Workshop Manual
VW Marine Boat Engine

Engine code	BKS				

Booklet **6-Cyl. Diesel Engine**

Edition 12.06

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Safety Precautions and Technical Data

Safety precautions

Introduction

This Workshop Manual contains technical data, descriptions and repair instructions for the 6-cylinder Volkswagen Marine TDI boat engine.
The individual repair groups of the Volkswagen Marine boat engine are listed in the table of contents.

General information

Spare parts for electrical systems and fuel systems are subject to legal provisions. Genuine Volkswagen Marine parts comply with these provisions. Injuries and damage caused by the use of non-genuine spare parts are excluded from the warranty.

The Volkswagen Marine boat engine is certified in accordance with BSO 2 under the certificate number:

M 103 305 15.

Important

Read the safety precautions carefully before reading the repair instructions. The hazards and safety measures that should always be observed when operating and performing maintenance on the engine are listed below:

- *Stop the engine by switching off the power supply to the engine using the stop switch on the main electrical panel.*

- *Always conduct maintenance work with the engine switched off. However, certain adjustment tasks must be carried out with the engine running.*
  When the engine is running, ensure that loose clothing, long hair or tools cannot get caught in rotating parts and cause serious injuries.

- *During maintenance work or test drives, be sure to wear appropriate shoes (deck shoes) and work clothing.*

- *Stop the engine and close the seawater valve when working on the cooling system.*

- *Open the sealing cap of the cooling system extremely carefully when the engine is hot (danger of scalding) and do not remove the cap until the pressure is completely released.*

- *Connect and disconnect the cables of the glow plug and fuel injection system - including measurement device cables - only when the ignition is switched off.*

- *If the engine is to be run at starting speed without actually starting, e.g. during a compression test, disconnect the plug connector for the injection pump.*

- *Only use motor oils approved by Volkswagen Marine (⇒ Operating Manual for Volkswagen Marine Boat Engine).*

- *Only start the engine in a well-ventilated area. When operating the engine in an enclosed area, make sure that the exhaust gases are routed out of the working area by means of a suitable ventilation system.*

- *Exercise extreme caution in case of leaks in the fuel system. Wear protective goggles when testing the fuel injectors. Jets of fuel at high fuel injection pressures may cause severe injuries.*

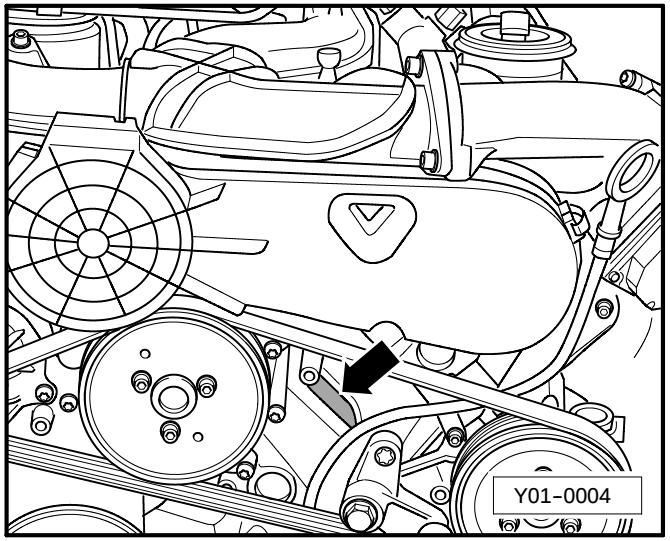
- *Incorrect connection of the battery can lead to sparks, which in turn can cause an explosion. Avoid open flames and welding work near the battery.*

- *Hydrogen gas escapes during battery charging. Hydrogen gas forms highly explosive oxyhydrogen gas when mixed with oxygen. Therefore, wear protective goggles and appropriate protective clothing. Since the mixture is heavier than air, it can collect in the bilge. Use only onboard chargers and, if possible, gel batteries.*

Torques

- *To ensure that the correct tightening torques are applied, tighten all screw connections with a torque spanner. All torques listed in this Workshop Manual refer to cleaned threads, screw/bolt heads and contact surfaces.*

- *When tightening components, first apply the specified torque with a torque wrench, then tighten further by turning through the specified angle.*



Technical Data

Engine number

◄ The engine number ("engine code letters" and "serial number") is located on the front left hand side underneath the toothed belt of the injection pump -Arrow-.

In addition, an adhesive label with "engine code letters" and "serial number" is located on the toothed belt guard.

