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Engine code 3B

Motronic control unit

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VAG 1551 diagnostic tester

Function 04:

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VAG 1598 text box

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Diagnosis, Fault Memory

Motronic self diagnosis, technical data

Control unit (J 220) capabilities:

Memory type	Permanent and sporadic Fault recognition
Data output modes	Rapid data transmission, and Blink code
Engine warning light (On Board Diagnosis)	Yes
Output checks	Yes (8)

The Motronic control unit can differentiate between 31 different faults. If these faults occur, they are stored in a permanent fault memory until intentionally erased.

- fault memory should be activated with the engine running if possible

The Motronic control unit can perform 8 different Output checks.

- output checks can only be performed with the engine **NOT** running

This system also recognizes sporadic (intermittent) faults.

Notes for fault recognition:

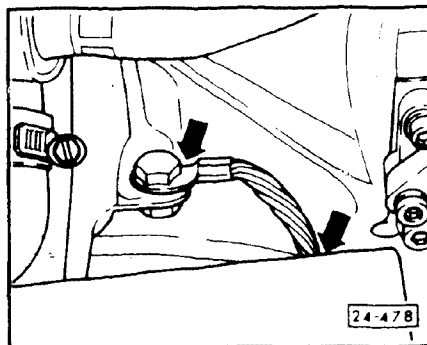
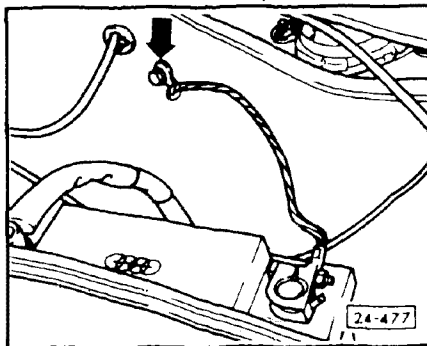
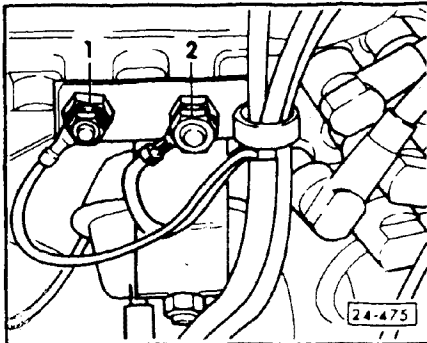
- if a fault is present for sufficient time it is stored as a static fault. If a condition appears momentarily or of insufficient time to be classified as static it will be stored in a portion of the control unit where it will receive different attention than a static fault. If within the next 50 engine starts the fault no longer appears, the fault will automatically be erased
- California version: faults which affect exhaust or emission requirements will be displayed by the engine warning light (OBD) on the instrument panel
- fault codes displayed by the engine warning light can be found in section D2-480
- before activating the fault memory, perform Output check diagnosis and test value block

Engine ground connections, checking

Check the following ground connections for corrosion and fit before checking the fault memory. Output checks, checking wiring or components, replace or repair as necessary.

Requirement

- fuse 21 OK
- electronics ground wire 1
- output ground wire 2
- battery ground strap mounting point on body
- ground strap mounting point between left engine support and cross member



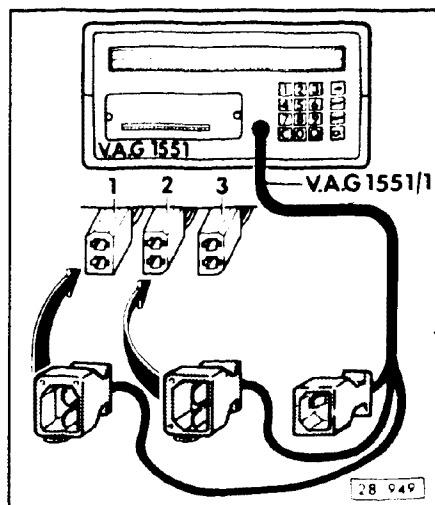
Diagnosis, Fault Memory

Fault memory, checking/erasing

Using **VAG 1551** Diagnostic Tester in mode 1
(Rapid data transfer)

Note

Fault memory cannot be erased until it has first been read (checked).

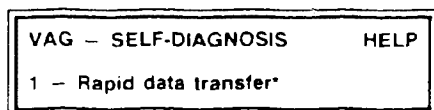


- switch **OFF** ignition
- connect **VAG 1551** diagnostic tester to diagnostic connectors in (above pedals in driver's side footwell) using **VAG 1551/1** connector harness as follows:

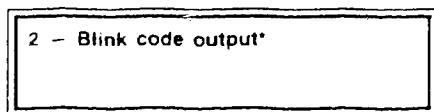
- **BLACK** wire to **BLACK** diagnostic connector 1
- **WHITE** wire to **BROWN** diagnostic connector 2
- **BLUE** wire **NOT** used

Note

Voltage supply is via fuse 21.



- display will then alternate as shown

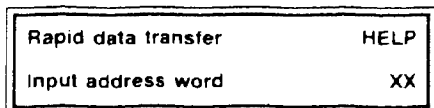


- turn on **VAG 1551** printer by pressing 'print' button
 - indicator lamp in button lights up

- start engine and let idle

If engine will **NOT** start

- crank engine for 5 seconds, then leave ignition switched in the **ON** position
- press button "1" to select "rapid data transfer" operating mode



- display will appear as shown

- press buttons **0** and **1** to select function **01** "engine electronics"

Diagnosis, Fault Memory

Rapid data transfer Q
01 - engine electronics

- display will appear as shown
- enter input by pressing Q button

447907404 A ENGINE
Coding 12

- control unit identification display will appear as shown (example only)
- press  button

Control unit does NOT respond!
HELP

- display will appear as shown
 - press HELP button
 - list of possible fault causes will print
 - after eliminating possible fault causes, re-select function 01 "engine electronics"
 - enter by pressing Q button
- If "Control unit does NOT respond! HELP" appears again
- check if control unit harness connectors are connected OK, properly connect if necessary
 - press  button

Rapid data transfer HELP
Select function XX

- display will appear as shown
- press 0 and 2 buttons to select function 02 "fault memory recall"

Rapid data transfer Q
02 - fault memory recall

- display will appear as shown
- enter by pressing Q button

No faults registered!

