CASE

PROFESSIONAL PARTNER

SERVICE MANUAL

4JG1 ISUZU ENGINE

9-93710 NA

Issued 04-2005

CASE

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4JG1
ISUZU ENGINES

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REVISION HISTORY			
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NOTES

SECTION 1

GENERAL INFORMATION

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GENERAL REPAIR INSTRUCTIONS

1. Before performing any service operation with the engine mounted, disconnect the grounding cable from the battery.

This will reduce the chance of cable damage and burning due to short circuiting.

2. Always use the proper tool or tools for the job on hand.

Where specified use the specially designed tool or tools.

3. Use genuine CASE parts, referring to the CASE PARTS CATALOG for engine safety.

4. Never reuse cotter pins, gaskets, O-rings, lock washers, and self locking nuts. Discard them as you remove them. Replace them with new ones.

5. Always keep disassembled parts neatly in groups. This will ensure a smooth reassembly operation.

It is especially important to keep fastening parts separate. These parts vary in hardness and design, depending on their installation position.

6. All parts should be carefully cleaned before inspection or reassembly.

Oil ports and other openings should be cleaned with compressed air to make sure that they are completely free of obstructions.

7. Rotating and sliding part surfaces should be lubricated with oil or grease before reassembly.

8. If necessary, use sealing compound on gaskets to prevent leakage.

9. Nut and bolt torque specifications should be carefully followed.

10. Always release the air pressure from any machine-mounted air tank(s) before dismounting the engine or disconnecting pipes and hoses. To not do so is extremely dangerous.

11. Always check and recheck you work. No service operation is complete until you have done this.

NOTES ON THE FORMAT OF THIS MANUAL

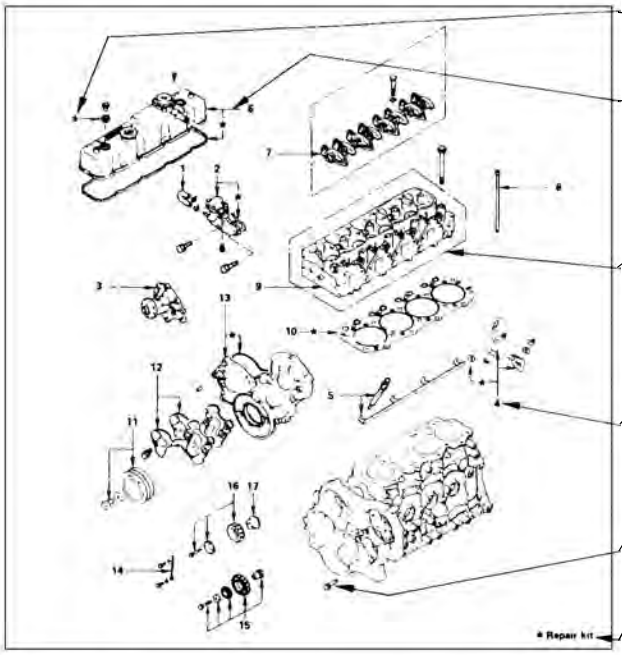
1. Find the applicable section by referring to the Table of Contents at the beginning of the Manual.

2. Common technical data such as general maintenance items, service specifications, and tightening torques are included in the “General Information” section.

3. Each section is divided into sub-sections dealing with disassembly, inspection and repair, and reassembly.

The section ENGINE ASSEMBLY is an exception. This part is divided into three sections to facilitate quick indexing.

4. When the same servicing operation is applicable to several different units, the manual will direct you to the appropriate page.
5. For the sake of brevity, self-explanatory removal and installation procedures are omitted. More complex procedures are covered in detail.
6. Each service operation section in this Service Manual begins with an exploded view of the applicable area. A brief explanation of the notation used follows.



Disassembly Steps - 2

1. Water by-pass hose
2. Thermostat housing
3. Water pump
▲ 4. Injection nozzle holder
5. Glow plug and glow plug connector
6. Cylinder head cover
▲ 7. Rocker arm shaft and rocker arm
8. Push rod
▲ 9. Cylinder head
10. Cylinder head gasket
▲ 11. Crankshaft damper pulley with dust seal
12. Timing gear case cover
13. Timing gear cover
14. Timing gear oil pipe
15. Idler gear "B" and shaft
▲ 16. Idler gear "A"
▲ 17. Idler gear shaft

Inverted Engine

Parts marked with an asterisk (*) are included in the repair kit.

Parts within a square frame are to be removed and installed as a single unit.

All parts within an irregularly shaped frame form a single assembly. They are considered to be a “major component”.

Individual parts within the irregularly shaped frame are considered to be “minor components”.

The number indicates the service operation sequence.

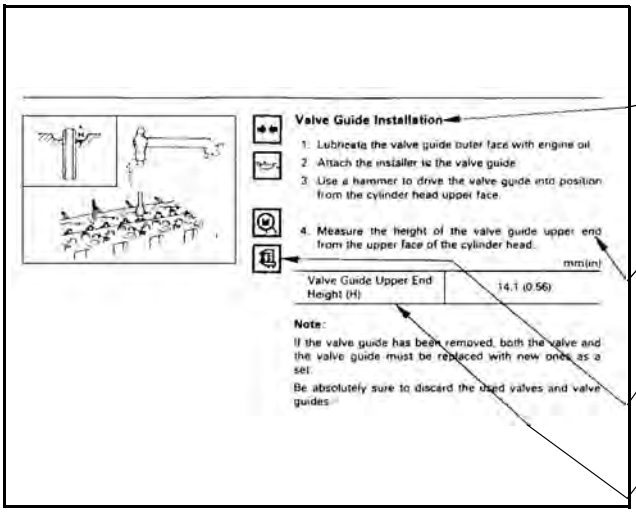
Removal of unnumbered parts is unnecessary unless replacement is required.

The “* Repair Kit” indicates that a repair kit is available.

The parts listed under “Reassembly Steps” or “Installation Steps” are in the service operation sequence.

