Advanced Training Course -

AB 026

Diesel Engines

Training Programme

Training course: AB 026 Diesel engines

Course duration: **4 days**

Training material preparation

Topics covered

- Fundamentals of engine mechanicals
- Using special tools
- Stripping, checking and assembling engines
- Basic engine adjustment
- Fundamentals of diesel injection systems
- Fuel supply, injectors, glow plug system and injector pump
- Measures to reduce emission of pollutants
- Systematic method of fault finding and repair
- Self-diagnosis

Training Objectives

The participants should be able to

- **recognise**
- **carry out**
- **and describe**
- the current mechanicals of direct injection diesel engines
- the design, function and diagnosis of special diesel engine components

The recommended teaching method is shown as a pictogram after the targets.

= instruction/ discussion

= team work

= practical work

= overhead

Please use the recommended teaching aids.

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Training material preparation

Course overheads

oriented towards the participants (as required)

- all modules

Videos

oriented towards the participants (as required)

References

oriented towards the participants (as required)

- Workshop Manuals
- Self-study Programmes (SSP)
- Technical Service Handbook
- Fault finding folder
- Special information
- Current flow diagrams

Exercise and demonstration materials

– 3 vehicles with current TDI engines
– Other parts if available

Special tools

see Technical literature (Workshop Manual)

	Topics/ modules	Training Objectives	Suggested methods	Suggested procedure	Materials/ description	Remarks
+	**Welcome**	The participants receive • an overview of the training course and its targets	Discussion	Introduction: Trainer/group, course agenda, intervals.	• Overheads • Flip chart	
+	**Record participant interests**	The participants • share responsibility for and have an interest in the course	Individual/ teamwork	Interests, wishes and problems are noted on presentation charts and displayed To get the most out of learning and working, you can agree on training rules.	• Prompt cards	Expectation questionnaire see 10 rules appendix
+	**Quality of service**	The participants must be aware that • quality of service is the most important part of our presence on the market	Instruction/ discussion	Discussion What does each of the participants contribute to ensure quality of service in their company?	• Flip chart • “Quality of service today” overhead module • VW/Audi TV if necessary	The module can be used at any point in the course.
+	**Current product information**	The participants should • know current customer problems and how to solve them according to the TSH and VW/Audi current product information • know current product innovations	Instruction/ team work	Work through the current problems cited with the participants	• TSH • Current VW/Audi product information (if available)	The module can be used at any point in the course.

+ Compulsory modules

	Topics/ modules	Training Objectives	Suggested methods	Suggested procedure	Materials/ description	Remarks
+	**Fuel supply**	The participants learn about • fuel supply in direct injection diesel engines	Instruction/ discussion	The trainer works through the fuel supply in discussion with the participants.	• Overheads • Self-study program	
+	**The fundamentals of engine mechanicals**	The participants learn about • the mechanicals of direct injection diesel engines. • carrying out the actual condition assessment.	Instruction/ discussion	The trainer presents the new features and the functional principle. The trainer explains the actual status assessment	• Overheads • Self-study program • Models • Demonstration parts • Measuring tools	For this section, the participants strip two diesel engines (in two groups) 2.
+	**Basic engine settings**	The participants should be able to • carry out basic static adjustments in accordance with regulations.	Instruction/ team work	Together with the participants, the trainer completes the power plant with reference to the current literature.		
+	**Pump injector elements**	The participants should familiarise themselves with • the design and the function of the pump injector elements.	Instruction/ discussion	The trainer explains design and function of the elements.	• Pump injector element • Overhead set	

+ Compulsory modules

	Topics/ modules	Training Objectives	Suggested methods	Suggested procedure	Materials/ description	Remarks
	Common Rail System	The participants should familiarise themselves with • the mechanical-hydraulic function.	Instruction/ discussion	The trainer explains the mechanical-hydraulic function.	• Overheads • SSP	
+	**Basic dynamic adjustment**	The participants should be able to • check the basic settings with the VAS 5051 tester.	Team work	3 groups check the dynamic basis settings on 3 vehicles.	• 3 TDI vehicles • 3 VAS 5051 testers	
+	**Self-**	The participants should • be familiar with the function of self-diagnosis. • be able to use self-diagnosis efficiently.	Team work	Using the service literature the participants work through self-diagnosis on 3 vehicles.	• 3 TDI vehicles • 3 VAS 5051 testers • Workshop Manual	

+ Compulsory modules

	Topics/ modules	Training Objectives	Suggested methods	Suggested procedure	Materials/ description	Remarks
+	**VTG charger**	The participants should familiarise themselves with • the design and function of the VTG charger.	Instruction	The trainer explains design and function of the turbocharger.	• Demonstration parts • VTG charger, disassembled	
	The TDI system	The participants familiarise themselves with • the design of an electronically controlled diesel injection system.	Team work	Each group puts together a presentation. **TDI system** **VP 37** **VP 44** **Pump injector**	• 3 vehicles	
+	**TDI 4-cylinder**	The participants should familiarise themselves with • quantity control, commencement of injection, charge pressure control, EGR, special functions and auxiliary signals.	Instruction	The trainer explains the function of the components and the system.	• Overheads • Self-study program	

