ventilation hole (near the connecting cable) is blocked.
- Probe has been subjected to thermal overload (vit-rified).
- Probe damaged by fuel containing lead.

CHECKING THE LAMBDA PROBE HEATING

- See the table for checking the injection system with the **VAG 1598/18**, at the end of this group.

IDLING SPEED STABILIZATION CHECKING

Conditions for checking:

- Idling speed adjustment correct.
- Coolant temperature 85 °C minimum.

Check the operation

- Check operation using the actuator diagnosis.

Check the adjustment

- Connect the fault detector **VAG 1551**.
- Start the engine and leave it idling.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **03** for the "Display group number" and confirm with **Q**.

The display shows:

Read measuring values block 3				→
1	2	3	4	

Allow the engine to run for at least 1 minute.

- Remember the value shown in field 4.

Theoretical value: $7 \div 25 \%$.

(Idling speed $770 \div 870$ rpm)

- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.

If the theoretical value is reached:

- Check the sealing of the inlet system (unwanted air).
- Replace the idling stabilizer valve.
- Replace the Digifant control unit.

Engine 24

Fuel preparation: 2.0 l 16 V engine

TESTING THE ENGINE LOAD STATES

Note

Checks whether the Digifant control unit recognizes the engine load states (idling, partial load, full load, deceleration).

Conditions for checking

- Coolant temperature 80 °C minimum.
- Connect the fault detector **VAG 1551**.
- Start the engine and leave it idling.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **04** for the "Display group number" and confirm with **Q**.

The display shows:

Read the measurement value block 4				→
1	2	3	XXXXXXX	

- Display field 4: note the 8-digit numeric block (the four to the right have no meaning).

Display when:

• Idling:

The second digit on the left should be a 1.

Display: 01000000

• Partial load:

- Accelerate evenly.

The third digit on the left should be a 1.

Display: 00100000

• Full load:

- Accelerate fully (suddenly).

The fourth digit from the left must be 1 briefly.

Display: 00010000

• Deceleration:

- Increase the engine speed to over 3000 rpm.
- Close the throttle valve suddenly.

While the speed is over 1500 rpm, the first digit on the left must be 1.

Display: 1000000 (briefly).

Note

Below 1500 rpm, idling is recognized.

- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.

If the theoretical values are not obtained:

- Consult the faults memory, eliminate the faults and erase the memory.
- Check the throttle valve potentiometer.
- Check the idling switch.

CHECKING THE THROTTLE VALVE POTENTIOMETER

- Connect the fault detector **VAG 1551**.
- Turn on ignition.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **03** for the "Display group number" and confirm with **Q**.

The display shows:

Read the measurement value block 3				→
1	2	3	4	

- Read the idling speed in display field 3.

Theoretical value: **0** °:

- Slowly open the throttle valve to its maximum, checking the angle shown in field 3.
The number value should increase evenly in the whole margin.

Note

The value shown depends on the throttle valve potentiometer's tolerances and does not match the actual opening angle. The maximum allowable displayed angle is 86 °.

If the value does not increase uniformly:

- Replace the throttle valve potentiometer.
- If the display remains constantly at 0 ° or approx. 90 °:

Indication	Cause	Continue the check
0 °	Break or short circuit to earth	Check with the VAG 1598/18
Approx. 90 °	Short circuit to positive	Check with the VAG 1598/18

Continuation with the check if 0 ° is displayed:

- Unplug the throttle valve potentiometer three-pin connector.



24A139

- Jumper contacts 1 and 2 of the connector using the **VAG 1594** auxiliary cables and watch the display.

Display 90 °:

- Replace the throttle valve potentiometer.

Display 0 °:

Measure voltage between contacts 1 and 3 of plug.
Theoretical value: approximately 5 V.

- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.
- Connect the **VAG 1598/18** tester to the control unit cabling harness.

If there is a voltage of approx. 5 V.

- Check for breaks in the cable between terminal 40 of the tester and contact 2 of the throttle valve potentiometer connector, using the electrical schematics.

Cable resistance: 1.5 Ω max.

- Also check the cable for a short circuit to earth.

Theoretical value: ∞ Ω.

If there is no voltage:

- Check for breaks in the cable between terminal 41 of the tester and the triple connector and between terminal 33 and contact 3, using the electrical schematics.

Cable resistance: 1.5 Ω max.

Continuation of the test if approx. 90 ° is displayed:

- Unplug the throttle valve potentiometer three-pin connector.

Display 0 °:

- Replace the throttle valve potentiometer.

Display 90 ° 0:

- Measure and note down the voltage between contacts 1 and 2 in the connector.
- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.
- Unplug the Digifant control unit connector.

Engine 24

Fuel preparation: 2.0 I 16 V engine

If there is a voltage of approx. 5 V:

- Check the cable in the triple connector, contact 2, for a short circuit, using the electrical schematics.

If the voltage is approx. battery voltage:

- Check the cable in the triple connector, contact 2, for a short circuit to battery positive, using the electrical schematics.

If no fault is detected in the wires:

- Replace the Digifant control unit.

CHECKING THE COOLANT TEMPERATURE TRANSMITTER

- Connect the fault detector **VAG 1551**.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **01** for the "Display group number" and confirm with **Q**.

The display shows:

Read the measurement value block 1 →			
1	2	3	XXXXXXXX

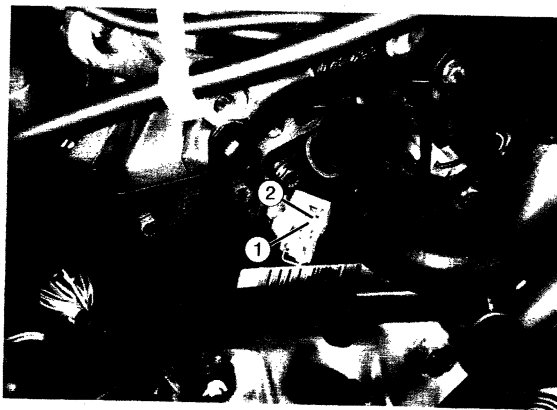
- Check the value of the coolant temperature in display field 2.

Indication	Cause	Continue the check ¹⁾
-40 °C	Interruption or short circuit to positive	Check as described in this repair group
120 °C	Short circuit to ground	Check as described in this repair group
Approx. coolant temperature ¹⁾	—	Check as described in this repair group

- ¹⁾ If the temperature shown differs greatly from the transmitter's ambient temperature, check the transmitter's cables for resistance.
- ²⁾ The check is only possible with the engine cold.

Continuation of the check if -40 °C is shown

- Unplug the cooling liquid temperature transmitter connector.



24A140

- Jumper the contacts using the **VAG 1594** auxiliary cables and watch the display.

120 °C displayed:

- Replace the coolant temperature transmitter (2).

-40 °C displayed:

- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.
- Connect the **VAG 1598/18** tester to the control unit cabling harness.

- Check the cable between tester terminal 14 and contact 1 of the double connector for breaks, using the electrical schematic.
 - Cable resistance: 1.5 Ω max.
 - Also check the cable for a short circuit to battery positive.
Theoretical value: $\infty \Omega$.
- If no wire fault is detected:
- Replace the Digifant control unit.

Continuation of the test if 120 °C is displayed:

- Unplug the cooling liquid temperature transmitter connector.
- Jumper the contacts using the **VAG 1594** auxiliary cables and watch the display.

-40 °C displayed:

- Replace the coolant temperature transmitter.

-120 °C displayed:

- Press the $\rightarrow$ key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.
- Connect the **VAG 1598/18** tester to the control unit cabling harness.
- Check the cable between the control unit connector and the double connector for a short circuit with the ignition cable and engine earth, using the electrical schematics
Theoretical value: $\infty \Omega$.

If no wire fault is detected:

- Replace the Digifant control unit.

Continuation of the test if the coolant temperature is displayed:

Functional test of transmitter.

- Watch the value of the coolant temperature (Display group 01, display field 2).

The value should increase evenly without interruption.

Notes

- If the value displayed in the fault finder increases by steps of 2 to 5 °C, this is due to the control unit and not to a faulty transmitter.
 - If within certain temperature ranges the engine fails and the temperature does not increase steadily, that means that the temperature signal is subject to temporary interruptions and the transmitter must be replaced.
- Press the $\rightarrow$ key.
 - Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.

CHECKING THE INLET AIR TEMPERATURE TRANSMITTER

- Connect the fault detector **VAG 1551**.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **02** for the "Display group number" and confirm with **Q**.