The removal or installation of parts marked with a triangle (▲) is an important operation. Detailed information is given in the text.

7. Below is a sample of the text of the Service Manual



This is the item shown in the illustration. It is marked with a triangle (▲) on the Major Components page.
Letters and numbers contained in a circle refer to the illustration.
Symbols indicate the type of service operation or step to be performed. A detailed explanation of these symbols follows.
Service data and specifications are given in this table.

8. The following symbols appear throughout this Service Manual. They indicate the type of service operation or step to perform.

	**Removal**		**Adjustment**
	**Installation**		**Cleaning**
	**Disassembly**		**Important Operation Requiring Extra Care**
	**Reassembly**		**Specified Torque (Tighten)**
	**Alignment (Marks)**		**Commercially Available Tool Use Required or Recommended**
	**Directional Indication**		**Lubrication (Oil)**
	**Inspection**		**Lubrication (Grease)**
	**Measurement**		
	**Sealant Application**		

9. Measurement criteria are defined by the terms “standard” and “limit”.

A measurement falling within the “standard” range indicates that the applicable part or parts are serviceable.

“Limit” should be taken as an absolute value.

A measurement which is outside the "limit" indicates that the applicable part or parts must be either repaired or replaced.

10. Components and parts are listed in the singular form throughout the Manual.

11. Directions used in this Manual are as follows:

Front: The cooling fan side of the engine viewed from the flywheel.

Left: The left hand side viewed from the same position.

Right: The right hand side viewed from the same position.

Rear: The flywheel side of the engine.

Cylinder numbers are counted from the front of the engine.

The front most cylinder is No. 1 and rear most cylinder is the final cylinder number of the engine.

The engine’s direction of rotation is counterclockwise viewed from the flywheel.

MAIN DATA AND SPECIFICATIONS

Note:

1. These specifications are based on the standard engine.
2. Specifications for items marked with an asterisk (*) will vary according to the type of equipment on which the engine is installed.

If you are unable to locate the data applicable to these specifications, please contact Isuzu Motors LTD through your machine supplier.

Item	Engine Model 4JB1
Engine type	Water cooled, four-cycle, in-line, overhead valve
Combustion chamber type	Direct injection
Cylinder liner type	Dry
No. of cylinders - bore x stroke mm (in)	4 - 95.4 x 107
Total piston displacement cm^3 (cid)	3.059 (186.7)
Compression ratio	18.6
* Engine dimensions mm (in)	739 x 625 x 746
Length x width x height	(29.1 x 24.6 x 29.4)
* Engine weight (Dry) kg (lb)	248 (547)
Fuel injection order	1 - 3 - 4 - 2
Fuel injection timing (B.T.D.C) degreas	16
Specified fuel	Diesel fuel
Injection pump	In-line plunger, Bosch A type
Governor	Variable speed mechanical type
Low idle speed (rpm)	850-1000
Injection nozzle	Multi-hole type
Injection starting pressure MPa (kg/cm^2 /psi)	18.1 (185/2630)
Fuel filter type	Cartridge paper element
Water sediment decanter (if so equipped)	Sediment water level indicating type
Compression pressure MPa (kg/cm^2 /psi)	3.04 (31/441)
Valve clearances (When cold)	
Intake mm (in)	0.40 (0.0157)
Exhaust mm (in)	0.40 (0.0157)
Lubrication method	Pressurized circulation
Oil pump	Trachoid type
Main oil filter type	Cartridge paper element, full flow
Partial oil filler	Not equipped
* Lubricating oil volume lit. (qts)	7.6-9.6 (oil pan)
Oil cooler (if so equipped)	Water cooled built in oil filter
Cooling method	Pressurized forced circulation
Coolant volume (engine only) lit. (qts)	5.0 (5.3)
Water pump	Belt driven impeller type
Thermostat type	Wax pellet type
* Generator V-A	12-50
* Starter V-KW	12-2.2

TIGHTENING TORQUE SPECIFICATIONS

The tightening torque values given in the table below are applicable to the bolts unless otherwise specified.

STANDARD BOLT

N.m (kgf.m)

Bolt Identification / Bolt Diameter x pitch (mm)				
				
