ISUZU
WORKSHOP MANUAL
INDUSTRIAL
DIESEL ENGINE
6RB1·6RB1T
MODELS

FOREWORD

This Workshop Manual is designed to help you perform necessary maintenance, service, and repair procedures on applicable Isuzu industrial engines.

Information contained in this Workshop Manual is the latest available at the time of publication.

Isuzu reserves the right to make changes at any time without prior notice.

The Table of Contents at the right hand side of this page shows you the general arrangement of the material in this Workshop Manual. A more detailed Table of Contents precedes each individual section.

The black spot at the right hand side of some pages indicates the first page of a given section.

This Workshop Manual is applicable to 1987 and earlier models.

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NOTICE

Before using this Workshop Manual to assist you in performing engine service and maintenance operations, it is recommended that you carefully read and throughly understand the information contained in Section - 1 under the headings "GENERAL REPAIR INSTRUCTION" and "NOTES ON THE FORMAT OF THIS MANUAL".

SECTION 1

GENERAL INFORMATION

TABLE OF CONTENTS

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 at hand.

   Where specified, use the specially designed tool or tools.
3. Use genuine ISUZU parts referring ISUZU PARTS CATALOG for the engines surely.
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 a sealer 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 your work. No service operation is complete until you have done this.
12. Information contained in the "Main Data and Specifications" of the Workshop Manual and the Instruction Book may differ. In this case, the information contained in the Instruction Book should be considered applicable.

NOTES ON THE FORMAT OF THIS MANUAL

This Workshop Manual is applicable to the ISUZU industrial diesel engine model specified in the title of this Workshop Manual.

Illustrations used in this Workshop Manual are based on the 6RB1TPA industrial standard model.

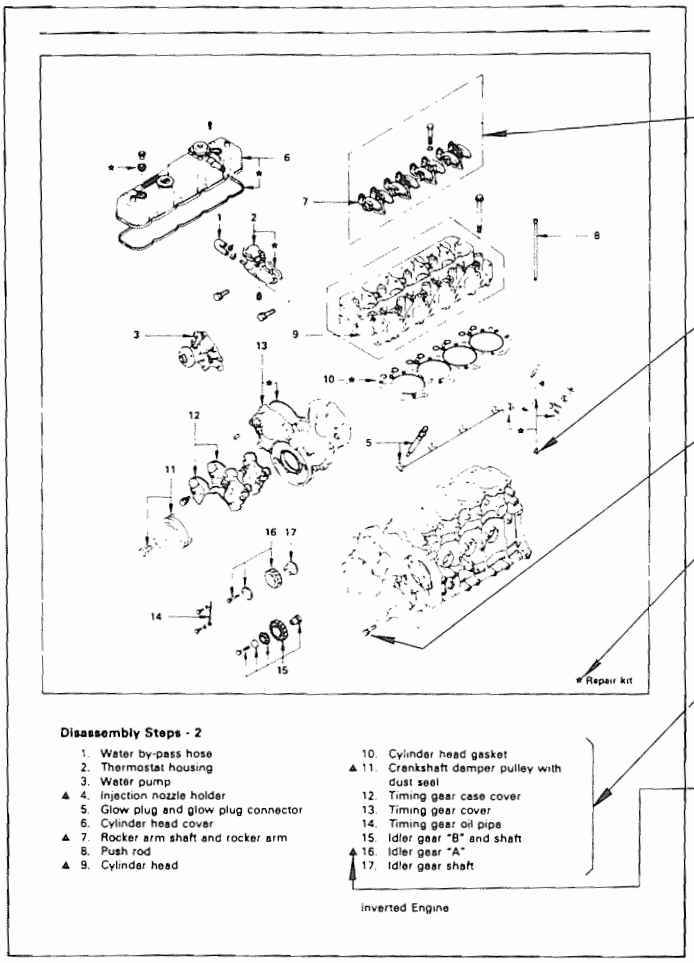
The 6RB1 engine is non-turbocharged and the 6RB1TPA, which is abbreviated to 6RB1T in the descriptions, is turbocharged.

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 facilitates 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 Workshop Manual begins with an exploded view of the applicable area. A brief explanation of the notation used follows.