- one of the displays will appear as shown

X Fault(s) registered!

- press  button
 - stored faults are displayed and printed consecutively

Diagnosis, Fault Memory

Note

If Fault Code 2111 (Engine speed sensor) and 2234 (Supply voltage) appear when the ignition is switched **ON** and the engine is not running; this is normal and the fault codes should be disregarded. If, however, the Faults appear after an unsuccessful start attempt (with the ignition left in the **ON** position) the fault should be investigated.

After last Fault is displayed or if "No fault recognized" is displayed

- press  button

Erasing fault memory

After display and print out of the last fault

- press  button

Rapid Data Transfer HELP
Select Function XX



- following display will appear as shown

- press 0 and 5 buttons

Rapid Data Transfer Q
05 – erase fault memory



- display will appear as shown

- enter by pressing Q button

CAUTION! Faults were not recalled
from fault memory



If display appears as shown

- follow work procedure sequentially, i.e. first recall faults from fault memory

CAUTION

If the ignition is switched off or the engine is run between fault memory checking and fault memory erasing stages, **FAULT MEMORY IS NOT ERASED.**

Rapid Data Transfer
Fault memory is erased!



If the fault memory is erased successfully, the display will appear as shown

- use fault table to find and eliminate faults that have been printed out, see section D2-480
- test drive vehicle again and recall faults from fault memory

Output checks diagnosis, using VAG 1551

Mode 1 (Rapid Data Transfer)

Notes

Output checks can only be performed when the engine is **NOT** running.

Output checks will stop being transmitted if the engine is started or if a speed impulse is recognized.

During the Output checks diagnosis, the Carbon canister frequency valve and the wastegate frequency valve can be checked audibly or by touch. Avoid unnecessary background noise while audibly checking these components.

During the Output checks, all of the components being checked will produce a sound or vibration except for the fuel injectors. Use the **US 1115 (VAG 1527B)** LED tester to check injector signals. Avoid unnecessary background noise while audibly checking those components.

If any of the components fail to sound or vibrate, check the component or the component triggering.

Output checks occur in the following triggering sequence:

Fuel injector cylinder 1 (**N 30**)

Fuel injector cylinder 2 (**N 31**)

Fuel injector cylinder 4 (**N 33**)

Fuel injector cylinder 5 (**N 83**)

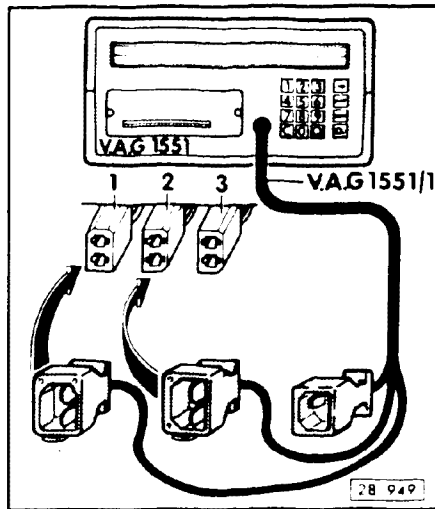
Fuel injector cylinder 3 (**N 32**)

Idle stabilizer valve (**N 71**)

Carbon canister frequency valve (**N 80**)

Wastegate frequency valve (**N 75**)

Diagnosis, Fault Memory



Output check diagnosis, activation

- switch **OFF** ignition
- connect **VAG 1551** Diagnostic tester to diagnostic connectors (above pedals in driver's side footwell) using **VAG 1551/1** connector harness as follows:
 - **BLACK** connector to diagnostic connector 1
 - **WHITE** connector to diagnostic connector 2
 - **BLUE** wire **NOT** used

Note

Voltage supply is via fuse 21.

- switch **ON** ignition but do **NOT** start engine

VAG SELF-DIAGNOSIS HELP
1 - Rapid data transfer*

- display should then alternate between the two displays as shown

VAG SELF-DIAGNOSIS HELP
2 - Blink code output*

- press button 1 of **VAG 1551** diagnostic tester to select operating mode "rapid data transfer"

Rapid data transfer HELP
Input address word XX

- display will appear as shown
- press 0 and 1 buttons to select function 01 "engine electronics"

Rapid data transfer Q
01 - engine electronics

- display will appear as shown
- enter input by pressing **Q** button

447 907 404 A ENGINE
Coding 12

- control unit identification will be displayed as shown (example only)

- press **→** button

Control unit does not respond! HELP

- following display will appear

Diagnosis, Fault Memory

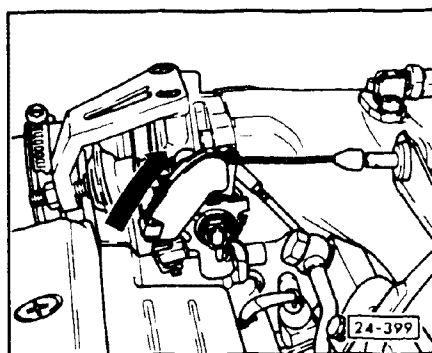
Rapid data transfer HELP
Select function XX



Rapid data transfer Q
03 - output check diagnosis



Output check diagnosis
Cylinder 1 Injector (N 30)



- press button

- following display will appear

- press 0 and 3 buttons to select function 03 "output check diagnosis"

- display will appear as shown

- enter input by pressing Q button

- display will appear as shown

- crack throttle slightly (in direction of arrow) and allow to return against throttle stop
 - injector for cylinder 1 will click 5 times, after that the control unit will switch to the next injector

- repeat opening the throttle in succession for each of the injectors in the order of cyls. 1, 2, 4, 5 and 3

Note

The injectors are difficult to hear unless conditions are very quiet, therefore it is recommended that you visually check the injector signal using the **US 1115 (VAG 1527B)** LED tester. Disconnect the injector harness connectors and connect the tester across the terminals (in the order of cyls. 1, 2, 4, 5 and 3).

