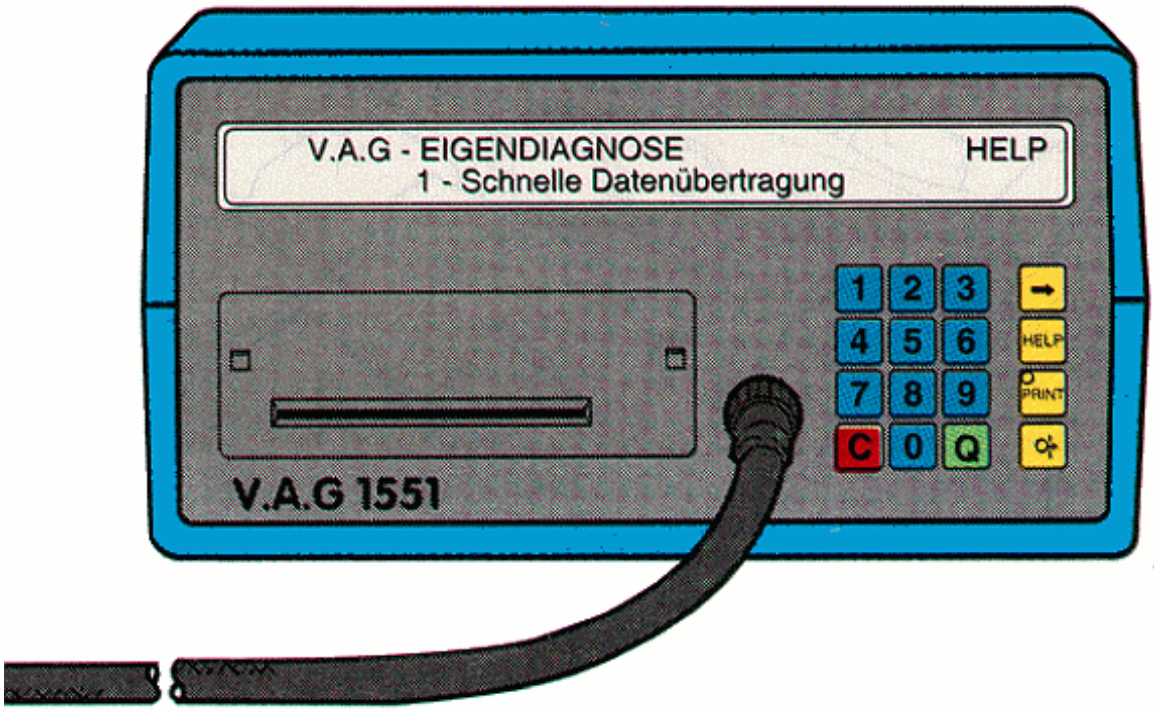
Set-up Instructions

for 1.9-litre TDI - industrial engine AFD

using the

V.A.G-1551



1.9-litre TDI / MSA 15 from 10.96

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1. Notes on initial operation

- These instructions are intended for the "examination of a 1.9-litre TDI - industrial engine AFD" with the MSA 15control unit.
- Example:
- Set-up must be carried out with the switch in the "drive operation" position.
- For the "examination with engine running", the vehicle should have a coolant temperature of **at least 60°C**. All **electrical consumers must be switched off**.
- Texts appearing in the display of the V.A.G 1552 / 1551, are reproduced in a frame. Entries made on the keyboard are given underneath (in this example "01").

e.g.

Rapid data transfer	HELP
Enter address word XX	

01

2. Functions of the diagnosis tester 1551

The following functions are available under the address word 01 - **engine electronics**:

No.	Function	Page
01:	Obtain control unit version	5
02:	Read fault memory	8
03:	Control element diagnosis	12
04:	Basic setting	10
05:	Erase fault memory	
06:	End output	
07:	Code control unit	6
08:	Read measuring value block	9
09:	Read individual measuring values	

2.1 Explanation of functions 01 and 07 of the diagnosis tester

Function 01: Obtain control unit version.

- On delivery of the standard ECU 028 906 021 CS, the zero-th of eight possible data blocks is activated. A new ECU must be coded prior to its initial operation.
- The control unit currently contains two different data blocks, each indicated by a five-digit code, which have been certified by the TÜV:

  Code 00000 = data block 1
  Code 00001 = data block 1
  Code 00002 = data block 2
  Code 00003 = data block 1
  Code 00004 = data block 1
  Code 00005 = data block 1
  Code 00006 = data block 1
  Code 00007 = data block 1
  Code 00008 = data block 1

- In other words, all codes not currently allocated a separate data block automatically contain data block 00001. **However**, if the control unit is activated with a code which has not yet been approved, the message "Control unit incorrectly coded" will appear when the fault memory is read.
- The identification of the workshop code (WSC) is always 00000 on delivery from production. Only after the IMO customer has for example changed the ECU coding with the V.A.G tester will his own WSC, ass allocated to him by VW, appear. This acts as a "fingerprint", making it possible to trace any change in ECU coding.

