

ENGINE 276 in MODEL 204

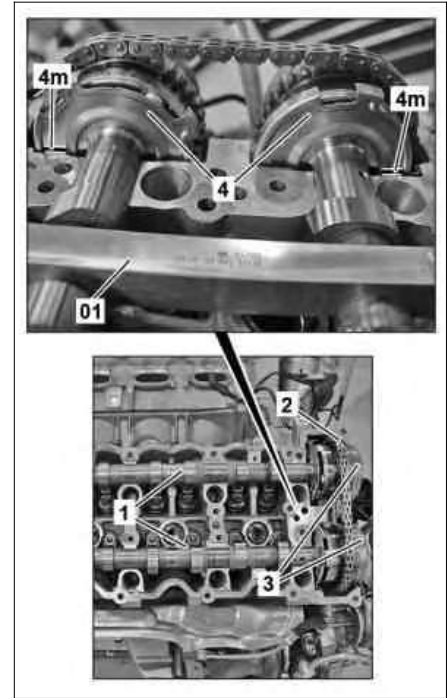
ENGINE 276, 278 in MODEL 207

Modification notes

26.3.14 Document adapted to new repair method



Shown on engine 278


- 01 Hold-down tool
 1 Camshafts
 2 Timing chain
 3 Camshaft positioner
 4 Segmental disks
 4m Markings

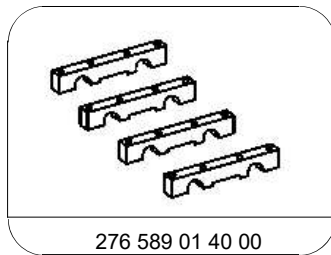


P05.20-2359-03

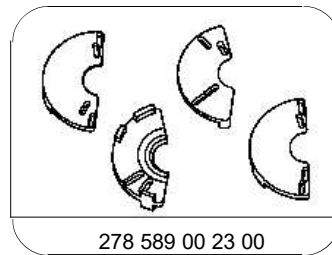
Danger!	Risk of injury. Moving parts can pinch, crush or, in extreme cases even sever extremities.	No parts of the body or limbs should be within the operating range of the mechanism when moving components.	AS00.00-Z-0009-01A
	Remove		
1	Remove centrifuge	ENGINE 276.8 ENGINE 276.9 ENGINE 278	AR01.20-P-2100ELS AR01.20-P-2100FH AR01.20-P-2100ELB
2	Remove cylinder head covers	Engine 276.8 - left cylinder head cover Engine 276.8 - right cylinder head cover Engine 276.9 - left cylinder head cover Engine 276.9 - right cylinder head cover Engine 278 - left cylinder head cover Engine 278 - right cylinder head cover	AR01.20-P-5013ELS AR01.20-P-5012ELS AR01.20-P-5013FH AR01.20-P-5012FH AR01.20-P-5013ELB AR01.20-P-5012ELB
3	Check segmented discs (4) for marking (4m)		
4	Remove camshafts (1)	If marking (4m) is not present on the segmented discs (4)	AR05.20-P-6992FH
5	Attach marking (4m) to the segmented discs (4)	If marking (4m) is not present on the segmented discs (4) Template	AR05.20-P-6292-04MM *278589002300
6	Install camshafts (1)	If marking (4m) is not present on the segmented discs (4)	
7	Mount hold-down tool (01) on camshafts (1)	Tie-down set	*276589014000
8	Unfasten charge air cooler and press to the front with attached coolant lines	ENGINE 276.8	AR09.41-P-6819ELS