M6 x 1.0	3.9 ~ 7.8 (0.4 ~ 0.8)	4.9 ~ 9.8 (0.5 ~ 1.0)		_____
M8 x 1.25	7.8 ~ 17.7 (0.8 ~ 1.8)	11.8 ~ 22.6 (1.2 ~ 2.3)		16.7 ~ 30.4 (1.7 ~ 3.1)
M10 x 1.25	20.6 ~ 34.3 (2.1 ~ 3.5)	27.5 ~ 46.1 (2.8 ~ 4.7)		37.3 ~ 62.8 (3.8 ~ 6.4)
*** M10 x 1.5**	19.6 ~ 33.4 (2.0 ~ 3.4)	27.5 ~ 45.1 (2.8 ~ 4.6)		36.3 ~ 59.8 (3.7 ~ 6.1)
M12 x 1.25	49.1 ~ 73.6 (5.0 ~ 7.5)	60.8 ~ 91.2 (6.2 ~ 9.3)		75.5 ~ 114.0 (7.7 ~ 11.6)
*** M12 x 1.75**	45.1 ~ 68.7 (4.6 ~ 7.0)	56.9 ~ 84.4 (5.8 ~ 8.6)		71.6 ~ 107.0 (7.3 ~ 10.9)
M14 x 1.5	76.5 ~ 115.0 (7.8 ~ 11.7)	93.2 ~ 139.0 (9.5 ~ 14.2)		114.0 ~ 171.0 (11.6 ~ 17.4)
*** M14 x 2.0**	71.6 ~ 107.0 (7.3 ~ 10.9)	88.3 ~ 131.0 (9.0 ~ 13.4)		107.0 ~ 160.0 (10.9 ~ 16.3)
M16 x 1.5	104.0 ~ 157.0 (10.6 ~ 16.0)	135.0 ~ 204.0 (13.8 ~ 20.8)		160.0 ~ 240.0 (16.3 ~ 24.5)
*** M16 x 2.0**	100.0 ~ 149.0 (10.2 ~ 15.2)	129.0 ~ 194.0 (13.2 ~ 19.8)		153.0 ~ 230.0 (15.6 ~ 23.4)
M18 x 1.5	151.0 ~ 226.0 (15.4 ~ 23.0)	195.0 ~ 293.0 (19.9 ~ 29.9)		230.0 ~ 345.0 (23.4 ~ 35.2)
*** M18 x 2.5**	151.0 ~ 226.0 (15.4 ~ 23.0)	196.0 ~ 294.0 (20.0 ~ 30.0)		231.0 ~ 346.0 (23.6 ~ 35.3)
M20 x1.5	206.0 ~ 310.0 (21.0 ~ 31.6)	270.0 ~ 405.0 (27.5 ~ 41.3)		317.0 ~ 476.0 (32.3 ~ 48.5)
*** M20 x 2.5**	190.0 ~ 286.0 (19.4 ~ 29.2)	249.0 ~ 375.0 (25.4 ~ 38.2)		293.0 ~ 440.0 29.9 ~ 44.9
M22 x 1.5	251.0 ~ 414.0 (25.6 ~ 42.2)	363.0 ~ 544.0 (37.0 ~ 55.5)		425.0 ~ 637.0 (43.3 ~ 64.9)
*** M22 x 2.5**	218.0 ~ 328.0 (22.2 ~ 33.4)	338.0 ~ 507.0 (34.5 ~ 51.7)		394.0 ~ 592.0 (40.2 ~ 60.4)
M24 x 2.0	359.0 ~ 540.0 (36.6 ~ 55.0)	431.0 ~ 711.0 (43.9 ~ 72.5)		554.0 ~ 831.0 (56.5 ~ 84.7)
