



Contents

00 - Technical data	1
1 Identification	1
2 Safety precautions	2
3 Repair instructions	3
10 - Removing and installing engine	4
1 Removing and installing engine	4
1.1 Removing engine	4
1.2 Separating engine and gearbox	16
1.3 Removing engine from scissor-type assembly platform	22
1.4 Securing engine to engine and gearbox support	23
1.5 Installing engine	25
2 Assembly mountings	32
2.1 Exploded view - assembly mountings	32
2.2 Supporting engine in installation position	33
2.3 Removing and installing engine mountings	34
2.4 Removing and installing gearbox mounting	36
3 Engine cover panel	38
13 - Crankshaft group	39
1 Cylinder block (pulley end)	39
1.1 Exploded view - cylinder block (pulley end)	39
1.2 Exploded view - sealing flange (pulley end)	39
1.3 Removing and installing poly V-belts	39
1.4 Removing and installing poly V-belt tensioner	39
1.5 Removing and installing vibration damper	40
1.6 Removing and installing bracket for ancillaries	43
1.7 Removing and installing engine support	43
1.8 Renewing crankshaft oil seal (pulley end)	44
1.9 Removing and installing sealing flange (pulley end)	44
2 Cylinder block (gearbox end)	45
3 Crankshaft	46
4 Balance shaft	47
5 Pistons and conrods	48
15 - Cylinder head, valve gear	49
1 Timing chain cover	49
2 Chain drive	50
2.1 Exploded view - camshaft timing chains	50
2.2 Exploded view - drive chain for oil pump	50
2.3 Removing camshaft timing chain from camshafts	50
2.4 Removing and installing camshaft timing chain	50
3 Cylinder head	51
3.1 Exploded view - cylinder head	51
3.2 Exploded view - camshaft housing	51
3.3 Removing and installing cylinder head	51
3.4 Removing and installing camshaft housing	51
3.5 Checking compression	52
4 Valve gear	53
4.1 Exploded view - valve gear	53
4.2 Measuring axial clearance of camshaft	53



4.3	Measuring radial clearance of camshaft	53
4.4	Removing and installing camshaft	53
4.5	Removing and installing cam actuators	53
4.6	Removing and installing camshaft control valve 1 N205	54
4.7	Removing and installing valve stem oil seals	54
17	- Lubrication	55
1	Sump/oil pump	55
1.1	Exploded view - sump/oil pump	55
1.2	Engine oil	55
1.3	Removing and installing sump (bottom section)	55
1.4	Removing and installing sump (top section)	55
1.5	Removing and installing oil baffle plate	55
1.6	Removing and installing oil pump	55
1.7	Removing and installing oil level and oil temperature sender G266	55
2	Engine oil cooler	56
3	Crankcase breather	57
4	Oil filter/oil pressure switches	58
4.1	Exploded view - oil filter	58
4.2	Exploded view - oil pressure switches/oil pressure control	58
4.3	Removing and installing oil filter housing	58
4.4	Removing and installing oil pressure switch F22	58
4.5	Removing and installing oil temperature sender G8	58
4.6	Removing and installing oil pressure sender G10	58
4.7	Checking oil pressure	59
4.8	Removing and installing valve for oil pressure control N428	59
19	- Cooling	60
1	Cooling system/coolant	60
1.1	Connection diagram - coolant hoses	60
1.2	Checking cooling system for leaks	63
1.3	Draining and filling cooling system	63
2	Coolant pump/thermostat assembly	70
2.1	Exploded view - coolant pump/thermostat	70
2.2	Exploded view - electric coolant pump	70
2.3	Exploded view - coolant temperature senders	71
2.4	Removing and installing electric coolant pump	72
2.5	Removing and installing coolant pump	74
2.6	Removing and installing map-controlled engine cooling system thermostat F265	74
2.7	Removing and installing coolant temperature sender G62	75
2.8	Removing and installing engine outlet coolant temperature sender G82	75
2.9	Removing and installing radiator outlet coolant temperature sender G83	75
2.10	Removing and installing temperature sender for engine temperature regulation G694 ..	76
2.11	Removing and installing coolant valves	76
3	Coolant pipes	77
3.1	Exploded view - coolant pipes	77
3.2	Removing and installing coolant pipes	79
4	Radiator/radiator fans	87
4.1	Exploded view - radiator/radiator fans	87
4.2	Exploded view - auxiliary radiator	90
4.3	Removing and installing radiator	90
4.4	Removing and installing radiator cowl	94
4.5	Removing and installing radiator fan V7	97
4.6	Removing and installing auxiliary radiator	97