Engine data

Code letters		BSP
Manufactured		03.06 ➤
Exhaust values as per		BSO 2
Displacement	litres	2.967
Output	kW at rpm	165/4000
Torque	Nm at rpm	450/2000
Bore	∅ mm	83.0
Stroke	mm	91.4
Compression ratio		17.5
CN	at least	51
Firing order		3-6-1-4-2-5
Turbocharging		yes
Self-diagnosis		yes
Intercooling		yes

Code letters		BSP
Weight (dry, with auxiliary equipment, cooling system and coupling flange)	kg	330
Certificate No. as per BSO 2		M 103 305 15

Self-diagnosis

Properties of the self-diagnosis

The control unit for the diesel direct injection system is equipped with a fault memory.

If any faults occur in the sensors or components monitored, these are stored in the fault memory together with details on the type of fault.

Sporadically occurring faults are also printed out with the supplement "sporadically occurring fault". On the display, these faults are indicated by the additional characters "/SP". The cause of sporadic faults can be, for example, a loose connection or a brief break in the line. A sporadic fault will be deleted from the fault memory if 50 warm-up cycles are carried out without this fault.

If faults are detected, which affect the handling, the word "Service" is displayed on the multi-function display.

Previously stored faults can be read out with the ScanDi Tool ⇒ Page 01-9.

The fault memory must be erased after the fault(s) has (have) been resolved ⇒ Page 01-11.

Note:

General information on self-diagnosis can be found in the ScanDi Tool operating manual.

Technical data for the self diagnosis

Equipment

♦ Fault memory: Permanent and volatile memory[1)]

[1)] Erased after the 50th warm-up cycle, if the fault has not recurred.

Query control unit version

The control unit version is shown when connecting the ScanDi Tool and selecting the control unit for the engine electronics ⇒ Page 01-4.

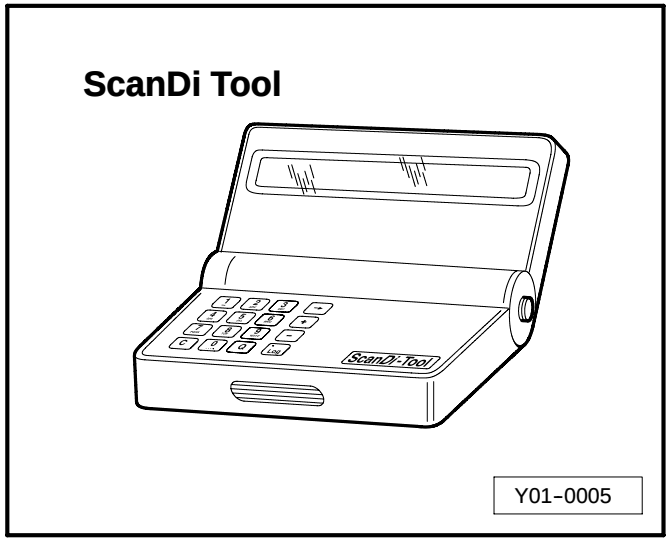
Selectable functions when using the tester ScanDi Tool under address word 01, engine electronics

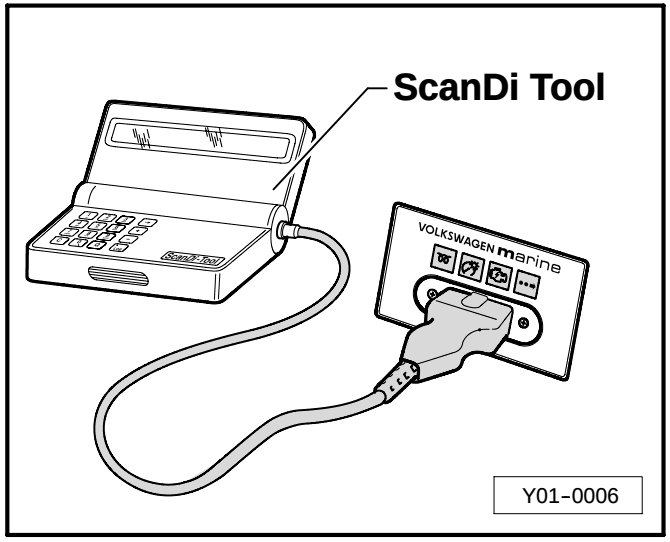
Note:

Please consult the following table to see the conditions for selecting the desired functions.

