

**KOBELCO**

## SERVICE MANUAL

mitsubishi DIESEL ENGINE

**4D3, DR**

For Industrial Use

Applicable Engine Models: 4D31, 4D31-T, 4D30  
4DR5, 6DR5

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**MITSUBISHI DIESEL ENGINE**

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**SHOP MANUAL**

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**MODEL**

**4D3, DR**

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**(FOR INDUSTRIAL USE)**





## FOREWORD

This shop manual contains the specification, construction, operation, adjustment and service procedures of the Model 4D31, 4D31-T, 4D30, 4DR5, 6DR5 diesel engine for service mechanics engaged in servicing of the Mitsubishi diesel engines.

Please make the most of this shop manual to perform correct servicing and wasteless operations.

Note that some of the contents of this shop manual are subject to change owing to improvements, etc. that may be introduced after publication of this shop manual.

### Applicable Engine Models

|        |   |                    |
|--------|---|--------------------|
| 4D31   | } | For industrial use |
| 4D31-T |   |                    |
| 4D30   |   |                    |
| 4DR5   |   |                    |
| 6DR5   |   |                    |

### Applicable Engine No.

4D31-472830 and up <4D31>  
4D31-473044 and up <4D31-T>  
4D30-475518 and up  
4DR5-783628 and up



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## ORGANIZATION

### 1. Group Classification

This manual is organized into several groups classified according to the engine basic elements.

| No. | Group name              | Description  |
|-----|-------------------------|--|
| 00  | General                 | External view, major specifications, engine outputs classified by application, engine numbers, nameplate, caution plate, general bolts and nuts tightening torque table                              |
| 11  | Engine                  | Engine proper (cylinder head, valve mechanism, camshaft, piston, crankshaft, timing gear, flywheel), air compressor, flywheel PTO, specifications, service standards, special tools, troubleshooting |
| 12  | Lubrication             | Lubrication system (oil pump, oil filter, oil cooler), specifications, service standards, special tools, troubleshooting   |
| 13  | Fuel and engine control | Fuel system (injection pump, injection nozzle, fuel filter, water separator), specifications, service standards, special tools, troubleshooting  |
| 14  | Cooling                 | Cooling system (water pump, thermostat, radiator, cooling system cleaning procedures, fan), specifications, service standards, special tools, troubleshooting  |
| 15  | Intake and exhaust      | Air cleaner, turbocharger, manifolds, specifications, service standards, troubleshooting   |
| 16  | Engine electrical       | Starter, alternator, vacuum pump, preheating system, relays, automatic stop device, specifications, service standards, special tools, troubleshooting  |
| 21  | Clutch                  | Clutch proper, clutch control (power cylinder, master cylinder, clutch lever), specifications, service standards, special tools, troubleshooting   |
| 22  | Transmission            | Transmission proper, bearing case, specifications, service standards, special tools, troubleshooting   |
| 36  | Parking brake           | Parking brake (brake drum, brake shoe), specifications, service standards, special tools, troubleshooting  |

**NOTE:** Each group starts with page 1.



## 2. General Precautions for Servicing

Before starting the service procedures, check the vehicle for total time driven, use conditions, and user's complaints and requests to know exactly the engine conditions. Record information where necessary.

To ensure you are doing correct and efficient service jobs, observe the following precautions.

- (1) Before performing the service procedures given in this manual, know the trouble spots and isolate the possible cause to determine whether the removal or disassembly procedure is required.



