

## Field campaign

<b>Topic</b>	V8 Kovomo - Bentayga - Valve spring replacement (SC21/42)
<b>Market area</b>	Russische Föderation (5RU),Australia E04 Bentley rest Asia and Australia (6E04),China 796 VW Import Comp. Ltd (Vico), Beijing (6796),Germany E02 Bentley rest Europe (6E02),Japan E03 Bentley Japan (6E03),Korea, (South) E08 Bentley South Korea (6E08),United Arab Emirates E06 Bentley Middle East and Africa (6E06),United States E05 Bentley USA and rest America (6E05)
<b>Brand</b>	Bentley
<b>Transaction No.</b>	2065480/3
<b>Campaign number</b>	EC25
<b>Note</b>	
<b>Type</b>	
<b>US code</b>	

## Vehicle data

### Bentayga

#### Sales types

Type	MY	Brand	Designation	Engine code	Gearbox code	Final drive code
4V14D9	2021	E		*	*	*
4V14D9	2022	E		*	*	*

#### Chas is numbers

Manufacturer	Filler	Type	Filler	MY	Factory	From	To	Prod from	Prod to
SJA	*	*	*	*	C	038153	039999		
SJA	*	*	*	N	C	011001	011069		

## Documents

Document name
<a href="#">master.xml</a>
<a href="#">install1-16.pdf</a>
<a href="#">removal1-16.pdf</a>
<a href="#">sc2142vinlist.pdf</a>

## Notes

▪ [Repair instructions](#)

### Technical background

The intake valve springs (16) and outlet valve springs (16) located within the cylinder heads of Bank 1 and 2 require replacing  
The replacement of all valve springs is required due to an issue which was discovered during a routine quality inspection

### Remedy

The replacement of all intake valve springs and all outlet valve springs (Bank 1 and Bank 2) is required

▪  
IMPORTANT: The removal and installation instructions are attached to this document, the operative MUST ensure the instructions are followed in numerical order as detailed within the work section

The repair manual is also referred to and MUST be followed when instructed

NOTE: The Work section also contains task applicable instructions which MUST also be referred to/conducted. The instructions can change without warning, the operative must always ensure the latest version of this document and the attached instructions are referred to (Use the applicable VIN in Elsa pro to ensure latest version is referred to)

TIP: The removal and installation procedures have been devised specifically for this procedure, all procedures MUST be strictly adhered to

### Customer notification

The procedure must be carried out in conjunction with the PDI process

### Warranty accounting instructions

#### Replacement of the intake and outlet valve springs

Warranty type 790

Damage service number EC25

Damage code 0066

Criteria 01

#### Labour

Labour Operation Code 15 65 56 20 (Use 99 index until 17/02/22)

Time 2100 TU

#### Alignment of applicable driver assist systems (Depending on vehicle specification)

NOTE: The codes for each vehicle type are the same, however some of the times may be different please note that Saga will auto-populate the times when the claim is submitted

- Vehicle front + rear measured wheel alignment checked - 44 95 03 00
- Rear wheel camber adjust - 44 94 15 50
- Rear wheel track adjust - 44 93 15 50
- Front wheel camber adjust - 44 89 15 50
- Front wheel track adjust - 44 88 15 50
- (ACC) - Radar sensor checked + adjusted - 91 63 05 51
- Overhead view camera adjusted - 90 83 15 00
- Driver assist camera adjusted - 96 38 15 50
- Control unit for (Lane change assist) adjusted - 96 35 15 00
- Night vision system calibration - 90 80 15 50
- Headlamps to adjust - 94 15 16 00
- ODIS Time - 01 50 00 00 (Time as per ODIS log)

### Genuine parts

Part number	Description	Quantity
-------------	-------------	----------

06E109623AD	Intake valve springs	16
0P2109623	Outlet valve springs	16
36A198115E	Parts set	1
0P2103484	Seal	1
0P2103517	Seal	1
G052565A1	Silicone paste	As required
N10458202	Hexagon bolt M6x22	4
WHT007821	O-ring 31x2	2
WHT008638	O-Ring 17.5x1.5	8
04E998907A	Repair kit for valve unit	8
D176501A1	Loctite 5970- BM (Source locally)	As required
04E906145	Seal ring	4
06M145113	Seal	1
034115427B	O-Ring 12x2	1
0P2103650E	Gasket for cover Cylinders 1-4	1
0P2103649E	Gasket for cover Cylinders 5-8	1
0P2103113A	Cover	3
06M109235	Seal	4
06M109493D	Plate	4
0P2129056	Seal	2
N90344501	O-Ring 45x3	2
N91019101	O-Ring 50x3	2
99970751741	O-Ring 22x3	2
N90365304	O-Ring 20x3	1
N90925001	O-Ring 17x3	3
8W0253115	Turbo to pre catalytic seal	2
8W0253725D	Clamp for turbochargers	2
8W0253115D	Downpipe to pre catalytic seal	2
N91130802	Downpipe to catalytic nut	6
Refer to ETKA and Rep.Gr 00 (Power transmission fluids and capacities)	Differential oil (front and centre)	As required
Refer to ETKA and Rep.Gr 00 (Power transmission fluids and capacities)	Transmission fluid	As required
Refer to ETKA and Rep.Gr 00 (Engine fluids and capacities)	Engine coolant	As required
00004320935	Microgleit DF977S (Source locally)	As required
Loctite 7515 primer	Loctite 7515 primer (Source locally)	As required

## Parts supply

All parts listed within this document are currently restricted and will follow a specific process to minimise disruption for Retailers and ensure delivery is received in complete vehicle sets.

Please do not raise any unnecessary part orders or service calls.

## Parts despatch control

The parts will be controlled centrally and automatically allocated and distributed therefore in this case there is no requirement for retailers to place orders

## Repair instructions

■ Notes

### Technical background

The intake valve springs (16) and outlet valve springs (16) located within the cylinder heads of Bank 1 and 2 require replacing  
The replacement of all valve springs is required due to an issue which was discovered during a routine quality inspection

### Check

If the vehicle is not already listed as repaired in the "Repair history" (in Elsa Pro) refer to the Identification section to check the presence of the green paint completion mark (Figure 4)

Should neither be evident ("Repair history" or applicable paint mark) carry out the required work in accordance with these instructions

### Genuine parts

Part number	Description	Quantity
06E109623AD	Intake valve springs	16
0P2109623	Outlet valve springs	16
36A198115E	Parts set	1
0P2103484	Seal	1
0P2103517	Seal	1
G052565A1	Silicone paste	As required
N10458202	Hexagon bolt M6x22	4
WHT007821	O-ring 31x2	2
WHT008638	O-Ring 17.5x1.5	8
04E998907A	Repair kit for valve unit	8
D176501A1	Loctite 5970- BM (Source locally)	As required
04E906145	Seal ring	4
06M145113	Seal	1
034115427B	O-Ring 12x2	1
0P2103650E	Gasket for cover Cylinders 1-4	1
0P2103649E	Gasket for cover Cylinders 5-8	1
0P2103113A	Cover	3
06M109235	Seal	4
06M109493D	Plate	4
0P2129056	Seal	2
N90344501	O-Ring 45x3	2
N91019101	O-Ring 50x3	2

99970751741	O-Ring 22x3	2
N90365304	O-Ring 20x3	1
N90925001	O-Ring 17x3	3
8W0253115	Turbo to pre catalytic seal	2
8W0253725D	Clamp for turbochargers	2
8W0253115D	Downpipe to pre catalytic seal	2
N91130802	Downpipe to catalytic nut	6
Refer to ETKA and Rep.Gr 00 (Power transmission fluids and capacities)	Differential oil (front and centre)	As required
Refer to ETKA and Rep.Gr 00 (Power transmission fluids and capacities)	Transmission fluid	As required
Refer to ETKA and Rep.Gr 00 (Engine fluids and capacities)	Engine coolant	As required
00004320935	Microgleit DF977S (Source locally)	As required
Loctite 7515 primer	Loctite 7515 primer (Source locally)	As required

## Tools

Refer to the attached instructions for all tooling requirements

## Work

1) Referring to Rep.Gr 10 - Remove the engine and transmission

▪

NOTE: Once the engine is removed there is not a requirement to separate the transmission from the engine, the replacement of the valve springs should be conducted with the engine and transmission sitting on the hydraulic lifting table

CAUTION: Ensure the engine and transmission is suitably secured to the hydraulic lifting table

2) Referring to Rep.Gr 26 - Remove both catalytic converters and associated heatshields

3) Refer to the attached instructions ensuring each process is conducted in numerical order (1 through to 16) as follows:

### Removal

1 - Remove rear high-pressure fuel line 2

- Remove upper chain housing covers 3 -

Remove oil mist separators

4 - Remove ignition coils

5 - Remove high pressure fuel lines, banks 1 and 2

6 - Remove high pressure fuel pumps

7 - Remove fuel rails

8 - Remove CDA solenoids

9 - Remove fuel injectors

10 - Remove mechanical vacuum pump

11 - Remove pressure pipes

12 - Remove camshaft actuators 13

- Remove cylinder head cover

14 - Remove valve lifters (hydraulic tappets) 15 -

Remove spark plugs

16 - Remove valve springs

NOTE: It is imperative the attached instructions are followed in numerical order as each task has been individually generated to allow the operative to conduct the rework with minimal disruption

▪

**VERY IMPORTANT:** The operative **MUST** ensure the valve springs are fitted in the correct location as the part numbers of the Intake valves and Outlet valves are different.

**TIP:** To ensure consistency/accuracy during the replacement of the valve spring process and to ensure the springs are fitted in the correct location, it is highly recommended the same operative is used for the duration of this process

- 06E 109 623AD - Intake valve springs - Figure 1 (Located on the outside edge of each bank)

**HINT:** Referring to Figure 1 - The valve spring is shown in the orientation as it should be fitted **IMPORTANT:** The 3 white lines shown/circled on the upper face of the spring must be facing upwards when fitted



Figure 1

- 0P2 109 623 - Outlet valve springs - Figure 2 (Located on the inside edge of each bank)

**HINT:** Referring to Figure 2 - The valve spring is shown in the orientation as it should be fitted **IMPORTANT:** The 4 blue lines shown/circled on the upper face of the spring must be facing upwards when fitted



Figure 2

**TIP:** When removing the original parts it is best practice to keep the new parts completely separate to eliminate cross contamination

**HINT:** Ensure all parts which are not required to be replaced (as part of this process) are inspected prior to refitting and replaced if required

**VERY IMPORTANT:** When replacing the valve springs (once the collets and valve spring cap is removed from each valve) it is imperative that constant air pressure is supplied to the affected cylinder whilst the replacement of the valve springs is being conducted, in the event the air supply is lost or is not maintained during this operation the applicable valve could drop directly in the cylinder resulting in the possible requirement to remove the cylinder head to retrieve the valve

4) To complete the installation of the valve springs - Refer to the attached installation instructions in numerical order

**VERY IMPORTANT:** The operative **MUST** ensure the valve springs are fitted in the correct location as the part numbers of the Intake valves and Outlet valves are different.

**TIP:** To ensure consistency/accuracy during the replacement of the valve spring process and to ensure the springs are fitted in the correct location, it is highly recommended the same operative is used for the duration of this process

#### INSTALLATION

- 1 - Install valve springs
- 2 - Install spark plugs
- 3 - Install valve lifters (hydraulic tappets) 4
- Install cylinder head covers
- 5 - Install camshaft actuators (includes setting timing)

- 6 - Install pressure pipes
- 7 - Install mechanical vacuum pump
- 8 - Install fuel injectors
- 9 - Install cylinder deactivation solenoids 10
- Install fuel rails
- 11 - Install high pressure fuel pumps
- 12 - Install high pressure fuel lines, banks 1 and 2
- 13 - Install ignition coils
- 14 - Install oil mist separators
- 15 - Install upper chain housing covers
- 16 - Install rear high-pressure fuel line
- 5) Referring to Rep.Gr 26 - Refit both catalytic converters and associated heatshields
- 6) Referring to Rep.Gr 10 - Refit the engine and transmission
- 7) Carry out wheel alignment and ensure the driver assist system calibrations are performed (Depending on vehicle specification) as follows

- Vehicle front + rear measured wheel alignment checked
- Rear wheel camber adjust
- Rear wheel track adjust
- Front wheel camber adjust
- Front wheel track adjust
- (ACC) - Radar sensor checked + adjusted
- Overhead view camera adjusted
- Driver assist camera adjusted
- Control unit for (Lane change assist) adjusted
- Night vision system calibration
- Headlamps to adjust

8) Raise a non-technical DISS query attaching the following

- Before and after screen shots of the wheel alignment results
- Screen shots confirming the applicable drive assist systems have been successfully adjusted/calibrated

Warranty payments will not be approved without the submission of the requested results via the open DISS query

9) Conduct the PDI road test - On return confirm that no DTC's are evident

10) Check and confirm that no DTC's are stored or there are no engine operation issues evident - Save an online log to confirm that no DTC's were evident at this stage of the procedure

- Referring to Figure 3
- Select Guided functions from *01 – Engine Control Module 1*
- Select Generate readiness code
- Select Execute

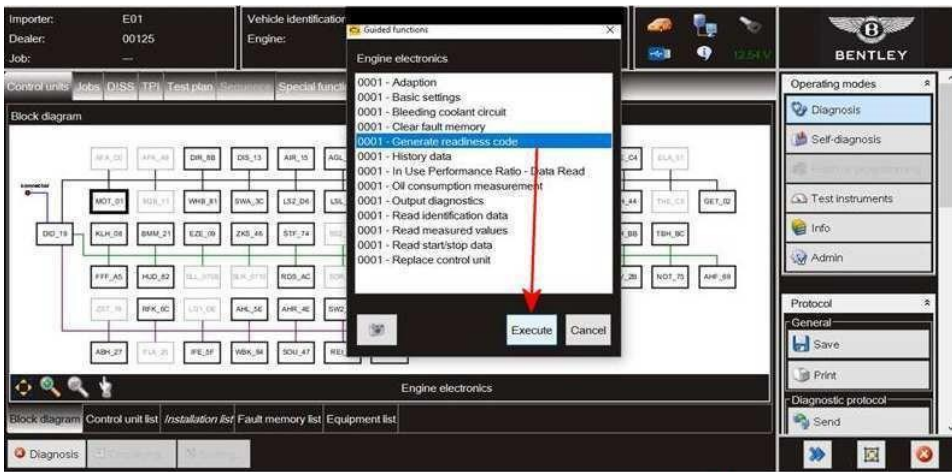


Figure 3

Please be aware that not all readiness bytes may be at zero, however this is not a requirement as the remaining bytes will set during normal customer driving cycle routines

11) Confirm no oil/fluid leaks are evident

12) Place a green paint completion mark as shown within the Identification section (Figure 4)

### Identification

Green paint completion mark on the 12 volt battery vent hose (Figure 4)