- press button

- display will appear as shown

Output check diagnosis
Idle stabilizer valve (N 71)



Output check diagnosis
Carbon canister solenoid valve 1 (N 80)



Output check diagnosis
Wastegate frequency valve (N 75)



- trigger valve by hitting button until display appears as shown

- trigger valve by hitting button until display appears as shown
- trigger valve by hitting button until Output checks ends

Diagnosis, Fault Memory

If one of the valves does not click

- check valve and triggering, see Repair Group 24

To repeat Output checks

- switch **OFF** ignition for 20 seconds minimum
- re-select function **03** via the **VAG 1551**

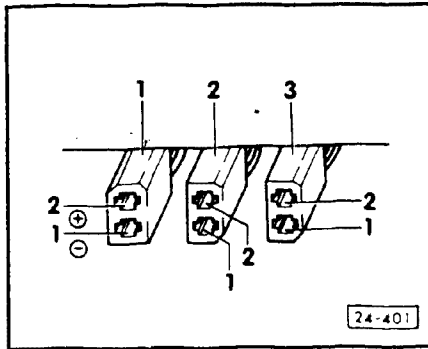
Note

If Output checks are repeated the injectors will not be triggered again unless the engine is started and allowed to run for a brief period.

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VAG 1551 Diagnostic connectors, checking

- diagnostic connectors are located in driver's side footwell above pedals



BLACK diagnostic connector 1 (voltage supply)

Terminal 1 (ground)

Terminal 2 (positive from terminal 15, protected via fuse 21)

- check continuity of connections using **US 1119** multimeter
- switch **OFF** ignition
- connect test box **VAG 1598** using adaptor cable **VAG 1598/5**

BROWN diagnostic connector 2

(Rapid data transfer)

Diagnostic connector terminal	VAG 1598 test box terminal number and/or (J 220) control unit terminal number
1	13
2	55

1 ← → 13
2 ← → 55

BLUE diagnostic connector 3

(Blink code output)

Diagnostic connector terminal	VAG 1598 test box terminal number and/or (J 220) control unit terminal number
1	not used
2	22

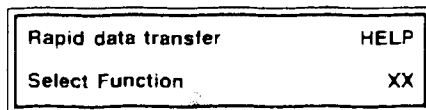
1 ← → not used
2 ← → 22

Engine, basic adjustment

Using VAG 1551 Diagnostic Tester

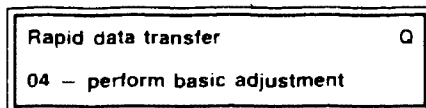
Requirements

- engine oil temperature 85°C (185 °F) minimum
- ALL electrical consumers switched **OFF**
- A/C switched **OFF**
- test drive vehicle for 5 minutes minimum
 - select driving conditions that will allow vehicle to be driven continuously without stopping
- connect **VAG 1551** and activate Fault memory, see section D2-400 for additional information
- do **NOT** switch engine **OFF** after reading Fault memory, allow engine to run at idle



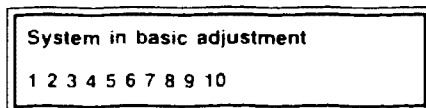
- display will appear as shown

- push **HELP** button to print list of possible functions
- push buttons **0** and **4** to select function **04** "Basic adjustment"



- display will appear as shown

- enter input by pressing **Q** button



- display will appear as shown

Notes

- tables for the individual channel displays, section D2-450
- the values displayed in channels 1 through 10 are in decimal form, see section D2-440 for table showing conversions of these displays into physical values
- after the test drive and reading Fault memory, compare the value in channel 9 with the specified value within a maximum of 5 minutes. If the engine idles longer the specified value can be exceeded without a Fault being present
- compare the channel displays with the specifications table on section D2-440 after approximately 2 seconds
- channel 10 represents the ignition angle calculated by the (J 220) control unit
- if there is a loss of power, check to see if the marks on the camshaft gear and the TDC mark on the flywheel agree. Repair or adjust as necessary. See Repair Group 13 for additional information

Diagnosis, Fault Memory

VAG 1551 Function 04, key to displays in channels 1 to 10

Channel	Displayed value	Corresponds to	Description	Remarks
1	184-215	85°-105°C	Momentary engine temperature	Requirement for all other displays: specified values
2	20-25		Momentary engine load	With A/C off, and all electrical consumers switched off.
3	77-83		Momentary engine speed	With A/C off, and all electrical consumers switched off.
4	121-135	770-830 rpm	Idle stabilizer operating range	Air quantity change by (N 71)
5	80-125		Idle stabilizer characteristic curve zero point	Internal calculation value
6	123-127		Idle stabilizer load adaptation	Air quantity change by (N 71)
7	41-55		Idle stabilizer characteristic curve control	Internal calculation value
8	123-133		Oxygen sensor control	After approximately 1.5 min.
9	115-141		Oxygen sensor adaptation	If display is high, execute test drive again
10	35-37	8-12° BTDC	Momentary ignition angle	Ignition angle calculated by (J 220) control unit

If displayed values do not correspond to the specified values

- check whether A/C is shut off

If YES

- see troubleshooting chart, section D2-450

Diagnosis, Fault Memory

VAG 1551 function 04, troubleshooting table

The following chart lists possible causes and corrective measures if the specified values are not displayed.

Note

Before testing, make sure that A/C and A/C compressor are switched **OFF**.

Channel	VAG 1551 display	Cause of fault	Corrective measure
1	Greater than 215	Coolant temperature sensor (G 62)	Check (G 62). Repair Group 28 Read Fault memory, section D2-400
1	Less than 184	Faulty thermostat	Check thermostat. Repair Group 19
		Coolant temperature sender (G 62)	Check (G 62). Repair Group 28 Read fault memory, section D2-400
2	Greater than 25	A/C switched ON Electrical consumer switched ON Oxygen sensor control Oxygen sensor probe A/C compressor running, even though A/C shut off Air mass sensor (G 70) Central hydraulic pump Air leak between turbocharger and throttle	Switch A/C OFF Switch consumers OFF Check oxygen sensor control, channel 8 Check oxygen sensor probe. Repair Group 24 Check A/C. Repair Group 87 Check (G 70). Repair Group 24 Check central hydraulic pump. Repair Group 48 Determine cause