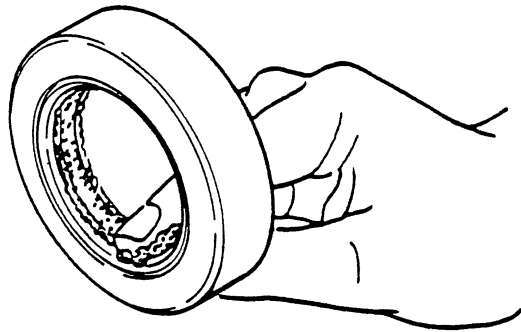
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- (2) Select a flat surface for the service job.
- (3) When servicing the electrical system, be sure to disconnect the negative cable from the battery.
- (4) Carefully check parts for oil leaks before cleaning. After cleaning, it may become difficult to spot defective areas.
- (5) Ready and make the most of the special tools required for servicing. Use the right tools (specified special tools) in the right place to prevent damages to parts and personal injury.
- (6) Make alignment marks and keep disassembled parts neatly arranged to ensure that they are reassembled into the right positions.
  - Special care must be taken for assemblies involving a number of parts, similar parts, or parts identical at right- and left-hand sides to ensure correct reassembly.
  - For alignment and punching markings, select a position that would not mar the appearance and function.
  - Clearly distinguish parts to be replaced from those reused.
- (7) The oil seals, packings, O-rings, and other rubber parts, gaskets, and split pins must be replaced with a new one whenever they are removed. For replacement, use Mitsubishi Genuine Parts.

**MITSUBISHI MOTORS  
GENUINE PARTS**

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- (8) Apply the specified grease to U-packings, oil seals, dust seals, and bearings before installation.



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- (9) When work requires an assistant or two, always make sure of the safety each other. Never play with switches and levers.
- (10) Make sure that your shoes are free from grease and oil especially when working on a heavy item.
- (11) When checking or changing lubricants, wipe off grease and oil from parts immediately with a waste.
- (12) Special care must be taken in handling sensors and relays which are susceptible to shocks and heat.
- (13) Use care so that hands and fingers are not injured by sharp edges or corners of the parts.
- (14) Wear safety goggles whenever handling a grinder or welding machine. Wear gloves as required to ensure utmost safety.

### 3. Terms and Units

The following terms and units are used throughout the entire texts of this manual.

(1) Front and Rear

The terms "front" is the fan side and "rear" the flywheel side of the engine.

(2) Right and Left

The terms "right" and "left" shall be used to indicate the side as viewed from the flywheel side of the engine.

(3) Service Standard Terms

● Nominal value

Shows the nominal dimensions, dimension of an individual part, standard clearance between parts in an assembly, or the standard performance of an assembly.

- Limit

Shows the value of a part at which the part is no longer serviceable from the performance as well as strength viewpoints, requiring replacement or repair.

(4) Tightening Torque

Over- or undertightening of bolts and nuts has critical effects on performance and functions. Tightening torque is therefore specified for some tightening points.

All tightening torque specifications may be considered as "dry" unless "wet" is specified.

Where no tightening torque is specified, use a torque value specified in the general bolts and nuts tightening torque table.

(5) Units

For length, weight, area, and volume, the SI unit (International System of units) is used with the metric notation jointly shown in parentheses.