The display shows:

Read the measurement value block 2				$\rightarrow$
1	2	3	4	

- Check the cable between tester terminal 14 and contact 1 of the double connector for breaks, using the electrical schematic.
 - Cable resistance: 1.5 Ω max.
 - Also check the cable for a short circuit to battery positive.
Theoretical value: $\infty \Omega$.
- If no wire fault is detected:
- Replace the Digifant control unit.

Continuation of the test if 120 °C is displayed:

- Unplug the cooling liquid temperature transmitter connector.
- Jumper the contacts using the **VAG 1594** auxiliary cables and watch the display.

-40 °C displayed:

- Replace the coolant temperature transmitter.

-120 °C displayed:

- Press the $\rightarrow$ key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.
- Connect the **VAG 1598/18** tester to the control unit cabling harness.
- Check the cable between the control unit connector and the double connector for a short circuit with the ignition cable and engine earth, using the electrical schematics
Theoretical value: $\infty \Omega$.

If no wire fault is detected:

- Replace the Digifant control unit.

Continuation of the test if the coolant temperature is displayed:

Functional test of transmitter.

- Watch the value of the coolant temperature (Display group 01, display field 2).

The value should increase evenly without interruption.

Notes

- If the value displayed in the fault finder increases by steps of 2 to 5 °C, this is due to the control unit and not to a faulty transmitter.
 - If within certain temperature ranges the engine fails and the temperature does not increase steadily, that means that the temperature signal is subject to temporary interruptions and the transmitter must be replaced.
- Press the $\rightarrow$ key.
 - Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.

CHECKING THE INLET AIR TEMPERATURE TRANSMITTER

- Connect the fault detector **VAG 1551**.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **02** for the "Display group number" and confirm with **Q**.

The display shows:

Read the measurement value block 2				$\rightarrow$
1	2	3	4	

Continuation of test if ambient temperature is identified:

- Remove the inlet air temperature transmitter without removing the connector.
- Remember the inlet air temperature value shown in field 4.
- Apply cooling spray to the transmitter, watching the temperature value, which should decrease.
- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.

CHECKING THE ENGINE SPEED TRANSMITTER

- Connect the fault detector **VAG 1551**.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **02** for the "Display group number" and confirm with **Q**.

The display shows:

Read the measurement value block 2				→
1	2	3	4	

- Remember the injection time shown in display field 2.
- Operate the starter motor. The injection time display should change.
- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.

If the time displayed does not change:

- Remove the three-way connector to the transmitter.
- Measure the voltage between contacts 1 and 3 of the connector.

Theoretical value: 9 V.

- Turn the ignition off.
- Connect the **VAG 1598/18** tester to the control unit cabling harness.

- Check for breaks in the cable between the tester and the three-way connector, using the electrical schematics.

Contact 1 and terminal 68

Contact 2 and terminal 67

Contact 1 and terminal 33

Cable resistance: 1.5 Ω max.

- Also check the cables for short circuits between them:

Theoretical value: ∞ Ω.

If no fault is found in the cables and there is voltage between contacts 1 and 3:

- Replace the engine speed transmitter.

If no fault is found in the cables and there is voltage between contacts 1 and 3:

- Replace the Digifant control unit.

REPLACE THE ENGINE REVOLUTIONS TRANSMITTER

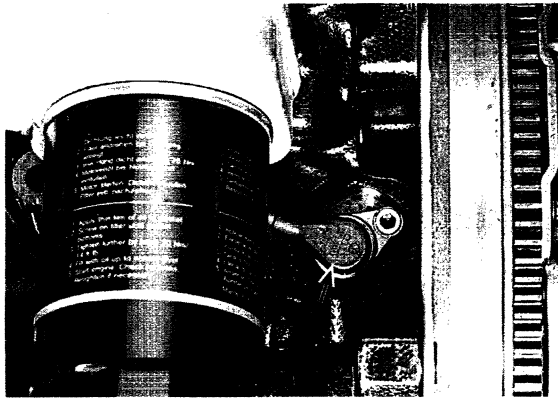
Note

The failure of this sensor causes the engine to stop immediately and it cannot be re-started, even sporadically. The faults memory in the control unit will detect and store the fault.

- Disconnect the battery negative lead.
- Remove the bolt or nut fixing the front engine support to the rubber/metal bush.
- Fit the **U-30025** cross-member with the **U-30017** adaptor, to prevent pressure of the engine on the support.
- Remove the bolts holding the starter motor bracket.

Engine 24

Fuel preparation: 2.0 l 16 V engine



24A130

- Remove the engine position sensor.
- To re-fit it, proceed in the reverse order to the above. Oil the O-ring and take care to position the sensor correctly to avoid oil leaks.

CHECKING THE INLET MANIFOLD PRESSURE TRANSMITTER

- Switch on the **VAG 1551** fault-finder in function **08** "Read measurement block values" and values group **02**.
 - Engine idling.
 - Engine temperature above 80 °C.
- The display will show:

Read measuring values block 2				→
1	2	3	4	

- Watch measurement field 4, which should show between 10 ... 60 %.
- If a constant value of approximately 80 % is shown (this value of 80 % will appear on the **VAG 1551** screen for a few seconds and then value will not remain constant):
- Check that there is no oil in the suction tube leading to the control unit and that its length is 1 metre.
 - Press the → key.
 - Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.

CHECKING THE IDLING SWITCH

- Connect the fault detector **VAG 1551**.
- Enter **1** for "Rapid data transmission" and **01** to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **01** for the "Display group number" and confirm with **Q**.

Read the measurement value block 1				→
1	2	3	XXXXXXX	

Watch the fourth digit from the left in display field 4, a block of 8 digits.

Theoretical value: 00000000

Slightly open the throttle valve; the fourth digit should change to 1.

Indication: 00010100

If the theoretical values are not obtained:

Indication	Cause	Continue the check
Always 0	Short circuit to ground	As follows
Always 1	Interruption or short circuit to positive	As follows

Continuation of the test if the display is always 0:

- Remove the two-way connector from the idling switch.

Display 1:

- Changing the idling switch.

Display 0:

- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.
- Unplug the Digifant control unit connector.

- Check the cables to the control unit in the two-way connector 1 for a short circuit to cable 2 and to vehicle earth.

If no wire fault is detected:

- Replace the Digifant control unit.

Continuation of test if the display is always 1:

- Remove the two-way connector from the idling switch.
- Jumper the connector contacts with the **VAG 1594** auxiliary cables and watch the display.

Display 0:

- Changing the idling switch.

Display 1:

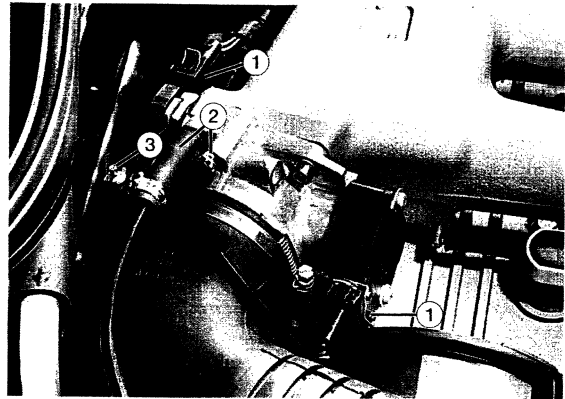
- Press the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.
- Connect the **VAG 1598/18** tester to the control unit cabling harness.
- Check for breaks in the cables between the tester and the two-way connector, using the electrical schematics.
 - Contact 1 and terminal 2.
 - Contact 2 and terminal 23.
 - Cable resistance: 1.5 Ω max.

If no fault is detected in the wires:

- Replace the Digifant control unit.

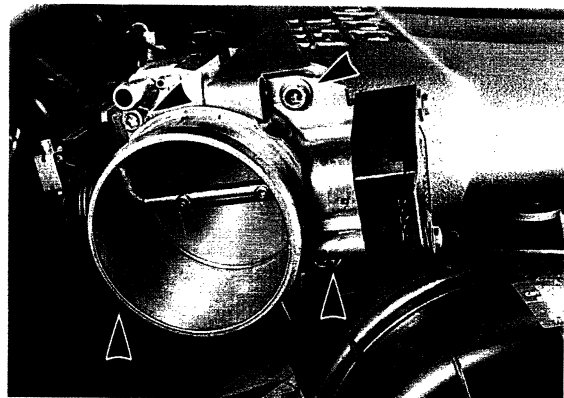
Changing the idling switch

- Remove the inlet tube from the throttle valve manifold.