Parts within a frame are to be removed and installed as a single unit, and their disassembly steps or reassembly steps are shown in the illustrations respectively.

The number tells you the service operation sequence.

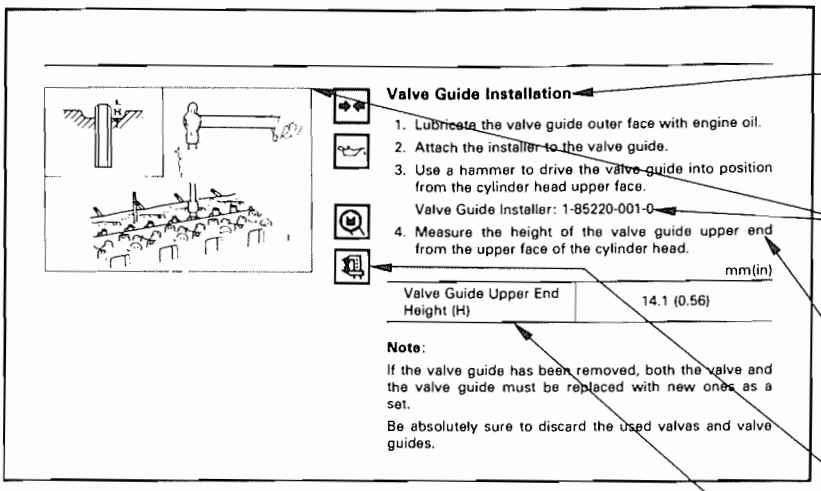
Removal of unnumbered parts is unnecessary unless replacement is required.

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

The parts listed under "Disassembly Steps" or "Reassembly 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 Workshop Manual.



Valve Guide Installation

1. Lubricate the valve guide outer face with engine oil.
2. Attach the installer to the valve guide.
3. Use a hammer to drive the valve guide into position from the cylinder head upper face.
   Valve Guide Installer: 1-85220-001-0
4. Measure the height of the valve guide upper end from the upper face of the cylinder head.

	mm(in)
Valve Guide Upper End Height (H)	14.1 (0.56)

Note:
If the valve guide has been removed, both the valve and the valve guide must be replaced with new ones as a set.
Be absolutely sure to discard the used valves and valve guides.

This is the item shown in the illustration. It is marked with a triangle (▲) on the Major Components page.

Special tools are identified by the tool name and/or number.
The illustration shows how the special tool is to be used.

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 Workshop Manual. They tell you the type of service operation or step to perform.

 .... Removal

 .... Installation

 .... Disassembly

 .... Reassembly

 .... Alignment (Marks)

 .... Directional Indication

 .... Inspection

 .... Measurement

 .... Liquid Gasket Application

 .... Adjustment

 .... Cleaning

 .... Important Operation Requiring Extra Care

 .... Specified Torque (Tighten)

 .... Special Tool Use Required or Recommended (Isuzu Tool or Tools)

 .... Commercially Available Tool Use Required or Recommended

 .... Lubrication (Oil)

 .... Lubrication (Grease)

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 thought of 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.

    Right;

    The injection pump side of the engine.

    Left;

    The exhaust manifold side of the engine.

