



Contents

00 - Technical data	1
1 Technical data	1
1.1 Engine number	1
1.2 Engine data	1
2 Checking the gas system	2
2.1 Test prerequisites for gas systems	2
2.2 Checking gas system for leaks	3
10 - Removing and installing engine	5
1 Removing and installing engine	5
1.1 Notes on removing	5
1.2 Securing engine to assembly stand	9
1.3 Notes on installing	9
1.4 Specified torques	11
1.5 Aligning engine and gearbox mountings	11
1.6 Assembly mountings	12
1.7 Additional information and assembly work for vehicles with air conditioner	12
13 - Crankshaft group	14
1 Dismantling and assembling engine	14
1.1 Assembly overview - parts I and II	14
1.2 Assembly overview - part I, belt drive	16
1.3 Assembly overview - part II, cylinder block	17
1.4 Removing and installing poly V-belt	18
2 Removing and installing sealing flanges and flywheel or drive plate	21
2.1 Assembly overview	21
2.2 Renewing crankshaft oil seal - pulley end	22
2.3 Removing and installing front sealing flange	24
2.4 Removing and installing drive plate	27
3 Removing and installing crankshaft	29
3.1 Assembly overview	29
3.2 Colour coding	30
3.3 Crankshaft dimensions	31
4 Dismantling and assembling pistons and conrods	32
4.1 Assembly overview	32
4.2 Removing and installing oil scraper ring	35
4.3 Piston and cylinder dimensions	36
15 - Cylinder head, valve gear	37
1 Cylinder head	37
1.1 Assembly overview	37
1.2 Removing, installing and tensioning toothed belt	39
1.3 Checking semi-automatic toothed belt tensioning roller	43
1.4 Removing and installing cylinder head	44
1.5 Checking compression	48
2 Repairing valve gear	50
2.1 Assembly overview	50
2.2 Reworking valve seats	53
2.3 Renewing camshaft oil seal	54
2.4 Removing and installing camshaft	56
2.5 Checking hydraulic bucket tappets	59
2.6 Checking valve guides	60



2.7	Renewing valve guides	60
2.8	Renewing valve stem seals	61
17	- Lubrication	65
1	Removing and installing parts of lubrication system	65
1.1	Assembly overview	65
1.2	Assembly overview - oil filter bracket	68
1.3	Assembly overview - oil pump with balancer shaft gear assembly	69
1.4	Removing and installing oil pump with balancer shaft gear assembly	70
1.5	Removing and installing oil pan	73
1.6	Checking oil pressure and oil pressure switch	75
19	- Cooling	78
1	Removing and installing parts of cooling system	78
1.1	Assembly overview - parts of cooling system, body side	78
1.2	Assembly overview - parts of cooling system, engine side	80
1.3	Coolant hose schematic diagram	82
1.4	Draining and filling coolant	83
1.5	Removing and installing radiator	86
1.6	Removing and installing coolant pump	87
1.7	Removing and installing thermostat	89
20	- Fuel supply system	92
1	Removing and installing parts of fuel supply system (petrol)	92
1.1	Assembly overview - fuel tank with attachments and fuel filter	92
1.2	Safety precautions when working on fuel supply system	95
1.3	Rules for cleanliness	96
1.4	Removing and installing fuel delivery unit	96
1.5	Removing and installing fuel gauge sender G	98
1.6	Removing and installing fuel tank	98
1.7	Crash fuel shut-off	100
1.8	Checking fuel pump	100
2	Accelerator mechanism	107
2.1	Assembly overview	107
2.2	Function of EPC system	107
3	Activated charcoal filter system	109
3.1	Function	109
3.2	Assembly overview	109
3.3	Checking fuel tank breather	110
4	Removing and installing parts of fuel supply system (natural gas)	112
4.1	Safety precautions when working on natural gas system	112
4.2	Rules for cleanliness	113
4.3	Natural gas system components	114
4.4	Fuel line connections	115
4.5	Assembly overview - support for fuel tank and securing straps	116
4.6	Assembly overview - fuel tank with attachments	117
4.7	Removing and installing fuel tank	118
4.8	Removing and installing tank shut-off valve	120
4.9	Removing and installing thermal fuse	122
4.10	Assembly overview - filling connection	123
4.11	Removing and installing filling connection	124
5	Evacuating natural gas tank	127
24	- Mixture preparation - injection	128
1	Repairing injection system	128



1.1	Assembly overview - intake manifold upper part	128
1.2	Assembly overview - intake manifold lower part	130
1.3	Assembly overview - fuel rail with injectors (petrol operation)	131
1.4	Assembly overview - gas rail with gas injectors	132
1.5	Assembly overview - gas pressure regulator	133
1.6	Removing and installing gas pressure regulator	133
1.7	Assembly overview - air filter	135
1.8	Cleaning throttle valve module J338	136
1.9	Safety precautions	137
1.10	Rules for cleanliness	138
1.11	Technical data	138
2	Checking components	139
2.1	Checking injectors for leaks and injection rate	139
2.2	Checking fuel pressure regulator and holding pressure	141
2.3	Checking intake manifold change-over	144
3	Engine control unit	147
3.1	Renewing engine control unit	147
3.2	Adapting functions and components	147
3.3	Reading and erasing engine control unit fault memory	148
26	- Exhaust system	150
1	Removing and installing parts of exhaust system	150
1.1	Assembly overview - front exhaust pipe and catalytic converter with attachments	150
1.2	Assembly overview - silencers with mountings	152
2	Secondary air system	154
2.1	Function	154
2.2	Assembly overview - parts of secondary air system	154
2.3	Checking combination valve	155
28	- Ignition system	157
1	Repairing ignition system	157
1.1	Assembly overview - ignition system	157
1.2	Safety precautions	158
1.3	Test data, spark plugs	159