Diagnosis, Fault Memory

Channel	VAG 1551 display	Cause of fault	Corrective measure
2	Less than 20	Air leak between air mass sensor (G 70) and turbocharger Air leak at throttle Detached vacuum hose Fuel pressure regulator Leak in crankcase breather Fuel tank ventilation Carbon canister frequency valve sticking Air mass sensor (G 70)	Determine cause Determine cause Check vacuum system Check fuel pressure regulator, Repair Group 24 Check crankcase for leaks Check tank ventilation system Repair Group 24 Perform-Output checks diagnosis, section D2-410 Check (G 70) — see Repair Group 24
3	Greater than 83	Idle stabilizer valve (N 71) at lower control stop Air leak at throttle, or fuel injector Vacuum hose fallen off at rear of manifold A/C A/C compressor signal present, even though compressor is switched off	Push down gas pedal briefly four times, 15 seconds apart Eliminate cause See exploded view, page 24-10-1, Repair Group 24 Check A/C, Repair Group 87 Perform Output check diagnosis, section D2-410
3	Less than 77	Idle stabilizer valve (N 71) sticks A/C compressor runs, but does not supply signal to (J 220) Control Unit	Check (N 71), see Repair Group 24 Check A/C, Repair Group 87 Perform Output check diagnosis, section D2-410
4	Less than 121	Air leak at throttle Idle stabilizer valve (N 71) sticks	Eliminate cause Check (N 71), see Repair Group 24

Diagnosis, Fault Memory

Channel	VAG 1551 display	Cause of fault	Corrective measure
4	Greater than 135	A/C compressor runs, although A/C off State of battery charge	Check A/C. Repair Group 87 Check charge condition. Repair Group 27
5	Less than 80	Idle stabilizer valve (N 71)	Check (N 71), see Repair Group 24
5	Greater than 125	Air leak at idle stabilizer valve Idle stabilizer valve (N 71)	Eliminate cause Check (N 71), see Repair Group 24
6	Not Between 123-137	Idle stabilizer valve (N 71) control Air leakage problem	Push down gas pedal briefly and observe display, must be between 123 and 137 Determine cause
7	Less than 47 Greater than 55	Idle stabilizer valve (N 71) Air leakage problem	Check (N 71), see Repair Group 24 Determine cause
8	Constant 128	Fuel supply too low Oxygen sensor probe	Must be 2.6 gallon fuel minimum in tank Check oxygen sensor probe, see Repair Group 24
88	Not between 123 and 133	Oxygen sensor adaptation Oxygen sensor probe Air leak at air mass sensor (G 70) Fuel system pressure incorrect Exhaust system not sealed properly	Check channel 9 specified value Check oxygen sensor probe, see Repair Group 24 Eliminate cause Check system pressure, see Repair Group 24 Checking, Repair Group 26
8	Erratic Display	Fuel supply too low	Must be 2.6 gallon fuel minimum in tank

Diagnosis, Fault Memory

Channel	VAG 1551 display	Cause of fault	Corrective measure
9	Less than 115	Fuel system pressure Air mass sensor (G 70) Oxygen sensor probe Air leak between turbocharger and throttle body	Check system pressure, see Repair Group 24 Check (G 70), see Repair Group 24 Check oxygen sensor probe, see Repair Group 24 Determine cause
9	141 or higher	Fuel supply too low Air leak between turbocharger and air mass sensor (G 70) and/or manifold	Must be 2.6 gallon fuel minimum in tank Eliminate cause, See Repair Group 24
10	38 or higher	Idle stabilizer valve (N 71) Idle switch (F 60)	Perform Output check diagnosis, Section D2-400 Check (N 71), Repair Group 24 Check (F 60), Repair Group 24
10	34 or less	Idle stabilizer valve (N 71)	Perform Output check diagnosis, section D2-400 Check (N 71), Repair Group 24
10	Erratic Display	Air leak at injectors Spark plugs	Eliminate cause Check spark plugs

Diagnosis, Fault Memory

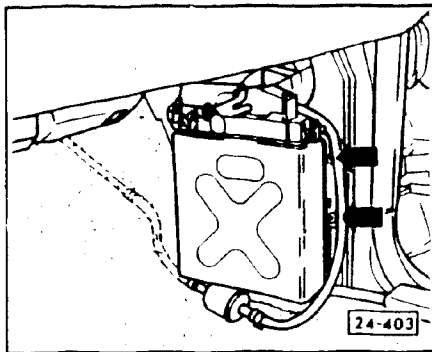
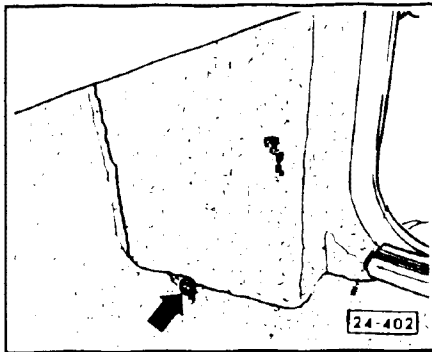
Motronic control unit, removing and installing

CAUTION

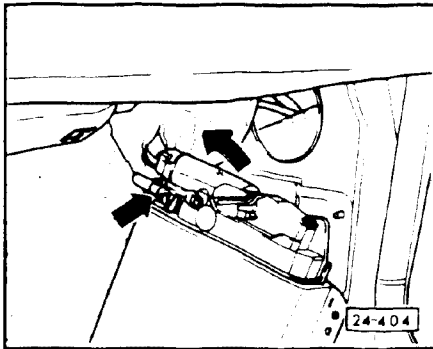
Do **NOT** attempt to disconnect the Motronic control unit (**J 220**) with the ignition switched **ON**. The control unit could be destroyed. Wait a minimum of 20 seconds after switching **OFF** the ignition before disconnecting the control unit.

Removing

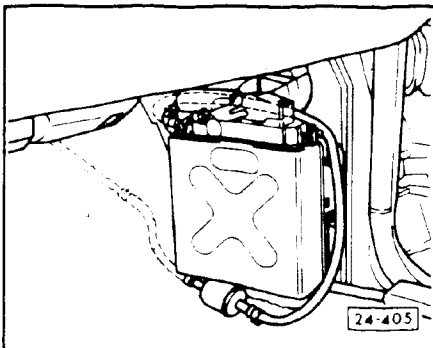
- switch **OFF** ignition
- remove screw (**arrow**)
- remove A-pillar cover in passenger side footwell
- pry off carpeting
- unscrew Motronic-control unit from bracket and pull from retainer on front side



Diagnosis, Fault Memory



- disconnect vacuum hose (**lower arrow**)
- unlock and disconnect control unit harness connector in direction of upper arrow



Installing

- route vacuum line with moisture separator such that there are **NO** kinks
- reinstall carpet cover over control unit
- reinstall unit in reverse order of removal

CAUTION

Do **NOT** attempt to disconnect the Motronic control unit (J 220) with the ignition switched **ON**. The control unit could be destroyed. Wait a minimum of 20 seconds after switching **OFF** the ignition before disconnecting the control unit.