    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

Item \ Engine Model		6RB1	6RB1T
Engine type		Water cooled, four cycle, vertical in-line, overhead valve	
Combustion chamber type		Direct injection	
Cylinder liner type		Dry	
No. of cylinders — bore × stroke	mm(in)	6 — 135 × 160 (5.31 × 6.30)	
Total piston displacement	$cm^3(in^3)$	13,741 (838)	
Compression ratio (To 1)		16.5	
*Engine dimensions Length × width × height	mm(in)	1,471 × 773 × 1,027 (57.9 × 30.4 × 40.4)	1,471 × 885 × 1,267 (57.9 × 34.8 × 49.9)
*Engine weight (Dry)	kg(lb)	980 (2,163)	1,076 (2,375)
Fuel injection order		1 — 4 — 2 — 6 — 3 — 5	
*Fuel injection timing (BTDC)	degrees	22	17
Specified fuel		Diesel fuel (ASTM D975 No. 2D)	
Injection pump		In-line plunger, Bosch P type	
Governor		Mechanical, RSV type	
*Low idle speed	rpm	650 — 750	
Injection nozzle		Hole type (with multi orifices)	
*Injection starting pressure	kg/cm^3(psi/kPa)	200 (2,844/19,620) or 225 (3,195/22,073)	
Fuel filter type		Center bolt or cartridge (spin-on)	
Water sedimentor		Optional equipment	
Compression pressure (At warm)	kg/cm^2(psi/kPa)	29 (412/2,842) at 220 rpm at sea level	
Valve clearances (At cold)	Intake mm(in)	0.60 (0.024)	
	Exhaust mm(in)	0.60 (0.024)	
Lubrication method		Pressurized circulation	
Oil pump		Gear type	
Main oil filter type		Center bolt, full flow or cartridge (spin-on)	
Partial oil filter		Centrifugal type	
*Lubricating oil capacity	lit(US/UK gal)	19 (5.0/3.5)	45 (11.9/9.9)

Item \ Engine Model		6RB1	6RB1T
Oil cooler		Water cooled integral type	
Cooling method		Pressurized forced circulation	
Coolant capacity	lit(US/UK gal)	30 (7.93/6.60)	
Water pump		Belt driven impeller type	
Thermostat type		Wax pellet type	
*Alternator	V-A	24 — 20 or 24 — 30	
*Starter	V-kW	24 — 7.4 or 24 — 11	
*Turbocharger manufacturer		—	GARRETT AUTOMOTIVE PRODUCTS COMPANY
*Turbocharger model		—	TV61 or T51

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.
Regarding the injection starting pressure and the injection timing crank angle of your engine, make sure the applicable data referring MAINTENANCE DATA PLATE affixed on your engine.
If you are unable to locate the data applicable to the specifications, please contact to ISUZU MOTORS LIMITED through your machine suuplier.

DESIGN FEATURES AND GENERAL OUTLINES

The ISUZU 6RB1 industrial diesel engine is a water-cooled, in-line six-cylinders having 13,741 liters (838 cubic inches) piston displacement.

The model 6RB1 is the naturally aspirated engine and, model 6RB1T is the turbocharged one.

The combustion system is a direct fuel injection type.
The valve configulation is four valves (two inlet and two exhaust valves) driven by the roller tappet (i.e. cam-follower), push rod, rocker arm and valve bridge.

In order to level up the air intake efficiency and the combustion efficiency, a dual port type intake system is employed. One of the dual ports is a conventional swirl port, while the another one is a tangential swirl type. They act together to generate an optimum air swirls. However, the exhaust system is of a single-port with two-valve configulation and, the port sectional shape is designed to reduce the exhaust resistance.

The water passages specially cross-drilled around the injection nozzle position contribute to reduce the local thermal-load at this cylinder head area.

The fuel injection nozzles are located at the central position of the combustion chamber to give a better fuel combustion efficiency.
The Bosch P type in-line fuel injection pump with the RSV type mechanical governor is equipped giving a high versatility for various industrial applications. A forced circulation type lubricating system with a full-flow center bolt type oil filter or a spin-on type oil filter together with a partial-flow oil filter assures an improved durability and reliability.

TIGHTENING TORQUE SPECIFICATIONS

STANDARD BOLTS

The torque values given in the following table should be applied where a particular torque is not specified.

kg·m(lb.ft/N·m)