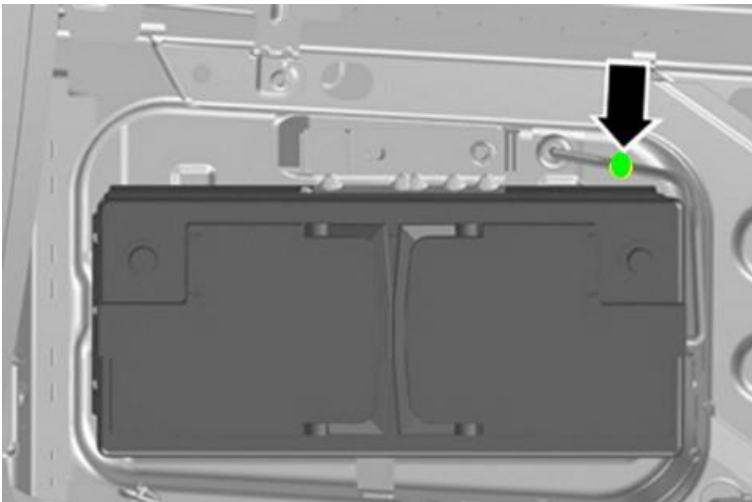


Figure 4

SJAAL14V8MC038153	SJAAM2ZV1MC039348	SJAAL1ZV0MC039516	SJAAM2ZV2NC039635
SJAAL14V2MC038424	SJAAL14V4MC039350	SJAAD14V0MC039519	SJAAM14V2NC039636
SJAAL34VXMC038506	SJAAD14V5MC039354	SJAAL1ZV2MC039520	SJAAM2ZV8NC039641
SJAAL14VXMC038543	SJAAM2ZV4MC039361	SJAAL1ZV5MC039527	SJAAM2ZVXNC039642
SJAAM2ZV7MC038544	SJAAD14V4MC039362	SJAAD14V3MC039529	SJAAM2ZV3NC039644
SJAAL14VXMC038591	SJAAD14V8MC039364	SJAAD14V1MC039531	SJAAM14V3NC039645
SJAAD14V0MC038595	SJAAL1ZV7MC039366	SJAAD14V5MC039533	SJAAM2ZV7NC039646
SJAAL14V4MC038635	SJAAL1ZV0MC039371	SJAAD14V9MC039535	SJAAM2ZV9NC039647
SJAAD14V1MC038637	SJAAL14V9MC039375	SJAAD14V2MC039537	SJAA514V2NC039648
SJAA514V5MC038640	SJAAM2ZV1MC039379	SJAAD14V4MC039538	SJAAM2ZV9NC039650
SJAAL14V1MC038690	SJAAM2ZV5MC039384	SJAAD14V6MC039539	SJAAM14V6NC039655
SJAAB14V3MC038709	SJAAM2ZV0MC039387	SJAAL14V9MC039540	SJAAM2ZVXNC039656
SJAAB14V9MC038715	SJAAM2ZV2MC039388	SJAAL14V0MC039541	SJAAM2ZV3NC039658
SJAAL14V9MC038727	SJAAD14V0MC039391	SJAAL14V6MC039544	SJAAM2ZV3NC039661
SJAAL1ZV6MC038743	SJAAD14V4MC039393	SJAAD14V5MC039547	SJAAM14V9NC039665
SJAAL1ZV2MC038772	SJAAL14V4MC039400	SJAAD14V8MC039557	SJAAM2ZV4NC039667
SJAAL14V8MC038797	SJAAM2ZV1MC039401	SJAAD14VXMC039558	SJAAM2ZV6NC039668
SJAAL14V8MC038833	SJAAD14V3MC039403	SJAAM2ZV3MC039559	SJAAM2ZV8NC039669
SJAAL14V8MC038850	SJAAD14V5MC039404	SJAAM2ZVXMC039560	SJAAM2ZV6NC039671
SJAAL14V0MC038860	SJAAL14V3MC039405	SJAAD14VXMC039561	SJAAM2ZV8NC039672
SJAAL14VXMC038865	SJAAD14V0MC039407	SJAAM2ZV9NC039566	SJAAM2ZVXNC039673
SJAAD14V5MC038866	SJAAL14V9MC039408	SJAAM14V9NC039570	SJAAM2ZV1NC039674
SJAAL14V1MC038897	SJAAL14V9MC039411	SJAA514V4NC039571	SJAAM2ZV7NC039677
SJAAD14V5MC038916	SJAAM2ZV6MC039412	SJAAM2ZV6NC039573	SJAAM2ZV9NC039678
SJAAD14V7MC038920	SJAAD14VXMC039415	SJAAL14V2NC039574	SJAAM2ZV7NC039680
SJAAL14V7MC038922	SJAAM2ZV7MC039418	SJAAM2ZVXNC039575	SJAAM2ZV0NC039682
SJAAL14V5MC038949	SJAAM2ZV7MC039421	SJAAM2ZV1NC039576	SJAAM2ZV6NC039685
SJAAL14V6MC038958	SJAAD14V0MC039424	SJAAM2ZV3NC039580	SJAAL14V4NC039690
SJAAL34V3MC038962	SJAAD14V4MC039426	SJAAM2ZV5NC039581	SJAAM2ZV3NC039692
SJAAB14V7MC038969	SJAAL34V8MC039427	SJAAM2ZV9NC039583	SJAAM2ZV5NC039693
SJAAL14V6MC038975	SJAAD14VXMC039432	SJAAM2ZVXNC039589	SJAAM14V5NC039694
SJAAD14V3MC038977	SJAAD14V7MC039436	SJAAM2ZV6NC039590	SJAAM2ZV9NC039695
SJAAL14V5MC038983	SJAAM2ZV2MC039438	SJAAM14V6NC039591	SJAAM2ZV4NC039698
SJAAL14V4MC039090	SJAAM2ZV0NC039441	SJAAM2ZV1NC039593	SJAAM2ZV0NC039701
SJAAD14V9MC039129	SJAAD14VXMC039446	SJAAM2ZV7NC039596	SJAAM2ZV4NC039703
SJAAL14V5MC039132	SJAAL14VXMC039448	SJAAM2ZV9NC039597	SJAAM2ZV6NC039704
SJAAL14V9MC039134	SJAAL14VXMC039451	SJAAM2ZV0NC039598	SJAAM2ZV3NC039708
SJAAL1ZV7MC039142	SJAAD14V7MC039453	SJAAM2ZV2NC039599	SJAAM2ZV1NC039710
SJAAL14V2MC039153	SJAAL14V5MC039454	SJAAM2ZV0NC039603	SJAAL14V8NC039711
SJAAB14V2MC039155	SJAAD14VXMC039463	SJAAM14V2NC039605	SJAAM2ZV5NC039712
SJAAL14V8MC039156	SJAAM2ZV3MC039464	SJAAM2ZV8NC039607	SJAAL14V2NC039722
SJAAD14V6MC039184	SJAAL1ZV4MC039471	SJAAM2ZVXNC039608	SJAA514V7NC039726
SJAAL14V6MC039186	SJAAL1ZV1MC039475	SJAAM2ZV1NC039609	SJAAM2ZV7NC039727
SJAAM2ZV4MC039196	SJAAL1ZV9MC039479	SJAAM2ZV8NC039610	SJAAM2ZV0NC039729
SJAAL14V5MC039213	SJAAL14V1MC039483	SJAAM2ZVXNC039611	SJAAM2ZV7NC039730
SJAAM2ZV1MC039298	SJAAD14V7MC039484	SJAAM14VXNC039612	SJAAD14V6NC039736
SJAAD14V1MC039299	SJAAL14V5MC039485	SJAAM2ZV5NC039614	SJAAM2ZV3NC039739
SJAAM2ZV0MC039308	SJAAL14V7MC039486	SJAAL14V1NC039615	SJAAL14V4NC039740
SJAAD14V4MC039314	SJAAD14V4MC039488	SJAAM2ZV0NC039617	SJAAM2ZV3NC039742
SJAAL14VXMC039319	SJAAL14V0MC039491	SJAAM2ZV4NC039619	SJAAM2ZV9NC039745
SJAAL14VXMC039322	SJAAL14V1MC039497	SJAAM2ZV2NC039621	SJAAD14V2NC039748
SJAAL14V7MC039326	SJAAD14V9MC039504	SJAAM2ZV6NC039623	SJAAM2ZV1NC039755
SJAAL14V0MC039328	SJAAL1ZV8MC039506	SJAAM2ZV3NC039627	SJAAM2ZV5NC039760
SJAAL14V2MC039329	SJAAM2ZVXMC039509	SJAAM14V3NC039628	SJAAD14V0NC039764
SJAAL14V8MC039335	SJAAM2ZV6MC039510	SJAAM2ZV3NC039630	SJAA514V8NC039766
SJAAL1ZV1MC039346	SJAAD14V1MC039514	SJAAM2ZV5NC039631	SJAAD14V8NC039768
SJAAD14V8MC039347	SJAAM2ZV5MC039515	SJAAM2ZV7NC039632	SJAAM2ZV1NC039769

SJAAL14V5NC039777	SJAAM2ZVXNC039852	SJAAM2ZV3NC039921	SJAAM2ZVXNC039978
SJAAM2ZV2NC039778	SJAAM2ZV1NC039853	SJAAM2ZV9NC039924	SJAA514V5NC039983
SJAAM2ZV4NC039779	SJAAM2ZV3NC039854	SJAAM2ZV0NC039925	SJAAM2ZV5NC039984
SJAAM2ZV2NC039781	SJAAD14V3NC039855	SJAAM2ZV2NC039926	SJAAM2ZV7NC039985
SJAAM4ZV3NC039784	SJAAM2ZV7NC039856	SJAAD14V2NC039927	SJAAM2ZV9NC039986
SJAAM2ZV1NC039786	SJAAM2ZV2NC039859	SJAAM2ZV6NC039928	SJAAM2ZV0NC039987
SJAAM2ZV7NC039789	SJAAM2ZV9NC039860	SJAAM2ZV8NC039929	SJAAM2ZV4NC039989
SJAAM2ZV3NC039790	SJAAM2ZV0NC039861	SJAAM2ZV4NC039930	SJAAM2ZV0NC039990
SJAAM2ZV7NC039792	SJAAM2ZV2NC039862	SJAAM2ZV6NC039931	SJAAM2ZV1NC039996
SJAAM2ZV0NC039794	SJAAM2ZV4NC039863	SJAAM2ZV8NC039932	SJAAM2ZV3NC039997
SJAAM2ZVXNC039799	SJAAM2ZV8NC039865	SJAAM2ZV1NC039934	SJAAM2ZV5NC039998
SJAAM2ZV4NC039801	SJAAL14V9NC039880	SJAAM2ZV5NC039936	SJAAM2ZV7NC039999
SJAAM2ZVXNC039804	SJAAM2ZV1NC039884	SJAAM2ZV9NC039938	SJAAM2ZV8NC011001
SJAAM2ZV1NC039805	SJAAD14V1NC039885	SJAAM2ZV7NC039940	SJAAM2ZVXNC011002
SJAAM2ZV7NC039808	SJAAD14V3NC039886	SJAAM2ZV0NC039942	SJAAM2ZV1NC011003
SJAAM2ZV9NC039809	SJAAM2ZV7NC039887	SJAAM2ZV2NC039943	SJAAM2ZV1NC011017
SJAAM2ZV5NC039810	SJAAM2ZV9NC039888	SJAAM2ZV4NC039944	SJAAM2ZV3NC011018
SJAAL14V7NC039814	SJAAM2ZV0NC039889	SJAAM2ZV6NC039945	SJAAM2ZV5NC011022
SJAAM2ZV8NC039817	SJAAM2ZV7NC039890	SJAAM2ZV8NC039946	SJAAM2ZV7NC011023
SJAAD14VXNC039819	SJAAM2ZV9NC039891	SJAAD14VXNC039948	SJAAM2ZV9NC011024
SJAA514V5NC039823	SJAAM2ZV0NC039892	SJAAM2ZV3NC039949	SJAAM2ZV0NC011025
SJAAM2ZV7NC039825	SJAAM2ZV4NC039894	SJAAM2ZVXNC039950	SJAAM2ZV2NC011026
SJAAM2ZV9NC039826	SJAAM2ZV6NC039895	SJAAL14V6NC039951	SJAAM2ZV6NC011028
SJAAL14V5NC039827	SJAAM2ZVXNC039897	SJAAM2ZV3NC039952	SJAAD14V6NC011029
SJAAM2ZV4NC039829	SJAAM2ZV3NC039899	SJAAM2ZV5NC039953	SJAAM2ZV4NC011030
SJAAM2ZV0NC039830	SJAAM2ZV1NC039903	SJAAM2ZV9NC039955	SJAAM2ZV6NC011031
SJAAM2ZV2NC039831	SJAAM2ZV5NC039905	SJAAM2ZV0NC039956	SJAAM2ZV8NC011032
SJAAD14VXNC039836	SJAAM2ZV7NC039906	SJAAM2ZV2NC039957	SJAAD14V8NC011033
SJAAM2ZV3NC039837	SJAAM2ZV9NC039907	SJAAM2ZV4NC039958	SJAAM2ZV1NC011034
SJAAM2ZV5NC039838	SJAAM2ZV0NC039908	SJAAM2ZV6NC039959	SJAAM2ZV3NC011035
SJAAM2ZV3NC039840	SJAAM2ZV2NC039909	SJAAM2ZV2NC039960	SJAAM2ZV5NC011036
SJAAM2ZV5NC039841	SJAAD14V7NC039910	SJAAM2ZV4NC039961	SJAAM2ZV0NC011039
SJAAM2ZV7NC039842	SJAAM2ZV0NC039911	SJAAM2ZV6NC039962	SJAAM2ZV7NC011040
SJAAM2ZV2NC039845	SJAAD14V2NC039913	SJAAM2ZVXNC039964	SJAAM2ZVXNC011047
SJAAM2ZV6NC039847	SJAAM2ZVXNC039916	SJAAM2ZV3NC039966	SJAA514V9NC011068
SJAAM2ZV8NC039848	SJAAM2ZV1NC039917	SJAAM2ZV5NC039967	SJAAM2ZV9NC011069
SJAAM2ZVXNC039849	SJAAM2ZV3NC039918	SJAAD14V5NC039968	
SJAAM2ZV6NC039850	SJAAM2ZV5NC039919	SJAAM2ZV9NC039969	
SJAAM2ZV8NC039851	SJAAM2ZV1NC039920	SJAAM2ZV8NC039977	

## 1. Install valve springs:

### Special tools and workshop equipment required

- ◆ Guide plate -VAS 5161A/38-
- ◆ Removal and installation device for valve keys -VAS 5161A-
- ◆ Valve stem seal puller -3364-
- ◆ Press-on tool -3365-



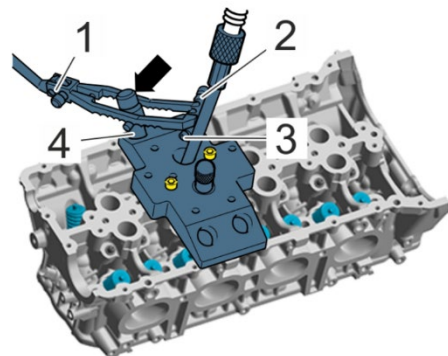
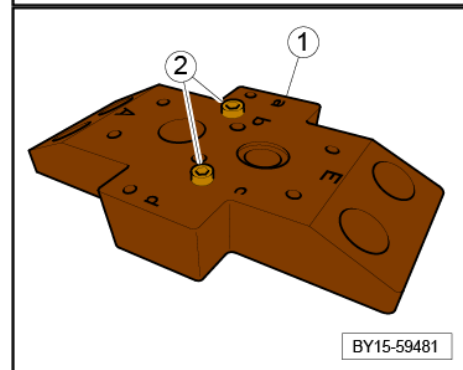
#### Note

In the Guide plate -VAS 5161A/38- -1- there are four bore holes -a, b, c, d- for mounting on the cylinder head. Depending on the installation situation, observe the use of the bores and secure the Guide plate -VAS 5161A/38- with the supplied screws, M5x40 -2-.

- ◆ -E- Intake side
- ◆ -A- Outlet side

### Installation

- Insert NEW valve springs and valve-spring plates in their original position. Observe installation positions.
- Install valve keys.
- Insert assembly cartridge -VAS 5161/8A- -4- into the Guide plate -VAS 5161A/38-.
- Press pressure fork -VAS 5161/2- -1- down, pull knurled screw -arrow- on the assembly cartridge -VAS 5161/8A- -4- upwards by turning it back and forth, thereby inserting the valve collets.
- Relieve pressure on the pressure fork -VAS 5161/2- -1- whilst pulling on the knurled screw.
- Repeat the procedure on each valve.
- When all valves are secured again, disconnect the compressed air connection and unscrew hose adapter -VAS 5161A/35-.
- Do the same on the other cylinders.



## 2. Install spark plugs:

### Special tools and workshop equipment required

Spark plug socket (14 mm) commercially available.

### Installation

Installation is the reverse of removal procedure, noting the following:

- Torque tighten each spark plug to 23 Nm.



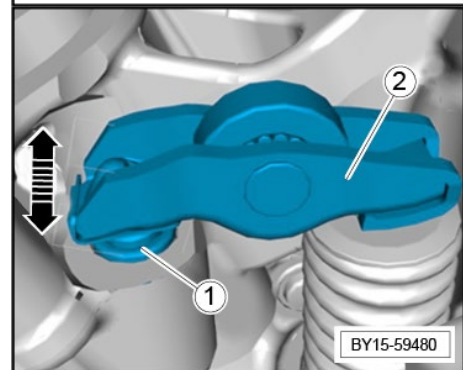
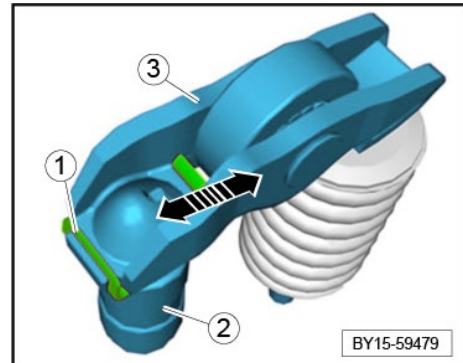
### **WARNING**

Always fit a complete set of spark plugs of the same specification.

### 3. Install valve lifters (hydraulic tappets):

#### Installation

- Fit hydraulic tappet -2- on valve lever -3-.
- Position hydraulic tappet -2- and safety clip -1- on valve lever -3-.
- Insert hydraulic tappet -2- and hook safety clip -1- into valve lever -3-. Check that the safety clip -1- is fitted correctly.
  
- Fit hydraulic tappet -1- and valve lever -2-.
- Lightly lubricate the hydraulic tappet -1- and valve lever -2- with engine oil (0W-40).
  
- Insert hydraulic tappet -1- with the valve lever -2- into the cylinder head together.
- Position the pressure face of the valve lever -2- on the valve pressure face.
  
- After you have installed all hydraulic tappets and valve levers, check that they are fitted correctly.
- In particular, check that the safety clip is fitted correctly and that the pressure faces of the valve lever and valve are positioned correctly.



#### 4. Install cylinder head covers:

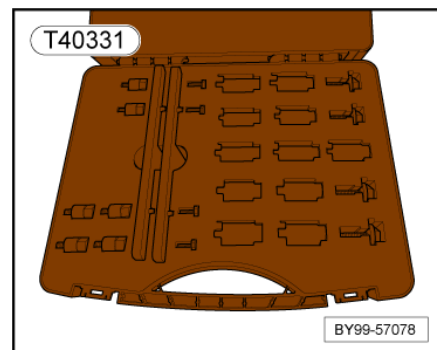
The following procedure covers both bank 1 and bank 2 camshaft covers.

 Note

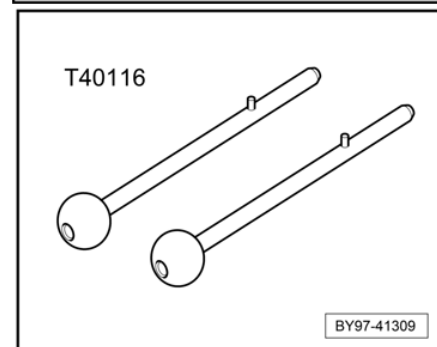
Cylinder heads are labelled Bank 1 (RHS) and Bank 2 (LHS) as viewed from the driver's seat.

#### Special tools and workshop equipment required

◆ Camshaft clamp kit -T40331-



◆ Locating pins -T40116-



#### Installation

Installation is the reverse of removal, noting the following.

 Note

The Camshaft clamp -T40331- must be fitted before removal and installation.

→ Rep.-Gr.15

 Note

Fitting and sealing components using liquid sealant.

◆ Clean sealing faces to remove all traces of residual sealant.

- ◆ Sealing faces must be free of grease and oil.
- ◆ Clean sealing faces with primer Loctite -7515-.
- ◆ Use liquid sealant Loctite -5970-BM-.

**i** Note

Before fitting the cylinder head cover, check that the rocker arms are aligned correctly.

- Apply liquid sealant Loctite -5970-BM- -1- on the cylinder head.

**i** Note

Install the cylinder head cover within five minutes of applying the liquid sealant.

- Fit and align cylinder head cover -1- on the cylinder head using Locating pins -T40116- -2-.

- Fit cylinder head cover.