Function		Condition		
Functions on ScanDi Tool/VAS 5052		**Engine stopped, ignition switched on**	**Engine idling**	**Boat in driving mode**
01	Query control unit version	yes	yes	yes
02	Interrogate fault memory	yes[1)]	yes	yes
03	Final control diagnosis	yes	no	no
05	Erase fault memory	yes	yes	yes
06	End output	yes	yes	yes
08	Read measurement block	yes	yes	yes
34	Adaptation	yes	yes	no

[1)] Perform only with ignition switched on, if engine fails to start.





Connecting the fault reader

All functions available on the ScanDi Tool tester are also available on the tester VAS 5052.

Connecting the ScanDi Tool

Connecting the VAS 5052 ⇒ Page 01-7

Special tools, workshop equipment, test and measuring equipment and accessories required

♦ ScanDi Tool

Test conditions:

- The battery voltage must be at least 11.5 V.
- Fuse 190 OK.

Operating procedure

- Unscrew the cover for the diagnostics connection on the main operating unit.

◄ - Connect the ScanDi tool.

Note:

You can also connect the ScanDi Tool to the diagnostics connector in the main electrical panel
⇒ Overview of installation points, Page 23-4.

- Depending on the function desired, you must:
  switch on the ignition
  or
  start the engine ⇒ Page 01-3, Table "Selectable functions".

Notes:

- *If the display remains dark, check the power supply for the diagnostics plug using the circuit diagram:*

⇒ Circuit diagrams, Electrical fault finding and Installation points

- *If the displays shown in the operating procedure do not appear on the display or if "Connection problem" is shown:*

⇒ ScanDi Tool operating manual

VW-Marine v1.71 +/- Q
Enter address word XX

◄ Display:

- Operate the ScanDi Tool taking into account the information shown on the display:

- Press the keys 0 and 1 for the "Engine electronics" address word and confirm your entry with the Q key.

06V910401 TDI 225-6 MD 000AG 0010 →	
Coding xxxxxxx	WSC xxxxx

◄ The control unit identification is shown on the ScanDi Tool display, e.g.:

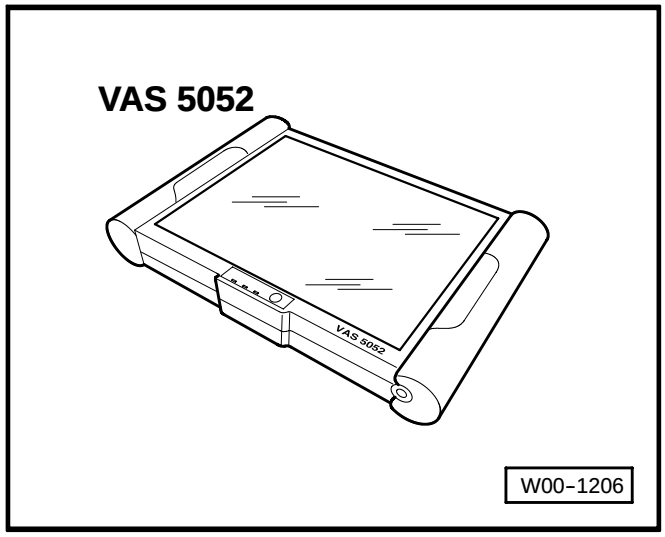
- ♦ 06V910401 = Part no. of the control unit (for current control unit version, see Spare Parts Catalogue)
- ♦ TDI = Turbo Diesel Injection
- ♦ MD 0000AG = Injection system (Marine Diesel Electronic Control)
- ♦ 0010 = Software version of control unit
- ♦ Coding xxxxxxx (ignore)
- ♦ WSC xxxxx = Dealership identifier

- Press the → key.

01 engine electronics	+/- Q
Select function XX	K-Ltg 2000

◄ Display:

- See repair procedures for further steps



Connecting the VAS 5052

Special tools, workshop equipment, test and measuring equipment and accessories required

