

## Contents

<b>00 - Technical data</b> .....	<b>1</b>
<b>1 Technical data</b> .....	<b>1</b>
1.1 Engine number .....	1
1.2 Engine data .....	1
<b>10 - Removing and installing engine</b> .....	<b>3</b>
<b>1 Removing and installing engine</b> .....	<b>3</b>
1.1 Removing engine .....	3
1.2 Separating engine from manual gearbox .....	21
1.3 Separating engine from automatic gearbox 01M .....	21
1.4 Separating engine from automatic gearbox 09A .....	23
1.5 Securing engine to assembly stand .....	25
1.6 Installing engine .....	27
<b>2 Adjusting assembly mountings</b> .....	<b>35</b>
2.1 Checking adjustment .....	35
2.2 Adjusting assembly mountings .....	35
<b>13 - Crankshaft group</b> .....	<b>38</b>
<b>1 Servicing work on pulley end</b> .....	<b>38</b>
1.1 Removing and installing poly V-belt .....	38
1.2 Removing and installing poly V-belt .....	39
1.3 Removing and installing vibration damper .....	41
1.4 Removing and installing bracket for ancillaries .....	42
1.5 Toothed belt - exploded view of components .....	45
1.6 Removing and installing toothed belt .....	48
1.7 Removing toothed belt from camshaft sprocket .....	53
1.8 Positioning crankshaft at TDC with engine removed .....	56
<b>2 Removing and installing sealing flanges and dual-mass flywheel/drive plate</b> .....	<b>57</b>
2.1 Renewing crankshaft oil seal - pulley end .....	58
2.2 Removing and installing sealing flange (front) .....	60
2.3 Removing and installing dual-mass flywheel .....	62
2.4 Removing and installing drive plate .....	64
<b>3 Removing and installing crankshaft</b> .....	<b>66</b>
3.1 Crankshaft - exploded view of components .....	66
3.2 Crankshaft dimensions .....	68
3.3 Removing and installing drive chain sprocket .....	68
<b>4 Dismantling and assembling pistons and conrods</b> .....	<b>71</b>
4.1 Different versions of conrods .....	71
4.2 Pistons and conrods - exploded view of components .....	71
4.3 Piston and cylinder dimensions .....	75
4.4 Measuring radial clearance of conrods .....	75
<b>15 - Cylinder head, valve gear</b> .....	<b>77</b>
<b>1 Removing and installing cylinder head</b> .....	<b>77</b>
1.1 Cylinder head - exploded view of components .....	77
1.2 Removing and installing cylinder head cover .....	79
1.3 Removing and installing cylinder head .....	82
1.4 Removing and installing intake manifold .....	87
1.5 Checking compression .....	91
<b>2 Servicing valve gear</b> .....	<b>94</b>
2.1 Valve gear - exploded view of components .....	94
2.2 Checking axial clearance of camshafts .....	97



2.3	Renewing exhaust camshaft oil seal	98
2.4	Renewing inlet camshaft oil seal	100
2.5	Removing and installing camshafts and hydraulic chain tensioner/camshaft adjuster	102
2.6	Checking hydraulic bucket tappets	108
2.7	Renewing valve stem oil seals	109
2.8	Valve dimensions	114
2.9	Checking valve guides	114
2.10	Machining valve seats	115
<b>3</b>	<b>Checking variable valve timing - only on vehicles with engine code ARX, ARY, AUM, AUQ</b>	<b>118</b>
3.1	Checking function of variable valve timing	118
3.2	Checking inlet camshaft control valve 1 N205	119
<b>17</b>	<b>Lubrication</b>	<b>124</b>
<b>1</b>	<b>Removing and installing parts of lubrication system</b>	<b>124</b>
1.1	Lubrication system - exploded view of components	124
1.2	Removing and installing sump	125
1.3	Removing and installing oil pump	129
1.4	Oil filter and oil cooler - exploded view of components	129
1.5	Checking oil pressure and oil pressure switch F1	131
1.6	Engine oil	132
1.7	Checking oil level	133
<b>19</b>	<b>Cooling</b>	<b>134</b>
<b>1</b>	<b>Removing and installing parts of cooling system</b>	<b>134</b>
1.1	Diagram of coolant hose connections	134
1.2	Draining and filling cooling system	136
1.3	Removing and installing coolant pump	141
1.4	Removing and installing thermostat	142
1.5	Checking thermostat	145
1.6	Removing and installing coolant pipe	145
1.7	Radiator and radiator fan - exploded view of components	148
1.8	Removing and installing radiator	149
1.9	Checking cooling system for leaks	152
<b>21</b>	<b>Turbocharging/supercharging</b>	<b>155</b>
<b>1</b>	<b>Charge air system with turbocharger</b>	<b>155</b>
1.1	Safety precautions	155
1.2	Test requirements for checking turbocharging	155
1.3	Diagram of connections for charge pressure control system	155
1.4	Effects of leaks in charge air system	159
1.5	Checking turbocharger and charge pressure regulating valve - vehicles with throttle cable	160
1.6	Checking turbocharger and charge pressure regulating valve - vehicles with electronic throttle	163
1.7	Checking mechanical air recirculation valve	169
1.8	Checking air recirculation valve for turbocharger N249 - vehicles with electronic throttle	170
1.9	Checking solenoid valve for charge pressure control N75	175
1.10	Checking charge pressure sender G31 - vehicles with electronic throttle	180
<b>2</b>	<b>Servicing charge air system with turbocharger</b>	<b>184</b>
2.1	Rules for cleanliness	184
2.2	Turbocharger - exploded view of components	184
2.3	Removing and installing turbocharger	187
2.4	Charge air cooler - exploded view of components	194
2.5	Removing and installing charge air cooler	194
<b>26</b>	<b>Exhaust system</b>	<b>197</b>

<b>1</b>	<b>Removing and installing parts of exhaust system - vehicles with front-wheel drive</b>	<b>197</b>
1.1	Exhaust system - exploded view of components	197
1.2	Separating centre and rear silencers	199
1.3	Removing and installing front exhaust pipe with catalytic converter	200
1.4	Removing and installing exhaust manifold	201
1.5	Stress-free alignment of exhaust system	204
1.6	Checking exhaust system for leaks	206
<b>2</b>	<b>Removing and installing parts of exhaust system - vehicles with four-wheel drive</b>	<b>207</b>
2.1	Exhaust system - exploded view of components	207
2.2	Separating centre and rear silencers	209
2.3	Removing and installing front exhaust pipe with catalytic converter	210
2.4	Removing and installing exhaust manifold	213
2.5	Stress-free alignment of exhaust system	215
2.6	Checking exhaust system for leaks	216
<b>3</b>	<b>Secondary air system - not on engine code AGU, AJQ, AQA</b>	<b>217</b>
3.1	Principle and function	217
3.2	Checking secondary air inlet valve N112	219
3.3	Checking secondary air pump relay J299 and secondary air pump motor V101	225
3.4	Checking combination valve for secondary air system for proper operation and leakage	230
3.5	Removing and installing combination valve for secondary air system	232
3.6	Removing and installing secondary air pump	233