*** M24 x 3.0**	338.0 ~ 507.0 (34.5 ~ 51.7)	406.0 ~ 608.0 (41.4 ~ 62.0)		521.0 ~ 782.0 (53.1 ~ 79.7)

An asterisk (*) indicates that the bolts are used for female threaded parts that are made of soft materials such as cast iron.

TIGHTENING TORQUE SPECIFICATIONS

The tightening torque values given in the table below are applicable to the bolts unless otherwise specified.

FLANGED HEAD BOLT

N.m (kgf.m)

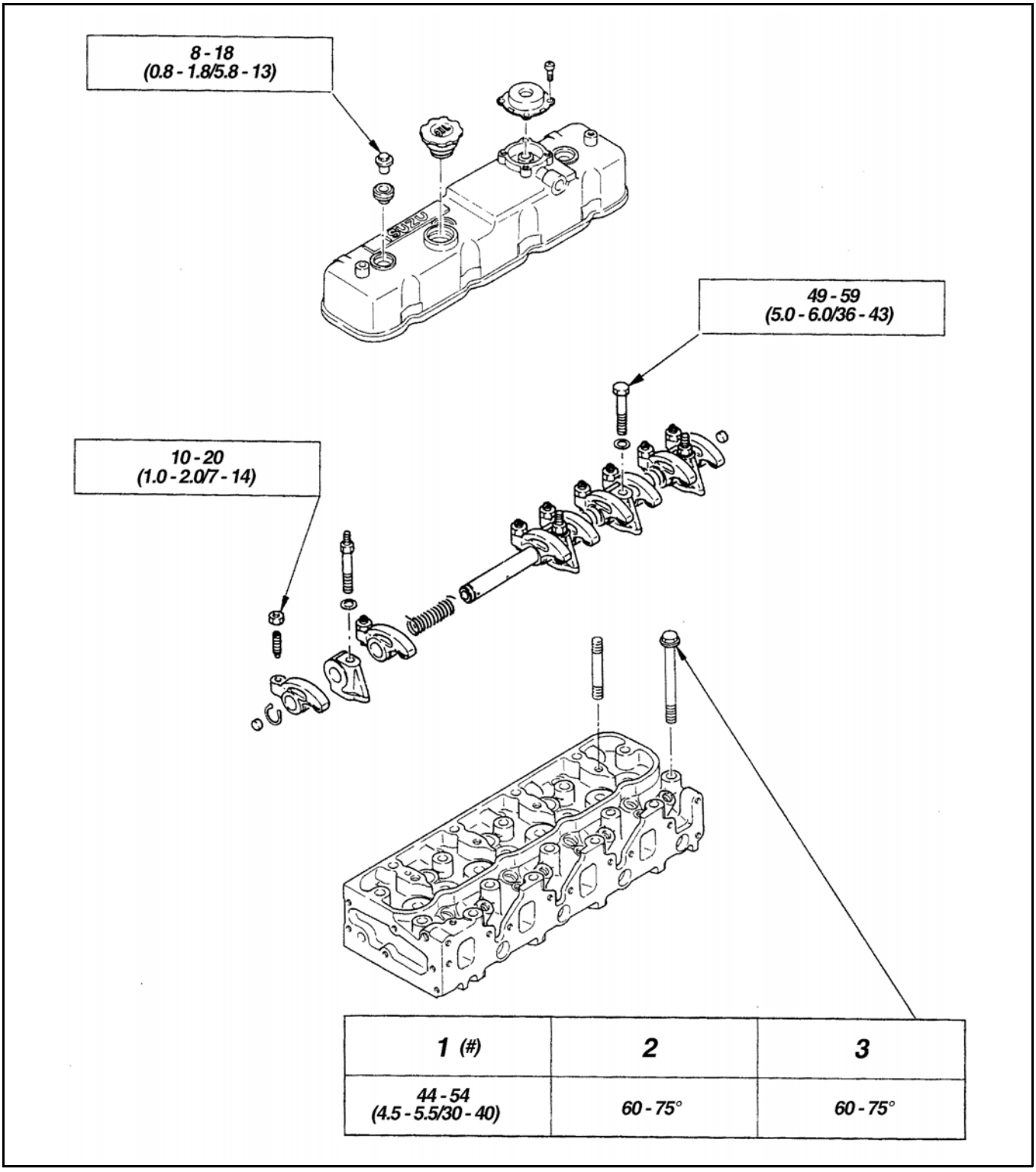
Bolt head marking / Nominal Size (dia. x pitch)			
M6 x 1.0	4.6 ~ 8.5 (0.5 ~ 0.9)	6.6 ~ 8.5 (0.6 ~ 1.2)	_____
M8 x 1.25	10.5 ~ 19.6 (1.1 ~ 2.0)	15.3 ~ 28.4 (1.6 ~ 2.9)	18.1 ~ 33.6 (2.1 ~ 3.4)
M10 x 1.25	23.1 ~ 38.5 (2.4 ~ 3.9)	35.4 ~ 58.9 (3.6 ~ 6.1)	42.3 ~ 70.5 (4.3 ~ 7.2)
***M10 x 1.5**	22.3 ~ 37.2 (2.3 ~ 3.8)	34.5 ~ 57.5) (3.5 ~ 5.8)	40.1 ~ 66.9) (4.1 ~ 6.8)
M12 x 1.25	54.9 ~ 82.3 (5.6 ~ 8.4)	77.7 ~ 117.0 (7.9 ~ 11.9)	85.0 ~ 128.0 (8.7 ~ 13.0)
***M12 x 1.75**	51.0 ~ 76.5 (5.2 ~ 7.8)	71.4 ~ 107.0 (7.3 ~ 10.9)	79.5 ~ 119.0 (8.1 ~ 12.2)
M14 x 1.5	83.0 ~ 125.0 (8.5 ~ 12.7)	115.0 ~ 172.0 (11.7 ~ 17.6)	123.0 ~ 185.0 (12.6 ~ 18.9)
***M14 x 2.0**	77.2 ~ 116.0 (7.9 ~ 11.8)	108.0 ~ 162.0 (11.1 ~ 16.6)	116.0 ~ 173.0 (11.8 ~ 17.7)
M16 x 1.5	116.0 ~ 173.0 (11.8 ~ 17.7)	171.0 ~ 257.0 (17.4 ~ 26.2)	177.0 ~ 265.0 (18.0 ~ 27.1)
***M16 x 2.0**	109.0 ~ 164.0 (11.2 ~ 16.7)	163.0 ~ 244.0 (16.6 ~ 24.9)	169.0 ~ 253.0 (17.2 ~ 25.8)

