

ENGINE

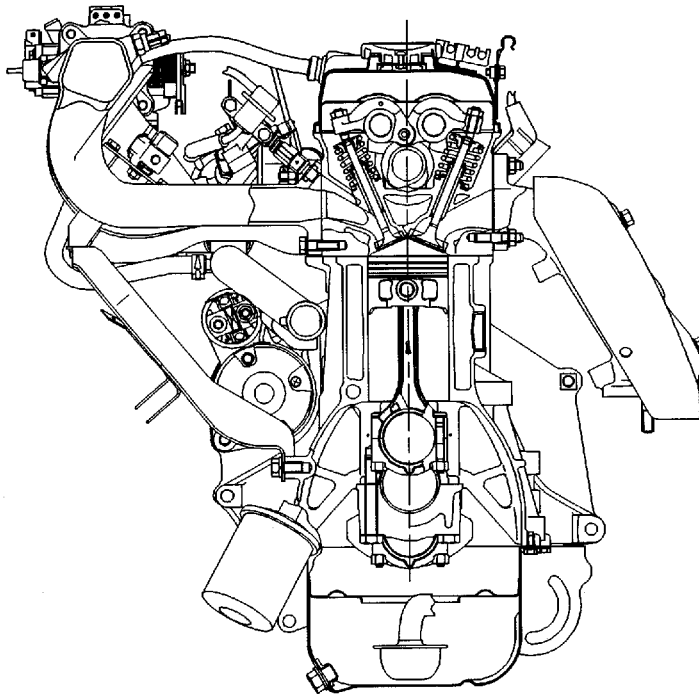
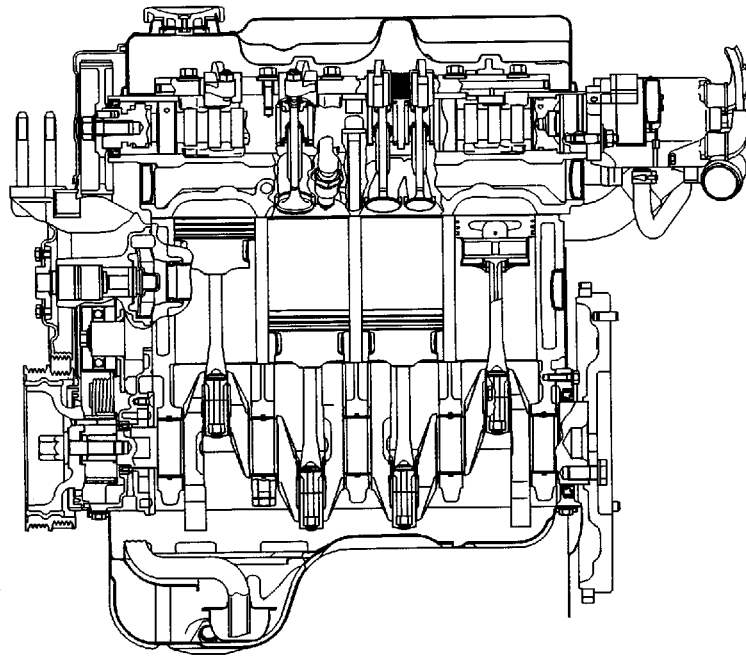
4G1 SERIES