**i** Note

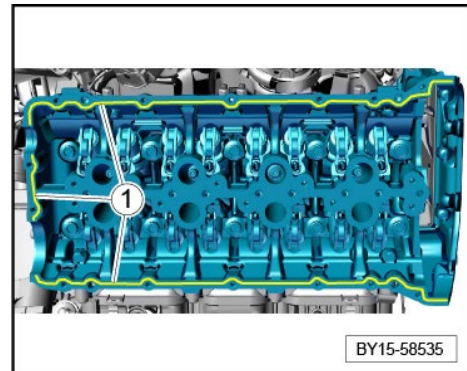
Top image – Bank 1 (RHS)

Bottom image – Bank 2 (LHS)

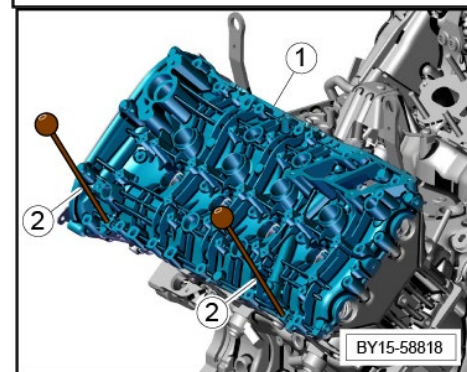
- Fit screws on the cylinder head cover uniformly and tighten according to the specified tightening sequence.

Torque tightening: 9 Nm

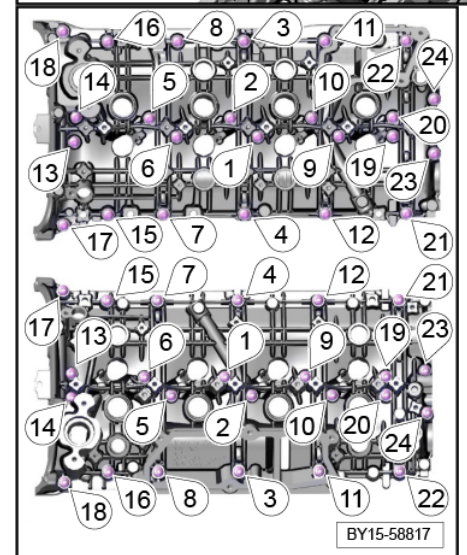
- Locating pins -T40116- must now be pulled off.
- Close off bearing tunnels with rubber caps. Exception: Left intake side with brake booster vacuum pump.



BY15-58535



BY15-58818



BY15-58817

## 5. Install camshaft actuators (includes setting timing):

The camshaft actuators are located at the rear of cylinder banks 1 and 2, behind the upper chain housing covers.

### **WARNING**

Before commencing work on and around the engine, ensure that it has cooled sufficiently, failure to do so may cause injury to personnel.

Avoid prolonged and repeated contact with oils and fluids etc.

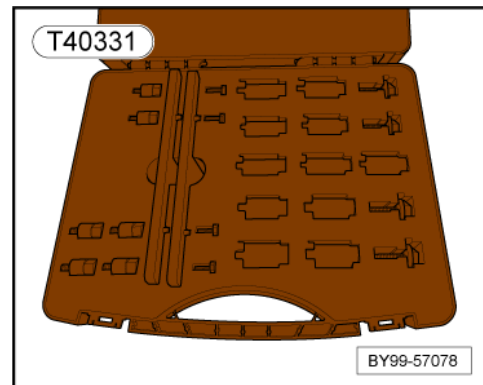
- ◆ Always protect the skin with impervious gloves.
- ◆ Always wear suitable eye protection.

### **Caution**

Suitably blank open ports to prevent the ingress of dirt, moisture and foreign objects into the engine. Failure to do so may cause irreparable damage to the engine.

### Special tools and workshop equipment required

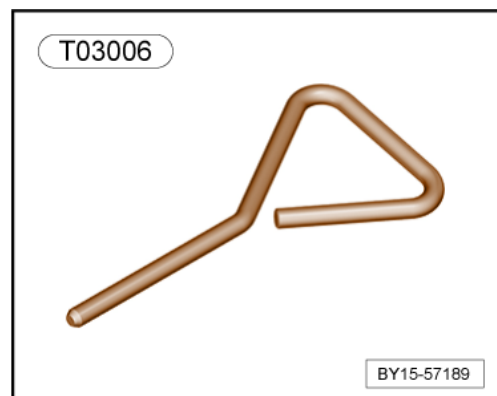
- ◆ Counter hold tool -T90001- (not illustrated)
- ◆ Ring wrench insert, a/f 41 -VAS 261 001- (not illustrated)
- ◆ Camshaft clamp -T40331-

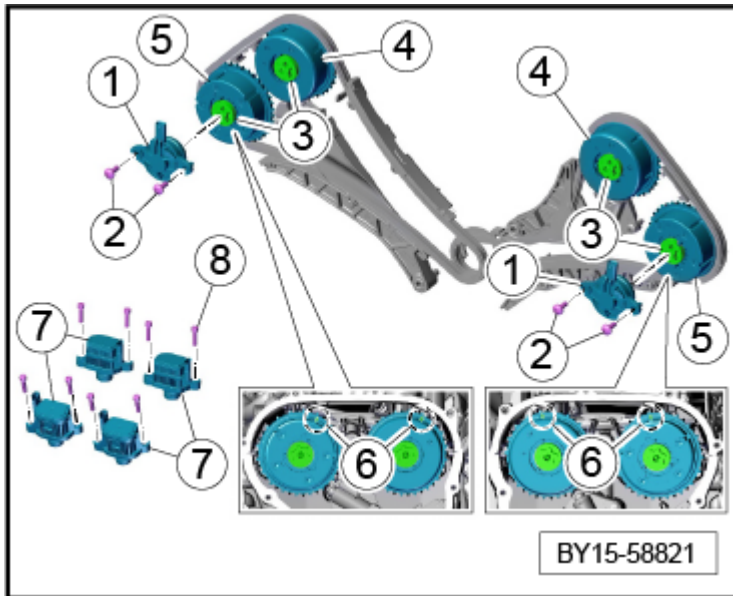


- ◆ Socket E24 -T90000- (not illustrated)
- ◆ Locking pin -T03006-
- ◆ Hook wrench -VAS 261 005- (not illustrated)
- ◆ Counterhold tool -T90002- (not illustrated)
- ◆ Vehicle tester

Component overview

Camshaft control





1 - Actuator for camshaft controller

2 - Screws, M6 x 16

Tightening torque: 9 Nm

3 - Central screw for camshaft controller

- ◆ Replace O-ring
- ◆ Initial tightening: 27 Nm
- ◆ Final tightening: 30 Nm +35°

4 - Actuator for outlet camshaft

5 - Actuator for intake camshaft

6 - Installation marking

7 - Valve lift adjustment

8 - Screw, M5 x 20

Tightening torque: 5 Nm

Tightening sequence for central screw for camshaft controller  
(item -3-)

Result:	Cylinder bank:	Camshaft:
1.	Bank 2	Outlet
2.	Bank 2	Intake
3.	Bank 1	Intake
4.	Bank 1	Outlet

## Installing camshaft actuators – setting the timing

### Note

No TDC markings on cylinder head cover.

● In the event that there are no TDC markings on the cylinder head covers, raise a DISS query with Aftersales technical support.

### Note

Camshaft actuator must not be disassembled!

Friction plate in camshaft actuator

- ◆ The camshaft actuator must never be disassembled.
- ◆ To replace the friction plate -1-, lever it out carefully using a small slotted screwdriver -2-.

– Check whether the crankshaft, the camshafts and the chain tensioners are fixed.

– Fit new friction plates between the camshaft actuators and camshaft stub.

– Allocate actuators to the camshafts. The actuator with the black surface is for the outlet side.

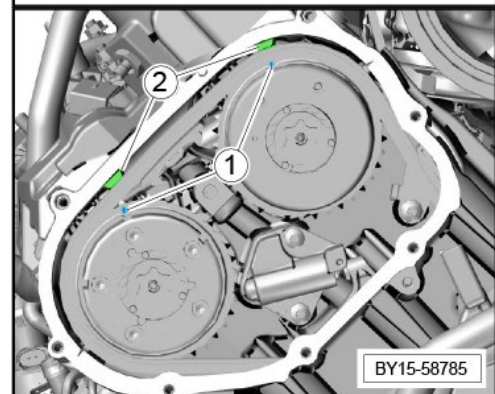
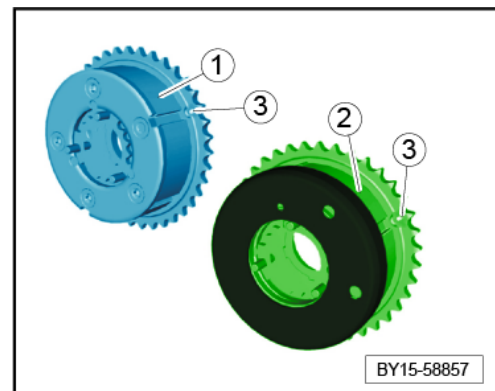
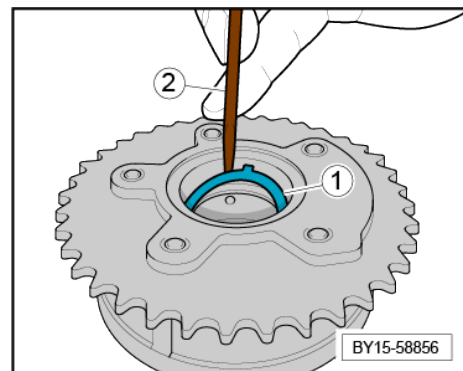
Distinguishing features of actuators

- 1- Actuator for intake camshaft
- 2- Actuator for exhaust camshaft
- 3- TDC markings

– Position the actuators on the camshafts and fit timing chain. Make sure that the markings on the actuators -1- match the cylinder head covers -2-.

### Note

If there are no markings -2- on the cylinder head cover, raise a DISS query with Aftersales technical support.



- Replace O-rings -1- on the central valves -2-.
- Lever out old O-ring -1- using a plastic wedge and dispose of it.
- Coat groove on central valve and new O-ring with oil.
- Carefully slide O-ring over the thread and shoulder -3- of the central valve and press it on using a plastic wedge.
- Do not use sharp-edged tools, such as a screwdriver.
- Never mask the thread with tape.
- Remove lock on the chain tensioner -3-.

**⚠ WARNING**

If the tensioner pin is removed without chain guide lever in place, the piston & spring may fly out! (depending on version fitted).

- Screw in central valves.
- Pre-tension the timing chain and pre-tighten central valves.

**⚠ Caution**

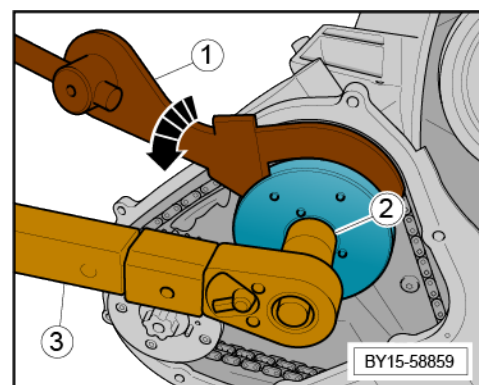
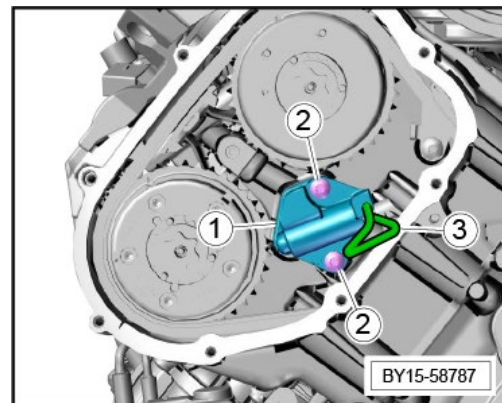
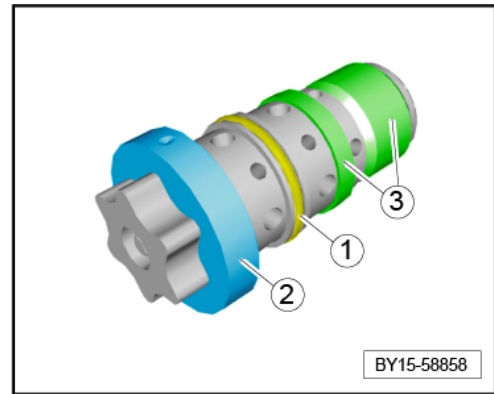
Observe specified tightening sequence!

- 1. Outlet, cylinder bank 2
- 2. Intake, cylinder bank 2
- 3. Intake, cylinder bank 1
- 4. Outlet, cylinder bank 1

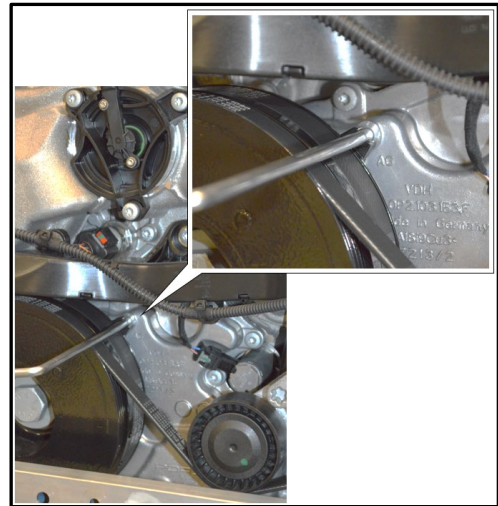
Use Hook wrench -VAS 261 005- -1- to pre-tension the actuators anti-clockwise and use Socket E24 -T90000- -2- and a torque wrench -3- to pre-tighten the central valves.

Initial tightening: 27 Nm.

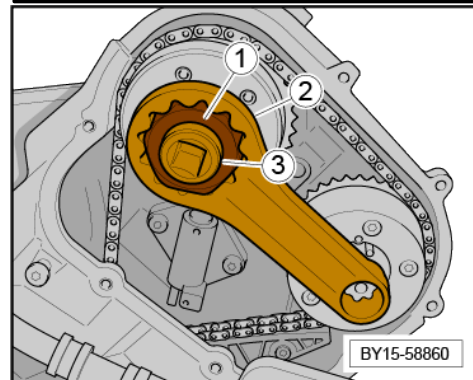
- Remove all staking tools.
- Camshaft clamp -T40331- and adapter can now be removed.



The tool securing the crankshaft at the front of the engine can now be removed.

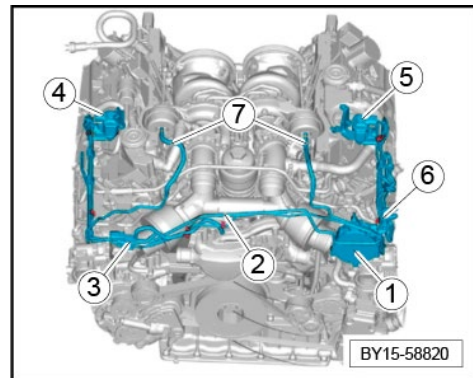


- Secure central valves.
- Counterhold tool -T90001- -1- and Counterhold tool - T90002- -2- must be fitted on the actuators. To do this, turn the engine clockwise until the tool engages.
- Tighten central valves using Socket E24 -T90000- -3-.
- ◆ Final tightening: 30 Nm.
- ◆ Final tightening: + 35°.

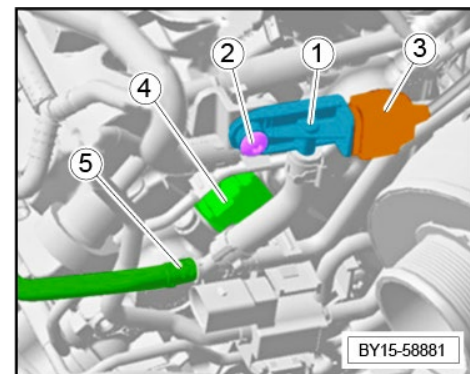


### Subsequent work

- Fit change-over valve for water pump -3- and holder.
- Vacuum System for reference:
- 1- Brake booster vacuum pump
  - 2- Vacuum line
  - 3- Electric change-over valve for water pump
  - 4- Control valve for boost pressure control, cylinders 1 to 4
  - 5- Control valve for boost pressure control, cylinders 5 to 8
  - 6- Brake booster connection
  - 7- Vacuum unit connection



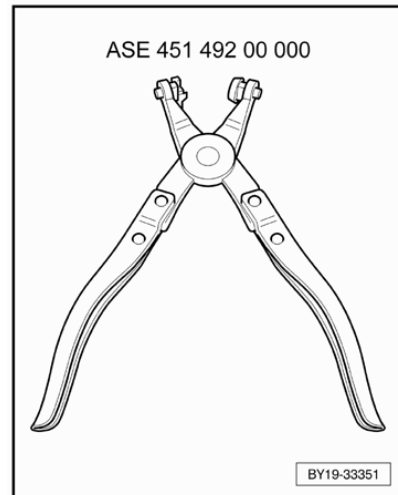
- Secure tank ventilation sensor (USA) or dummy (cylinders 1-4) -1-.
- Position tank ventilation sensor (USA) or dummy -1- together with vent line -5- on holder -4-.
- Screw in and tighten fastening screw -2-.
- Plug in electric plug connection -3-.
- For bank 2 only, fit the dipstick.



## 6. Install pressure pipes:

### Special tools and workshop equipment required

- ◆ Hose clip pliers -ASE 451 492 00 000-.



### Installation

Installation is the reverse of removal procedure, noting the following.

- RENEW any "O-rings".
- Refit all previously removed components.  
Torque tighten all fixings as per removal.

–

→ Rep.-Gr.00

## 7. Install mechanical vacuum pump:

### Installation

Installation is the reverse of removal procedure, noting the following.

- Ensure the mating faces between the vacuum pump and cylinder head are clean and free of dirt and residual oil.
- RENEW the "O-ring" -1- for the vacuum pump.

– Using NEW fixings -3-, secure the vacuum pump. Torque tighten in the sequence shown:

- ◆ Stage 1 — Hand tighten
- ◆ Stage 2 — 5 Nm
- ◆ Stage 3 – 9 Nm

### Drive gear

- Ensure that the drive gear in the camshaft -arrowed- aligns with the slot in the vacuum pump -arrowed-.