21 - Turbocharging/supercharging	100
1 Turbocharger	100
1.1 Exploded view - turbocharger	100
1.2 Removing and installing turbocharger	100
1.3 Renewing vacuum unit for turbocharger	101
1.4 Removing and installing temperature sender for engine cover panel G765	101
2 Charge air system	102
2.1 Exploded view - charge air system	102
2.2 Exploded view - hose connections for charge air system	103
2.3 Removing and installing air pipe	103
2.4 Removing and installing charge air cooler	107
2.5 Removing and installing charge pressure sender G31	109
2.6 Checking charge air system for leaks	109
24 - Mixture preparation - injection	112
1 Injection system	112
1.1 Overview of fitting locations - injection system	112
1.2 Checking fuel system for leaks	121
2 Vacuum system	122
3 Air cleaner	123
3.1 Exploded view - air cleaner housing	123
3.2 Removing and installing air cleaner housing	124
4 Intake manifold	125
4.1 Exploded view - intake manifold	125
4.2 Removing and installing intake manifold	125
4.3 Removing and installing throttle valve module J338	126
5 Injectors	127
5.1 Exploded view - fuel rail with injectors	127
5.2 Removing and installing fuel rail	127
6 Senders and sensors	128
6.1 Exploded view - actuator for structure-borne sound and control unit for structure-borne sound	128
6.2 Exploded view - pressure differential sender, vehicles with particulate filter	129
6.3 Removing and installing actuator for structure-borne sound R214	129
6.4 Removing and installing control unit for structure-borne sound J869	130
6.5 Removing and installing intake manifold pressure sender G71	130
6.6 Removing and installing fuel pressure sender G247	130
6.7 Removing and installing fuel pressure sender for low pressure G410	130
6.8 Removing and installing pressure differential sender for particulate filter G1037 - vehicles with particulate filter	131
7 High-pressure pump	132
8 Lambda probe	133
8.1 Exploded view - Lambda probe	133
8.2 Removing and installing Lambda probe	133
9 Engine control unit	134
9.1 Exploded view - engine control unit	134
9.2 Removing and installing engine control unit J623	134
26 - Exhaust system	136
1 Exhaust pipes/silencers	136
1.1 Exploded view - silencers	136
1.2 Removing and installing front silencers	138
1.3 Separating exhaust pipes/silencers	140
1.4 Removing and installing silencers	141



1.5	Stress-free alignment of exhaust system	141
1.6	Checking exhaust system for leaks	142
2	Emission control system	143
2.1	Exploded view - emission control system	143
2.2	Removing and installing catalytic converter	145
2.3	Removing and installing particulate filter	146
2.4	Removing and installing exhaust flap control unit J883	149
3	Exhaust gas temperature control	150
3.1	Exploded view - exhaust gas temperature control	150
3.2	Removing and installing exhaust gas temperature sender 3 G495 - vehicles with particulate filter	150
28	- Ignition system	151
1	Ignition system	151
1.1	Exploded view - ignition system	151
1.2	Removing and installing ignition coils with output stages	151
1.3	Removing and installing knock sensor 1 G61	153
1.4	Removing and installing Hall senders	153
1.5	Removing and installing engine speed sender G28	154