CONTENTS

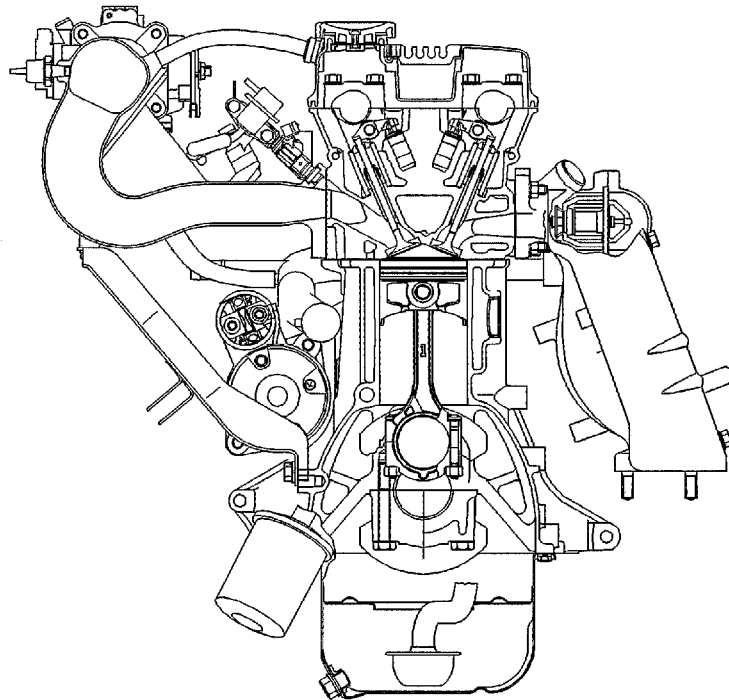
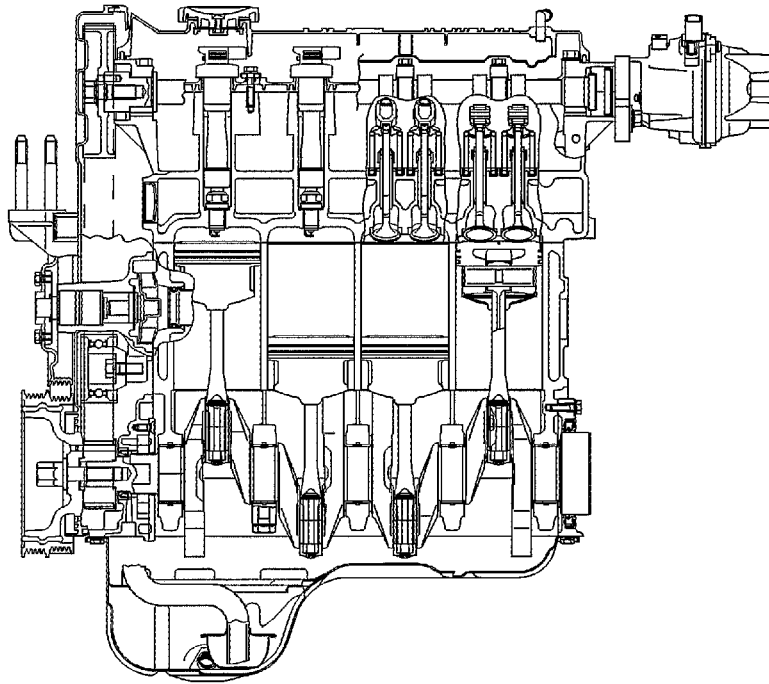
GENERAL INFORMATION	11A-0-3
1. SPECIFICATIONS	11A-1-1
SERVICE SPECIFICATIONS	11A-1-1
REWORK DIMENSIONS	11A-1-3
TORQUE SPECIFICATIONS	11A-1-4
NEW TIGHTENING METHOD-BY USE OF BOLTS TO BE TIGHTENED IN PLASTIC AREA	11A-1-6
SEALANT	11A-1-6
FORM-IN-PLACE GASKET	11A-1-7
2. SPECIAL TOOLS	11A-2-1
3. ALTERNATOR AND IGNITION SYSTEM	11A-3-1
4. TIMING BELT	11A-4-1
5. FUEL AND EMISSION CONTROL SYSTEMS	11A-5-1
5a. INTAKE MANIFOLD AND THROTTLE BODY (GDI)	11A-5a-1
5b. EXHAUST MANIFOLD (GDI)	11A-5b-1
6. WATER PUMP AND WATER HOSE	11A-6-1
7. INTAKE AND EXHAUST MANIFOLDS	11A-7-1
7a. FUEL SYSTEM (GDI)	11A-7a-1
8. ROCKER ARMS AND CAMSHAFTS	11A-8-1
8a. ROCKER ARMS AND CAMSHAFTS (GDI)	11A-8a-1
9. CYLINDER HEAD AND VALVES	11A-9-1
10. OIL PUMP AND OIL PAN	11A-10-1
11. PISTONS AND CONNECTING RODS	11A-11-1
12. CRANKSHAFT AND CYLINDER BLOCK	11A-12-1

NOTES

GENERAL INFORMATION



1EN0524



1EN0416

Descriptions		4G13 12-VALVE-CARBURETOR	4G13 12-VALVE-MPI
Type		In-line OHV, SOHC	In-line OHV, SOHC
Number of cylinders		4	4
Combustion chamber		Pentroof type	Pentroof type
Total displacement dm ³		1,299	1,299
Cylinder bore mm		71.0	71.0
Piston stroke mm		82.0	82.0
Compression ratio		9.5	9.5
Number of valves	Intake	8	8
	Exhaust	4	4
Valve timing	Intake opens	BTDC 14°	BTDC 19°
	Intake closes	ABDC 48°	ABDC 43°
	Exhaust opens	BBDC 55°	BBDC 60°
	Exhaust closes	ATDC 13°	ATDC 8°
Lubrication system		Pressure feed, full-flow filtration	Pressure feed, full-flow filtration
Oil pump type		Trochoid type	Trochoid type
Cooling system		Water-cooled, forced circulation	Water-cooled, forced circulation
Water pump type		Centrifugal impeller type	Centrifugal impeller type