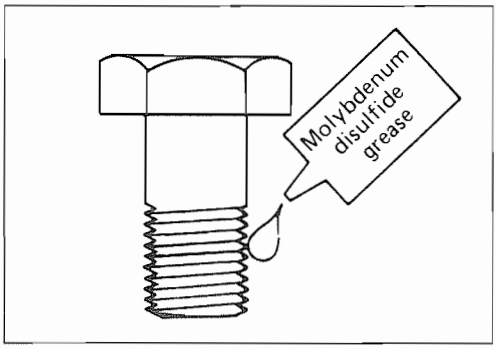
Bolt identification / Material / Bolt diameter x pitch (mm)	4	7	9
	4T (Low carbon steel)	7T (High carbon steel)	9T (Alloy steel)
M 6 × 1.0	0.6 ±0.2 (4.4± 1.4/ 5.88± 1.96)	0.75± 0.2 (5.43± 1.43/ 7.35± 1.96)	—
M 8 × 1.25	1.3 ±0.5 (0.4± 3.4/ 12.74± 4.90)	1.75± 0.5 (12.66± 3.00/ 17.15± 4.90)	2.0 ± 0.7 (17.36± 5.36/ 19.60± 6.86)
M10 × 1.25	2.8 ±0.7 (20.3± 5.2/ 27.44± 6.86)	3.75± 0.9 (27.20± 7.2 / 36.75± 8.82)	5.0 ± 1.3 (36.88± 9.88/ 49.00± 12.74)
M12 × 1.25	6.25±1.2 (45.2± 9.2/ 61.25±11.76)	7.75± 1.5 (56.03± 11.03/ 75.95± 14.70)	9.65± 1.9 (69.77± 13.77/ 94.57± 18.62)
M14 × 1.5	8.75±1.9 (70.5±14.5/ 85.75±18.62)	11.85± 2.3 (85.67± 16.6 /116.13± 22.54)	14.50± 2.9 (104.84± 20.83/142.1 ± 28.42)
M16 × 1.5	13.3 ±2.7 (94.0±17.0/130.34±26.46)	17.30± 3.5 (125.07± 25.07/169.54± 34.30)	20.40± 4.1 (147.5 ± 29.49/199.92± 40.18)
M18 × 1.5	19.2 ±3.8 (138.9±27.9/188.16±37.24)	24.90± 5.0 (180.03± 36.3 /244.02± 4.90)	29.30± 5.9 (211.84± 42.83/287.14± 57.82)
M20 × 1.5	26.3 ±5.3 (190.2±38.2/257.74±51.94)	34.40± 6.9 (248.72± 49.7 /337.12± 67.62)	40.40± 8.1 (292.10± 58.09/395.92± 79.38)
M22 × 1.5	33.0 ±8.3 (245.1±60.1/323.40±81.34)	46.25± 9.2 (334.39± 66.38/453.25± 90.16)	54.10±10.8 (391.15± 78.14/530.18±105.84)
M24 × 2.0	45.8 ±9.2 (331.2±60.2/448.84±90.16)	58.20±14.0 (420.70±102.78/570.36±137.20)	70.60±14.1 (510.44±101.44/691.88±138.18)
*M10 × 1.5	2.7 ±0.7 (19.6± 5.6/ 26.46± 6.86)	3.7 ± 0.9 (26.75± 6.7 / 36.26± 8.82)	4.9 ± 1.2 (35.43± 8.42/ 48.02± 11.76)
*M12 × 1.5	5.8 ±1.2 (42.0± 9.0/ 56.84±11.76)	7.2 ± 1.4 (52.02± 10.05/ 70.56± 13.72)	9.1 ± 1.8 (65.80± 12.80/ 89.18± 17.64)
*M14 × 2.0	9.1 ±1.8 (65.8±12.8/ 89.18±17.64)	11.2 ± 2.2 (80.97± 15.7 /109.76± 21.56)	13.6 ± 2.7 (98.33± 19.33/133.28± 26.46)
*M16 × 2.0	12.7 ±2.5 (91.9±17.9/124.46±24.5)	16.5 ± 3.3 (119.30± 24.3 /161.70± 32.34)	19.5 ± 3.9 (140.99± 27.99/191.1 ± 38.22)

Note:

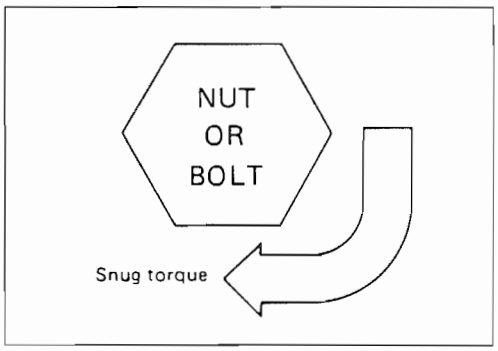
The asterisk (*) indicates that the bolts are used for female-threaded parts that are made of soft materials such as casting.