24B072

- Remove the electrical connections to the throttle valve potentiometer and switch (1). Remove the suction tubes from the throttle valve manifold (2) and remove the accelerator cable (3).

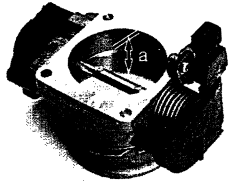


24B073

- Remove the throttle valve manifold.

Engine 24

Fuel preparation: 2.0 I 16 V engine



- Measure the distance between the throttle valve and the sealing surface -a- and note it down.
- Adjust the throttle valve by move the throttle valve switch. Adjustment distance a = the noted value + 0.5 mm.

Note

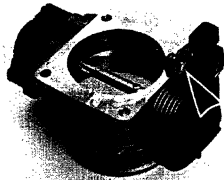
The throttle valve must be adjusted with special care and the adjustment distance -a- must never be exceeded.

CHECKING THE INJECTION CONTROL UNIT POWER SUPPLY

24B074

- Measure the distance between the throttle valve and the sealing surface -a- and note it down.
- Adjust the throttle valve by moving the idling switch until the distance -a- is obtained again.

Adjust the idling switch



24B075

- Release the idling switch.
- Slowly close the throttle valve (the stop on the cam disc must not make contact with the switch).

Conditions for checking

- Battery voltage over 11 V.
- Alternator, OK.

Checking process

- Connect the fault detector **VAG 1551**.
- Enter **1** for "Rapid data transmission" and 01 to select "Engine electronics".
- Press the **08** keys to select the function "Read measurement value block" and confirm the selection by pressing the **Q** key.
- Enter **02** for the "Display group number" and confirm with **Q**.

The display will show:

Read the measurement value block 2				→
1	2	3	4	

- Read the idling speed in display field 3.
Theoretical value: approx. battery voltage.
 - Press the → key.
 - Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- If the value indicated oscillates or does not reach battery voltage:
- Turn the ignition off.
 - Connect the **VAG 1598/18** tester to the control unit cabling harness.

- Turn on ignition.
- Use the **VAG 1526** digital multimeter and the **VAG 1594** auxiliary cables to measure the power supply voltage between terminals 1 and 23 of the tester:
Theoretical value: 11 V min.
- Also measure the voltage between terminals 1 and 9 of the tester:
Theoretical value: 9 V min.

If the theoretical values are not obtained:

- Replace the power supply relay.

Check the power supply voltage on terminal 15.

- Use the **VAG 1526** digital multimeter and the **VAG 1594** auxiliary cables to measure the power supply voltage between terminals 1 and 23 of the tester.

Theoretical value: 11 V min.

If the minimum rated value is not reached:

- Check the connectors using the electrical schematics.

CHECK THE SIGNAL OF THE STARTER ENGINE

Checking process

- Connect the **VAG 1598/18** checking unit to the installation connector.
- Connect the **VAG 1526** digital multimeter in voltage measuring to terminals 1 and 7 of the checking unit.
- Operate the starter.

The digital multimeter should read 8 V min.

If the minimum rated value is not reached:

- Check the wiring to the starter motor terminal 50, following the wiring diagram.

ADAPTATION OF THE IMMOBILIZER SYSTEM TO THE ENGINE CONTROL UNIT

Condition

- The vehicle's key must be available and this must have been memorized as "authorized" by the immobilizer control unit.

Process:

- Connect the fault detector **VAG 1551**.
- Enter 1 for "Rapid data transmission and 25 to select "Immobilizer", and confirm with the **Q** key.
- After the control unit has replied to the immobilizer control unit, press the → key.

The display shows:

Read the measurement value block Key in value group number XX	HELP
--	------

- Enter 10 for the "Adaptation" function and confirm with **Q**.

The display shows:

Adaptation Key in channel number XX
--

- Enter 00 for channel 0 and confirm with **Q**.
- The display shows:

Adaptation Erase adaptive values?	Q
--------------------------------------	---

- Confirm the selection by pressing the **Q** key.

The display shows:

Adaptation
The adaptive values are erased →

- Complete adaptation with the → key.
- Enter **06** for "End of data transmission" and confirm by pressing the **Q** key.
- Turn the ignition off.

Warning!

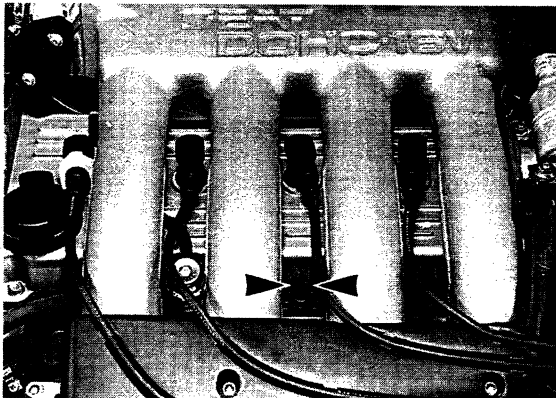
Before turning the ignition back on, wait at least 30 seconds in order for the control unit relay to disconnect from the power supply.

Note

When the ignition is switched on again, the identification of the control unit of the engine will be introduced into the immobiliser control unit.

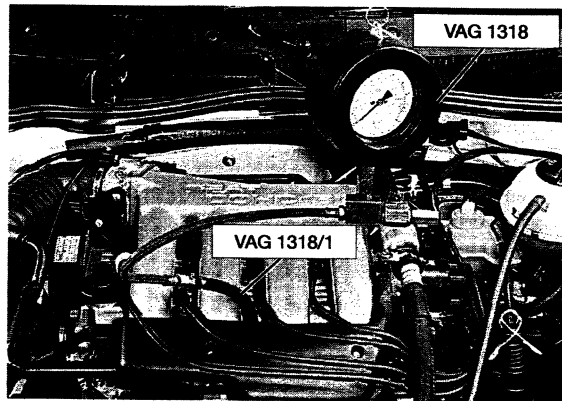
CHECK THE FUEL PRESSURE REGULATOR AND THE RETENTION PRESSURE

- Fuel pump flow correct.



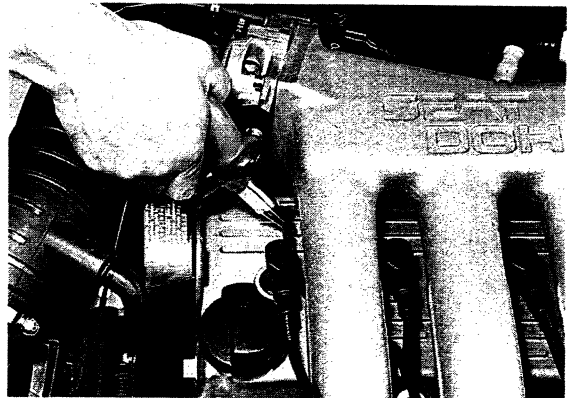
24B076

- Remove the measurement connection cover by pressing its sides to free it.



24B077

- Connect the **VAG 1318** measuring device, with the key closed (lying across the fuel flow), using the **VAG 1318/1** adaptor, to the fuel distributor pressure take-off.
- Start the engine and leave it idling.
- Measure fuel pressure.
Theoretical value: approximately **2.5 bar**.



24B078

- Squeeze the pressure regulator's flexible tube. The pressure should drop by about **3 bar**.
- Turn the ignition off.
- Check the air-tightness of the system and the retention pressure, monitoring the drop shown on the pressure gauge. After 10 minutes it should be approx. **2 bar**.

If the pressure drops below 2 bar:

- Start the engine and leave it idling.
- Wait until the pressure rises again, switch off the ignition and, at the same time, squeeze the flexible return tube on the fuel distributor.

If the pressure does not drop:

- Change the fuel regulator.

If the pressure drops again:

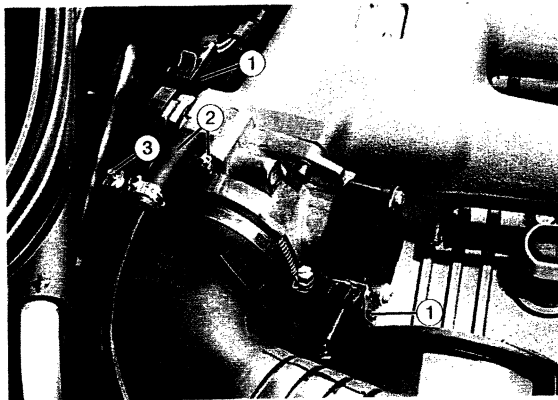
- Check the retention valve on the fuel and injectors pump.
- Check the air-tightness of the joins in the tubes, O-rings on the fuel distributor and injectors.