A bolt with an asterisk (*) is used for female screws of soft material such as cast iron.

MAJOR COMPONENT MOUNTING NUTS AND BOLTS

CYLINDER HEAD COVER, CYLINDER HEAD AND ROCKER ARM SHAFT BRACKET

N.m (kgf.m/lb.ft)

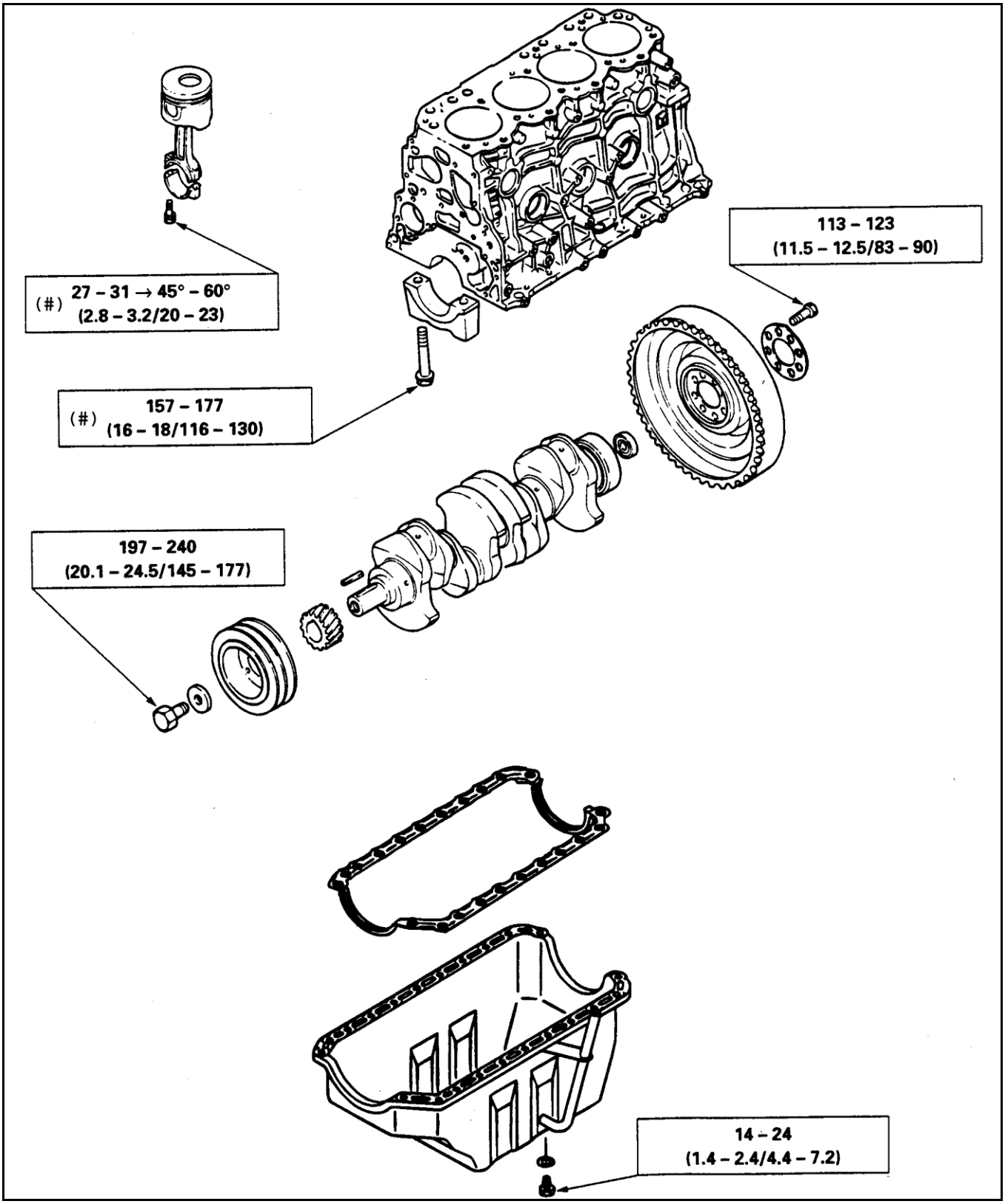


1 (#)	2	3
44 - 54 (4.5 - 5.5/30 - 40)	60 - 75°	60 - 75°

(#) Apply engine oil to thread portion

CRANKSHAFT BEARING CAP, CONNECTING ROD BEARING CAP, CRANKSHAFT DAMPER PULLEY, FLYWHEEL AND OIL PAN

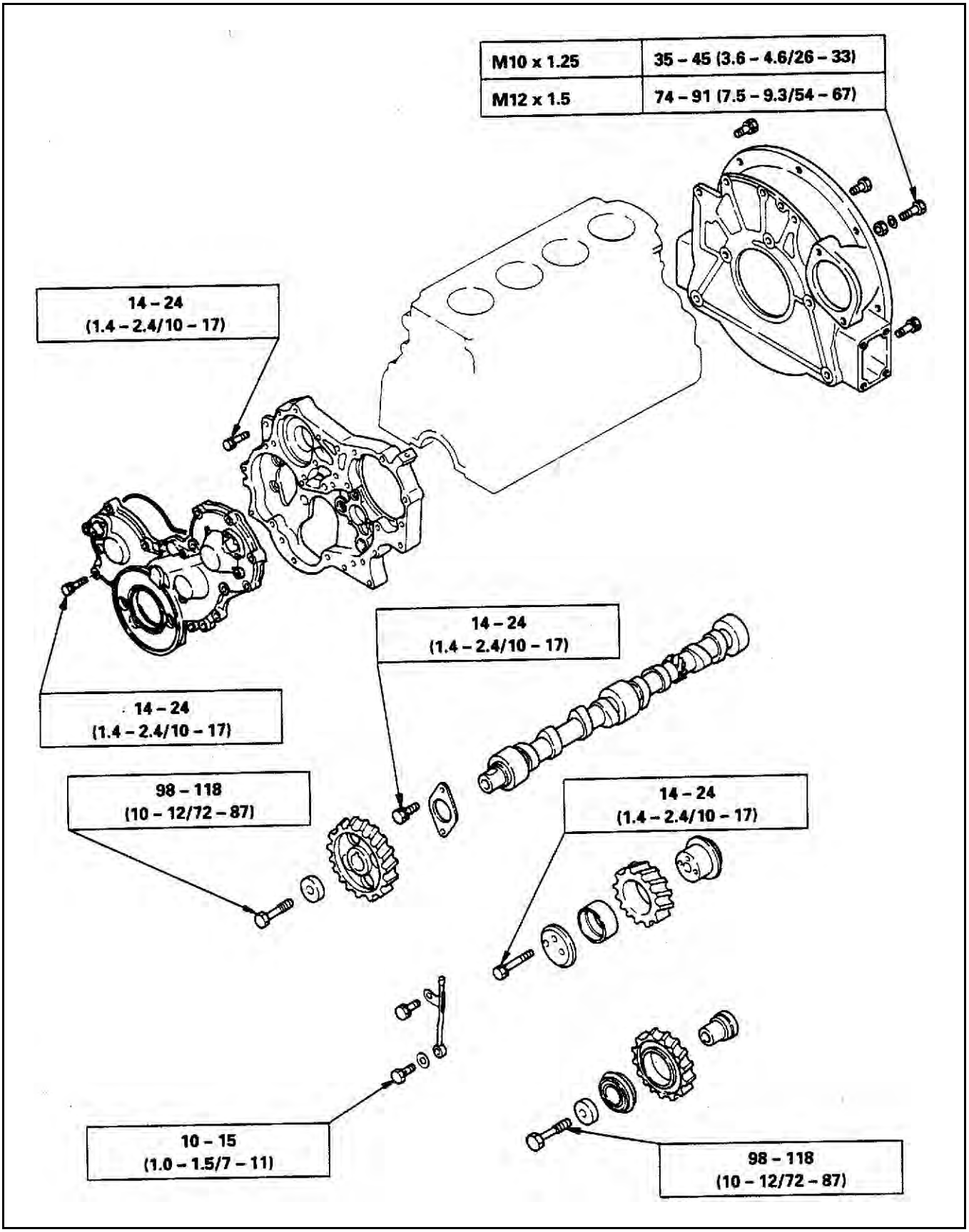
N.m (kgf.m/lb.ft)