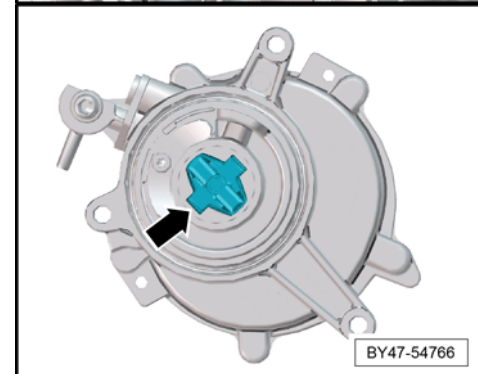
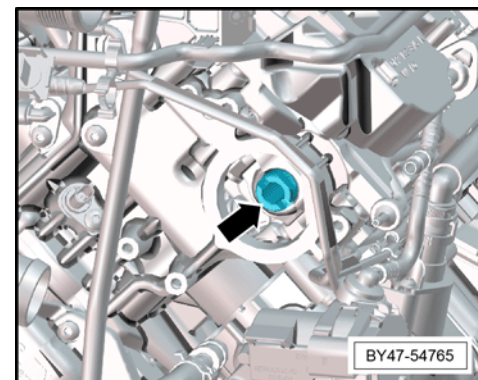
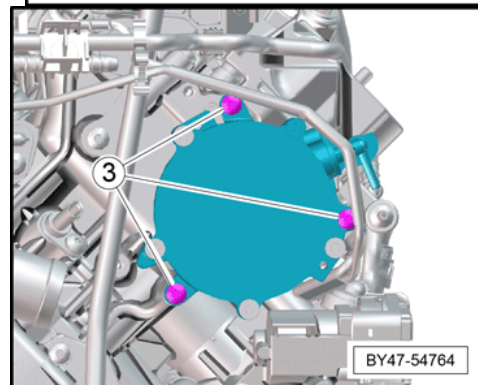
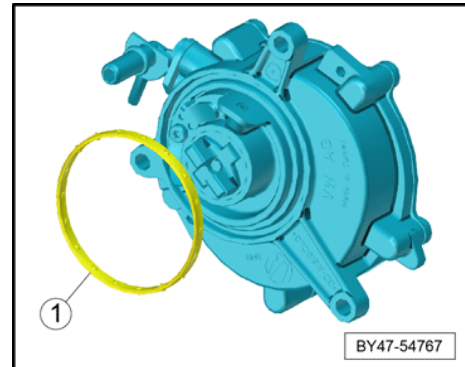
Camshaft keyway

Drive gear in vacuum pump

- Ensure all wiring and hoses are clipped in their original positions.

Torque tighten all remaining fixings.

– → Rep.-Gr.00



## 8. Install fuel injectors:

### Special tools and workshop equipment required

Tool set for TSI engines -T10133-

#### Dismantling the injector

- Pull the O-ring -3- and spacer ring -2- off from the injector -1- and DISCARD.
- Unclip the sealing element -5- and DISCARD.  
Carefully remove the old combustion chamber sealing ring -6- and DISCARD. To do so, very carefully cut the sealing ring with a knife or prise off with a suitable non-metallic tool.



Note

Take care not to damage the sealing groove on the injector. The injector must be renewed if the groove is damaged.

#### Installation

Installation is the reverse of removal procedure, noting the following.



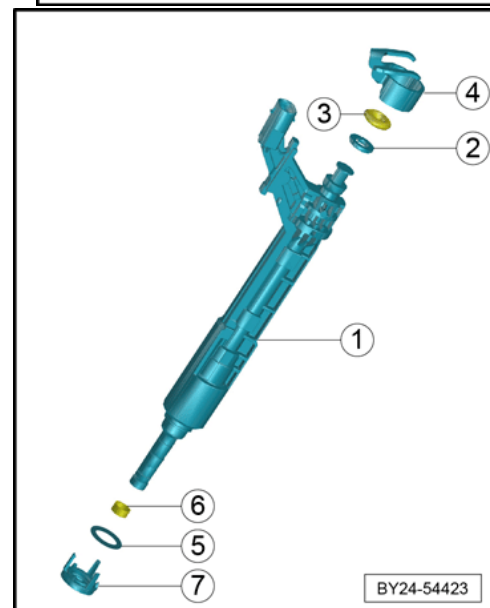
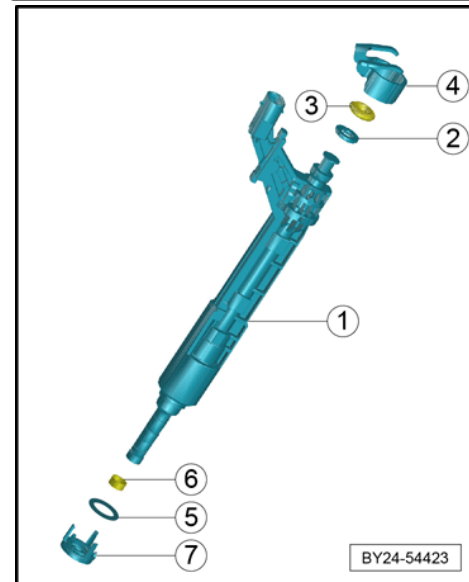
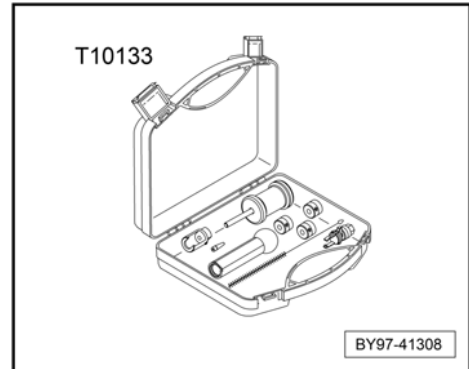
Note

Renew sealing element -5-, combustion chamber ring -6-, seal and O-ring-3- and backing ring -2-.

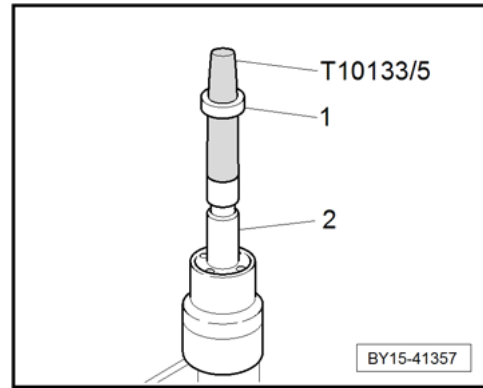
Renew spacer ring if damaged.

Lubricate O-rings of injectors lightly with clean engine oil.

- Clean the bore in cylinder head with Nylon cylinder brush -T10133/4-.

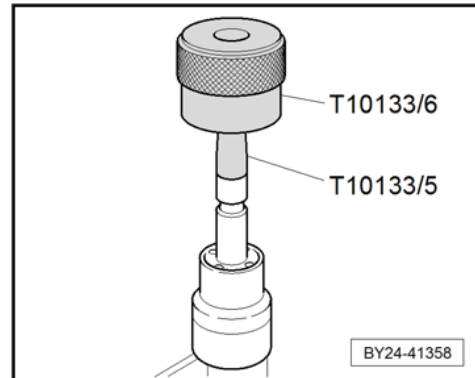


– Fit Assembly cone -T10133/5- with a NEW combustion chamber sealing ring -1- onto the injector -2-.



Using the Assembly sleeve -T10133/6- push the combustion chamber sealing ring onto Assembly cone -T10133/5- as far as it will go.

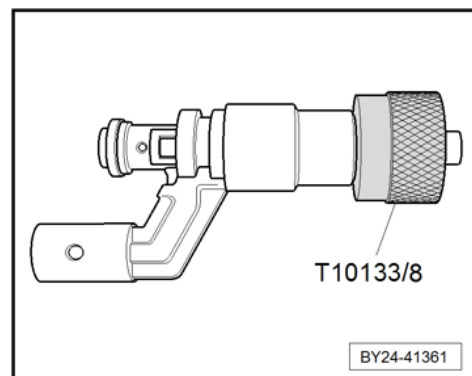
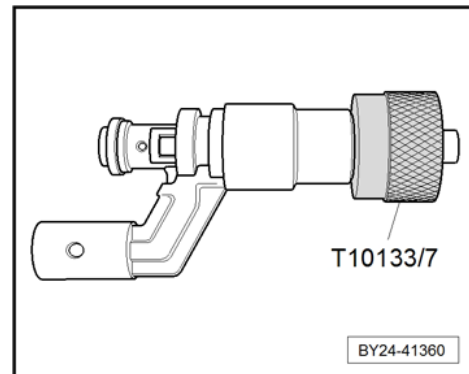
– Turn around Assembly sleeve -T10133/6- and slide the combustion chamber sealing ring into the groove of the injector.



**i** Note

The combustion chamber sealing ring is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in four stages, as described below.

- ◆ Push Calibration sleeve -T10133/7- onto the injector as far as it will go and simultaneously turn it 180°.
- ◆ Pull Calibration sleeve -T10133/7- off again by turning in the opposite direction.
- ◆ Push Calibration sleeve -T10133/8- onto the injector as far as it will go and simultaneously turn it 180°.
- ◆ Pull Calibration sleeve -T10133/8- off again by turning in the opposite direction.



- Fit the parts from the injector repair kit onto the injector - 1-:

To ease injector installation into the fuel rail, lubricate

- new O-ring lightly with clean engine oil before installing it.



Note

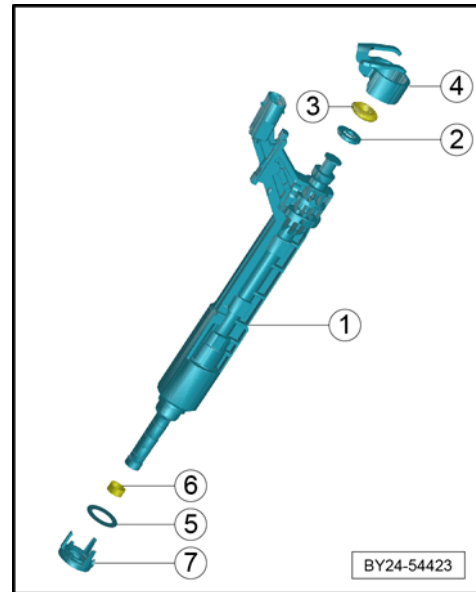
The combustion chamber ring seal -6- must NOT be lubricated.



**Caution**

Use Press tool -T10133/9-, push the injector into the cylinder head as far as it will go. DO NOT push the injector in by force.

- Replace all previously discarded parts.
- Replace low pressure injector O rings and the fuel supply pipes and clamps.



## 9. Install cylinder deactivation solenoids:

### Installation

Installation is the reverse of removal procedure, noting the following.

- RENEW the "O-rings" on the cylinder deactivation solenoids.
- Before refitting the solenoids, apply a small amount of CLEAN engine oil to the "O-ring".
- Torque tighten all fixings as per removal.
- [→ Rep.-Gr.00](#)

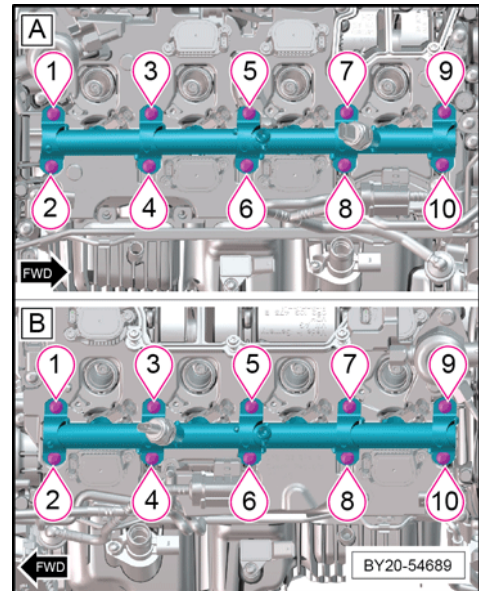
## 10. Install fuel rails:

The installation of the fuel rails is symmetrically the same on both banks of the engine unless stated otherwise.

### Installation

Installation is the reverse of removal procedure, noting the following.

- Torque tighten the fixings in the sequence shown.
- ◆ Stage 1 — Hand tight.
- ◆ Stage 2 — 7 Nm.
- ◆ Stage 3 — 10 Nm.



## 11. Install high pressure fuel pumps:

The installation of the high pressure fuel pump is the same for both sides of the engine unless stated otherwise.

### Special tools and workshop equipment required

- ◆ Torque wrench -VAG 1331 -

- ◆ Tool insert AF 17 -VAG 1331/6-

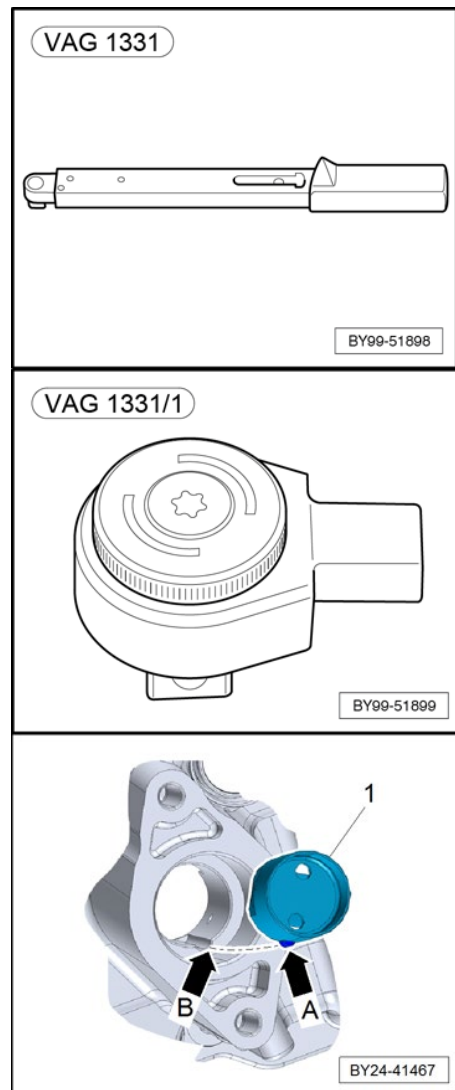
Consumables

Microgleit DF977S lubricant (refer to electronic parts catalogue "ETKA")

### Installation

Installation is the reverse of removal procedure, noting the following.

- Lightly lubricate roller tappet with engine oil (0W-40) and insert it so that the lug -arrow A- slides into the guide notch. -arrow B-.
- Using a suitable "breaker" bar, rotate the engine in the direction of normal engine rotation and at the same time press the roller tappet into the camshaft cover until it reaches its lowest point.



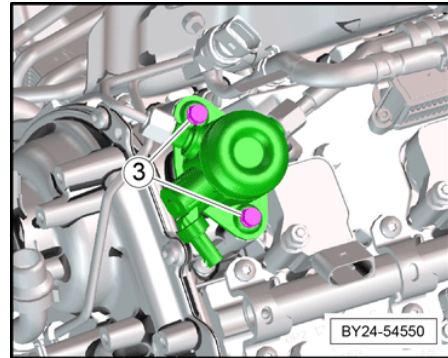
- Fit the high pressure pump into the camshaft cover making sure that a NEW O-ring is fitted.

 **Caution**

When installing the fixings -3- for the high pressure pump, first fit them by hand.

When first installed, the high pressure pump will protrude from the camshaft cover, therefore the following tightening procedure MUST be adhered to.

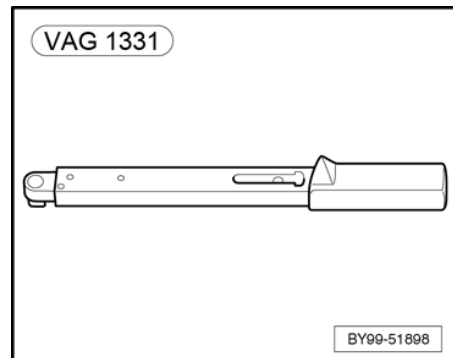
- ◆ Stage 1 — Sequentially hand tighten the fixings -3- two turns at a time until the pump contacts the mating face to prevent damage to the internal spring in the high pressure pump.
- ◆ Stage 2 — Torque tighten to 12 Nm.
- ALWAYS lubricate the fuel pipe threads with Microgleit DF977S lubricant prior to fitting.
- Torque tighten all remaining fixings.
- 
- → Rep.-Gr.00
- Upon completion check for leaks.



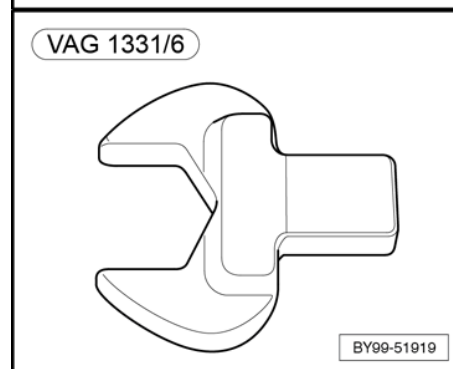
## 12. Install high-pressure fuel lines, banks 1 and 2:

### Special tools and workshop equipment required

- ◆ Torque wrench -VAG 1331 -



- ◆ Tool insert AF 17 -VAG 1331/6-



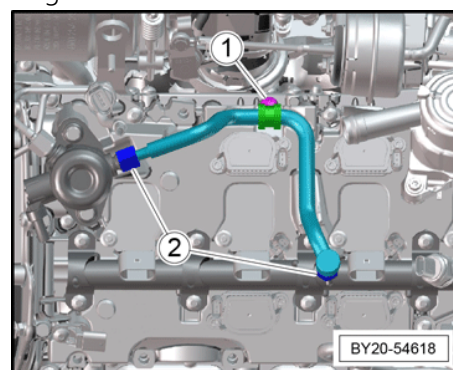
### Consumables

Microgleit DF977S lubricant (refer to electronic parts catalogue "ETKA")

### Installation

Installation is the reverse of removal procedure, noting the following.

- Bank 1



- Bank 2
- ALWAYS lubricate the union threads -2- with Microgleit DF977S lubricant prior to fitting.

The following procedure must be followed to ensure the high pressure fuel pipes are correctly tightened to eliminate the risk of fuel leaks.

Fit the fixing for the fuel pipe clamp first onto the cylinder head BEFORE tightening the high pressure fuel pipes. Do

- not tighten until the fuel pipes have been torque tightened.

 Note

Hand tighten the high pressure fuel pipe unions before torque tightening. Ensure the pipes are stress free before tightening.

Fit the fuel rail union first, then fit the high pressure fuel pump union.