Diagnosis, Fault Memory

Test box VAG 1598, connecting to Motronic control unit

CAUTION

The **VAG 1598** Test Box cannot be connected to the vehicle at the same time as the **VAG 1551** Diagnostic Tester. Only have one or the other connected.

CAUTION

Do **NOT** attempt to disconnect the Motronic control unit (**J 220**) with the ignition switched **ON**. The control unit could be destroyed. Wait a minimum of 20 seconds after switching **OFF** the ignition before disconnecting the control unit.

CAUTION

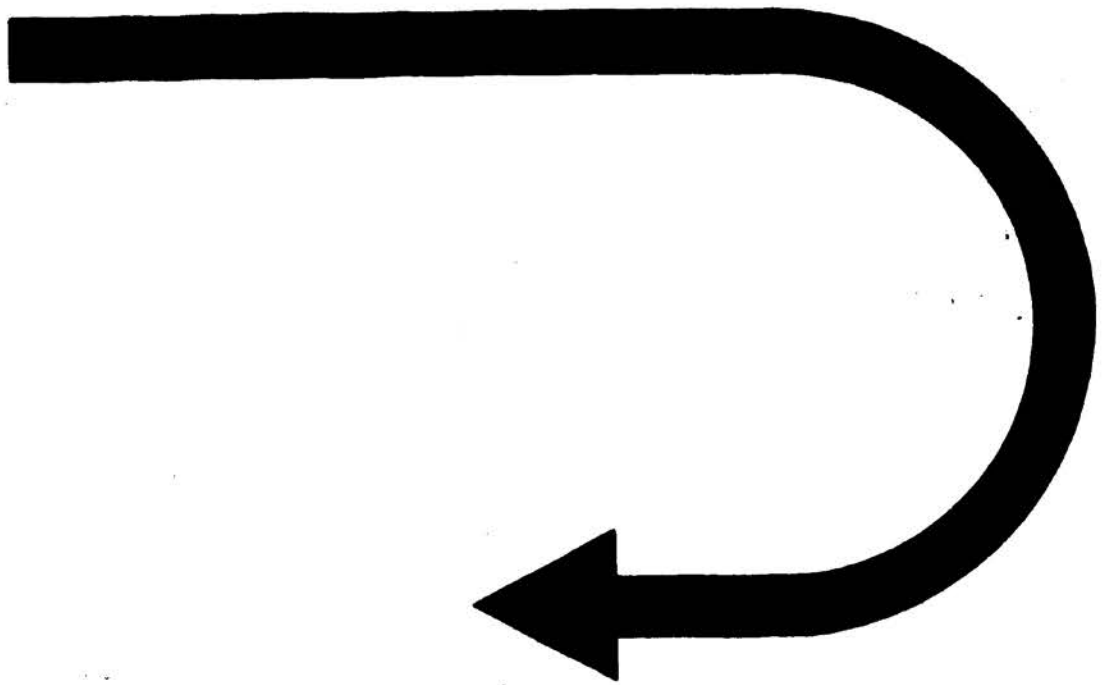
By disconnecting the harness connector from the control unit, battery supply voltage is interrupted, thereby erasing the fault memory.

- switch **OFF** ignition
- remove Motronic control unit (**J 220**), see section D2-460
 - vacuum hose remains connected
- connect adaptor cable **VAG 1598/5** between Motronic control unit and control unit harness connector

Note

The terminal numbering of the control unit harness connector corresponds to the terminal numbering of the Test Box.

CONTINUED IN THE
BEGINNING OF NEXT ROW



Diagnosis, Fault Memory

Fault troubleshooting, chart

The following pages list all of the possible faults which can be detected by the Motronic-control unit (J 220) and displayed by the **VAG 1551** Diagnostic tester and/or instrument panel warning lamp (On Board Diagnosis, California ONLY).

CAUTION

ONLY disconnect components with the ignition switched **OFF**. Failure to do so could generate/store a Fault in memory.

CAUTION

Do **NOT** attempt to connect the Motronic control unit (J 220) with the ignition switched **ON**. The control unit could be destroyed. Wait a minimum of 20 seconds after switching **OFF** the ignition before disconnecting the control unit.

Problems which occur occasionally or faults which were not canceled from the fault memory are displayed as "sporadically occurring faults".

The Fault identifier and blink code can be printed out on the paper strip of the **VAG 1551**.

Fault code display via the instrument panel warning lamp (California ONLY) is by Blink code ONLY.

If a component Fault Code is displayed: **ALWAYS** check the wiring to the component for a short or open circuit using the wiring diagram. Also check for loose or corroded terminals and proper seating of connectors before replacing components. Repair or replace as necessary.

Before correcting a fault or replacing components

- check Motronic control unit ground connections at terminals **10, 14, 19, 24** and **26**
 - must be between 0 and 0.2 ohms (continuity)
- check ground connections on engine for corrosion or damage, see section D2-390
- check fuel pump relay, see Repair Group 24

Diagnosis, Fault Memory

After activating Fault memory and/or performing fault repairs

- check engine basic adjustment using **VAG 1551**. see section D2-430 for additional information

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
65535	1111 Control unit (J 220) defective	Ground Connections to (J 220) terminals 10, 14, 19, 24 and 26 (J 220) defective With ignition switched ON no voltage at terminal 37 of (J 220)	Engine does not start —	Check ground connections using wiring diagram Replace (J 220) Check wiring using wiring diagram

- check Motronic control unit ground connections at terminals **10, 14, 19, 24 and 26**
 - must be between 0 and 0.2 ohms (continuity)
- check ground connections on engine for corrosion or damage, see section D2-390
- check fuel pump relay, see Repair Group 24
- erase Fault memory after repairing any faults
- test drive vehicle for 5 minutes minimum
 - select driving conditions that will allow vehicle to be driven continuously without stopping
- connect **VAG 1551** and activate Fault memory. see section D2-400 for additional information