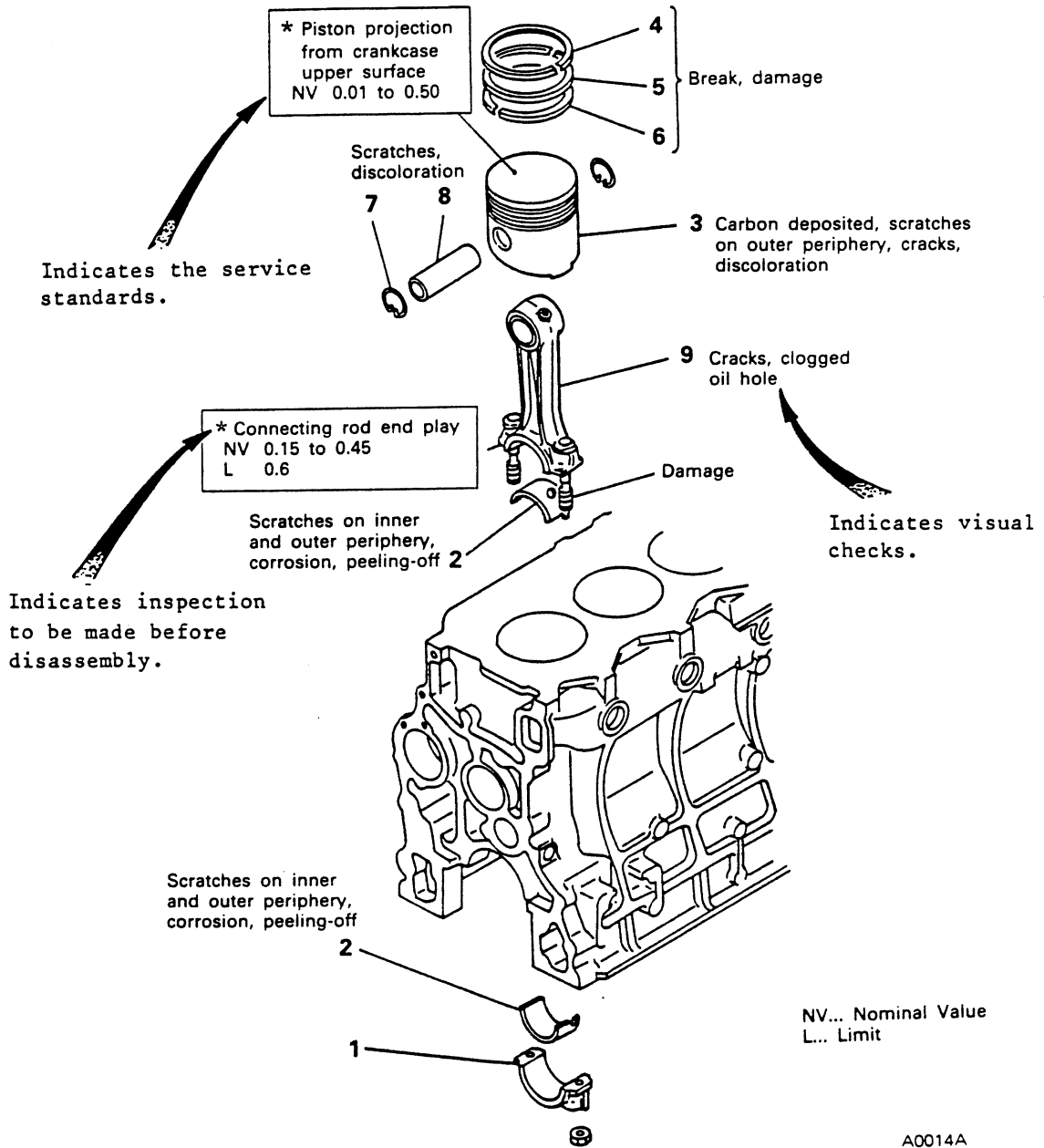
Temperature is shown in centigrade (°C).

**4. Table of Conversion Rate for Foot-pound Units into SI Units**

| Unit                    | Sign of SI unit   | Sign of foot-pound unit | Conversion rate   |
|-------------------------|-------------------|-------------------------|---|
| Mass quantity of matter | kg<br>g           | lb<br>oz                | 1 kg = 2.2046 lb<br>1 g = 0.035274 oz   |
| Dimension               | m<br>mm           | ft.<br>in.              | 1 m = 3.2808 ft.<br>1 mm = 0.03937 in.  |
| Capacity                | lit.<br>cc        | gal.<br>oz              | 1 lit. = 0.2642 gal. (U.S.)<br>1 lit. = 0.220 gal. (Imp.)<br>1 cc = 0.033814 oz (U.S.)<br>1 cc = 0.035195 oz (Imp.) |
| Force                   | N (Newton)        | lbf                     | 1 N = 0.2248 lbf  |
| Pressure                | kPa (kilopascal)  | lbf/in. <sup>2</sup>    | 1 kPa = 0.145 lbf/in. <sup>2</sup><br>1 kPa = 0.2953 in.Hg  |
| Stress                  | N/cm <sup>2</sup> | lbf/in. <sup>2</sup>    | 1 N/cm <sup>2</sup> = 1.45 lbf/in. <sup>2</sup>   |
| Moment of force         | N m               | ft. lbf                 | 1 N m = 0.7375 ft. lbf  |
| Output                  | kW (kilowatt)     | HP                      | 1 kW = 1.34 HP  |
| Temperature             | °C                | °F                      | t °C = (1.8t °C + 32) °F  |