9	Rotate engine at crankshaft center bolt in direction of engine rotation to a 40° crank angle (CKA) after top dead center (TDC) on 1st cylinder (ignition TDC)		AR05.10-P-7620-04MM
		<p>i After performing repair work on crank assembly ensure that this stands at 40° after ignition TDC. If the crank assembly should stand at 40° after overlap TDC for assembly, all camshafts (1) have a wrong position of about ½ a tooth for the basic setting. If the crankshaft is turned with the secondary chain removed, this may only take place in 720° steps in order to again come to the correct ignition TDC on the crank assembly.</p>	
10	Remove both chain tensioners	ENGINE 276	AR05.10-P-7800FH
		ENGINE 278	AR05.10-P-7800ELB
		<p>i For removed cylinder head covers both chain tensioners can be removed for a 40° crank angle (CKA) after top dead center (TDC) on cylinder 1 (ignition TDC). To remove the RH chain tensioner the tensioning rail should be relieved by an assistant by turning the exhaust camshaft.</p>	
11	Remove camshaft positioner (3) for right exhaust camshaft	ENGINE 276.8	AR05.20-P-7201ELS
		ENGINE 276.9, 278	AR05.20-P-7201FH
		<p>i To loosen the control valve on the RH camshaft positioner (3), the exhaust camshaft must be counterheld by a helper.</p>	
12	Remove timing chain (2) from camshaft positioners (3)	<p>i To relieve tensioning rail the camshafts (1) should be held by an assistant in the basic position.</p>	
13	Turn camshafts (1) into basic position	<p>i The camshafts (1) must be held in the basic position using a suitable tool by a helper.</p>	
	Check		
14	Check timing chain (2) on left cylinder head for correct seating	<p>i Check whether the timing chain (2) is laid on both camshaft positioners (3) and sits correctly in the tooth systems.</p> <p>If this is not the case:</p> <p style="text-align: center;">↓</p> <p>The respective camshaft (1) must be turned until the timing chain (2) lies on correctly.</p>	
15	Check camshafts (1) for correct installation position	<p>i Markings (4m) on segment discs (4) must be aligned with edges on the cylinder heads.</p>	
	Install		
16	Mount the camshaft positioner (3) for the right exhaust camshaft and, in doing so, lay timing chain (2) on the camshaft positioner (3)	ENGINE 276.8	AR05.20-P-7201ELS
		ENGINE 276.9, 278	AR05.20-P-7201FH
		<p>i To tighten down the control valve on the right camshaft positioner (3) and to relieve the tensioning rail, the camshafts (1) must be held in their basic position by a helper.</p>	
17	Install both chain tensioners	ENGINE 276	AR05.10-P-7800FH
		ENGINE 278	AR05.10-P-7800ELB
		<p>i For removed cylinder head covers, both chain tensioner can be installed for a 40° crank angle (CKA) after top dead center (TDC) on cylinder 1 (ignition TDC). To install the RH chain tensioner, the tensioning rail should be relieved by an assistant by turning the exhaust camshaft.</p>	
18	Crank engine at crankshaft center bolt in direction of engine rotation through about 720°.		
19	Rotate engine at crankshaft center bolt in direction of engine rotation to a 40° crankshaft angle (CKA) after top dead center (TDC) on 1st cylinder (ignition TDC)		AR05.10-P-7620-04MM

		i After performing repair work on crank assembly ensure that this stands at 40° after ignition TDC. If the crank assembly should stand at 40° after overlap TDC for assembly, all camshafts (1) have a wrong position of about ½ a tooth for the basic setting. If the crankshaft is turned with the secondary chain removed, this may only take place in 720° steps in order to again come to the correct ignition TDC on the crank assembly.	
20	Check engine valve timing	i The engine must be stand at a 40° crank angle (CKA) after top dead center (TDC) on cylinder 1 (ignition TDC) (markings on the belt pulley/vibration damper) and the markings (4m) on the segment discs (4) must be flush with the edges on the cylinder heads. If the timing of the engine is incorrect: ↓ Perform work procedure from operation step 9 again	
21	Mount charge air cooler	ENGINE 276.8	AR09.41-P-6819ELS
22	Remove hold-down tool (01) on camshafts (1)	 Tie-down set	*276589014000
23	Install cylinder head covers	Engine 276.8 - left cylinder head cover Engine 276.8 - right cylinder head cover Engine 276.9 - left cylinder head cover Engine 276.9 - right cylinder head cover Engine 278 - left cylinder head cover Engine 278 - right cylinder head cover	AR01.20-P-5013ELS AR01.20-P-5012ELS AR01.20-P-5013FH AR01.20-P-5012FH AR01.20-P-5013ELB AR01.20-P-5012ELB
24	Install centrifuge	ENGINE 276.8 ENGINE 276.9 ENGINE 278	AR01.20-P-2100ELS AR01.20-P-2100FH AR01.20-P-2100ELB
⚠ Danger !	Risk of accident from vehicle starting off by itself when engine running. Risk of injury (bruises and burns) resulting from working on the engine while it is being started or when it is running.	Secure vehicle to prevent it from starting off by itself. Wear closed and snug-fitting work clothes. Do not touch hot or rotating parts.	AS00.00-Z-0005-01A
25	Carry out an engine test run, checking the engine for proper operation and leaktightness		



Tie-down set



Template