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00513	2111			
	Engine speed sender (G 28)	Metal chips on (G 28)	Engine does not start	Check (G 28), see Repair Group 28
	*No signal	(G 28) mounting base loose		Tighten base
	*Mechanical fault	Distance from (G 28) to ring gear of flywheel larger than 1.2 mm	Engine misfires	Repair short or open circuit using wiring diagram
		Broken teeth on ring gear of flywheel	—	—
		Open circuit between 3 pin connector in engine compartment and (G 28)	—	—
		Open circuit between (J 220) and (G 28)	—	—
		Short circuit between terminal 47 and (J 220) or between (J 220) and shielding or engine ground	—	—
		Open circuit in shielding of (G 28)	—	—
		3 pin connector from (G 28) and (G 4) in engine compartment reversed	Engine does not start	Reverse connections
		(G 28) faulty	—	—
		Input for (G 28) in (J 220) faulty	—	Replace (J 220)

* One of these displays is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00514	2112 Ignition reference sender (G 4) No change in signal	Mounting base of (G 4) loose	Fault occurs before engine start	Check (G 4), see Repair Group 24
		Distance from (G 4) to pin on flywheel greater than 1.2 mm	Engine will not start	—
		Pin on flywheel bent or damaged	—	—
		Open circuit between 3 pin connector in engine compartment and (g 4)	Fault after engine start or start attempt with ignition ON . Fault code 2112 is stored.	—
		Open circuit between (G 4) and (J 220)	—	—
		Short circuit between terminal 49 and (J 220) and or shielding or engine ground	—	—
		Open circuit in shielding of (G 4)		
		3 pin connector from (G 4) and (G 28) have interchanged harness connectors		Reverse harness connectors
		(G 4) defective		Replace (G 4)
		Input for (G 4) in (J 220) defective		Replace (J 220)

* This display is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00515	2113			
	Hall sender (G 40)	No power to (G 40) from (J 220)	Engine does not start up	Check (G 40), see Repair Group 28
	*Short to ground	(G 40) ground missing	—	Repair short or open circuit using wiring diagram
	*Open circuit or short to positive		—	
	*Mechanical Fault	Signal lead to (J 220) open or short circuit to ground in signal wire	—	—
		Short circuit between terminals 8 and 12 of (J 220)	—	—
		Open circuit between 3 pin connector in engine compartment and (J 220)	—	—
		Position of reference pin (G 4) incorrect	—	Repair or replace, see Repair Group 24
		(G 40) defective	—	Replace (G 40)
		Input for (G 40) in (J 220) defective	—	Replace (J 220)
		Drive belt slipped off	Loss of power	Check drive belt. Repair Group 15 Check (G 40)
		Ignition distributor Basic adjustment	—	Perform basic adjustment. Repair Group 28

Note
 Ignore Fault display if displayed as sporadic.
 *One of these displays is shown in addition to the component

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Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00516	2121 Idle switch (F 60) *Short to ground *Open circuit or short to positive	(F 60) out of adjustment	Idle stabilization system switches to control	Check (F 60), Repair Group 24
		Throttle valve sticking	Idle speed too high	Adjust throttle cable, see Repair Group 20
		Floor mat pressing against accelerator pedal	—	—
		Throttle cable out of adjustment	—	—
		Throttle damper	—	Check throttle damper, see Repair Group 20, page 20.33
		Open circuit between terminal 52 and (J 220)	—	Repair circuit using wiring diagram
		Input for (F 60) in (J 220) defective	—	Replace (J 220)
		Terminal 52 from (J 220) short circuited to ground	—	Repair short circuit
		Moisture in throttle valve harness connector	—	Dry out or replace

*One of these displays is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00518	2212 Throttle potentiometer (G 69) * Disconnection short to ground * Short circuit to positive	Short circuit to + from (G 69) or short between (G 69) and terminal 53 of (J 220)	Lack of power or boost pressure not attained	Check (G 69), see Repair Group 24
		Short circuit to ground in (G 69) or short circuit between (G 69) and (J 220)	—	—
		(G 69) and (J 220) defective	—	Replace
		Moisture or corrosion in (G 69) harness connector	—	—
00522	2312 Coolant temperature sensor (G 62) * Short circuit to ground * Disconnection short circuit to + (plus)	Short circuit to ground	Cold starting difficulties at low temps	Check (G 62), see Repair Group 24
		Moisture in (G 62) harness connector	Poor idle and acceleration during warmup	—
		Open circuit between (G 62) and (J 220)	—	—
		Resistance between (G 62) and (J 220)	—	—
		(G 62) defective	—	Replace (G 62)
		Input from (G 62) in (J 220) defective	—	Replace (J 220)

* One of these displays is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00523	2322 Intake air temperature Sensor (G 42) *Short circuit to ground *Break in wiring or short circuit to positive	Short circuit to ground	Slight power loss	Check (G 42), Repair Group 28
		Open circuit between (G 42) and terminal 44 of (J 220)	—	—
		(G 42) defective	Increase in fuel consumption	—
		Input from (G 42) in (J 220) defective	—	Replace (J 220)

*One of these displays is shown in addition to the component

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00524	2142 Knock sensor 1 (G 61) *No signal	(G 61) loose or connector corroded	High fuel consumption	Re-torque, 20 Nm (15 ft lb)
		Open or short circuit between (G 61) and (J 220)	Power loss	Repair open or short circuit
		Short circuit between (G 61) and ground or between (G 61) and shielding	Boost pressure not attained	—
		(G 61) defective	—	Replace (G 61)
		Input for (G 61) in (J 220) defective	—	Replace (J 220)

*This display is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00525	2342			
	Oxygen sensor (G 39)	Open circuit to (J 220)	Emissions NOT within specs	Repair open circuit
	*No signal	(G 39) heater inoperative	—	Check OXS heating, Repair Group 24
	*Short circuit to + (plus)	Fuse (S 28) defective	—	
	*Short circuit to ground	Heat resistor in sensor defective	—	Perform basic engine adjustments using VAG 1551
		Incorrect wiring on (G 39) heater	—	—
		Signal wire short circuit to ground	—	—
		Short circuit in signal wire to shielding	—	—
		(G 39) defective	—	Replace (G 39)
		Fuel tank empty	—	Must have 2.6 gallon minimum
		Fuel system pressure	—	Check fuel pressure, Repair Group 24
		Ignition system component failure: spark plug, connector, distributor cap, rotor		Replace as necessary
		Air leak at air mass sensor (G 70)	—	—
		Air leak in exhaust before catalyst	—	—
		Break in ground reference wire from terminal 10 of (J 220) to engine block	—	—

