



## Contents

<b>00 - Technical data</b>	<b>1</b>
1 <b>Safety information</b>	1
1.1    Safety regulations for working on fuel supply	1
1.2    Safety measures when working on vehicles with a start/stop system	1
1.3    Safety precautions when using testers and measuring instruments during a road test	2
1.4    Safety precautions when working on the cooling system	2
1.5    Safety precautions when working on ignition system	2
2 <b>Identification</b>	3
2.1    Engine number/engine data	3
3 <b>Repair instructions</b>	4
3.1    Rules for cleanliness	4
3.2    General information	4
3.3    General repair instructions	4
3.4    Foreign objects in engine	5
3.5    Contact corrosion	5
3.6    Routing and attachment of lines	5
3.7    Fitting radiator and condensers	5
3.8    Checking vacuum system	5
<b>10 - Removing and installing engine</b>	<b>7</b>
1 <b>Removing and installing engine</b>	7
1.1    Removing engine	7
1.2    Separating engine and gearbox	24
1.3    Securing engine on engine and gearbox support	25
1.4    Installing engine	27
2 <b>Assembly mountings</b>	32
2.1    Assembly overview - assembly mountings	32
2.2    Removing and installing engine mounting	36
2.3    Removing and installing gearbox mounting	39
2.4    Removing and installing pendulum support	43
2.5    Supporting engine in installation position	45
2.6    Adjusting assembly mountings	49
2.7    Checking adjustment of assembly mountings (engine and gearbox mountings)	50
<b>13 - Crankshaft group</b>	<b>51</b>
1 <b>Cylinder block (pulley end)</b>	51
1.1    Assembly overview - poly V-belt drive	51
1.2    Assembly overview - cylinder block (pulley end)	55
1.3    Removing and installing poly-V belt	57
1.4    Removing and installing tensioner for poly V-belt	62
1.5    Removing and installing engine support	65
1.6    Renewing crankshaft oil seal - belt pulley end	67
2 <b>Cylinder block, gearbox end</b>	70
2.1    Assembly overview - cylinder block, gearbox end	70
2.2    Removing and installing flywheel	71
2.3    Removing and installing sealing flange on gearbox side	72
3 <b>Crankshaft</b>	80
3.1    Crankshaft dimensions	80
4 <b>Pistons and conrods</b>	81
4.1    Assembly overview - pistons and conrods	81
4.2    Checking pistons and cylinder bores	82
4.3    Separating new conrod	84



4.4	Removing and installing oil spray jets .....	85
4.5	Setting piston to TDC position .....	86
<b>15 - Cylinder head, valve gear</b>	.....	<b>88</b>
1	<b>Cylinder head</b> .....	<b>88</b>
1.1	Assembly overview - cylinder head .....	88
1.2	Removing and installing cylinder head .....	91
1.3	Removing and installing camshaft housing .....	97
1.4	Checking compression .....	100
2	<b>Toothed belt drive</b> .....	<b>104</b>
2.1	Assembly overview - toothed belt cover .....	104
2.2	Assembly overview - toothed belt .....	105
2.3	Removing and installing toothed belt guard .....	106
2.4	Removing and installing toothed belt .....	107
2.5	Preassembling and installing valve timing tool .....	114
2.6	Checking valve timing .....	121
2.7	Adjusting valve timing .....	124
2.8	Removing toothed belt from camshaft .....	133
3	<b>Valve gear</b> .....	<b>138</b>
3.1	Assembly overview - valve gear .....	138
3.2	Measuring axial play of camshaft .....	139
3.3	Removing and installing camshaft oil seal .....	140
3.4	Removing and installing camshaft adjuster .....	144
3.5	Removing and installing toothed belt pulley .....	149
3.6	Removing and installing valve stem seals .....	152
4	<b>Inlet and exhaust valves</b> .....	<b>160</b>
4.1	Checking valve guides .....	160
<b>17 - Lubrication</b>	.....	<b>161</b>
1	<b>Sump, oil pump</b> .....	<b>161</b>
1.1	Assembly overview - sump/oil pump .....	161
1.2	Engine oil: .....	164
1.3	Removing and installing sump .....	165
1.4	Removing and installing oil pump .....	168
1.5	Removing and installing oil level and oil temperature sender G266 .....	170
2	<b>Crankcase ventilation</b> .....	<b>171</b>
2.1	Assembly overview - crankcase breather system .....	171
2.2	Removing and installing oil separator .....	172
3	<b>Oil filter, oil pressure switch</b> .....	<b>175</b>
3.1	Removing and installing oil pressure switch F1 .....	175
3.2	Checking oil pressure and oil pressure switch .....	176
3.3	Removing and installing oil filter housing .....	177
<b>19 - Cooling</b>	.....	<b>179</b>
1	<b>Cooling system/coolant</b> .....	<b>179</b>
1.1	Connection diagram - coolant hoses .....	179
1.2	Checking cooling system for leaks .....	180
1.3	Draining and adding coolant .....	183
2	<b>Coolant pump, regulation of cooling system</b> .....	<b>197</b>
2.1	Assembly overview - coolant pump .....	197
2.2	Assembly overview - thermostat .....	199
2.3	Removing and installing coolant pump .....	201
2.4	Removing and installing thermostat .....	205
2.5	Removing and installing toothed belt for coolant pump .....	211
2.6	Removing and installing toothed belt pulley for coolant pump .....	214