Descriptions		4G13 16-VALVE-CARBURETOR	4G13 16-VALVE-MPI
Type		In-line OHV, SOHC	In-line OHV, SOHC
Number of cylinders		4	4
Combustion chamber		Pentroof type	Pentroof type
Total displacement dm ³		1,299	1,299
Cylinder bore mm		71.0	71.0
Piston stroke mm		82.0	82.0
Compression ratio		9.5	10, 9.5* ¹
Number of valves	Intake	8	8
	Exhaust	8	8
Valve timing	Intake opens	BTDC 12°	BTDC 17°
	Intake closes	ABDC 48°	ABDC 39°
	Exhaust opens	BBDC 48°	BBDC 49°
	Exhaust closes	ATDC 12°	ATDC 7°
Lubrication system		Pressure feed, full-flow filtration	Pressure feed, full-flow filtration
Oil pump type		Trochoid type	Trochoid type
Cooling system		Water-cooled, forced circulation	Water-cooled, forced circulation
Water pump type		Centrifugal impeller type	Centrifugal impeller type

*1: LANCER for General Export

Descriptions		4G15– CARBURETTOR	4G15–MPI 12-VALVE	4G15–MPI 16-VALVE	4G15–GDI
Type		In-line OHV, SOHC	In-line OHV, SOHC	In-line OHV, DOHC	In-line OHV, DOHC
Number of cylinders		4	4	4	4
Combustion chamber		Semi spherical type	Semi spherical type	Pentroof type	Pentroof + Curved piston head
Total displacement dm ³		1,468	1,468	1,468	1,468
Cylinder bore mm		75.5	75.5	75.5	75.5
Piston stroke mm		82.0	82.0	82.0	82.0
Compression ratio		9.0	9.0	9.5	11.0
Number of valves	Intake	8	8	8	8
	Exhaust	4	4	8	8
Valve timing	Intake opens	BTDC 14°	BTDC 14° , BTDC 13°*1	BTDC 16°	BTDC 12°
	Intake closes	ABDC 48°	ABDC 48° , ABDC 47°*1	ABDC 40°	ABDC 44°
	Exhaust opens	BBDC 55°	BBDC 55° , BBDC 56°*1	BBDC 45°	BBDC 48°
	Exhaust closes	ATDC 13°	ATDC 13° , ATDC 8°*1	ATDC 15°	ATDC 12°
Lubrication system		Pressure feed, full-flow filtration	Pressure feed, full-flow filtration	Pressure feed, full-flow filtration	Pressure feed, full-flow filtration
Oil pump type		Trochoid type	Trochoid type	Trochoid type	Trochoid type
Cooling system		Water-cooled, forced circulation	Water-cooled, forced circulation	Water-cooled, forced circulation	Water-cooled, forced circulation
Water pump type		Centrifugal impeller type	Centrifugal impeller type	Centrifugal impeller type	Centrifugal impeller type

*1: Special low-emission engines on vehicles for Australia

Descriptions		4G18 16-VALVE-CARBURETOR	4G18 16-VALVE-MPI
Type		In-line OHV, SOHC	In-line OHV, SOHC
Number of cylinders		4	4
Combustion chamber		Pentroof type	Pentroof type
Total displacement dm ³		1,584	1,584
Cylinder bore mm		76.0	76.0
Piston stroke mm		87.3	87.3
Compression ratio		9.5	9.5, 10 ^{*1*2}
Number of valves	Intake	8	8
	Exhaust	8	8
Valve timing	Intake opens	BTDC 12°	BTDC 17° , BTDC 9° ^{*1} , BTDC 17° ^{*2}
	Intake closes	ABDC 48°	ABDC 39° , ABDC 51° ^{*1} , ABDC 43° ^{*2}
	Exhaust opens	BBDC 48°	BBDC 49° , BBDC 49° ^{*1} , BBDC 53° ^{*2}
	Exhaust closes	ATDC 12°	ATDC 7° , ATDC 15° ^{*1} , ATDC 7° ^{*2}
Lubrication system		Pressure feed, full-flow filtration	Pressure feed, full-flow filtration
Oil pump type		Trochoid type	Trochoid type
Cooling system		Water-cooled, forced circulation	Water-cooled, forced circulation
Water pump type		Centrifugal impeller type	Centrifugal impeller type