Note

Before removing the pressure measuring device, release the fuel pressure by opening the stop-cock and placing a vessel under the outlet.

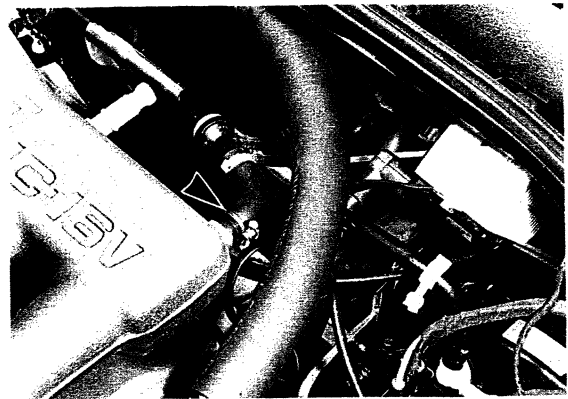
FUEL DISTRIBUTOR WITH INJECTORS Removal, replacement and checking

- Disconnect the battery's positive terminal.
- Remove the inlet air temperature transmitter.
- Remove the inlet nozzle.



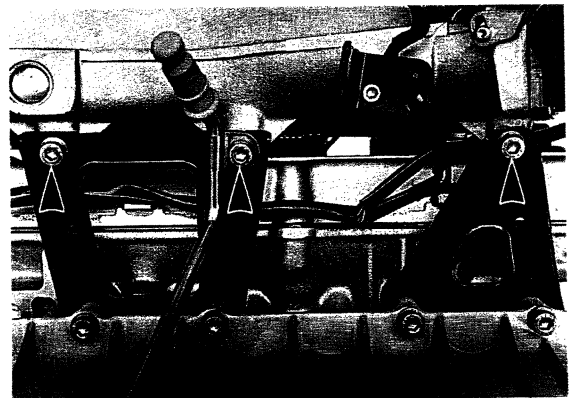
24B072

- Remove the electrical connections to the throttle valve potentiometer and switch (1). Remove the suction tubes from the throttle valve manifold (2) and remove the accelerator cable (3).



24B079

- Remove the brake servo suction tube.

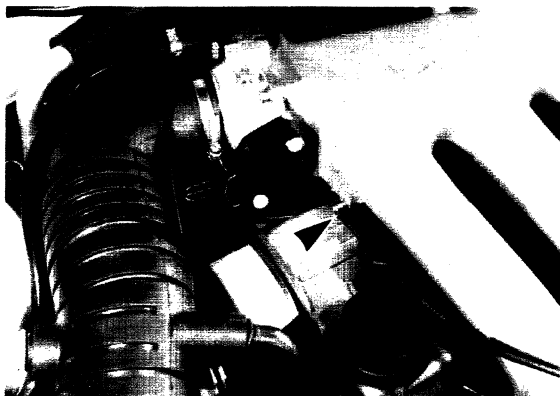


15B062

- Remove the bolts from the rear of the inlet manifold brackets.

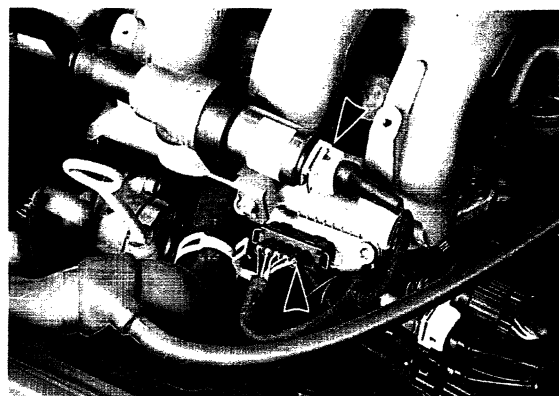
Engine 24

Fuel preparation: 2.0 I 16 V engine



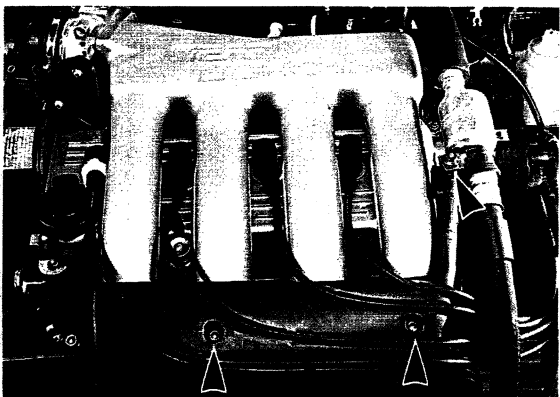
24B068

- Remove the suction tube from the pressure regulator.
- Remove the spark plug cables.



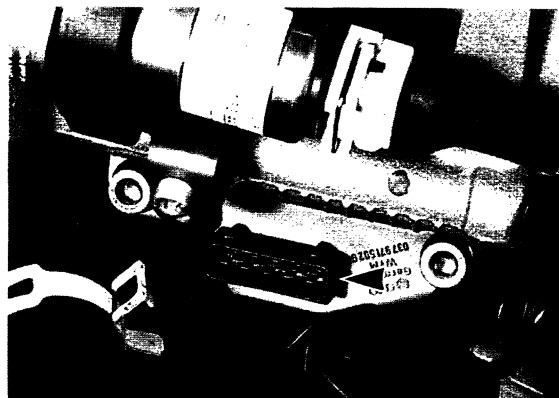
24A131

- Remove the electrical connections from the idling stabilizer and the fuel distributor.



24B080

- Remove the channelling supporting the spark plug cables.

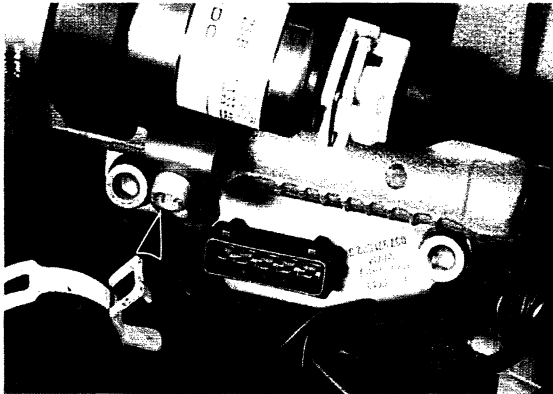


24A132

- Remove the fuel distributor's male connector from its bracket.

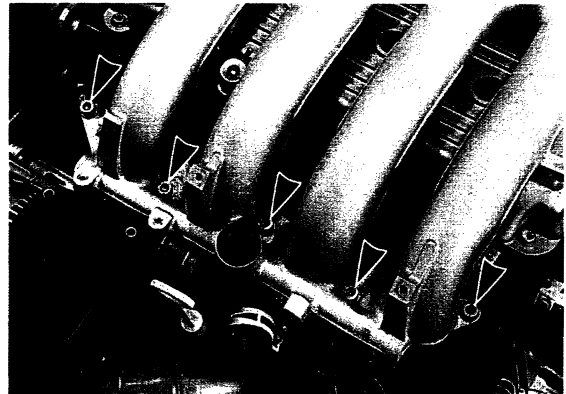
Engine 24

Fuel preparation: 2.0 I 16 V engine



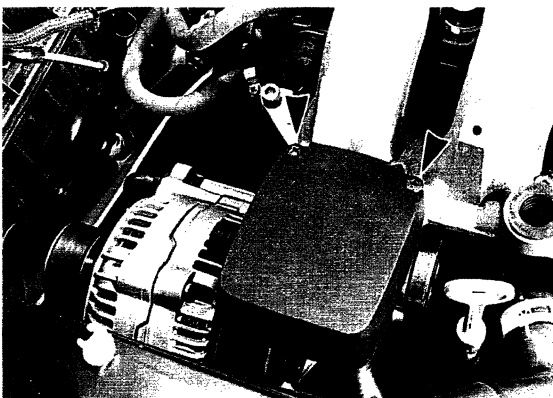
24A133

- Remove the stabilizer together with its bracket.