ANGULAR NUT AND BOLT TIGHTENING METHOD

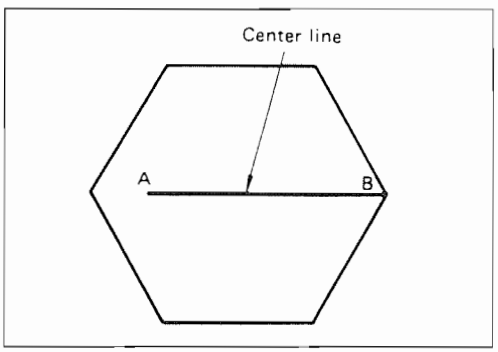
1. Carefully wash the nuts and bolts to remove all oil and grease.



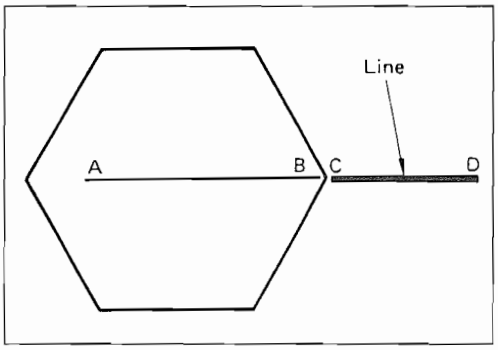
2. Apply a coat of molybdenum disulfide grease to the threads and setting faces of the nuts and bolts.



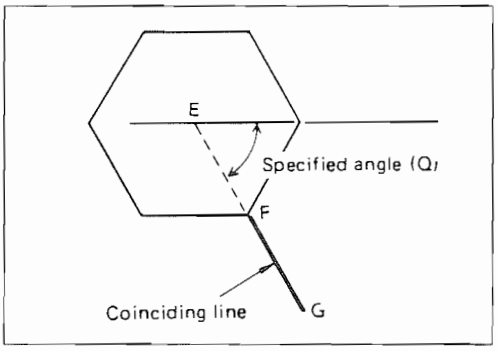
3. Tighten the nuts and bolts to the specified torque (snug torque) with a torque wrench.



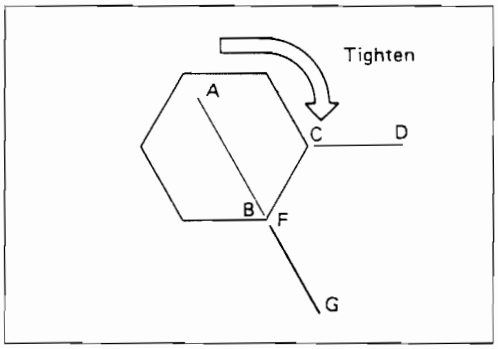
4. Draw a line [A-B] across the center of each bolt.



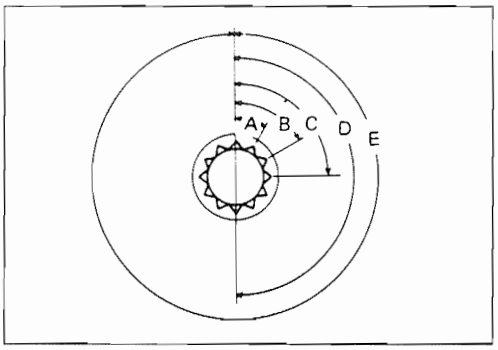
5. Draw another line [C-D] on the face of each of the parts to be clamped. This line should be an extension of the line [A-B].



6. Draw another line [F-G] on the face of each of the parts to be clamped. This line will be in the direction of the specified angle [Q] across the center [E] of the nut or bolt.



7. Use a socket wrench to tighten each nut or bolt to the point where the line [A-B] is aligned with the line [F-G].



Example: Specified Angle and Tightening Rotation

A	30°	1/12 of a turn
B	60°	1/6 of a turn
C	90°	1/4 of a turn
D	180°	1/2 of a turn
E	360°	One full turn

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