*1: SPACE STAR for Europe

*2: LANCER for General Export

1. SPECIFICATIONS

SERVICE SPECIFICATIONS

Item		Standard	Limit	
Rocker arms and camshaft				
Camshaft cam height mm	SOHC 12-VALVE	Intake (primary)	38.78	38.28
		Intake (secondary)	38.78	38.28
		Exhaust*1	39.01	38.51
		Exhaust*2	38.97	38.47
	SOHC 16-VALVE*3	Intake	36.99	36.49
		Exhaust	36.85	36.35
	SOHC 16-VALVE*4	Intake	36.86	36.36
		Exhaust	36.68	36.18
	SOHC 16-VALVE*5	Intake	37.30	36.80
		Exhaust	37.16	36.66
	SOHC 16-VALVE*6	Intake	37.17	36.67
		Exhaust	36.99	36.49
	DOHC	Intake	34.67	34.17
		Exhaust	34.26	33.76
DOHC GDI	Intake	34.85	34.35	
	Exhaust	34.59	34.09	
Camshaft journal diameter mm	SOHC	45.93–45.94	–	
	SOHC 16-VALVE*7	44.93–44.94	–	
	DOHC	25.95–25.97	–	
Cylinder head and valves				
Flatness of cylinder head gasket surface mm		0.05 or less	–	
Cylinder head gasket surface grinding limit (including grinding of cylinder block gasket surface) mm		–	0.2	
Cylinder head overall height mm	SOHC 12-VALVE	106.9–107.1	–	
	SOHC 16-VALVE	119.9–120.1	–	
	DOHC	131.9–132.1	–	
Cylinder head bolt nominal length mm		–	103.2	
Valve margin mm	Intake	1.0	0.5	
	Exhaust	1.5	1.0	
Valve stem diameter mm	SOHC 12-VALVE	6.6	–	
	SOHC 16-VALVE	5.5	–	
	DOHC	5.5	–	

*1: With low pollution system

*2: Without low pollution system

*3: Except 2001 model front wheel drive vehicles

*4: 2001 model front wheel drive vehicles for Europe

*5: 2001 model front wheel drive vehicles for General Export

*6: 2002 model front wheel drive vehicles for Europe

*7: SOHC 16-VALVE MPI for Europe

Item			Standard	Limit
Valve stem-to-guide clearance mm	SOHC 12-VALVE	Intake	0.020-0.050	0.10
		Exhaust	0.035-0.050	0.15
	SOHC 16-VALVE	Intake	0.020 - 0.047	0.10
		Exhaust	0.030 - 0.057	0.15
	DOHC	Intake	0.020-0.047	0.10
		Exhaust	0.030-0.062	0.15
Valve face angle			45° - 45.5°	-
Valve stem projection mm	SOHC 12-VALVE	Intake	43.70	44.20
		Exhaust	43.30	43.80
	SOHC 16-VALVE	Intake	53.21	53.71
		Exhaust	54.10	54.60
	DOHC	Intake	48.80	49.30
		Exhaust	48.70	49.20
Overall valve length mm	SOHC 12-VALVE	Intake	100.75	100.25
		Exhaust	101.05	105.55
	SOHC 16-VALVE	Intake	111.56	111.06
		Exhaust	114.71	114.21
	DOHC	Intake	106.35	105.85
		Exhaust	106.85	106.35
Valve spring free height mm	SOHC 12-VALVE	Intake	46.1	45.6
		Exhaust	46.8	46.3
	SOHC 16-VALVE		50.9	50.4
	DOHC		49.1	48.6
Valve spring load/installed height N/mm	SOHC 12-VALVE	Intake	226/40.0	-
		Exhaust	284/39.6	-
	SOHC 16-VALVE		216/44.2	-
	DOHC		177/40.0	-
Valve spring squareness			2°	4°
Valve seat contact width mm			0.9- 1.3	-
Valve guide internal diameter mm	SOHC 12-VALVE		6.6	-
	SOHC 16-VALVE		5.5	-
	DOHC		5.5	-
Valve guide projection mm	SOHC 12-VALVE		17.0	-
	SOHC 16-VALVE		23.0	-
	DOHC		23.0	-
Oil pump and oil pan				
Oil pump tip clearance mm			0.06-0.18	-
Oil pump side clearance mm			0.04-0.10	-
Oil pump body clearance mm			0.10-0.18	0.35