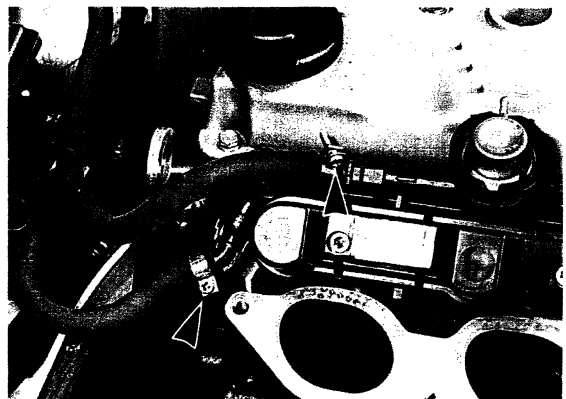
24B085

- Remove the bolts from the front upper part of the inlet manifold and remove it.



24B084

- Remove the sump gasses regulating valve.



24B086

- Disconnect the fuel entry and return tubes from the distributor.

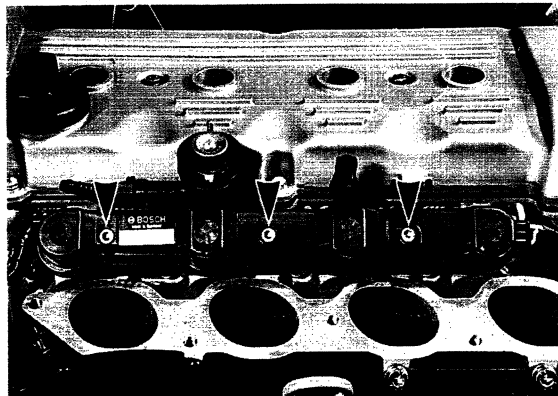
Engine 24

Fuel preparation: 2.0 I 16 V engine



24B087

- Remove the fuel distributor installation fixing from its housing on the lower part of the inlet manifold.

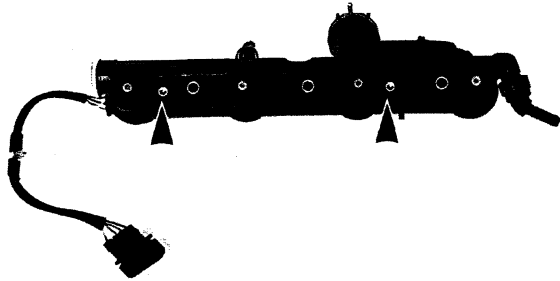


24B088

- Unscrew the bolts which hold the fuel distributor to the lower part of the manifold and remove it.

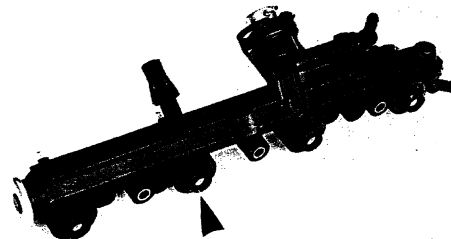
Removal and replacement of injectors.

- Fuel distributor tube removed.



24A134

- Remove the fixing bolts from the two distributor halves.



24B090

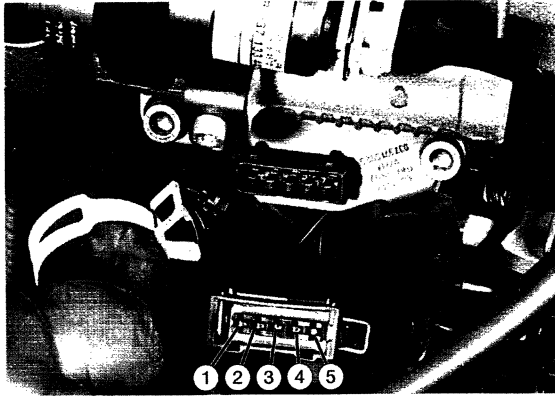
- Remove the injectors from their housing, by its interior, pushing smoothly and taking care not to damage the O-rings.

Engine 24

Fuel preparation: 2.0 I 16 V engine

Injector power supply voltage

- Remove the power supply connector from the fuel distribution tube.



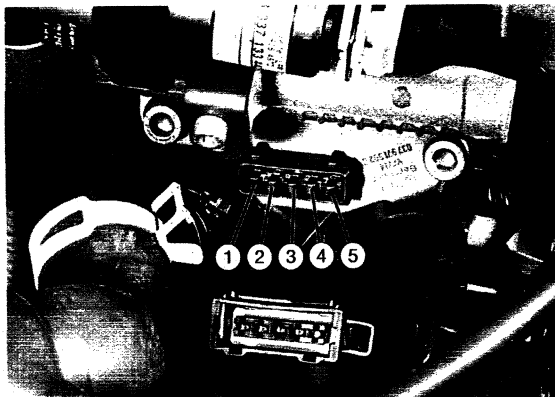
24A135

- Connect the **VAG 1527** test lamp to the connector's terminals, using the **VAG 1594 A** cables and adapters.
- Operate the starter. The LED should flash.
- Repeat the test with contacts 2 and 5, 3 and 5 and 4 and 5.

The LED should not flash:

- Carry out an electrical check using the **VAG 1598/18**.
- If necessary, replace the Digifant control unit.

Check the injector resistance



24A136

- Connect the **VAG 1526** digital multimeter in resistance measurement mode to the terminals of the distributor tube, using the **VAG 1594 A** auxiliary cables.

Injector	1	2	3	4
Contacts	1 and 5	2 and 5	3 and 5	4 and 5

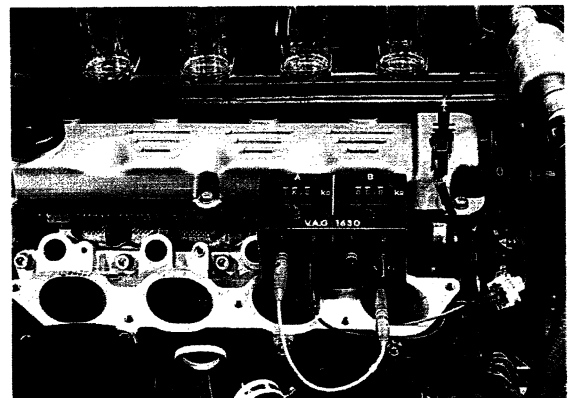
Approximate resistance: $15 \div 20 \Omega$.

If the minimum rated value is not reached:

- Remove and disassemble the distributor and repeat the check for each of the injectors. If necessary, replace defective injectors.

Check the spray shape and sealing of the injectors

- Completely remove the fuel distributor (do not remove the fuel tubes).
- Unplug the connector from the coolant temperature sensor.

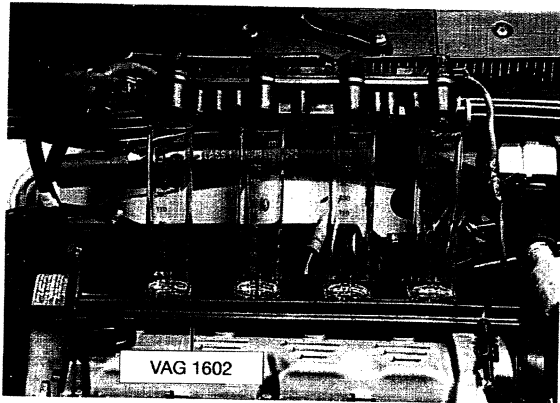


24B093

- Connect the **VAG 1630** digital potentiometer (side A), previously adjusted to $15 K\Omega$, using the **VAG 1594 A** auxiliary cables, to the previously removed connector

Engine 24

Fuel preparation: 2.0 I 16 V engine



24B094

- Place the fuel distributor with the injectors on the **VAG 1602** measuring device.
- Remove the final stage of the ignition transformer.
- Activate starter motor.

The injectors' sprays should be uniform and pulsing.

- Switch off the ignition and check the injectors' fuel tightness. No more than 2 drops/min should leave each injector.

If this standard is not met, change the injector(s) concerned.