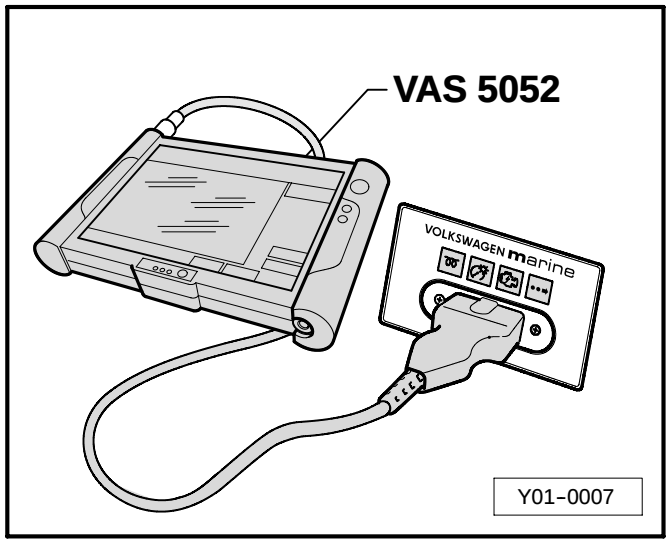
♦ - Fault reader VAS 5052

Test conditions:

- The battery voltage must be at least 11.5 V.
- Fuse 190 OK.

Operating procedure

- Unscrew the cover for the diagnostics connection on the main operating unit.



◄ - Connect the fault reader VAS 5052.

Note:

You can also connect the VAS 5052 to the diagnostics plug in the main electrical panel ⇒ Overview of installation points, page 23-4.

Select operating mode:

- Press the ""Vehicle Self-diagnosis" button on the display.

Select vehicle system:

- Press the “01 - Engine electronics” button on the display.

The control unit identification of the engine control unit is shown on the display.

Selecting the diagnosis function:

All executable diagnosis functions are available on the display.

- Press the button for the desired function on the display.

Notes:

The display fields in the functions 04 - Basic setting and 08 - Read measurement block, are shown from top to bottom.

The following test procedures are described for the ScanDi Tool.

Fault memory

Interrogate fault memory

Special tools, workshop equipment, test and measuring equipment and accessories required

ScanDi Tool

Y01-0005

♦ ScanDi Tool or VAS 5052 fault reader

Operating procedure

- Connect the ScanDi Tool or the VAS 5052 fault reader and select the engine control unit with the "address word" 01. The engine must be idling. (Connecting the fault reader and selecting the engine control unit ⇒ Page 01-4)

Only if the engine does not start:

- *Switch on the ignition.*

01 engine electronics	+/- Q
Select function XX	K-Ltg 2000

◄ Display:

- Operate the fault reader taking into account the information shown on the display:

- Press the keys 0 and 2 for the function "Interrogate fault memory" and confirm your entry using the Q key.

X faults detected

◄ The display shows the number of faults stored or, alternatively, "No faults detected".

If one or more faults are stored:

By pressing the → key, you can now display the individual fault numbers, together with the corresponding text.

01 engine electronics	+/- Q
Select function XX	K-Ltg 2000

◄ Display:

- Remedy the fault using the fault table:
  SAE P0 codes ⇒ Page 01-13
  SAE P1 codes ⇒ Page 01-27

- Then erase the fault memory ⇒ Page 01-11

If no faults are stored:

- Press the → key.

01 engine electronics	+/- Q
Select function XX	K-Ltg 2000

◄ Display:

- Press keys 0 and 6 for the "End data transfer" function and confirm your entry with the Q key.

Erasing the fault memory

Special tools, workshop equipment, test and measuring equipment and accessories required

ScanDi Tool

Y01-0005

♦ ScanDi Tool or VAS 5052 fault reader

Test condition

- Fault rectified

Note:

After the fault has been cleared, the fault memory must again be interrogated as described below and then erased.

Operating procedure

- Connect the ScanDi Tool or the VAS 5052 fault reader and select the engine control unit with the "address word" 01. The engine must be idling. (Connecting the fault reader and selecting the engine control unit ⇒ Page 01-4)

01 engine electronics	+/- Q
Select function XX	K-Ltg 2000

◄ Display:

- Press the keys 0 and 2 for the function "Interrogate fault memory" and confirm your entry using the Q key.

01 engine electronics	+/- Q
Select function XX	K-Ltg 2000

- Press the → key repeatedly until all the previously stored faults have been displayed and the display is as follows:

- Press the keys 0 and 5 for the function "Erasing the fault memory" and confirm your entry using the Q key.

05 Erasing the fault memory	→
Fault memory erased	

◄ Display:

- If the fault memory cannot be erased, there is still a fault to be rectified.

- Press the → key.

no fault found	→

◄ Display:

- Press the → key.

01 engine electronics	+/- Q
Select function XX	K-Ltg 2000

◄ Display:

- Press keys 0 and 6 for the "End data transfer" function and confirm your entry with the Q key.