Using the Torque wrench -VAG 1331 - and Tool insert AF

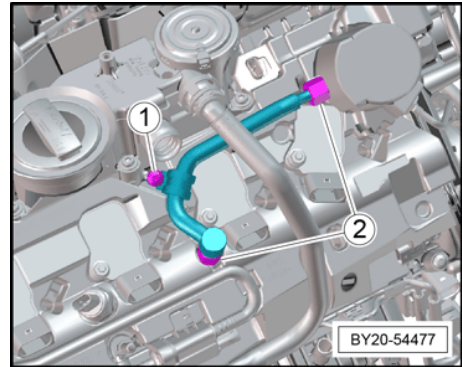
- 17 -VAG 1331/6- torque the high pressure fuel pipes -2- to the following torque.
- ◆ Stage 1 — Hand tighten.
- ◆ Stage 2 — 8 Nm.
- ◆ Stage 3 — + 50°.

 **Caution**

During the torque tightening procedure, ensure the fuel pipe remains central inside the union. Failure to do so may cause damage to the brass fitment seal and cause a fuel leak.

- Refit all previously removed components.
- Torque tighten all remaining fixings.

→ Rep.-Gr.00



### 13. Install ignition coils:

Consumables

Silicone paste -G052565A1- (refer to ETKA)

#### Installation

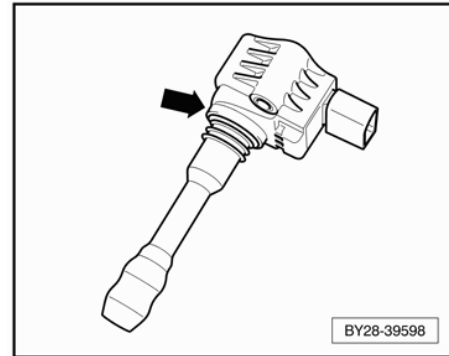
Installation is the reverse of removal procedure, noting the following.

- Apply Silicone paste -G052565A1- to the area shown - arrow- prior to refitting the ignition coils.
- Push the ignition coils fully home to the abutment with the camshaft cover face.
- Ensure the correct electrical connector is fitted to each ignition coil.

Torque tighten all remaining fixings.

-

→ Rep.-Gr.00



14. The following is applicable to both oil mist separators.

### **Installation**

Installation is the reverse of removal procedure, noting the following.

- RENEW the seal.
- Refit all previously removed components.  
Torque tighten all remaining fixings.
- → Rep.-Gr.00

## 15. Install upper chain housing covers:

### Installation

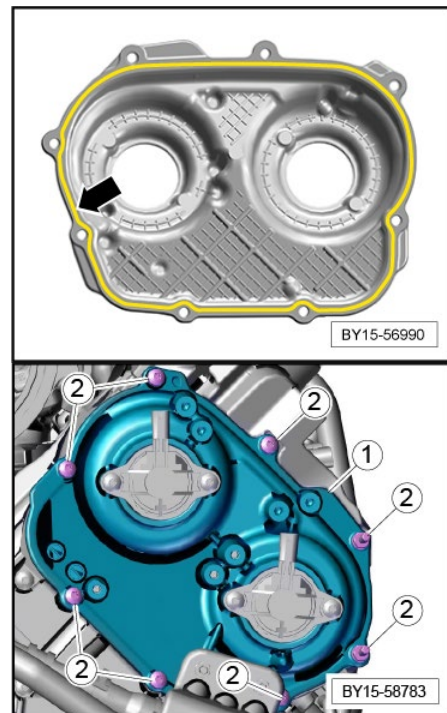


#### Note

Fitting and sealing components using liquid sealant.

- ◆ Clean sealing faces to remove all traces of residual sealant.
- ◆ Sealing faces must be free of grease and oil.
- ◆ Clean sealing faces with primer Loctite -7515-.
- ◆ Use liquid sealant Loctite -5970-BM-.
- Apply liquid sealant Loctite -5970-BM- -arrow- on the chain housing cover.
- Install the chain housing cover within 5 minutes of applying the liquid sealant.

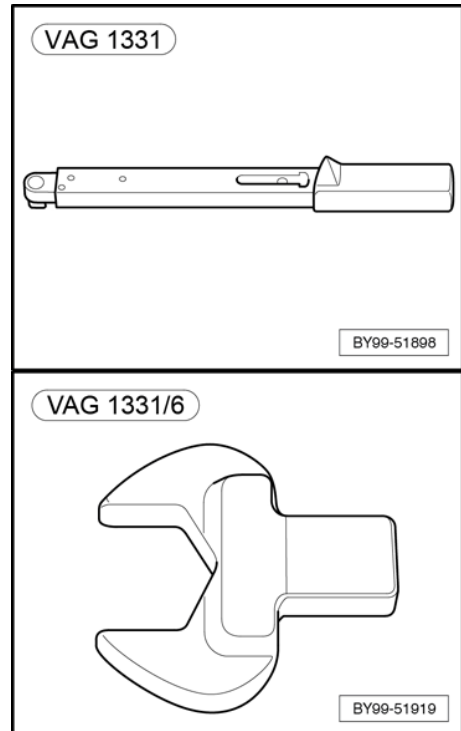
- Install chain housing cover -1-.
- Fit chain housing cover -1- on cylinder head.
- Fit and tighten screws -2- (9 Nm) uniformly.



## 16. Install rear high-pressure fuel line:

### Special tools and workshop equipment required

- ◆ Torque wrench -VAG 1331 -
- ◆ Tool insert AF 17 -VAG 1331/6-



### Consumables

Microgleit DF977S lubricant (refer to electronic parts catalogue "ETKA")

### Installation

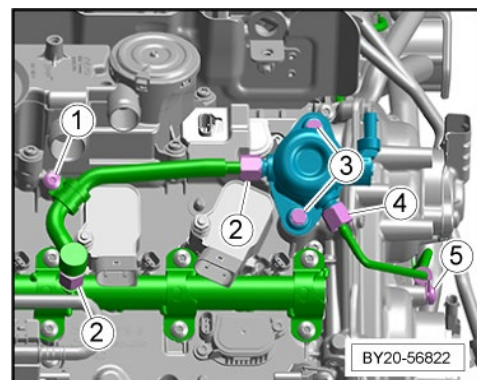
Installation is the reverse of removal procedure, noting the following.

- On both sides, lubricate the union threads -4- with Microgleit DF977S lubricant prior to fitting the link pipe.

### Note

Hand tighten the high pressure fuel pipe unions before torque tightening. Ensure the pipes are stress free before tightening.

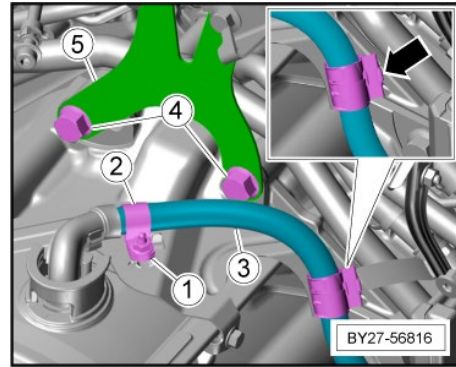
- Using Torque wrench -VAG 1331 - and Tool insert AF 17 - VAG 1331/6-, torque tighten the union fittings -4- to 8 Nm + 50°.



 **Caution**

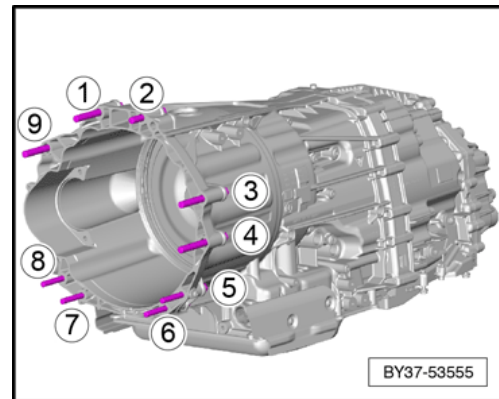
During the torque tightening procedure, ensure the fuel pipe remains central inside the union. Failure to do so may cause damage to the brass fitment seal and cause a fuel leak.

- Fit NEW O-rings to the coolant pipes.
- Fit the catalyst support bracket -5- and secure with NEW fixings -4-, noting the information below:



 **Note**

The fixings -1, 2 - for the catalyst support bracket (see previous graphic) are different lengths. Ensure the fixings are fitted in the correct location and torque tightened as shown below.



**Table 1 - Automatic transmission retaining bolt chart**

Position	Material	Size	Torque	Notes
1	Steel	M12 x 110	20 Nm + 60°	
2	Steel	M12 x 75	20 Nm + 60°	

-

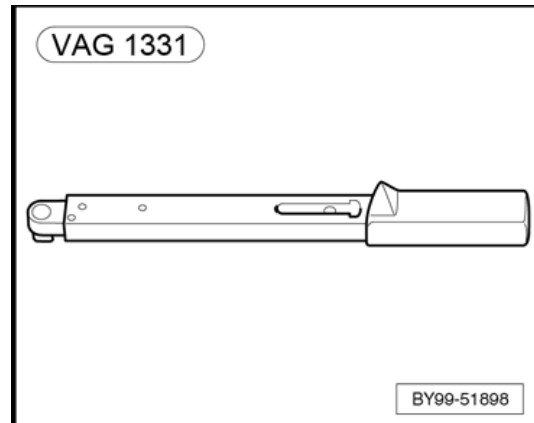
Torque tighten all remaining fixings.

→ Rep.-Gr.00

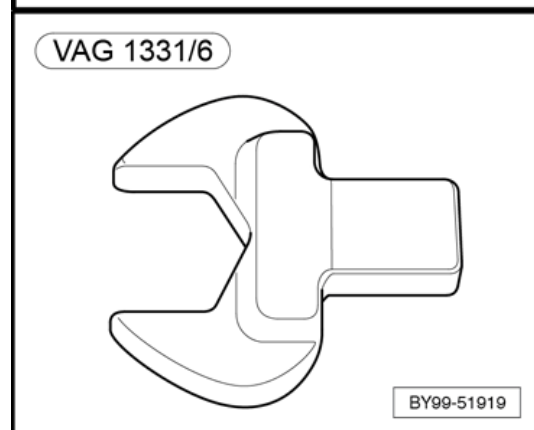
1. Remove rear high-pressure fuel line:

Special tools and workshop equipment required

◆ Torque wrench -VAG 1331 -



◆ Tool insert AF 17 -VAG 1331/6-



Consumables

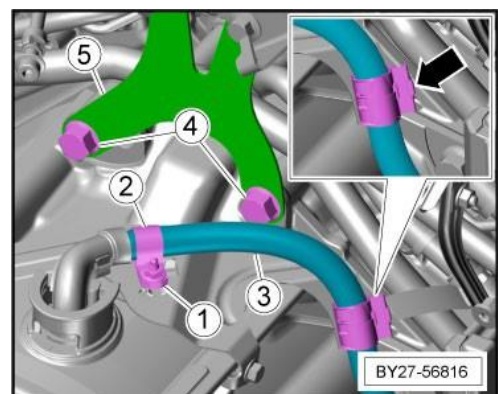
Microgleit DF977S lubricant (refer to electronic parts catalogue "ETKA")

Removal

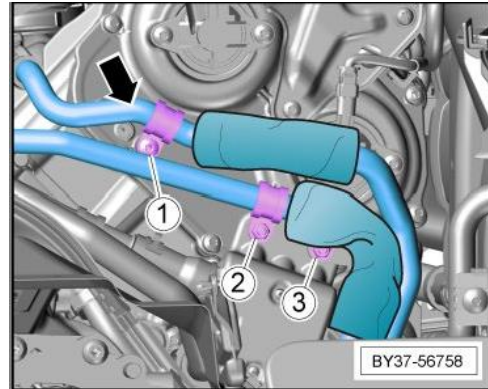
Using a suitable tool, unclip the top part of the harness  
– retainer -arrow- to allow the retainer to open up and the harness to be removed detached.

– Remove the fixing -1- (9 Nm), detach the P-clip -2- and move the starter cable -3- to one side.

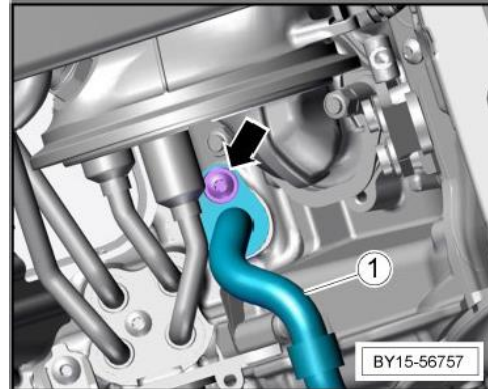
– Remove and DISCARD the two fixings -4- and detach the catalyst support bracket -5-.



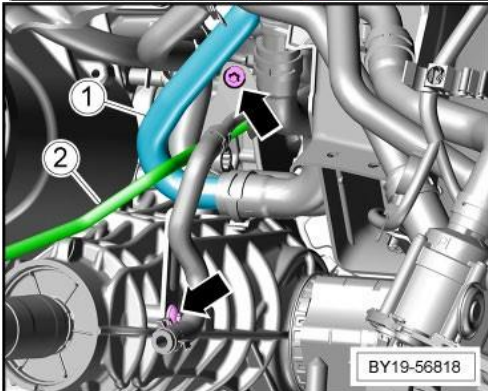
- Remove the fixings -1 to 3- (9 Nm) securing the RH turbocharger coolant pipe.



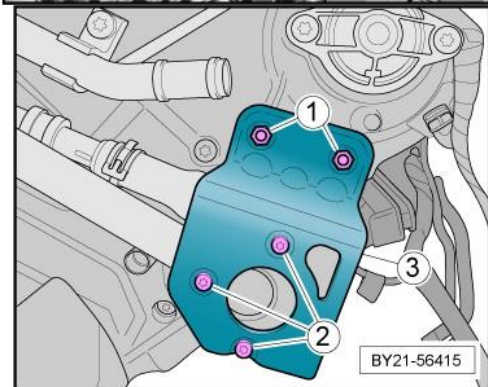
- On the top RH side of the engine, remove the fixing - arrow- (9 Nm), detach the turbocharger coolant pipe -1- and DISCARD the O-ring.



- Remove the two fixings -arrows- (9 Nm) securing the RH turbocharger coolant pipe -1- and the "OPF" pipe -2- (where fitted).

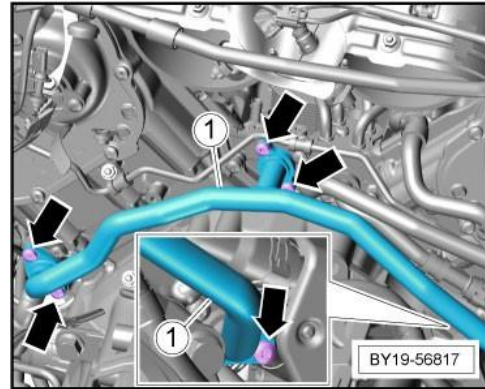


- Remove the fixings -1- (9 Nm) and -2- (1.5 Nm) and detach the heatshield -3-.



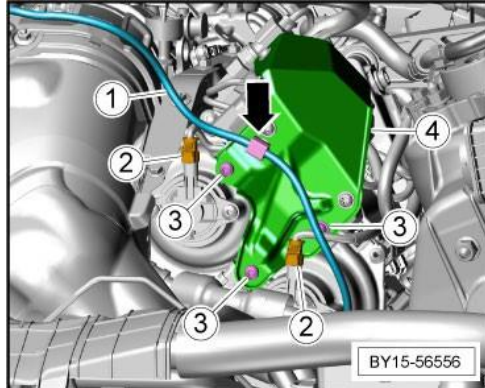
- Remove the fixings -arrows- (9 Nm) and detach the coolant pipe -1-. DISCARD the O-rings upon removal.

Bank 1



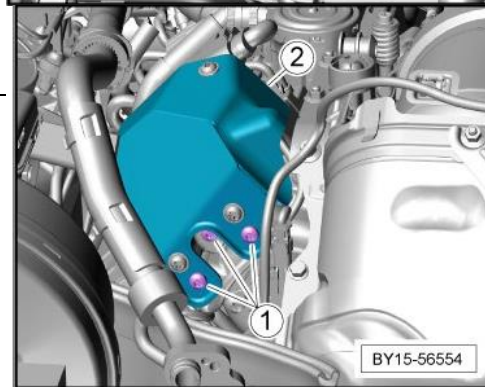
- Release the lambda sensor cable -1- at the clipping point -arrow-.
- Disconnect the electrical connections -2- and release the harness from the clipping points.
- Remove the fixings -3- (8 Nm) and detach the fuel pump crash assembly -4-.

Bank 2

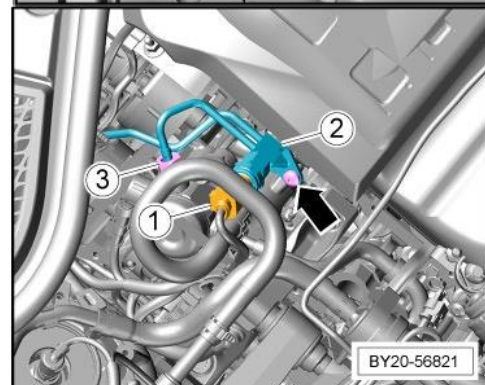


- Remove the three fixings -1- (8 Nm) and detach the fuel pump crash assembly -2-.

Continuation for both sides



- On the RH side of the engine, disconnect the harness connector -1- from the pressure sensor -2-.
- Remove the fixing -arrow- (9 Nm) securing the pressure sender assembly.
- Undo the union nut -3- securing the high-pressure pipe to the fuel pump.