Note

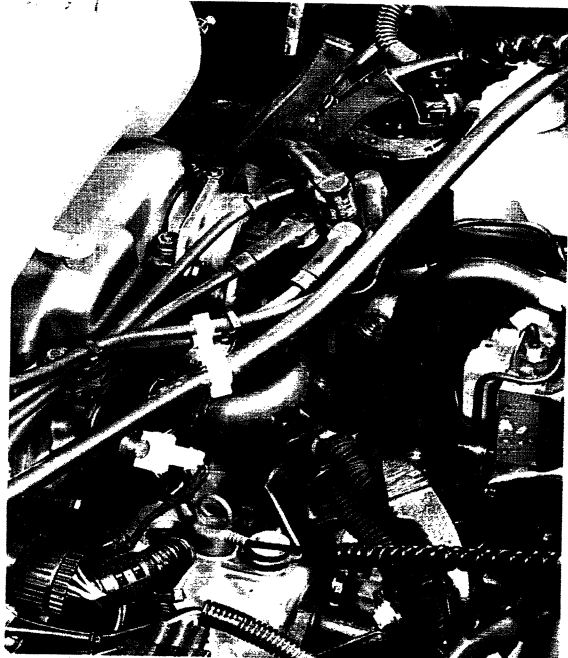
When fitting the injectors, check that the O-rings are not damaged.

INLET SYSTEM: CHECKING FOR LEAKS

Test to be carried out using the **G 001 800 A1** engine leaks locating spray.

Notes

- Because of the suction in the inlet system, the unwanted air leaks detection spray is sucked in. This reduces the burning capacity of the mixture, thus reducing the engine idling speed and causing a large rise in the CO content.
- Always follow the safety rules on the packaging.

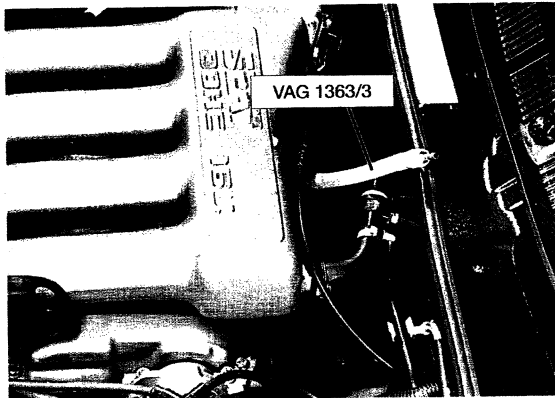


24A128

- Connect the ignition timing and engine speed checking equipment **VAG 1367** using the pick up clamp **VAG 1367/8** or connect directly the equipment **VAG 1767**.

Engine 24

Fuel preparation: 2.0 I 16 V engine



24A129

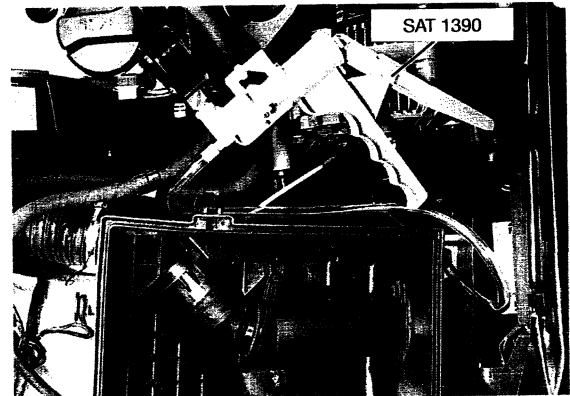
- Connect the CO content checking equipment **VAG 1363A**; connect also the adaptor **VAG 1363/3** to the CO measuring pipe.
- Start the engine and allow it to idle until it reaches running temperature.
- Systematically apply the spray to the inlet system's components.

If the engine idling speed drops and the CO content change:

- Check the sprayed area of the inlet system and eliminate the leaks.

CHECKING THE INLET AIR PRE-HEATING SYSTEM

- Engine cold (inlet air temperature below 20 °C).
- Regulator valve suction capsule tight.
- Remove the temperature regulator flexible tube coming from the suction capsule.
- Remove the upper part of the filter casing and remove the filter cartridge.



24B096

- Connect the tube to the **SAT 1390** manual vacuum pump.
- Operate the pump and check the smooth operation of the regulator valve and the operation of the suction capsule.

The regulator valve must close the cold air inlet.

Check the temperature regulator.

- Connect the suction tube to the temperature regulator.

- Start the engine and leave it idling.

Check the position of the regulator valve after at least 20 seconds.

Temperature of the temperature regulator	Position of the regulator valve
Less than 20 °C	Cold air inlet closed
Over 30 °C	Hot air inlet closed
Between 20 and 30 °C	Between cold and hot air inlets

Engine 24

Fuel preparation: 2.0 I 16 V engine

SUMMARY TABLE FOR DISPLAY GROUPS IN FUNCTION 08 "READ MEASUREMENT VALUES BLOCK"

Display group number	Display in the corresponding field
00	The meaning of this group is defined in the following table
01	1 = engine speed 2 = coolant temperature 3 = lambda probe voltage 4 = adjustment conditions
02	1 = engine speed 2 = Injection time 3 = battery voltage 4 = inlet air temperature
03	1 = engine speed 2 = engine load signal 3 = throttle valve angle 4 = opening of stabilizer valve
04	1 = engine speed 2 = engine load signal 3 = no meaning 4 = operating state*

* Meaning of the operation state digits if they are 1:

1	1	1	1	1	1	1	1
Decel- eration	Idling	Partial load	Full load	No mean- ing	No mean- ing	No mean- ing	No mean- ing

Display group number	Display in the corresponding field
05	1 = engine speed 2 = AKF valve signal 3 = fuel consumption signal 4 = no meaning
06	1 = lambda integrator value* 2 = lambda integrator value* 3 = self-adapted value for idling stabilization 4 = memorized value for throttle valve potentiometer in "Basic adjustment", throttle valve closed
07	Only used for factory tests

* The values in display fields 1 and 2 must always be observed together:

- If display field 1 contains a 0, field 2 must show a value between 0 and 70.
- If display field 1 contains 255, display field 2 must indicate a value between 144 and 255.

Engine 24

Fuel preparation: 2.0 I 16 V engine

Table for values for group 00 in function 08 "Read measurement values block"

Display field	Meaning	Theoretical value	Real value
1	Inlet air temperature	$24 \div 73$	$15 \div 50^{\circ}\text{C}$
2	Battery voltage	$128 \div 150$	$12,0 \div 14,2 \text{ V}$
3	Coolant liquid temperature	$4 \div 10$	$85 \div 105^{\circ}\text{C}$
4	Engine load	$60 \div 90$	$23 \div 36 \%$
5	Lambda probe signal	$100 \div 240$	$0 \div 1,0 \text{ V}$
6	Lambda regulation timing	0	—
7	Lambda probe status counter	$0 \div 20$	—
8	Throttle valve potentiometer voltage	$12 \div 49$	$0,25 \div 0,95 \text{ V}$
9	Injection time	$5 \div 8$	$2,5 \div 4,0 \text{ ms}$
10	Engine speed	$212 \div 202$	$770 \div 870/\text{min}$

AUTODIAGNOSIS WITH THE FAULT DETECTOR EQUIPMENT VAG 1551 READ THE FAULT MEMORY

- Connect the **VAG 1551** fault finder to the diagnosis connectors located in the switch hole on the left of the steering column.
- Start the engine.

If the engine does not start:

- Operate the starter for 6 seconds. Do not switch off the ignition afterward.
- Activate the printer by pressing the PRINT key (the key's pilot light comes on).
- Press the **1** key to select the function "Quick data transmission".
- Press the **0** and **1** keys to select the function "Engine electronics". Confirm the selection by pressing the **Q** key.
- Press the **→** key.

The display will show:

Rapid data transmission Select function XX	HELP
---	-------------

- Press the **02** keys to enter the "Consult faults memory" function and confirm by pressing the **Q** key.

The display will show:

X faults detected

The display shows the number of faults detected or "No fault detected".

If one or more faults are memorized, they are displayed on the screen and printed one by one.

The display then show:

Rapid data transmission Select function XX	HELP
---	-------------

If no fault has been memorized:

Press the **→** key.

- Press the **06** keys to enter the "End transmission" function and confirm it by pressing the **Q** key.

To find and eliminate the faults printed out, see the table with the **VAG 1551** fault-finder described in this repair group.

- Erase the faults memory as described below.

ERASE FAULT MEMORY

- Fault eliminated.
- Carry out a test run of at least 10 minutes' duration.

During the run:

- The coolant temperature must reach at least 80 °C.
- The rpm must reach at least 3000 rpm.
- The accelerator pedal must be pressed down fully for a brief period.
- Press the **1** key to select the function "Quick data transmission".
- Press the **0** and **1** keys to select the function "Engine electronics". Confirm the selection by pressing the **Q** key.
- Press the key **→**.