*One of these displays is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00528	2223 Altitude sensor (F 96) *Break in wiring or short to + *Short circuit to ground	Short circuit to + in (F 96)	Loss of power	Check (F 96), Repair Group 24
		Short circuit in wiring between terminal 46 of (J 220)	Boost pressure not attainable	Replace (J 220)
		Short circuit to ground in (F 96) and/or in wiring between (F 96) and terminal 46 of (J 220)	—	—
		(F 96) defective	—	Replace (F 96)
		Input for (F 96) in (J 220) defective	—	Replace (J 220)
00532	2234 Supply voltage (Info) *Signal voltage too low *Signal voltage too high	Supply voltage to (J 220) greater than 16 Volts	—	Check voltage
		Alternator defective	—	Check (J 220) see Repair Group 28
		Engine started with two batteries in series	(J 220) malfunction range	Check charging condition of battery, see Repair Group 27
		Poor ground connection to (J 220)	Idle speed too low	—
		Current drain with ignition switched OFF	Battery voltage less than 6 Volts	—
		—	Engine does not run	—
		Battery discharged	—	—

*One of these displays is shown in addition to the component

Notes for Fault Code **2234**:

Ignore fault if displayed as sporadic (intermittent).

This fault may be stored if the engine is idling for a long period of time with heavy electrical consumption and a battery that is severely drained.

This fault can also be generated if the starter is NOT cranked before checking Fault memory and the ignition is only switched ON.

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00533	2231 Idle speed control	Idle stabilizer valve (N 71) sticks	Idle speed too low	Check (N 71) Repair Group 24
	*Adaptation limit exceeded	Temporary resistance at (N 71) connector	—	—
	*Value drops below adaptation limit	(N 71) sticks in open position	Idle speed too high	Repair leak
		(G 70) Air mass sensor characteristic curve displaced	—	Check (G 70) Repair Group 24
		Air leak between (G 70) and (N 71)	—	—
00535	2141 First knock regulation	Knock regulation module in (J 220) defective or (J 220)	High fuel consumption	Replace (J 220)
			Loss of power	
	*Maximum control limit exceeded	Affects cylinders 1, 2 or 3	Top speed not attainable	
		Open circuit in signal wire from (G 28) engine speed sensor or (G 4) ignition timing sensor or (G 28) and (G 4) are reverse connected on (J 220)	—	Check wiring using wiring diagram
		Poor fuel quality, less than 87 AKI rating	Moderate loss of power	Use fuel rated 87 AKI minimum, (91 AKI recommended)
		Abnormal engine noises (loose components)	—	—
		Open circuit in shielding of (G 61)	Boost pressure drop	Repair open circuit

*One of these displays is shown in addition to the component

Notes for Fault Code 2141:

This Fault Code indicates that cylinders 1, 2 or 3 are affected.

In addition to the display: **"*Control limit exceeded"** the affected cylinder will also be displayed (when appropriate).

Ignition angle retard is always directed to the affected cylinder.

*This display is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00538	2241 Second knock regulation *Maximum control limit exceeded		High fuel consumption	Replace (J 220)
			Top speed not attainable	
		Affects cylinders 4 or 5	—	Check wiring using wiring diagram
		Open circuit in signal wire from (G 28) engine speed sensor or (G 4) ignition timing sensor or (G 28) and (G 4) are reverse connected on (J 220)	—	Reverse connections at (J220)
		Poor fuel quality, less than 87 AKI rating	Moderate loss of power	Use fuel rated 87 AKI minimum, (91 AKI recommended)
		Abnormal engine noises (loose components)	—	—
		Open circuit in shielding of (G 61)	Boost pressure drop	Repair open circuit

Notes for Fault Code 2143:

This Fault Code indicates that cylinders 4 or 5 are affected.

In addition to the display: "**Control limit exceeded**" the affected cylinder will also be displayed (when appropriate).

Ignition angle retard is always directed to the affected cylinder.

*This display is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00537	2341	Fuel tank empty	CO before catalyst less than 0.3%	Fill up tank, must be 2.6 gal minimum
	Oxygen sensor control			
	*Control limit exceeded	Fuel system pressure too low	—	Check fuel system pressure, see Repair Group 24
	*Control limit underexceeded	Fuel system pressure too high	—	
		Defective: spark plug, connectors, ignition wiring, distributor cap and rotor	—	Check components and replace if necessary
		Intake air leak after (G 70) Air mass sensor	Rich exhaust	Repair leak
		Exhaust leak in front of catalyst	Spark plug fouling	Repair leak
		Oxygen sensor faulty	CO before catalyst greater than 1%	Check Oxygen sensor, see Repair Group 24

*This display is shown in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00540	2144 Knock sensor 2 (G 66) *No change in signal	(G 66) loose or connector corroded	High fuel consumption	Re-torque sensor 20 Nm (15 ft lb)
		Open or short circuit between (G 66) and (J 220)	Power loss impact- like (like misfiring)	Repair open or short circuit
		Short circuit between (G 66) and ground or between (G 66) and shielding	Boost pressure not attained	—
		(G 66) defective	—	Replace (G 66)
		Input for (G 66) in (J 220) defective or (J 220) defective	—	Replace (J 220)
00543	2214 Engine rpm limit exceeded	Engine over-revs e.g. missed shift	Possible engine damage	—

*This display is shown in addition to the component

Note for Fault Code **2214**:

This code will be generated if the upper rpm limit of 7440 rpm's is exceeded.

The limit can only be exceeded by making an operating error, for example a missed shift.