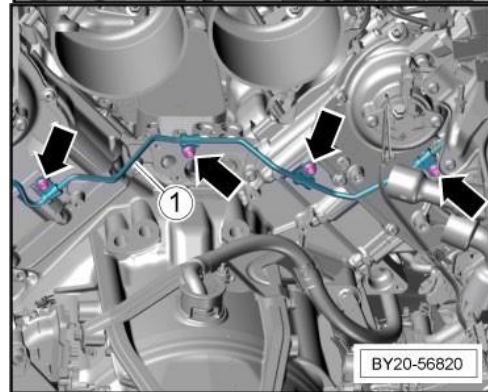
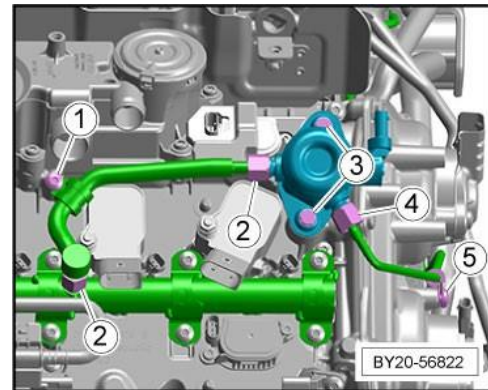
- \_ On the LH side of the engine, undo the union nut -4- (8 Nm + 50°).
- Remove the fixing -5- (9 Nm) securing the P-clip.



Note

Disregard items -1, 2 & 3-

- \_ Remove the fixings -arrows- (9 Nm) securing the P-clips and detach the fuel link pipe -1- from the engine.



## 2. Remove upper chain housing covers:



*Caution*

Dirt and contamination

Risk of damage to units or components

— Protect components from dirt and contamination.

— Secure components to prevent them from falling down.

— Clean or replace dirty components.

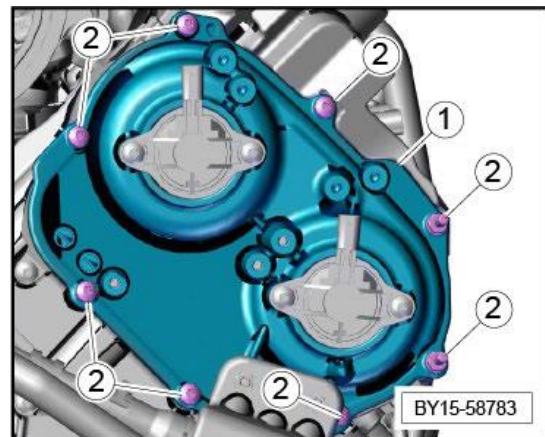


**Note**

The procedure for removing and installing is described for one side as an example. The procedure for the other side is practically identical.

### Removal

- Unscrew fixings -2- (9 Nm).
- Press off chain housing cover -1- at a suitable point and set it down on a clean surface.



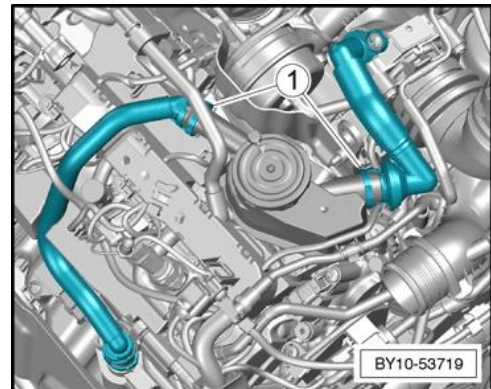
### 3. Remove oil mist separators:

#### Removal

- Remove the turbocharger heatshields upper sections.

[Bank 1]

- Disconnect the pipes -1- from the oil mist separator.



- Loosen the captive fixings -2- (9 Nm) that retain the oil mist separator to the cylinder head cover.



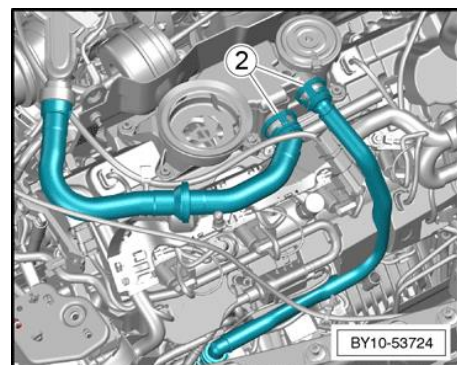
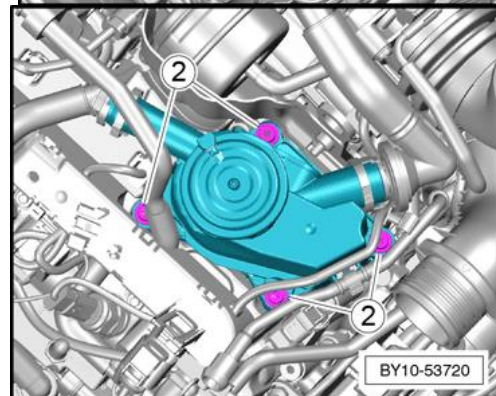
#### Note

The foremost fixing may be obstructed by sound deadening, suitably peel back the material until the fixing is accessible.

- Remove the oil separator and DISCARD the seal.

[Bank 2]

- Disconnect the vent lines -2- from the oil mist separator.



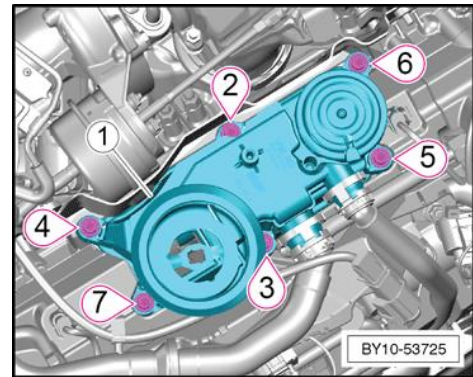
- \_ Loosen the captive fixings -2.....7- (9 Nm) that retain the oil mist separator -1- to the cylinder head cover.

**i** Note

Fixings -2, 4 and 6- may be obstructed by sound deadening, suitably peel back the material until the fixings are accessible.

Oil filler cap shown not fitted for illustration purposes only.

- Remove the oil separator -1- and DISCARD the seal.



#### 4. Remove ignition coils:

Consumables

Silicone paste -G052565A1- (refer to ETKA)

Removal

Bank 1

- Remove the fixing -3- (55 Nm), the fixing -4- (20 Nm) and the engine mount bracket -2-.



Note

Disregard -1-.

- Disconnect the lower quick connect -1- and detach the vent line.
- Remove the nuts -2- (9 Nm) for the cylinder head harness carrier.

- Disconnect ALL harness connectors from the following components;

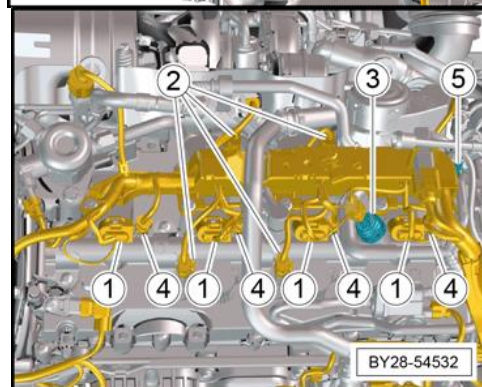
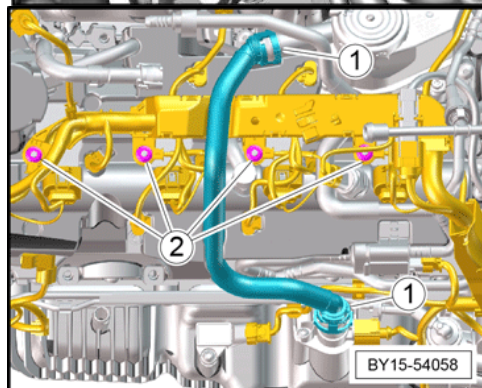
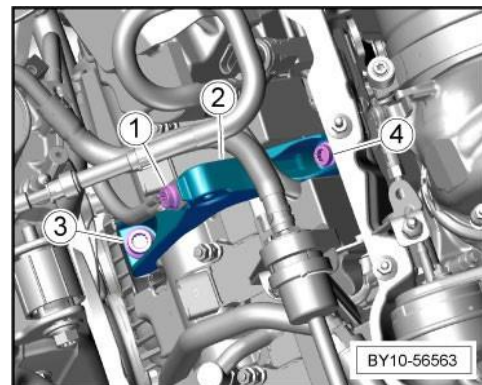
- ◆ -1- Ignition coils
- ◆ -2- Cylinder deactivation solenoids
- ◆ -3- Fuel pressure sensor
- ◆ -4- Fuel injectors
- ◆ -5- Camshaft position sensor

- Carefully move the harness to one side to allow access to the ignition coils.



Caution

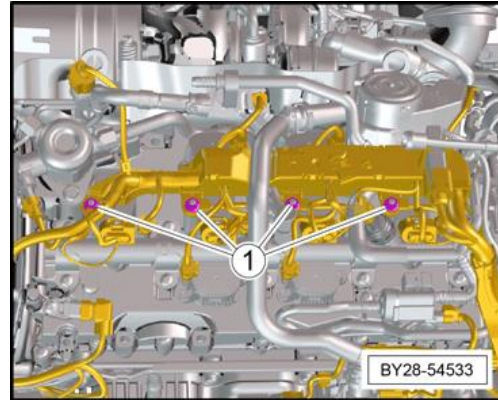
Take care not to put too much tension on the harness.



- Remove the studs -1- (9 Nm) for the ignition coils.
- Carefully extract the ignition coil from the cylinder head.

**i** Note

Number each ignition prior to removal to aid installation.

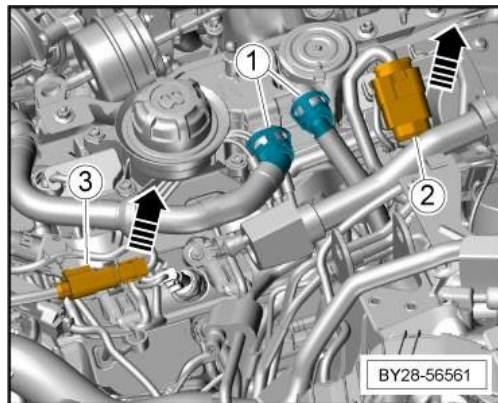


Bank 2

- Disconnect the two electrical connections -2 & 3- and release from their clipping points.

**i** Note

Disregard -1-, previously disconnected.

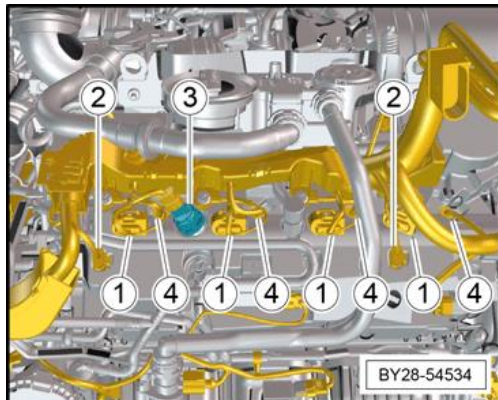


Disconnect the lower 'quick-connect' (not shown) and remove the vent line.

Disconnect the vacuum pipe 'quick-connect' from the intake manifold.

- Disconnect ALL electrical harness connectors from the following components:

- ◆ -1- Ignition coils
- ◆ -2- Cylinder deactivation solenoids
- ◆ -3- Fuel pressure sensor
- ◆ -4- Fuel injectors



- Remove the nuts -1- (9 Nm) and move the harness to one side to allow access to the ignition coils.

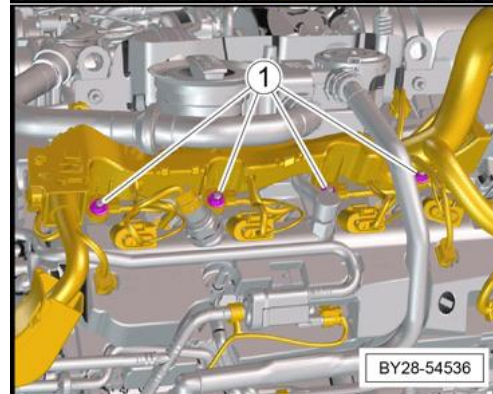
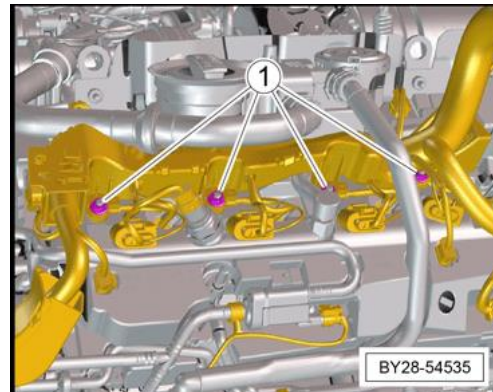
 *Caution*

Take care not to put too much tension on the harness.

- Remove the studs -2- (9 Nm) for the ignition coils.
- Carefully extract the ignition coil from the cylinder head.

 *Note*

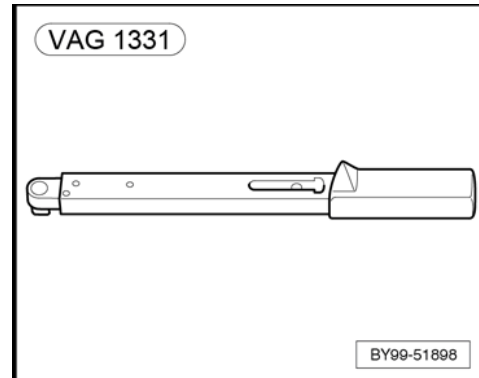
Number each ignition prior to removal to aid installation.



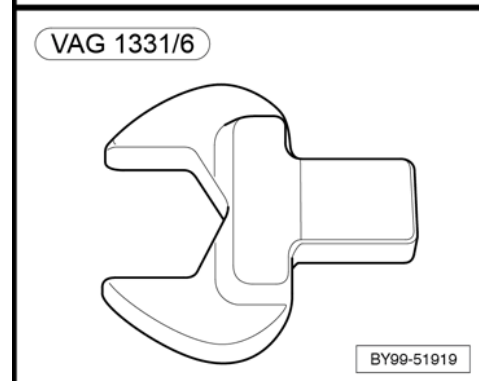
5. Remove high-pressure fuel lines, banks 1 and 2:

Special tools and workshop equipment required

◆ Torque wrench -VAG 1331 -



◆ Tool insert AF 17 -VAG 1331/6-



Consumables

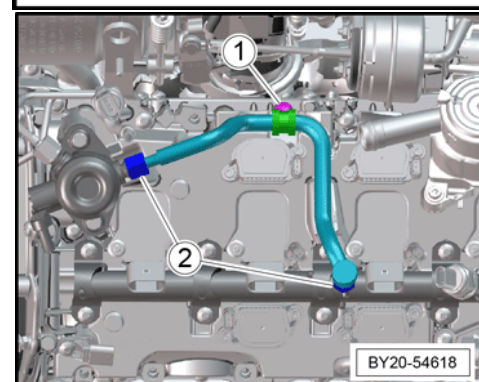
Microgleit DF977S lubricant (refer to electronic parts catalogue "ETKA")

Removal

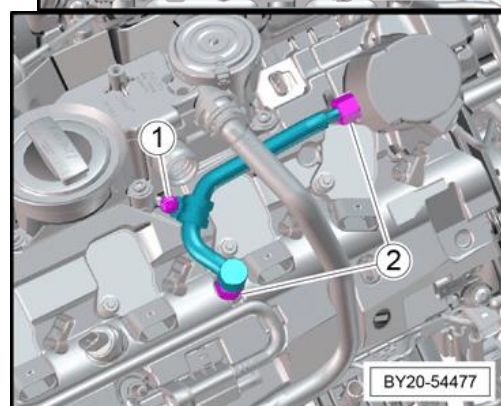
[Bank 1]

- Remove the fixing -1- (9 Nm) for the fuel line clamp.
- Unscrew the union nuts -2- and remove the fuel line.

[Bank 2]



- Remove the fixing (9 Nm) -1- for the fuel line clamp.
- Unscrew the union nuts -2- and remove the fuel line.



## 6. Remove high-pressure fuel pumps:

There are two high pressure fuel pumps fitted to the engine:

- ◆ The High-pressure pump -N290- is mounted on the rear top surface of the bank one camshaft cover.
- ◆ The High-pressure pump -N402- mounted on the rear top surface of the bank two camshaft cover.

The removal of the high-pressure fuel pump is the same for both sides of the engine unless stated otherwise.

### Special tools and workshop equipment required

- ◆ Torque wrench -VAG 1331 -

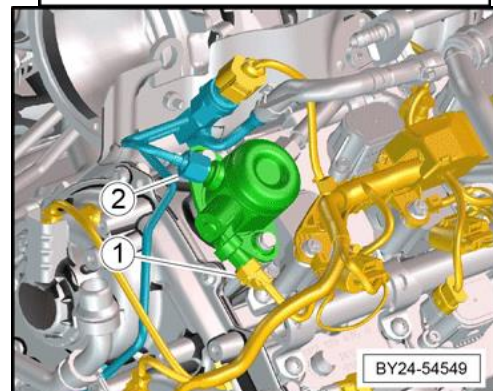
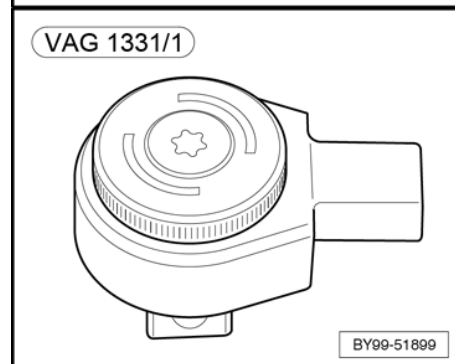
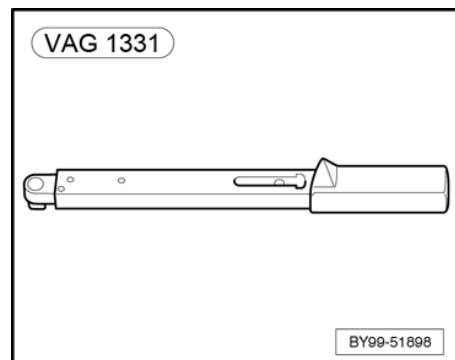
- ◆ Tool insert AF 17 -VAG 1331/6-

Consumables

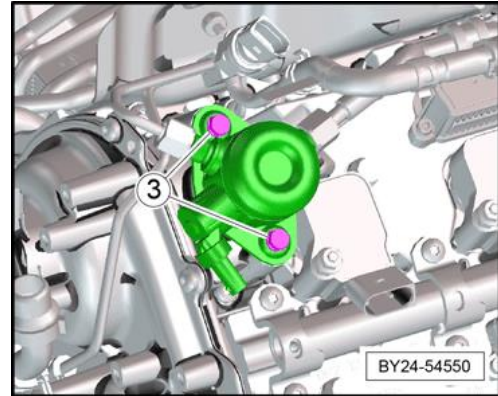
Microlelit DF977S lubricant (refer to electronic parts catalogue "ETKA")

Removal

- \_ Disconnect the harness connector -1- from the fuel pump.
- \_ Disconnect the fuel pipe union -2- from the high-pressure pump.