The display will show:

Rapid data transmission Select function XX	HELP
---	-------------

- Press the **02** keys to enter the "Consult faults memory" function and confirm by pressing the **Q** key.
- Press the **→** key until all the memorised faults have been displayed and the following appears on screen:

Rapid data transmission Select function XX	HELP
---	-------------

- Press the **05** keys to enter the "Erase faults memory" function and confirm by pressing the **Q** key.
- The display will show:

Rapid data transmission The faults memory is erased	→
--	----------

- Press the **→** key.
- The display will show:

Rapid data transmission Select function XX	HELP
---	-------------

- Press the **06** keys to enter the "End transmission" function and confirm it by pressing the **Q** key.
 - Carry out a new test run and check the faults memory again.
- It should not show any fault.

Engine 24

Fuel preparation: 2.0 I 16 V engine

SELECTABLE FUNCTIONS WITH THE FAULT DETECTOR VAG 1551

Selectable functions	Ignition on	Engine idling
02 Fault memory query	X	X
03 Diagnosis of controls	X	—
04 Start basic adjustment	X	X
05 Erase fault memory	X	X
06 End transmission	X	X
08 Read measurement value block	X	X
00 Fault memory direct query for all vehicle control units	X	X

DRIVER DIAGNOSIS WITH THE FAULT DETECTOR VAG 1551

When making the driver diagnosis, the following components are operated in the same order they are shown:

1. Fuel pump relay.
 2. Idle speed stabilization valve.
 3. Activated carbon tank solenoid valve.
- Connect the fault detector **VAG 1551** using the cable **VAG 1551/1**.
 - Turn on ignition.
 - Press the **1** key to select the function "Quick data transmission".
 - Press the **01** keys to select the function "Engine electronics" and confirm the selection by pressing the **Q** key.

- Press the → key.
 - Press the **03** keys to select the function "Controller diagnostic".
- The display will show:

Quick data transmission 03 - Actuators diagnosis	Q
---	----------

- Activate the fuel pump relay.
- Confirm the selection by pressing the **Q** key.
- The display will show:

Actuators diagnosis Fuel pump relay	→
--	---

The fuel pump relay must activate (make a "click") until the → key is pressed to move to the next actuator.

Note

When the fuel pump relay is activated, the pump also functions audibly.

If the relay does not work:

- Check the pump relay using the electrical schematics.

Activate the idling stabilizer valve:

- Press the → key.

The display will show:

Actuators diagnosis Idle speed stabilization valve	→
---	---

The idling stabilizer valve must actuate (the sound it makes when connecting and disconnecting is audible) until the → key is pressed to pass to the next actuator.

Engine 24

Fuel preparation: 2.0 I 16 V engine

SELECTABLE FUNCTIONS WITH THE FAULT DETECTOR VAG 1551

Selectable functions	Ignition on	Engine idling
02 Fault memory query	X	X
03 Diagnosis of controls	X	—
04 Start basic adjustment	X	X
05 Erase fault memory	X	X
06 End transmission	X	X
08 Read measurement value block	X	X
00 Fault memory direct query for all vehicle control units	X	X

DRIVER DIAGNOSIS WITH THE FAULT DETECTOR VAG 1551

When making the driver diagnosis, the following components are operated in the same order they are shown:

1. Fuel pump relay.
 2. Idle speed stabilization valve.
 3. Activated carbon tank solenoid valve.
- Connect the fault detector **VAG 1551** using the cable **VAG 1551/1**.
 - Turn on ignition.
 - Press the **1** key to select the function "Quick data transmission".
 - Press the **01** keys to select the function "Engine electronics" and confirm the selection by pressing the **Q** key.

- Press the **→** key.
- Press the **03** keys to select the function "Controller diagnostic".

The display will show:

Quick data transmission 03 - Actuators diagnosis	Q
---	----------

Activate the fuel pump relay.

- Confirm the selection by pressing the **Q** key.

The display will show:

Actuators diagnosis Fuel pump relay	→
--	----------

The fuel pump relay must activate (make a "click") until the **→** key is pressed to move to the next actuator.

Note

When the fuel pump relay is activated, the pump also functions audibly.

If the relay does not work:

- Check the pump relay using the electrical schematics.

Activate the idling stabilizer valve:

- Press the **→** key.

The display will show:

Actuators diagnosis Idle speed stabilization valve	→
---	----------

The idling stabilizer valve must actuate (the sound it makes when connecting and disconnecting is audible) until the **→** key is pressed to pass to the next actuator.

Engine 24

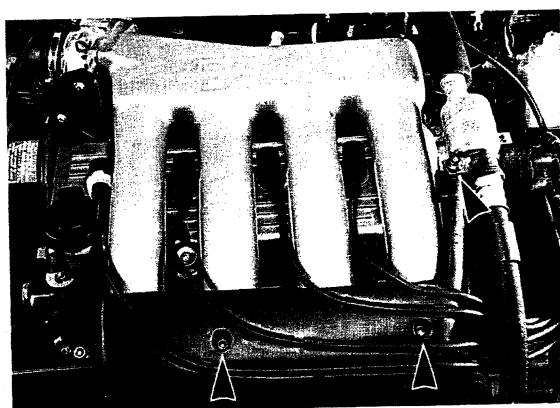
Fuel preparation: 2.0 I 16 V engine

Warning

When the checking of the actuator elements has been completed, you must exit the **VAG 1551**, using function **06** "End data transmission" and then switch off the ignition. Otherwise, if you try to start up immediately, the fuel pump will remain in constant operation even although the motor stops.
If this occurs, disconnect the positive terminal of the battery for more than 30 seconds.

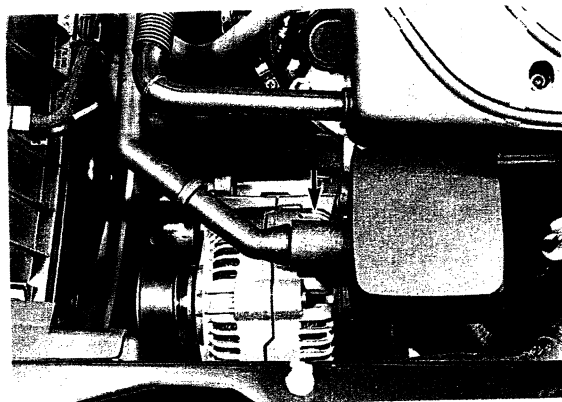
PINKING SENSORS

- Right sensor tightening torque:



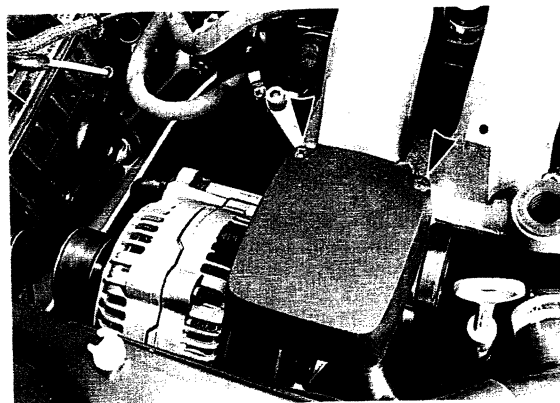
24B080

- Remove the bolts from the spark plug cable guide.



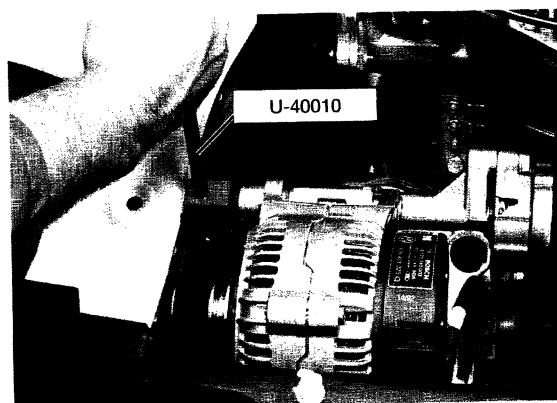
24B066

- Remove the tube from the sump gases breather valve to the inlet manifold.



24B084

- Remove the sump gases breather valve bracket.



24A142

- Remove the alternator belt using the **U-40010** tool.

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Fuel preparation: 2.0 I 16 V engine

- Remove the alternator belt tensioner.
- Apply the **U-40083** tool and tighten to **20 Nm**.
- Left sensor tightening torque:
- Apply the **U-40083** tool and tighten to **20 Nm**.
- To replace (both):
- Remove the bolt fixing the pinking sensor.
- Remove the sensor's electrical connector from its bracket.