2.7	Removing and installing coolant temperature sender G62 .....	215
<b>3</b>	<b>Coolant pipes .....</b>	<b>217</b>
3.1	Assembly overview - coolant pipes .....	217
3.2	Removing and installing coolant pipes .....	218
<b>4</b>	<b>Radiator, radiator fan .....</b>	<b>220</b>
4.1	Assembly overview - radiator/radiator fan .....	220
4.2	Assembly overview - radiator cowl and radiator fan .....	223
4.3	Removing and installing radiator .....	225
4.4	Removing and installing radiator cowl with radiator fan .....	233
4.5	Removing and installing radiator fan V7 .....	235
<b>24 - Mixture preparation - injection .....</b>	<b>237</b>	
<b>1</b>	<b>Injection system .....</b>	<b>237</b>
1.1	Overview of fitting locations - injection system .....	237
1.2	Assembly overview - fuel system .....	244
<b>2</b>	<b>Injectors .....</b>	<b>246</b>
2.1	Assembly overview - fuel rail with injectors .....	246
2.2	Removing and installing injectors .....	246
2.3	Checking injectors .....	248
2.4	Cleaning injectors .....	253
<b>3</b>	<b>Air filter .....</b>	<b>255</b>
3.1	Assembly overview - air filter housing .....	255
3.2	Removing and installing air filter housing .....	258
<b>4</b>	<b>Intake manifold .....</b>	<b>260</b>
4.1	Assembly overview - intake manifold .....	260
4.2	Removing and installing intake manifold .....	261
4.3	Removing and installing throttle valve module GX3 .....	263
4.4	Cleaning throttle valve module GX3 .....	265
<b>5</b>	<b>Senders and sensors .....</b>	<b>266</b>
5.1	Removing and installing intake manifold sender GX9 .....	266
<b>6</b>	<b>Engine control unit .....</b>	<b>268</b>
6.1	Assembly overview - engine control unit .....	268
6.2	Removing and installing engine (motor) control unit J623 .....	269
6.3	Removing and installing engine (motor) control unit J623 with protective housing .....	271
<b>7</b>	<b>Lambda probe .....</b>	<b>276</b>
7.1	Assembly overview - Lambda probe .....	276
7.2	Removing and installing Lambda probe .....	277
<b>26 - Exhaust system .....</b>	<b>284</b>	
<b>1</b>	<b>Exhaust pipes and silencers .....</b>	<b>284</b>
1.1	Assembly overview - silencers .....	284
1.2	Separating exhaust pipes from silencers .....	287
1.3	Removing and installing silencer .....	288
1.4	Aligning exhaust system free of stress .....	291
1.5	Checking exhaust system for leaks .....	291
1.6	Installation position of clamp .....	292
<b>2</b>	<b>Emission control .....</b>	<b>294</b>
2.1	Assembly overview - emission control .....	294
2.2	Removing and installing catalytic converter .....	297
<b>28 - Ignition system .....</b>	<b>303</b>	
<b>1</b>	<b>Ignition system .....</b>	<b>303</b>
1.1	Assembly overview - ignition system .....	303
1.2	Removing and installing ignition coils with output stage .....	305



1.3	Removing and installing knock sensor 1 G61	307
1.4	Removing and installing Hall sender G40	308
1.5	Removing and installing engine speed sender G28	309