## 5. Reading the Illustration

(Ex. 1: Disassembly and Inspection)



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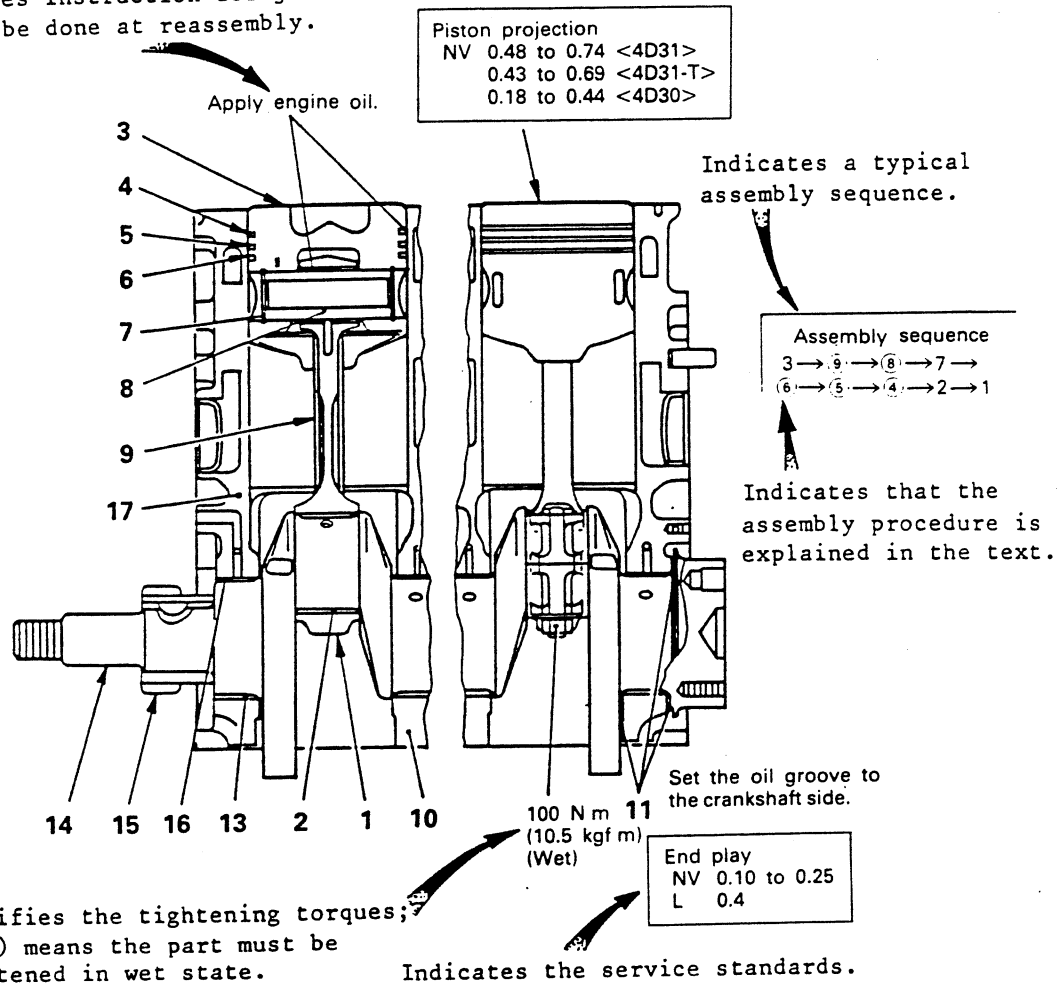
Numbers assigned indicate a typical disassembly sequence.