(#) Apply engine oil to thread portion

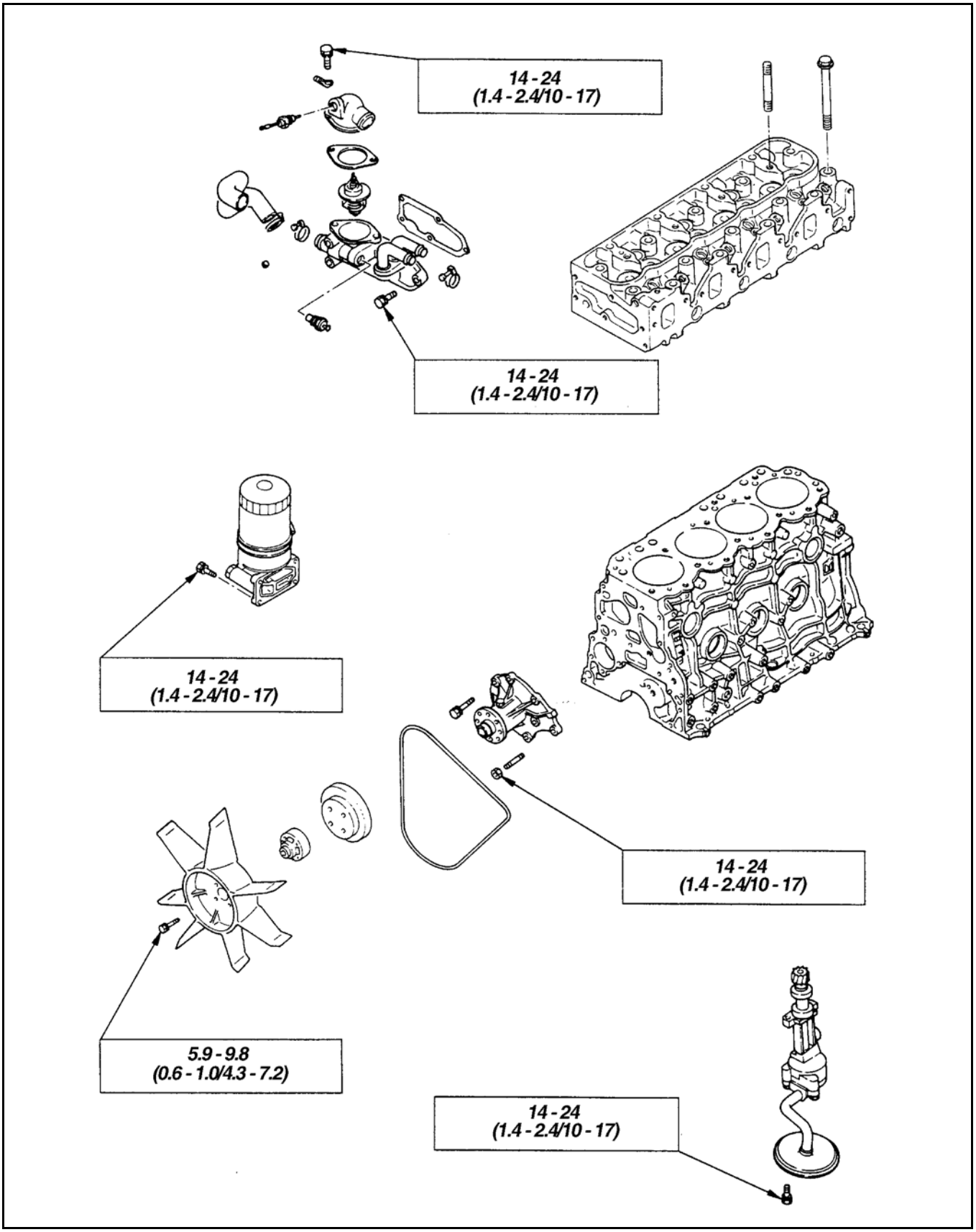
TIMING GEAR CASE, FLYWHEEL HOUSING, CAMSHAFT AND TIMING GEAR

N.m (kgf.m/lb.ft)