Function 07: Coding control unit

- To carry out this function, the IMO customer must input his own operator number into the V.A.G tester and inform his responsible distributor/importer of this. Without this operator number it is not possible to change the data block.
- After changing to a new data block, e.g. code 00002, this will be displayed under function 01 "Obtain control unit version". **IMPORTANT !**
- The new data block is not activated until the ECU is reset to the new data block by switching off the ignition for at least 10 seconds. Until this is done, the originally data block remains active.

3. Connecting the control unit to the diagnosis tester 1551

Procedure for connecting up the TDI **engine control unit** MSA15.

Turn the ignition key to the "ignition on" position.

V.A.G - Self-diagnosis	HELP
1- Rapid data transfer	

(display flashes) **1**

Rapid data transfer	HELP
Input address word XX	

01

Rapid data transfer
01-Engine electronics

Q

Please wait

Industrial engine control unit

028 906 021CS	1.9 ltr.	R4	IMO	G00SG	0818	➔
Coding: 00000				WSC 00000		

➔

4. Examining fault memory

Rapid data transfer	HELP
Select function XX	

02

Rapid data transfer	Q
Interrogate fault memory	

Q

No fault recognised *	➔

➔

* On initial operation, the message "Control unit incorrectly coded" appears. The ECU must be re-coded (function 07)

5. Temperature measurements with a cold engine

Precondition for this test is that the vehicle has been left standing over night and the engine has not beet started. The temperature sensors for coolant, intake manifold and fuel must all give roughly the same reading.

Rapid data transfer	HELP
Select function XX	

08

Rapid data transfer	Q
08 Read measuring value block	

Q

Read measuring value block
Enter display group number XXX

Display group number **007**

Q

Display group number 07: Temperatures
cold, standing engine

Description	Specification	VAG 1551 reading	Remarks
Fuel [°C]	-20...+20		
Reserve			
Intake air temperature [°C]	-20...+20		
Coolant [°C]	-20...+20		

Important: The deviation within the measured temperatures must not exceed 5°C.

6. Examining basic setting

The engine control unit outputs a fixed specification value during the basic setting. This value does not correspond to the idling speed value. A comparison of specification and actual values gives information of the function of the corresponding regulatory circuits.

Engine running at idling speed

Rapid data transfer	HELP
Select function XX	

04

Rapid data transfer	Q
04 Basic setting	

Q

Basic setting
Enter display group number XXX

000

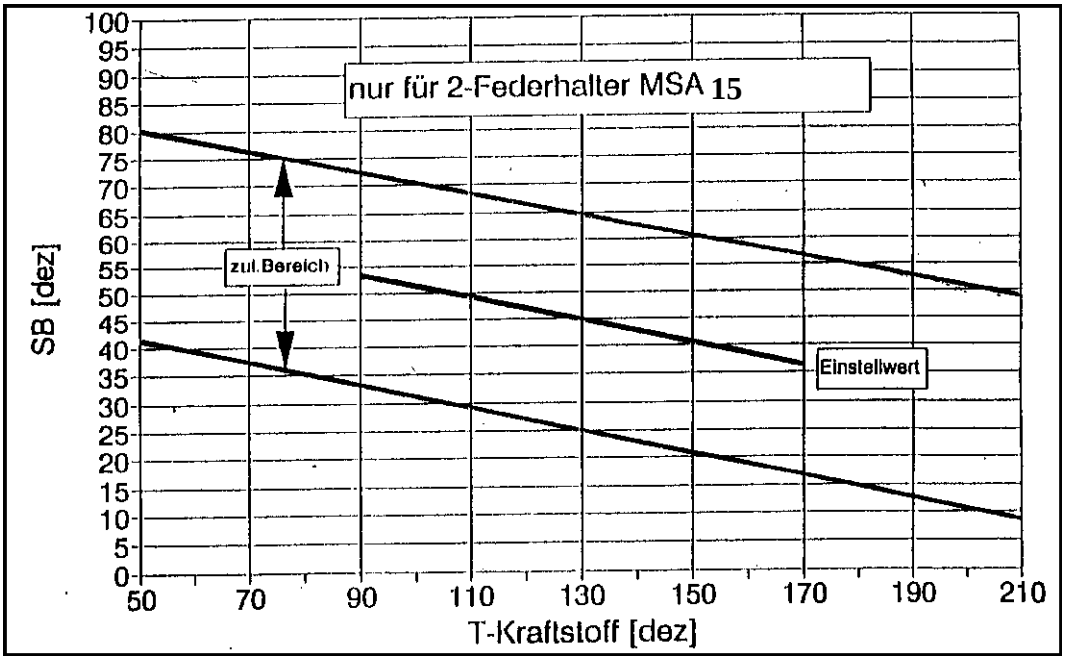
Q

Channel 00: Commencement of injection

Basic setting

Description	Specification	VAG 1551 reading	Remarks
Comm. of injection [dec.]	see diagram		2nd decimal value from the left
Fuel temperature [dec.]	see diagram		9th decimal value from the left

The readings for commencement of injection (SB) and fuel temperature (T-Kraftstoff) must correlate with the following diagram.