+ Compulsory modules

	Topics/ modules	Training Objectives	Suggested methods	Suggested procedure	Materials/ description	Remarks
+	**Engine management-systems TDI with pump injector**	The participants should familiarise themselves with • the special features of the sensors, actuators and the differences from the system with **VP 37**.	Team work, instruction	The group presents the differences in the sensor and the actuator systems from the system with **VP 37**. The trainer supplements and explains the interrelations.	• Overhead set • Self-study program • Demonstration parts	
+	**Engine management V6 TDI with VP 44 Bosch**	The participants should familiarise themselves with • the special features of the sensors, actuators and the differences from the other systems.	Instruction	The trainer explains the interrelations between the sensor and actuator systems and the differences from the other systems..	• V6 overhead set	
+	**Engine management TDI with Common Rail System**	The participants should • familiarise themselves with the special features of the sensor and actuator systems and the differences compared to other systems. . • familiarise themselves with the design and function of the V8 Common Rail System.	Teamwork with presentation	The participants work through the Common Rail System and present the differences from the other TDI systems.	• Self-study program • Overhead set • Demonstration parts	

+ Compulsory modules

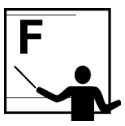
	Topics/ modules	Training Objectives	Suggested methods	Suggested procedure	Materials/ description	Remarks
+	**Evaluating measured value blocks**	The participants should be able to • evaluate and assess the measured value blocks from the various injection systems. • identify the causes of errors.	Teamwork in three groups	The groups read out all the measured value blocks. Evaluation by all the participants follows.	• Workshop Manual	Copy output for all the participants. .
+	**Pump injector elements**	The participants should familiarise themselves with • the design and the function of the pump injector elements.	Instruction/ discussion	The trainer explains design and function of the elements.	• Pump injector element • Overhead set	
+	**Developing a fault finding strategy**	The participants should be able to • develop their own fault finding strategy with the aid of the literature.	Team work	3 groups use the literature to work out a fault finding strategy. The results are then discussed by the whole group.	• Service literature	
+	**Testing the fault finding strategy**	The participants should • learn how to apply the strategy they have worked out.	Team work	3 groups work on 3 vehicles each of which has one fault.	• 3 vehicles • 1551 • 1526 • measuring aids	

+ Compulsory modules

	Topics/ modules	Training Objectives	Suggested methods	Suggested procedure	Materials/ description	Remarks
+	**Presentation of results**	The participants should • present their results.	One group member presents	Presentation with discussion	• Flip chart • Board • Presentation chart	
+	**Summary and conclusion**	The participants • review the course. • are motivated to apply what they have learnt on the course in their workplaces and build on it	Dialog	Summarise the training material covered Finally, work through participants' expectations.		

+ Compulsory modules

Training objective	Method	Personal notes/instructions
Familiarisation with the fuel supply in direct injection diesel engines		• If possible, touch on all the systems. - VP 37 - VP 44 - Pump injector - Common Rail System
Familiarisation with different fuels and their properties.		• Low-sulphur fuel • Paraffin separation • Rape seed methylester • Do not mix with petrol
Familiarisation with the mechanicals of direct injection diesel engines.		• Familiarisation with the phases of engine function • What do we want to achieve? - high performance - low consumption - few pollutants - broad engine speed range • Highlight the following in particular: - port timing - compression

Training objective	Method	Personal notes/instructions
Carrying out an actual state assessment		• Measuring the piston projection • Determining the condition of the cylinder head gasket • Damage assessment
Basic engine adjustment **To be able to adjust port timing temporarily for testing purposes.**		• Emphasise how important precise setting of the port timing is!
Design and function of the pump injector elements.		• Mechanical-hydraulic function. • Please use the pump injector overhead set.
Design and function of the Common Rail System.	 	• Mechanical-hydraulic function. • Please use the V8 TDI Common Rail System overhead set.

Training objective	Method	Personal notes/instructions
Dynamic basic setting with the VAS 5051 tester.		• The participants work independently in 3 groups of four. • Please do not fail to refer to the service literature. • The trainer gives help where required.
The participants should familiarise themselves with the functions of the self-diagnosis system and be able to use it efficiently.		• The participants work independently in 3 groups of four. • The trainer gives help where required.

Working Materials for the Advanced Training Course - AB 026

Diesel Engines

Engine Function Phases - Mechanicals Diesel Engines

- **Priming**
- **Compression**
- **Operation**
- **Emissions**

Template

Engine Function Phases - Mechanicals Diesel Engines

❍ Priming

- Pistons from TDC to BDC
- Inlet valve opens, exhaust valve closed – port timing
- Leak Tightness - suction side - warm-up
- Induction of air - air excess - oxygen
- Turbulence – air swirls

❍ Compression

- Pistons from BDC to TDC
- Inlet valve and exhaust valve closed – port timing, oil pressure
- Compression – leak tightness
- Turbulence – air swirls

❍ Operation

- Pistons from TDC to BDC
- Inlet valve and exhaust valve closed – port timing
- Injection point – combustion

❍ Emissions

- Pistons from BDC to TDC
- Inlet valve closed, exhaust valve open – port timing
- Exhaust system – back pressure, leak tightness

Answer sheet

Training Course Contents

- Fundamentals of engine mechanicals
- Using special tools
- Basic engine adjustment
- Stripping, checking and assembling engines
- Fundamentals of diesel injection systems
- Fuel supply
- Glow plug system, injectors, diesel catalysor
- Injection pump
- Systematic method of error detection and repair
- Self-diagnosis
- Current product information

The 10 Rules of Training

- Take time for questions and problems
- Any question is permitted
- Listen to the person speaking and allow him/her to finish what they are saying
- Interruptions take priority
- Keep to the timeframes agreed
- The group determines the learning speed
- Concentrate on the theme agreed
- Co-ordinate the teamwork
- Honest feedback on the work done
- Bring your experience and your knowledge with you