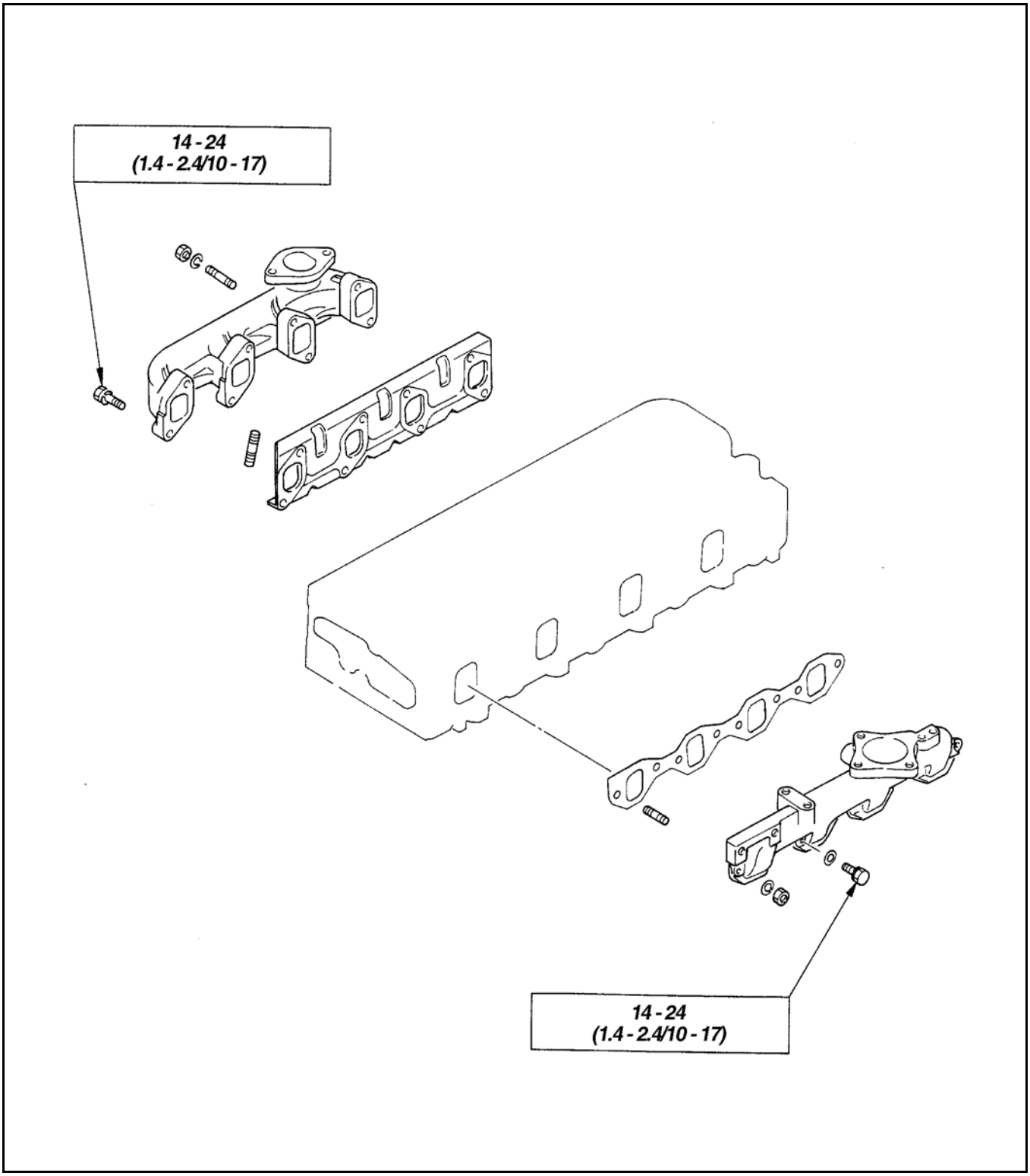
COOLING AND LUBRICATING SYSTEM

N.m (kgf.m/lb.ft)



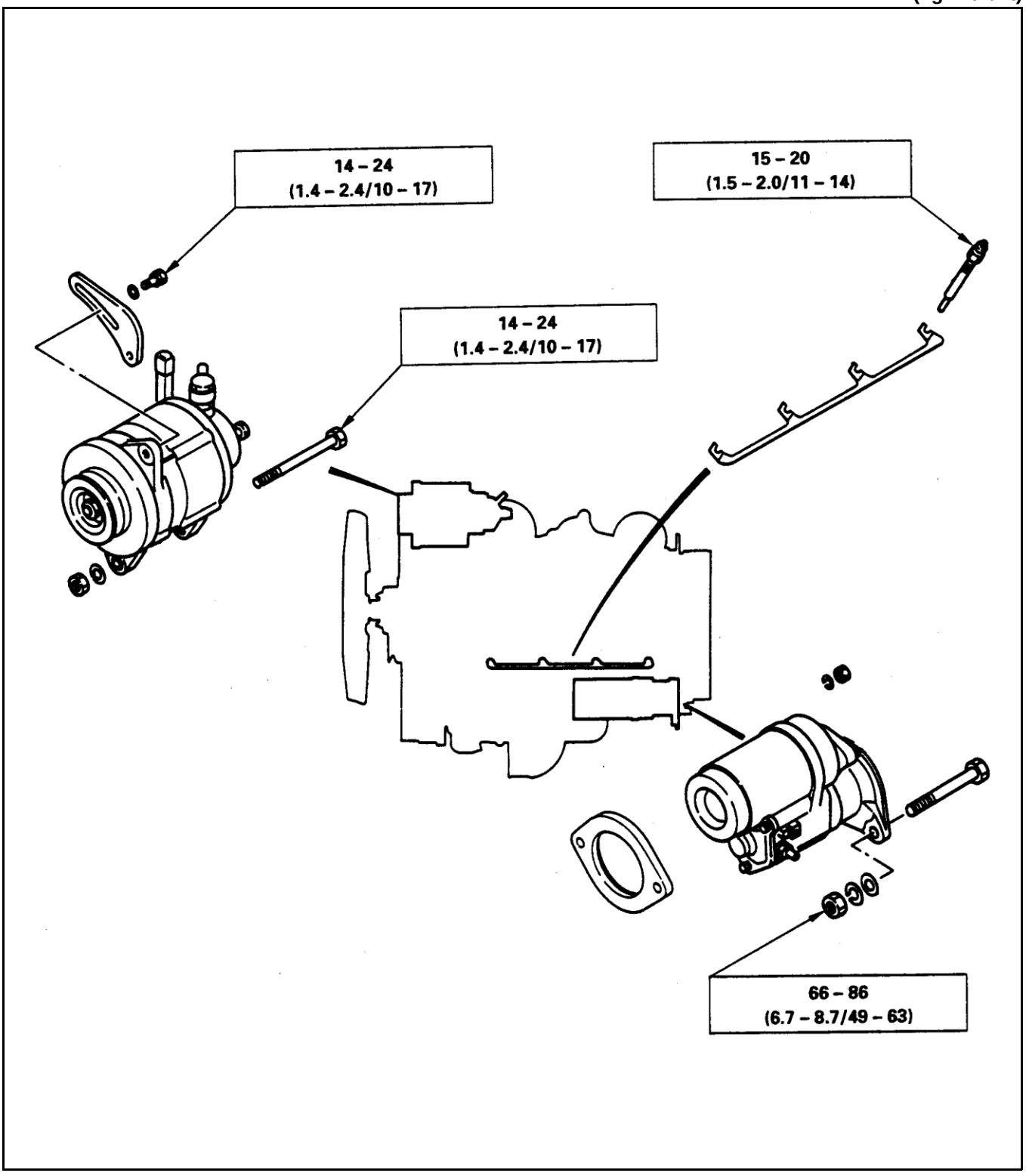
INTAKE AND EXHAUST MANIFOLD

N.m (kgf.m/lb.ft)