- \_ Lift the sound insulation material up to gain access to the fuel pump fixings.
- \_ Remove the fixings -3- and carefully withdraw the fuel pump from the camshaft cover.

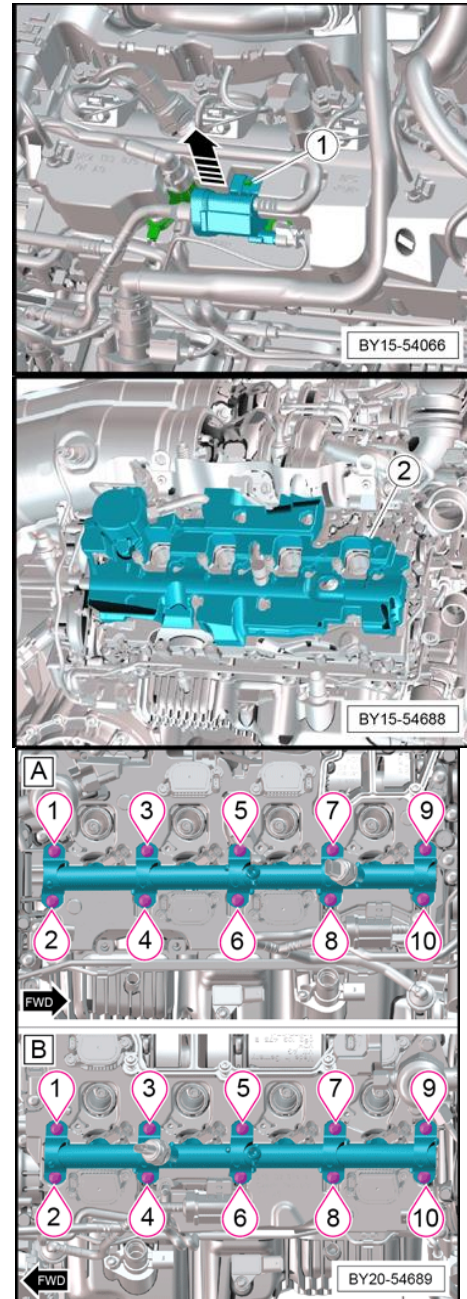


## 7. Remove fuel rails:

The removal of the fuel rail is symmetrically the same on both banks of the engine unless stated otherwise.

### Removal

- Lift the check valve assembly from the guide away from the valve cover -arrow-.
- Remove the sound proof material from the cylinder head -2-.
- Remove the fixings -1.....10- in the sequence shown.
- Detach the fuel rail from the cylinder head, ensuring that the fuel injectors remain seated in the cylinder head.



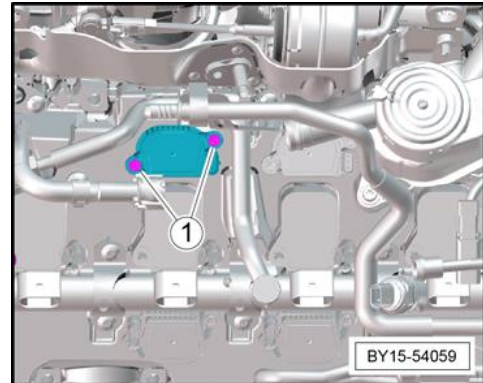
## 8. Remove cylinder deactivation solenoids:

The cylinder deactivation solenoid system comprises of the following:

- ◆ Camshaft lobe sliding element - which is part of the camshaft assembly and operates on a splined section of the camshaft.
- ◆ CDA activation/ deactivation solenoids (actuators) (4 per engine bank).

### Removal

- Remove the fixings -1- (5 Nm) for the relevant cylinder deactivation solenoid.
- Carefully remove the cylinder deactivation solenoid from the cylinder head.
- Repeat for all remaining cylinder deactivation solenoids, noting the locations to aid installation.



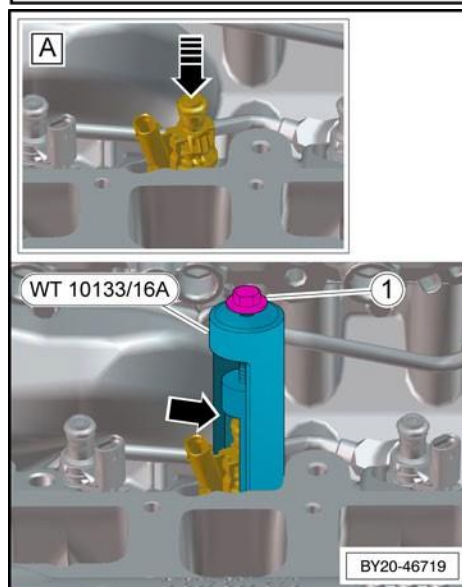
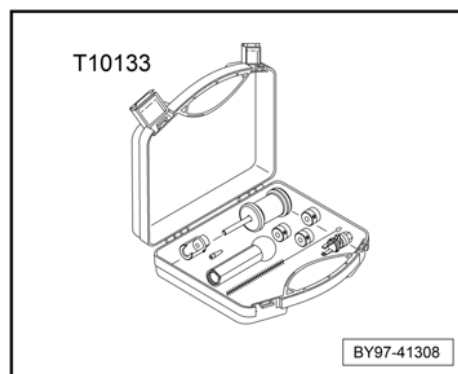
9. Remove fuel injectors:

Special tools and workshop equipment required

Tool set for TSI engines -T10133-

Removal

- Apply Puller -T10133/2A- to the groove of the injector.
- Apply Puller -T10133/16A- over Puller -T10133/2A-, and extract the injector by turning the bolt -1-.
- Repeat for all injectors, taking note of the locations to aid installation.

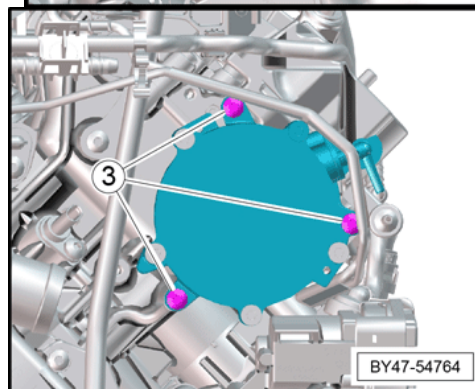
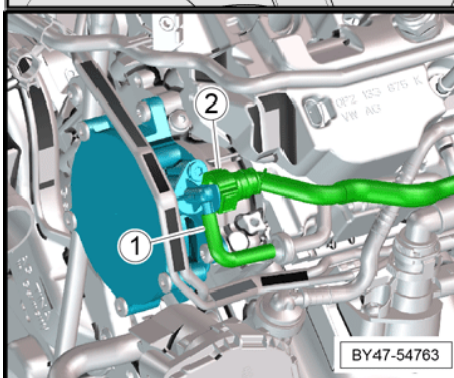
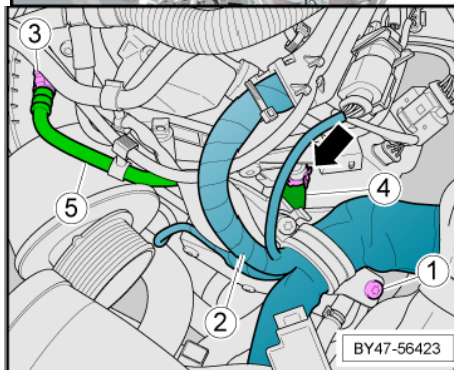
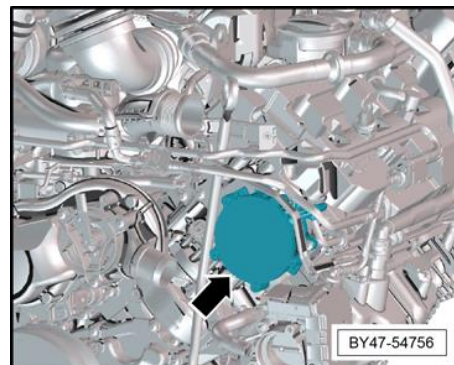


10. Remove mechanical vacuum pump:

The mechanical vacuum pump is located at the front LH side (bank 2) of the cylinder head -arrow-.

Removal

- Remove the fixing -1- retaining the engine harness -2-.
- Detach the quick connect -3- from the pressure tube breather.
- Release the "Springband" clamp -arrow- and detach from the hose -4-.
- Release the pipe assembly -5- from the clipping points for improved access.
- From the top of the vacuum pump, disconnect the vacuum line -2- and the push-on hose -1-.
- Remove and DISCARD the three fixings -3- from the vacuum pump.
- Carefully detach the vacuum pump from the engine.



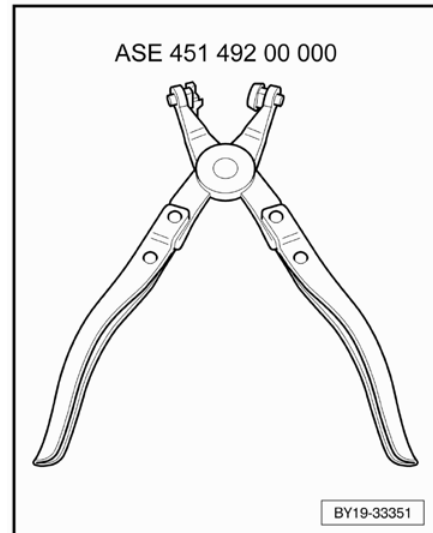
11. Remove pressure pipes:

Special tools and workshop equipment required

Hose clip pliers -ASE 451 492 00 000-.

Removal

LH side (bank 2) only	
-----------------------	--

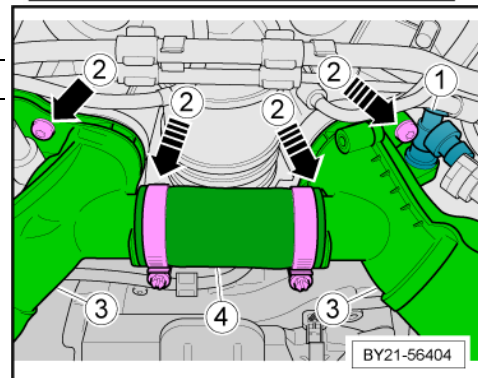


– Pull the breather stub -1- out from the pressure pipe.

Continuation for both sides	
-----------------------------	--

On the appropriate side, release the two captive fixings -

– 2- (9 Nm) and detach the pressure pipe -3- from the centre connecting hose -4-.

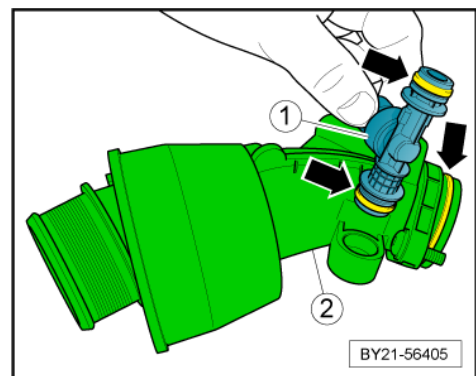


An additional fixing may be fitted dependent on model year.

 *Caution*

Blank off all open ports.

– Remove and DISCARD the "O-rings" -arrows- from the breather stub -1- and the pressure pipe -2-.

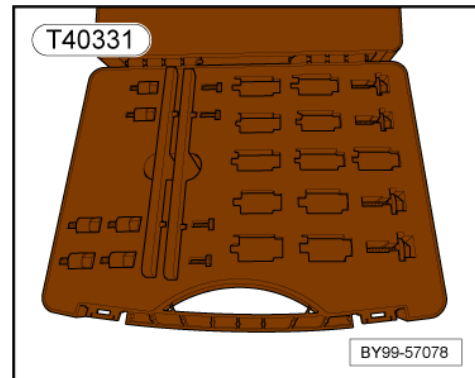


12. Remove camshaft actuators:

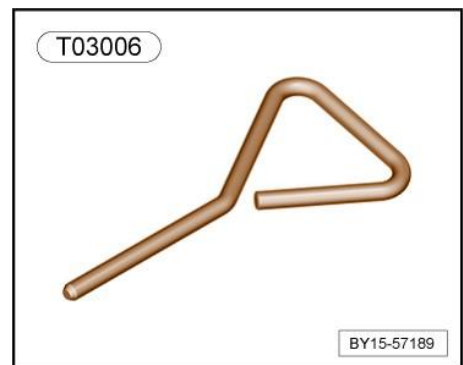
The camshaft actuators are located at the rear of cylinder banks 1 and 2, behind the upper chain housing covers.

Special tools and workshop equipment required

- ◆ Counterhold tool -T90001- (not illustrated)
- ◆ Ring wrench insert, a/f 41 -VAS 261 001- (not illustrated)
- ◆ Camshaft clamp -T40331-

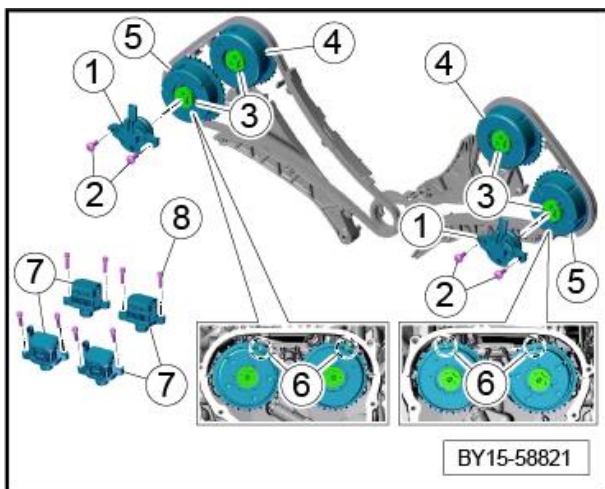


- ◆ Socket E24 -T90000- (not illustrated)
- ◆ Locking pin -T03006-
- ◆ Hook wrench -VAS 261 005- (not illustrated)
- ◆ Counterhold tool -T90002- (not illustrated)
- ◆ Vehicle tester



Component overview

Camshaft control



1 - Actuator for camshaft controller

2 - Screws, M6 x 16

Tightening torque: 9 Nm

3 - Central screw for camshaft controller

- ◆ Replace O-ring
- ◆ Initial tightening: 27 Nm
- ◆ Final tightening: 30 Nm +35°

4 - Actuator for outlet camshaft

5 - Actuator for intake camshaft

6 - Installation marking

7 - Valve lift adjustment

8 - Screw, M5 x 20

Tightening torque: 5 Nm

Tightening sequence for central screw for camshaft controller  
(item -3-)

Result:	Cylinder bank:	Camshaft:
1.	Bank 2	Outlet
2.	Bank 2	Intake
3.	Bank 1	Intake
4.	Bank 1	Outlet

Preliminary work

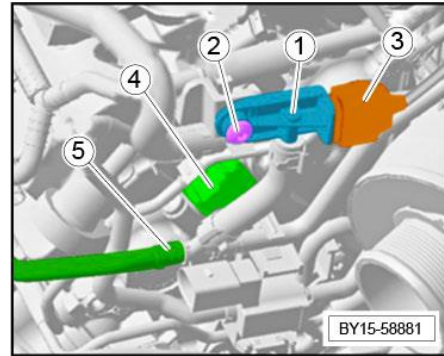
- For bank 2 only, remove the dipstick.



Note

Photos taken with a digital camera are helpful with complicated line routing (engine wire harness).

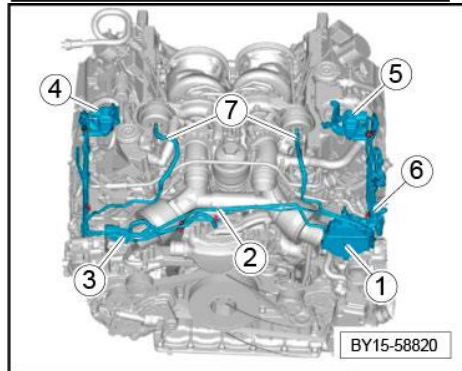
- \_ Loosen tank ventilation sensor (USA) or dummy (cylinders 1-4) -1-.
- Unscrew and remove fastening screw -2-.
- Release and disconnect electric plug connection -3-.
- \_ Loosen tank ventilation sensor (USA) or dummy -1- together with vent line -5- from holder -4-.



- \_ Loosen change-over valve for water pump -3- and remove holder. Ref: Image

Vacuum System for reference:

- 1- Brake booster vacuum pump
- 2- Vacuum line
- 3- Electric change-over valve for water pump
- 4- Control valve for boost pressure control, cylinders 1 to 4
- 5- Control valve for boost pressure control, cylinders 5 to 8
- 6- Brake booster connection
- 7- Vacuum unit connection



Remove camshaft actuator



*Caution*

Timing not set correctly

- Risk of engine damage
- Rough running engine
- Loss of engine power
- Do not use force when fitting the staking tool.
- Make sure that the gap is equal on both sides.
- When inserting the staking tools, do not use force to turn the camshafts against any resistance.
- The engine must be exactly at top dead centre.
- The opposite cylinder must be at ignition TDC.



*Caution*

Dirt and contamination

Risk of damage to units or components

- Protect components from dirt and contamination.
- Clean or replace dirty components.



Note

Do not clean the camshaft controller in a parts washer.  
Only the outside can be cleaned using a clean, lint-free cloth.

**i** Note

Never use the Camshaft clamps -T40331- as a counterhold tool for loosening and tightening the camshaft controllers.

**i** Note

The Counterhold tool -T90001- can only be inserted at one position. The markings -1 and 2- must line up.

- \_ Turn engine clockwise to ignition TDC of cylinder 1. Check markings on crankshaft and actuators.
- Secure camshafts.
  
- \_ Carefully lever out stoppers on the cylinder head cover using a screwdriver.
- \_ Screw adapter -1- into the camshaft housing and tighten to 9 Nm.