7. Control element test

This examination test individual control elements. Each control element is pulsed for a period of 30 seconds, i.e. it is moved alternately between its extreme positions.
The evaluation of control elements should be entered in the table at the end of this section, either as "OK" or "not OK". Measured values are required only for the exhaust gas recirculation and the commencement of injection. To do this, it is necessary to actuate the control elements N18 (exhaust gas recirculation valve) and N108 (commencement of injection valve) and then to leave the control element test with "Cancel". Proceeding in this manner effectively "pulses" the exhaust gas recirculation and commencement of injection valves, allowing the extreme values for exhaust gas recirculation and commencement of injection to be measured in Channel 003 and 004 respectively of measuring value block.

Rapid data transfer	HELP
Select function XX	

03

Rapid data transfer	Q
03 Control element test	

Q

Commencement of injection valve N108	➔

➔

The commencement of injection valve does not have to be evaluated as the basic setting contains all the necessary information.

Exhaust gas recirculation valve N18

➔

Channel 03: Exhaust gas recirculation
Control element test

Description	Specification	VAG 1551 reading	Remarks
Engine speed [1/min]	861...945		
EGR specified [mg/stroke]	0 ... 180		
EGR actual (EGR on) [mg/stroke]	230...320		Difference between the specified and actual value is possible on the AFD
EGR actual (EGR off) [mg/stroke]	360...480		Difference between the specified and actual value is possible on the AFD
on-off ratio (EGR on) [%]	94		
on-off ratio (EGR off) [%]	4		

Air conditioner compressor engagement

Switching on the air conditioner compressor, if available, must be visually and audibly recognisable (**not relevant for the AFD engine**). ➔

Fuel cut-off valve (ELAB)

The engine must stop. ➔

Solenoid valve for charge pressure limitation N75

Grasp the charge pressure control element. The relay must be felt to switch. ➔

Glow plug relay J52

Switch on interior lighting! A difference in lighting intensity (bright/dim) must be noticeable.

If the glow plug relay can be heard to switch, this control element is also OK. ➔

Glow period warning lamp K29

The preglow lamp must light up rhythmically.

➔

Relay for lower heater output J359

The control relay must be audible **(not relevant for the AFD engine)**.

➔

Relay for higher heater output J360

The control relay must be audible **(not relevant for the AFD engine)**.

Control elements

Control element	not OK	OK	Remarks
Air conditioner cut-off: check that compressor is running			**only if fitted**
ELAB: engine must stop			
Charge pressure valve: feel CPR by hand			
Glow plug relay: check interior lighting intensity (bright/dim) (preglow lamp does not light up)			
Warning lamp: preglow lamp must flash			
Relay for lower heater output: control relay must be heard to switch			**not relevant for the AFD engine**

8. Examination of vehicle with the AFD engine at idling speed

Sensor values, specifications and switch positions are registered.

Start the engine now!

Rapid data transfer	HELP
Select function XX	

08

Rapid data transfer	Q
08 Read measuring value block	

Q

Read measuring value block
Enter display group number XXX

Display group number **000**

Q

8.1 Decimal representation (10-digit block)

Display group number 000: 10-digit block

Idle

Description	Specification	VAG 1551 reading	Remarks
Engine speed	41...45		
Comm. of injection	50 ... 125		
Throttle position	0		
Injection quantity	15 ... 45		
Charge pressure	82 ...112		
Atmospheric pressure	181 ... 242		
Coolant temperature	35 ...167		
Intake air temperature	51...182		
Fuel temperature	91... 201		
Air mass	69 ...128		

8.2 Normed Representation

Display group number 001: Quantity adjustment

Idle

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	861... 945		
Injection quantity [mg/stroke]	3 ... 9		
Voltage [V]	1.50 ... 1.95		
Coolant temperature [°C]	20 ...110		

Display group number 002: Idling speed

Idle

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	861 ... 945		
Throttle position [%]	0		
Switch positions	010		Meaning of bits (from the left): **idle boost, idle switch, a/c**
Coolant temperature [°C]	20 ...110		

Display group number 003: Exhaust gas recirculation

Idle

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	861 ... 945		
EGR specified [mg/stroke]	0 ... 180		
EGR actual [mg/stroke]	230 ... 420		Difference between specified and actual value is possible on the AFD
on-off ratio [%]	40 ... 60		