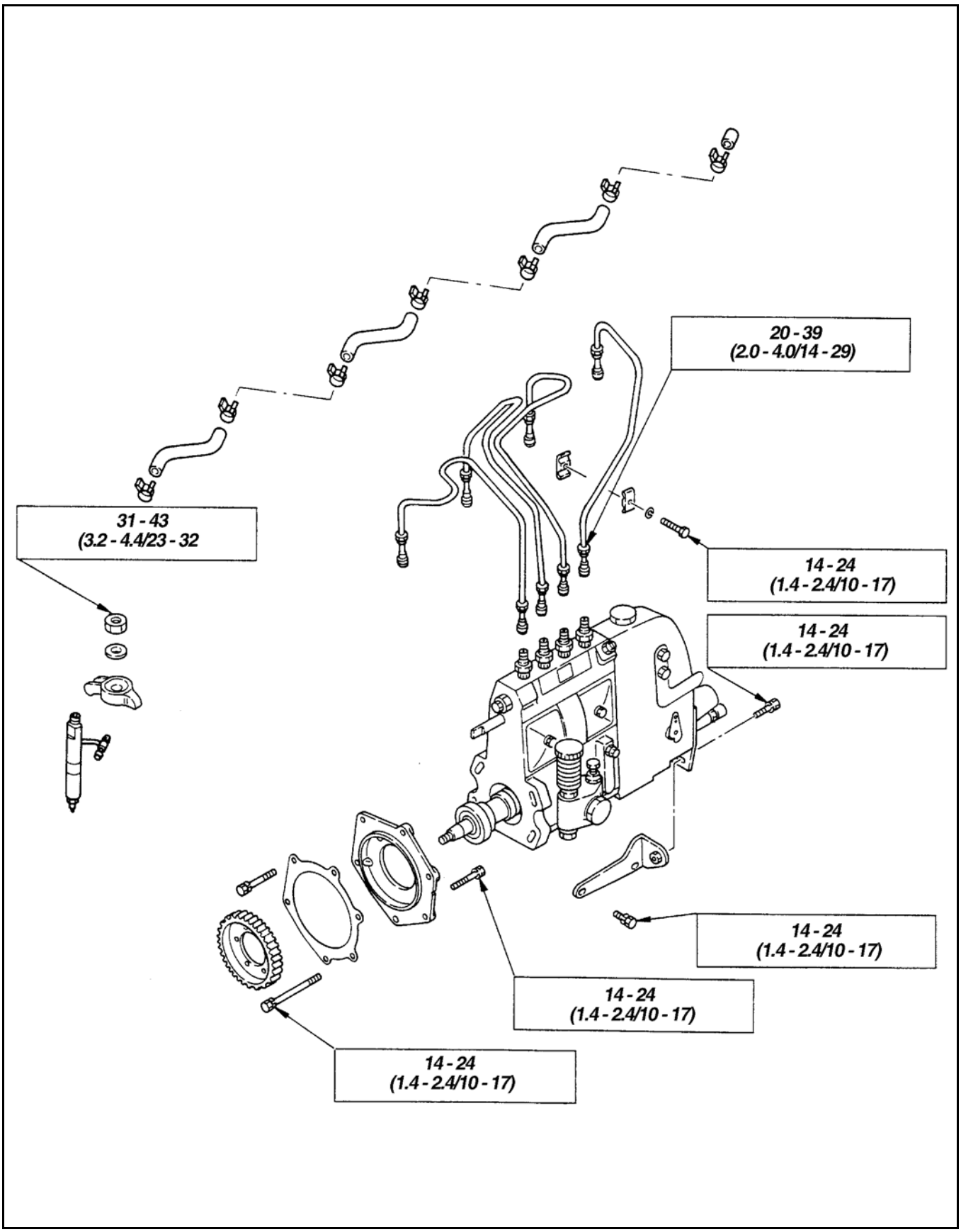
ENGINE ELECTRICAL

N.m (kgf.m/lb.ft)



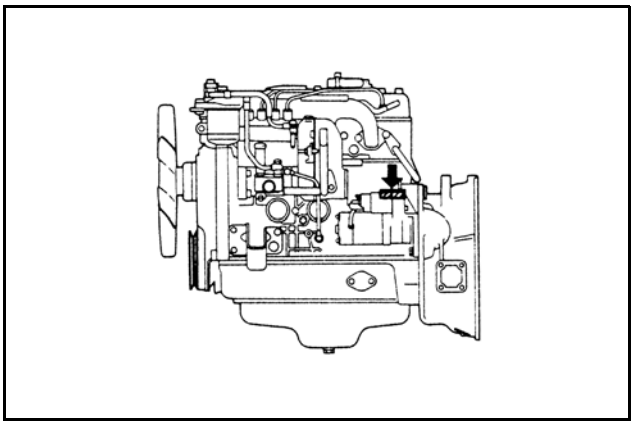
FUEL INJECTION SYSTEM

kgf.m (lb.ft/Nm)



IDENTIFICATION

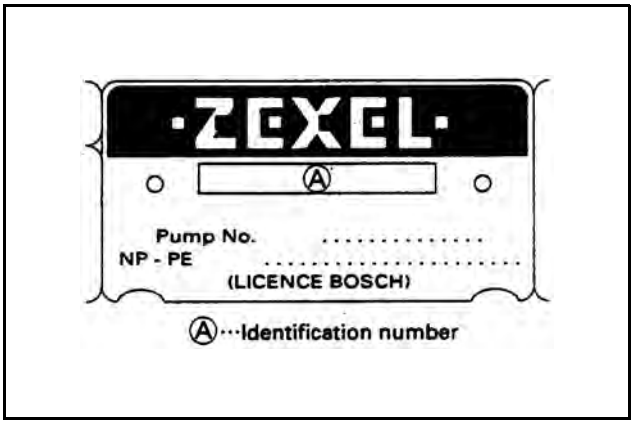
Servicing refers to general maintenance procedures to be performed by qualified service personnel. Maintenance interval such as fuel or oil filter changes should be refered to “INSTRUCTION MANUAL”.



MODEL IDENTIFICATION

Engine Serial Number

The engine number is stamped on the rear left-hand side of the cylinder body.



INJECTION PUMP IDENTIFICATION

Injection Pump Number

Injection volume should be adjusted after referring to the adjustment data applicable to the injection pump installed.

The injection pump identification number (A) is stamped on the injection pump identification plate.

Note:

Always check the identification number before beginning a service operation.

Applicable service data will vary according to the identification number. Use of the wrong service data will result in reduced engine performance and engine damage.

(1) ZEXEL (Manufacturer of the injection pump) identification number

(2) ISUZU parts number