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00544	2224 Boost pressure limit exceeded	Air leak at turbo charger	Severe misfiring during full throttle application	Check connections
	*Value too high	Wastegate valve defective	Boost pressure too high	Check wastegate valve, see Repair Group 21
		Wastegate frequency frequency valve (N 75)	—	Check wastegate frequency valve Repair Group 24
		Vacuum line between intake manifold and (J 220) disconnected	—	—
		Pressure sensor in (J 220) defective	—	—
		Severe misfiring during full throttle application	—	—
		Boost pressure too high	—	—
00553	2324 Air mass sensor (G 70)	Open circuit between (G 70) and (J 220)	System goes into limp home mode	Check (G 70) Repair Group 24
	*Value too high	(G 70) Voltage supply has open circuit	Poor throttle response	
	*Value too low	Signal wire to terminal 7 of (J 220) short circuited	Failure during acceleration	
		(G 70) defective (J 220) input for (G 70) defective	Engine occasionally shuts off during start or while decelerating	

This display is shown in addition to the component

One of these displays is shown, in addition to the component.

Notes for Fault Code **2324**:

Ignore fault if displayed as sporadic (intermittent).

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00561	2413 Mixture adjustment	Fuel system pressure too low	Increased fuel consumption	Fill fuel tank
	*Adaptation limit exceeded (multiplicatively)	Defective: spark plug — connectors, ignition wiring, distributor cap and rotor	—	Repair leak
	*Value drops below adaptive limit (multiplicatively)			Check components and replace if necessary
	*Adaptation limit exceeded (additively)	Intake air leak after (G 70) Air mass sensor	Rich exhaust	Repair leak
00575	2221 Manifold pressure			
	*Value too small	Vacuum line between (J 220) and manifold broken, plugged, pinched or kinked	Loss of power	Check vacuum hoses
	*Value too high	Fuel separator between intake manifold and (J 220) contains fluid		Empty fluid from separator
	*Control difference	Wastegate valve defective Wastegate frequency valve (N 75) defective Pressure sensor in (J 220) is defective Turbo-charger defective		Check turbocharger, Repair Group 21
00824	3424 Fault lamp trigger defective	(J 220) defective	OBD lamp does not light up with ignition ON	Check OBD lamp
	*Short circuit to positive (+)	OBD lamp defective		
	*Open circuit or short circuit to ground	Line connection between (J 220) and OBD lamp		Check wiring connections using wiring diagram

*One of these displays is shown, in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
01247	4343 Carbon canister solenoid valve 1 (N 80) * Short circuit to positive (+) * Open circuit short circuit to ground	Short circuit to plus in (N 80) or between (N 80) and terminal 5 of (J 220) *	Poor response in part of load range	Check (N 80), see Repair Group 24
		Short circuit to ground in (N 80) or between (N 80) and terminal 5 of (J 220)	Fuel odors Idle speed	—
		Fuse (S 24) faulty	—	—
		Open circuit	—	—
01249	4411 Fuel injector cylinder 1 (N 30) * Open circuit or short circuit to ground * Short circuit to positive (+)	Short circuit to ground	Engine runs rough and possibly stalls	Check injectors, see Repair Group 24
		Open circuit	—	Repair open circuit, using wiring diagram
		Fuse (S 28) faulty	—	
		Short circuit to positive at harness connector or injector		
01250	4412 Fuel injector cylinder 2 (N 31) * Open circuit or short circuit to ground * Short circuit to positive (+)	Short circuit to ground	Engine runs rough and possibly stalls	Check injectors, see Repair Group 24
		Open circuit	—	Repair open circuit, using wiring diagram
		Fuse (S 28) faulty	—	
		Short circuit to positive at harness connector or injector		

*One of these displays is shown, in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
01251	4413 Fuel injector cylinder 3 (N 32) *Open circuit or short circuit to ground *Short circuit to positive	Short circuit to ground	Engine runs rough and possibly stalls	Check injectors, see Repair Group 24 Repair open circuit, using wiring diagram
		Open circuit	—	
		Fuse (S 28) faulty	—	
		Short circuit to positive at harness connector or injector		
01252	4414 Fuel injector cylinder 4 (N 33) *Open circuit or short circuit to ground *Short circuit to positive (+)	Short circuit to ground	Engine runs rough and possibly stalls	Check injectors, see Repair Group 24 Repair open circuit, using wiring diagram
		Open circuit	—	
		Fuse (S 28) faulty	—	
		Short circuit to positive at harness connector or injector		
01253	4421 Fuel injector cylinder 5 (N 83) *Open circuit or short circuit to ground *Short circuit to positive (+)	Short circuit to ground	Engine runs rough and possibly stalls	Check injectors, see Repair Group 24 Repair open circuit, using wiring diagram
		Open circuit	—	
		Fuse (S 28) faulty	—	
		Short circuit to positive at harness connector or injector		

*One of these displays is shown, in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
01257	4431 Idle stabilizer valve (N 71) *Short circuit to positive (+) *Short to ground	Short circuit to plus in (N 71) or between (N 71) and terminal 4 of (J 220)	Engine speed out of range at operating temperature	Check (N 71) see Repair Group 24
		Short circuit to ground in (N 71) or between (N 71) and terminal 4 of (J 220)	Engine might die when cold	—
		Open circuit	Engine runs rough or has flat spot When in limp home mode, idle speed is between 1100 and 1200 rpm	—
01262	4442 Wastegate frequency valve (N 75) *Short circuit to positive *Open circuit or short to ground	Short circuit to positive in (N 75) and or in wiring connection between (N 75) and terminal 23 of (J 220) Short circuit to ground in (N 75) or in wiring between (N 75) and terminal 23 of (J 220)	Boost pressure too high Boost pressure too low Severe misfiring during full throttle	Check (N 75) Repair Group 24

*One of these displays is shown, in addition to the component

Diagnosis, Fault Memory

Fault Code Display		Problem	Symptom	Repair
Number	Fault Code			
00000	4444 No fault recognized	If a complaint exists, fault not recognized by self diagnosis	—	—
00000	0000 End of output	— —	— —	— —

- check Motronic control unit ground connections at terminals **10, 14, 19, 24** and **26**
- must be between 0 and 0.2 ohms (continuity)
- check ground connections on engine for corrosion or damage, see section D2-390
- check fuel pump relay, see Repair Group 24
- erase Fault memory after repairing any faults
- test drive vehicle for 5 minutes minimum

Note

Select driving conditions that will allow vehicle to be driven continuously without stopping.

- connect **VAG 1551** and activate Fault memory, see section D2-400 for additional information