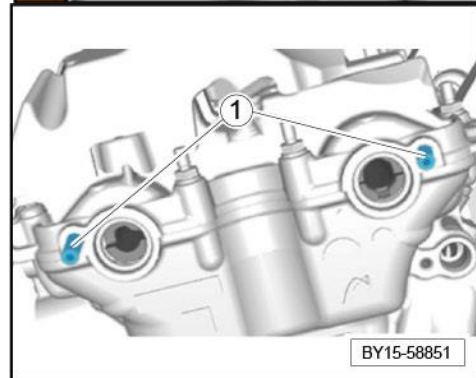
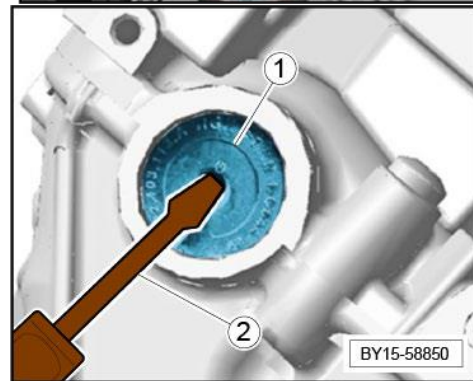
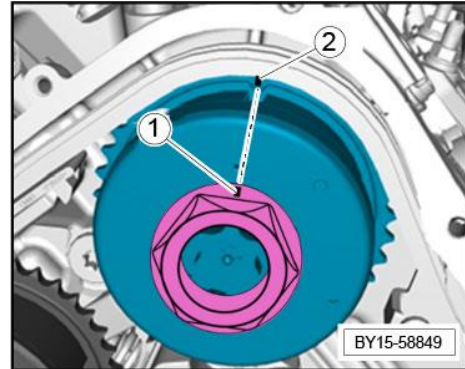
Cylinder bank 1: T40331/2, Cylinder bank 2: T40331/3

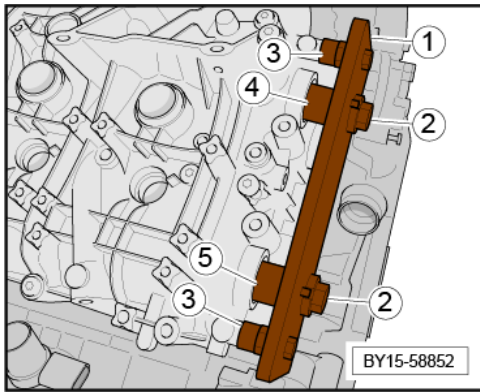
**i** Note

It may be necessary for another person to carefully position the camshafts at the actuators using Counterhold tool - T90001- and Ring wrench insert, a/f 41 -VAS 261 001-.

Camshaft clamp -T40331- must be inserted.

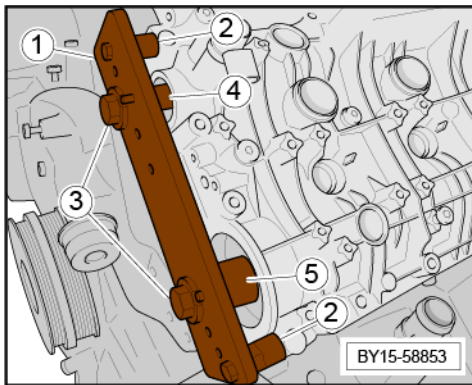
Cylinder bank 1:





- 1 - -T40331/1- – The letter "A" must be facing you
- 2 - -T40331/9-
- 3 - -T40331/2-
- 4 - -T40331/4- – Outlet camshaft
- 5 - -T40331/6- – Intake camshaft

Cylinder bank 2:



- 1 - -T40331/1- – The letter "B" must be facing you
- 2 - -T40331/9-
- 3 - -T40331/3-
- 4 - -T40331/10- – Outlet camshaft
- 5 - -T40331/8- – Intake camshaft

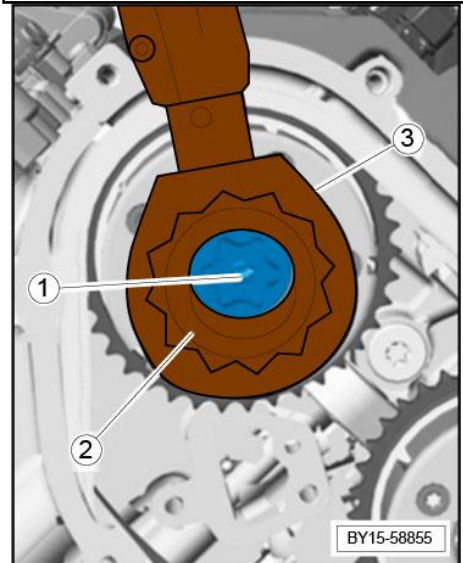
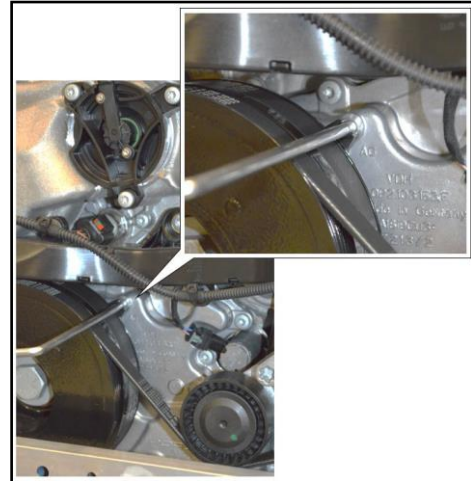
- Secure the crankshaft at the front of the engine using a suitable 6mm locking pin/drill bit.

 **Caution**

It may be necessary to rotate the crankshaft to fit the tool securing the crankshaft.

If the engine is turned over by hand using the crank damper bolt, it MUST be turned "clockwise" -arrowed- to avoid the possibility of loosening the bolt.

- Loosen and unscrew central valves -1-.
- Counterhold tool -T90001- -2- with Ring wrench insert, a/f 41 -VAS 261 001- -3- must be fitted on the actuators. Then loosen central valves -1- using Socket E24 -T90000-.



- Fix chain tensioner in place.
- Press the chain tensioner piston back fully. To do this, actuate the tensioning rail by hand.
- Fix the chain tensioner -1- in place using Locking pin - T03006- -3-.

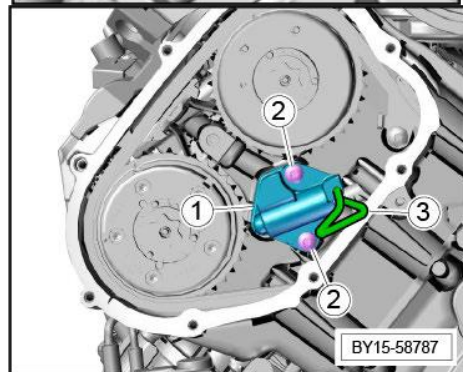
 **WARNING**

If the tensioner pin is removed without chain guide lever in place, the piston & spring may fly out! (depending on version fitted).

- Unscrew central valves and remove actuators from camshafts and from the timing chain.

 **Caution**

Secure the timing chain to prevent it from falling down.



13. Remove cylinder head cover:

The following procedure covers both bank 1 and bank 2 camshaft covers.

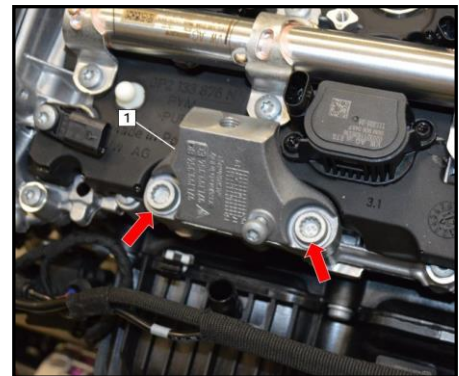
Removal

 Note

The procedure for removing and installing is described for one side as an example. The procedure for the other side is practically identical, except where shown.

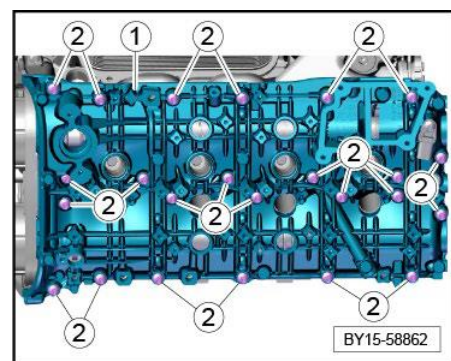
Bank 1

- Remove the fixings -arrows- (20 Nm).
- Remove the bracket -1-.



Continuation for both sides

- Remove cylinder head cover -1-.
- Unscrew screws -2- slowly and uniformly from the outside in.
- Remove cylinder head cover -1- (with camshaft clamp fitted) and set it down on a clean surface.



14. Remove valve lifters (hydraulic tappets):

Removal

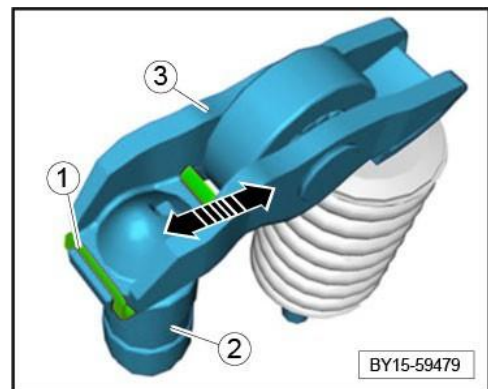
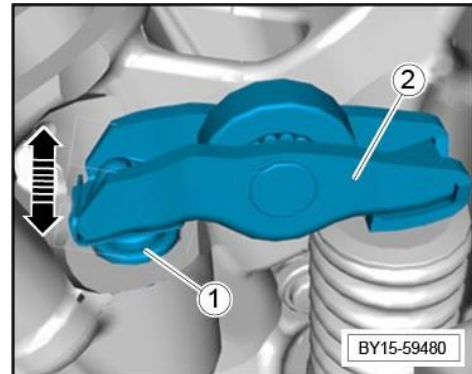
– If you intend to re-use hydraulic tappets, safety clips and valve levers: Mark allocation of the components using a coloured marker.

- Remove hydraulic tappet -1- and valve lever -2-.
- Take hydraulic tappet -1- with valve lever -2- out of the cylinder head together.

 Note

If you intend to re-use hydraulic tappets and valve levers, check that the components are not damaged.

- Check component allocation and check that all components are fitted.
- Remove hydraulic tappet -2- from valve lever -3-.
- Open safety clip -1- carefully.
- Remove safety clip -1- and hydraulic tappet -2-.



15. Remove spark plugs:

Special tools and workshop equipment required

Spark plug socket (14 mm) commercially available.

Removal



Note

Ensure the area around the spark plugs is free from dirt and debris.

- Using a suitable socket, remove the spark plugs.



Note

When spark plugs are removed, place a suitable clean cloth in the spark plug bore to prevent any dirt ingress.

16. Remove valve springs:

The following procedure is carried out with the engine and automatic transmission removed from the vehicle but with the cylinder installed.

### Special tools and workshop equipment required

- ◆ Guide plate -VAS 5161A/38-
- ◆ Removal and installation device for valve keys -VAS 5161A-
- ◆ Valve stem seal puller -3364-
- ◆ Press-on tool -3365-

### General information



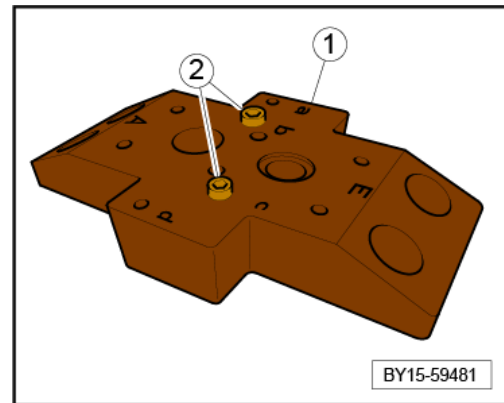
Note



In the Guide plate -VAS 5161A/38- -1- there are four bore holes -a, b, c, d- for mounting on the cylinder head.

Depending on the installation situation, observe the use of the bores and secure the Guide plate -VAS 5161A/38- with the supplied screws, M5x40 -2-.

- ◆ -E- Intake side
- ◆ -A- Outlet side



For (Bank 1)

- Using a suitable tool remove the “C-Clip” -1- that retains the “Waistgate actuator rod” to the turbocharger.
- Remove the two fixings -arrows- and remove the waistgate Actuator. This will allow greater access.



**Before attempting to remove the valve keys (collets) firstly**

**Ensure that all galleries in the area being worked are suitably**

**Covered with lint free cloths, to ensure NO foreign bodies enter the engine .**

– Guide plate -VAS 5161A/38- -1- must now be secured on the cylinder head.

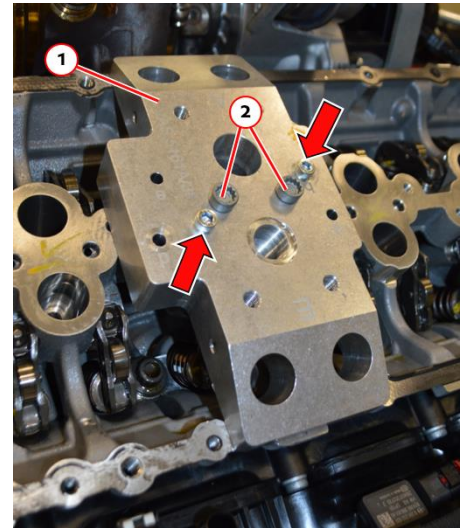
Guide plate -VAS 5161A/38- -1- on the cylinder head must be aligned above the relevant combustion chamber. Observe markings "A – Outlet side / E – Intake side" while doing this.

– **It is imperative that all the sealant is removed from the mating faces of the cylinder heads before proceeding further.**

- Insert the two fixings -arrows-, then install two suitable M8 dowel bolts -2- finger tight ONLY.

(The engine cross brace fixings are suitable for this instance)

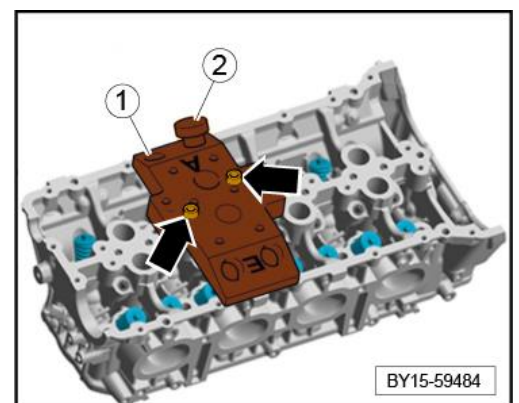
– Now tighten the fixings -arrows- to 9 Nm.  
(for the two rear cylinders, only one securing fixing –arrow- can be used)



Fit punch -2- -VAS 5161/3A- -2- from tool set Removal

and installation device for valve keys -VAS 5161A- on the valve-spring plate and loosen any tight valve keys by tapping them with a plastic hammer.

- Disregard all other position

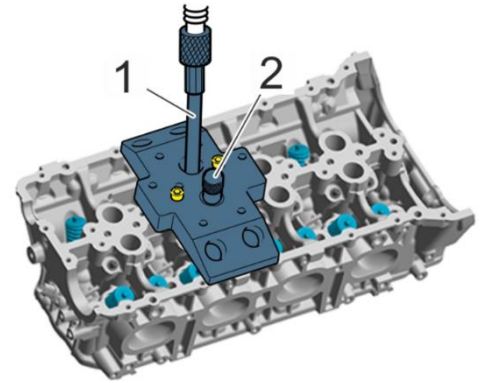


– Screw the sealing pin -VAS 5161/10- -2- from tool set "Removal and installation device for valve keys" -VAS 5161A-

into the Guide plate -VAS 5161A/38-. Hand tight ONLY.

Screw the hose adapter -VAS 5161A/35- -1- hand-tight into the respective spark plug thread.

Connect compressed air to the hose adapter -VAS 5161A/35- -1-.



**i** Note

Minimum pressure: 6 bar

Remove the valve springs using "Removal and installation device for valve keys" -VAS 5161A-.

Screw the retainer -VAS 5161/6- -2- with guided fork and M8 threaded bolt -VAS 5161/5- -3- into the guide plate.

Insert assembly cartridge -VAS 5161/8A- -4- into the bore over the valve spring to be removed.

Engage pressure fork -VAS 5161/2- -1- in the retainer -VAS 5161/6- -2- and press assembly cartridge down.

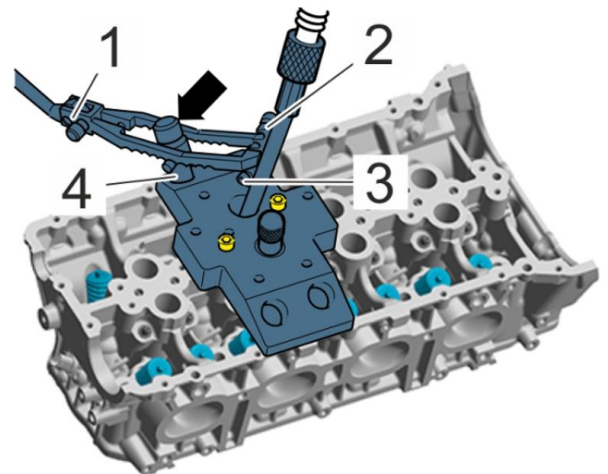
At the same time, turn the knurled screw -arrow- on the assembly cartridge clockwise until the tips engage in the valve collets.

Turn the knurled screw -arrow- back and forth to press the valve collets apart and capture them in the assembly cartridge. The knurled screw slips in as far as it will go into the assembly cartridge.

Relieve tension on pressure fork -VAS 5161/2- -1- and remove assembly cartridge -VAS 5161/8A- -4-.

Remove valve keys from the assembly cartridge.

Remove valve spring with valve-spring plate and mark installation position. DISCARD spring.



### To remove the valve keys from the cartridge

#### -VAS 5161/8A-

-If the valve keys were removed from the assembly cartridge, they must first be inserted into the insertion device -VAS 5161/18- -1- from the tool

set “Removal and installation device for valve keys”

-VAS 5161A-

-Insert the valve keys into the insertion device -VAS 5161/18- -1- .

-The large diameter of the valve keys must be facing upwards.

-Press the assembly cartridge -VAS 5161/8A- onto the valve keys from above and pick up the valve keys from the insertion device -VAS 5161/18- -1-.