FAULT TABLE FOR FAULT DETECTOR VAG 1551

- Before replacing any component diagnosed as faulty, all connector pin contacts, cables and ground connections must be thoroughly checked, specially if the fault is diagnosed as sporadic (S/P).
- The diagnostic is carried out in the "Quick data transmission" mode.
- The fault code and the intermittent ones are not displayed on the **VAG 1551** display; they are only shown in the paper from the printer if it is active.

MESSAGE DISPLAYED	FAULT POSSIBLE REASONS	FAULT ELIMINATION
00515 2113 Hall pulse generator No signal	Faulty Hall generator System discontinuity	— Check Hall generator — Check cables
00518 2212 Throttle valve potentiometer Short circuit to ground Break/short circuit to the positive terminal No fault detected/sporadic fault	Cables shortcircuited to ground Cable discontinuity Faulty potentiometer Briefly: cable break, short circuit or interruption in the potentiometer	— Check the electrical system and the potentiometer — Check the electrical system and the potentiometer — Check cables and connectors for loose contacts in accordance with the electrical schematics
00519 2222 Inlet manifold pressure transmitter No signal	Digifant control unit, defective Defective suction tube to the Digifant control unit, or tube not connected	— Check the pressure transmitter with the VAG 1551 — Check tube electrical schematics

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Fuel preparation: 2.0 I 16 V engine

MESSAGE DISPLAYED	FAULT POSSIBLE REASONS	FAULT ELIMINATION
00522 2312 Cooling liquid temperature transmitter Shortcircuit to the positive terminal/cable discontinuity No fault detected/sporadic fault	Faulty transmitter Faulty transmitter	— Check the complete system with transmitter — Check installation and transmitter — Check cables and connectors for loose contacts in accordance with the electrical schematics
00523 2322 Intake air temperature transmitter Short circuit to ground Cable discontinuity/shortcircuit to the positive terminal No fault detected/sporadic fault	Faulty transmitter Cables short-circuited to ground Faulty transmitter Cable discontinuity Briefly: installation break, short circuit or transmitter interruption	— Check the complete system with transmitter — Check the complete system with transmitter — Check installation and transmitter — Check cables and connectors for loose contacts in accordance with the electrical schematics
00525 2342 Lambda probe No signal Short circuit to ground or to the positive terminal	Faulty probe System discontinuity The installation has a short circuit to positive	— Replace probe — Check the installation, the lambda probe and adjustment
00532 2234 Power supply Signal too low Signal too large	Battery voltage over 15.5 V Battery voltage below 6.1 V	— Check the alternator — Check the battery

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Fuel preparation: 2.0 I 16 V engine

MESSAGE DISPLAYED	FAULT POSSIBLE REASONS	FAULT ELIMINATION
005224 Pinking sensor 1 No signal	2142 Cable break or short circuit in the sensor's cable Defective sensor Pinking not detected by the control unit	— Defective sensor — Change the sensor — Change the control unit
00540 Pinking sensor 2 No signal	Cable break or short circuit in the sensor's cable Defective sensor (left pinking sensor in direction of travel) Pinking not detected by the control unit	— Check the installation toward the sensor — Change the sensor — Change the control unit
00513 Engine speed transmitter No signal	Faulty transmitter Cable discontinuity	— Replace transmitter — Check system using the electrical schematics

MESSAGE DISPLAYED	FAULT POSSIBLE REASONS	FAULT ELIMINATION
65535 Faulty control unit	1111 Digifant control unit components	— Replace (see Repair Group 24)
01087 Basic adjustment not carried out	The engine control unit is not matched to the engine	— Carry out basic adjustment
00740 Transmitter for identifying cylinder 1	Faulty transmitter Or break in cable	Check G 145
01249 Injector of cylinder 1-N30*	Break or short circuit in the cables to the injectors of cylinders 1, 2, 3 or 4 Injector of cylinder 1, 2, 3 or 4 (N30 ... N33) faulty	Check N30 ... N33
17978 Engine control unit blocked	Communications failure with transponderr	Check transponder (Repair Group 96)

* The self diagnosis detects the failure of an injector, but not which one, even though the display shows number 1. If this fault is found in the memory, check them all.

If when checking the cables any faulty connection between cable and terminal is found and the terminal must be replaced, use tool **U-40901** to remove the terminal.

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Fuel preparation: 2.0 I 16 V engine

VAG 1598/18 TEST TABLE

Adjust the V measurement margin (voltage)				
Step	VAG 1598/18 terminal	Checking	Conditions for the checking	Nominal values
1	1 and 23 1 and 9	Digifant control unit power supply	Turn on ignition	About battery voltage
2	1 and 38	Power supply terminal 15 for Digifant control unit	Turn on ignition	
3	1 and 7	Starter motor cable terminal 50	Remove the Hall transmitter connector	8 V min.
4	Jump 1 and 6	Cable to fuel pump relay	Ignition on	Working of fuel pump should be clearly audible
5	Jump 1 and 28	Cable to lambda probe heating relay	Ignition on Jumper terminals 1 and 6 of the VAG 1598/18 tester Remove the lambda probe connector and connect the VAG 1526 digital multimeter to contacts 1 and 2 of the connector	About battery voltage
6	1 and 31	Active carbon tank electromagnetic valve	Ignition on	About battery voltage
7	1 and 39	Cable to air conditioning	Ignition on Switch on the ventilation fan Set the air conditioning to full power	Battery voltage

Engine 24

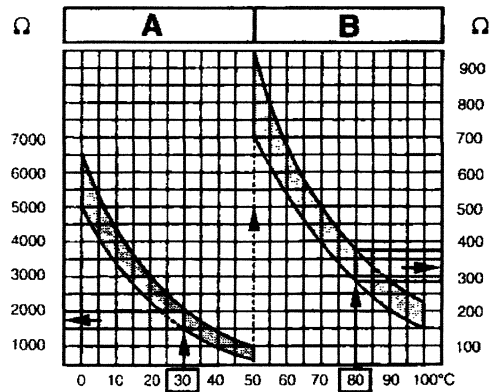
Fuel preparation: 2.0 l 16 V engine

Ignition turned off Adjust the measurement margin Ω (resistance)				
Step	VAG 1598/18 terminal	Checking	Conditions for the checking	Nominal values
8	33 and 45	Cables to the Hall transmitter	Remove the transmitter connector Jump contacts 1 and 3 on the connector	1.5 Ω max.
	33 and 44		Jumper contacts 1 and 2 in the connector	
9	67 and 68	Cables to the engine speed transmitter	Remove the transmitter connector Jumper contacts 1 and 2 in the connector	1.5 Ω max.
	33 and 68		Jump contacts 1 and 3 on the connector	
10	14 and 33	Cooling liquid temperature transmitter	—	See drawing 24AD13
11	33 and 36	Intake air temperature transmitter	—	See drawing 24AD13
12	20 and 42 20 and 65 42 and 65	Cables to the lambda probe	—	∞ Ω
	20 and 42		Remove the probe connector Jumper contacts 3 and 4	1.5 Ω max.
13	10 and 32 10 and 34 32 and 34	Cables to pinking sensor 1	—	∞ Ω
	32 and 34		Remove the sensor's connector (brown on cylinder head bracket, left side) Jumper contacts 1 and 2 in the connector	1.5 Ω max.
	10 and 34		Jump contacts 1 and 3 on the connector	1.5 Ω max.

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- Graph of cooling liquid liquid temperature transmitter resistance and intake air values.



24DD05

Step	VAG 1598/18 terminal	Checking	Conditions for the checking	Nominal values
14	55 and 56 55 and 57 56 and 57	Cables to the pinking sensor 2	—	$\infty \Omega$
	56 and 57		Remove the connector to the pinking sensor (black, on the cylinder head bracket, left side) Jump contacts 1 and 3 on the connector	1.5 Ω
	55 and 57		Jumper contacts 1 and 3 of the sensor's connector	
15	21 and 23	Idle speed switch	Throttle valve closed	1.5 Ω
			Open the throttle valve	$\infty \Omega$
16	27 and 38	Idle speed stabilization valve	—	3.5 ÷ 6.0 Ω
17	8 and 1	Cables to the final stage of the ignition transformer	Remove the connector Jumper contacts 1 and 2 in the connector	1.5 Ω

Adjust the V measurement margin (voltage)				
18	1 and 19	Air conditioner start-up signal cables	Turn on ignition Switch on the heater fan Switch on the air conditioner to its maximum cooling power	About battery voltage