Display group number 004: Commencement of injection (SB)

Idle

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	861 ... 945		
SB specified [° crankshaft]	1 ... 7 before TDC		
SB actual [° crankshaft]	1 ... 7 before TDC		
on-off ratio [%]	2 ... 95		

Display group number 005: Starting quantity

Idle

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	861 ... 945		
Starting quantity [mg/stroke]	15 ... 30		
SB actual [° crankshaft]	1 ... 7 before TDC		
Coolant temperature [°C]	>80		The coolant temperature should be above **80°C** for the measurement

Display group number 006: Switch positions **in drive mode**

Idle

Description	Specification	VAG 1551 reading	Remarks
Road speed [km/h]	50 ... 70		
Switches	1 0 0		Meaning of bits (from the left): **clutch, red. brake, brake**
Speed governor status			
Speed governor status (OLDA channel 75)	0		0 = activated in ECU 255 = not activated in ECU

Display group number 006: Switch positions **in governed mode**

Idle

Description	Specification	VAG 1551 reading	Remarks
Road speed [km/h]	50 ... 70		
Switches	0 0 0		Meaning of bits (from the left): **clutch, red. brake, brake**
Speed governor status	gov. off: 000 000 gov. on: 000 001 gov. WA: 001 001 tip up: 000 101 idling speed switch: 000 011		Governor must be switched on. Only in governed outside operation
Speed governor status (OLDA channel 75)	0		0 = activated in ECU 255 = not activated in ECU

Display group number 007: Temperatures

Idle

Description	Specification	VAG 1551 reading	Remarks
Fuel temperature [°C]	20 ... 80		
Reserve			
Intake air temperature [°C]	10 ... 100		
Coolant temperature [°C]	20 ... 110		

Display group number 010: Air readings

Idle

Description	Specification	VAG 1551 reading	Remarks
Air mass [mg/Hub]	230 ... 420		
Atmospheric pressure [mbar]	900 ... 1200		
Charge pressure [mbar]	900 ... 1200		
Throttle position [%]	0		

Display group number 011: Charge control

Idle

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	861 ... 945		
Specified pressure [mbar]	900 ... 1200		
Actual pressure [mbar]	900 ... 1200		
on-off ratio [%]	5 ... 95		

Display group number 012: Preglow

Idle

Description	Specification	VAG 1551 reading	Remarks
Glow status	11111111		glow off: 11111111 preglow: 00010000 start gl.: 01110000 intermed. gl: 11110000 after gl.: 10110000 Startbergl.: 00110000
Preglow period	0		
Battery voltage [V]	13.5 ... 14.5		
Coolant temperature [°C]	20 ... 110		The coolant temperature should be above **80°C** for the measurement

Display group number 013: Engine running control

Idle

Description	Specification	VAG 1551 reading	Remarks
Deviation cyl. 4 [mg/stroke]	-2 ...+2		
Deviation cyl. 2 [mg/stroke]	-2 ...+2		
Deviation cyl. 1 [mg/stroke]	-2 ...+2		
Current reserve			

9. Examination of vehicle with the AFD engine under full load

This examination is to be carried out with the throttle potentiometer at 100% and the vehicle under full load. If possible, the measuring values should read off or printed out when an engine speed of **2500 [rpm]** is reached.

Rapid data transfer	HELP
Select function XX	

08

Rapid data transfer	Q
08 Read measuring value block	

Q

Read measuring value block
Enter display group number XXX

Enter display group number **001**

Q

Display group number 001: Quantity adjustment

Full load

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	2500		
Injection quantity [mg/stroke]	25 ... 35		
Voltage [V]	2.8 ... 3.5		
Coolant temperature [°C]	> 80		

Display group number 003: Exhaust gas recirculation

Full load

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	2500 ... 3000		
EGR specified [mg/stroke]	850		
EGR actual [mg/stroke]	720 ... 850		
on-off ratio [%]	4		

Display group number 004: Commencement of injection (SB)

Full load

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	2500 ... 3000		
SB specified [° crankshaft]	5 ... 12 before TDC		
SB actual [° crankshaft]	5 ... 12 before TDC		
on-off ratio [%]	65 ... 85		

Display group number 010: Air readings

Full load

Description	Specification	VAG 1551 reading	Remarks
Air mass [mg/Hub]	700 ... 760		
Atmospheric pressure [mbar]	900 ... 1200		
Charge pressure [mbar]	1650 ... 2000		
Throttle position [%]	100		

Display group number 011: Charge control

Full load

Description	Specification	VAG 1551 reading	Remarks
Engine speed [rpm]	2500		
Specified pressure [mbar]	1650 ... 1950		
Actual pressure [mbar]	1650 ... 2000		
on-off ratio [%]	20 ... 70		