- |                          |                          |                  |
|--------------------------|--------------------------|------------------|
| 1 Connecting rod cap     | (4) 1st compression ring | 7 Snap ring      |
| 2 Connecting rod bearing | (5) 2nd compression ring | 8 Piston pin     |
| 3 Piston                 | (6) Oil ring             | 9 Connecting rod |

Indicates that the disassembly procedure is explained in the text.

(Ex. 2: Reassembly)

Gives instruction for jobs.  
to be done at reassembly.



NV... Nominal Value  
 L... Limit

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- (1) Illustrations (exploded views and assembly drawings) show a typical service procedures if it is identical among various types of available systems and units.

**GROUP 00 GENERAL**

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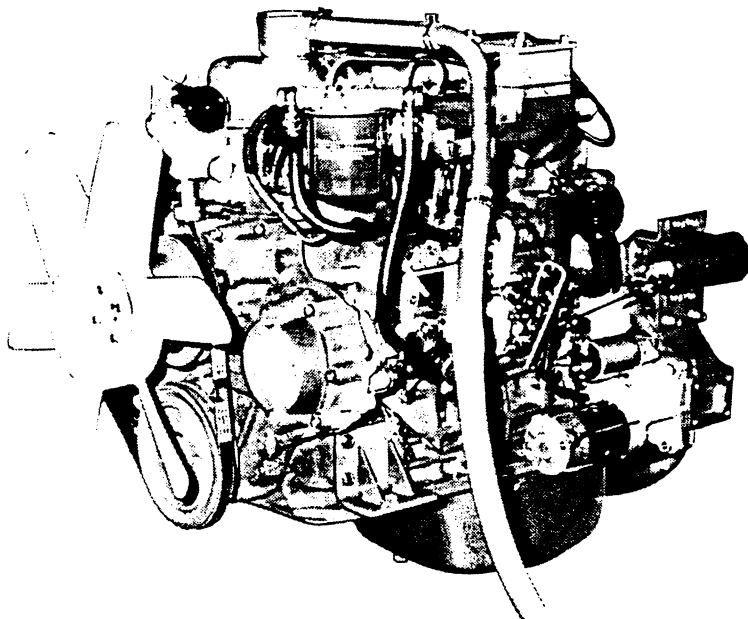
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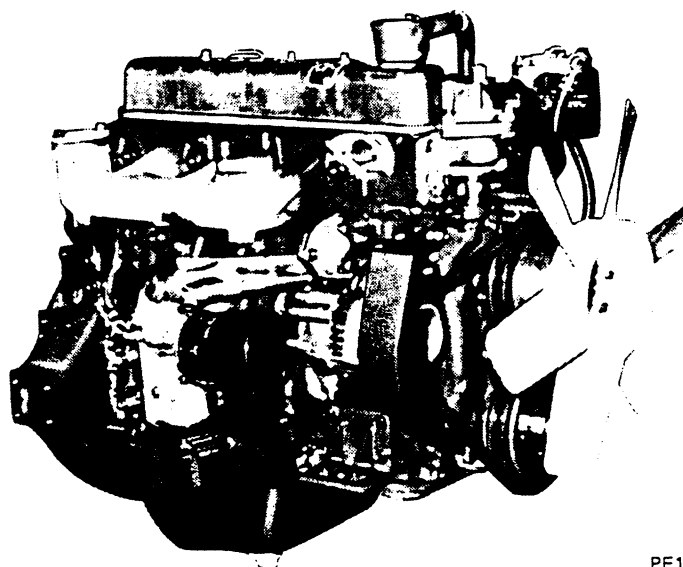


# 1. EXTERNAL VIEW

4D31 Model



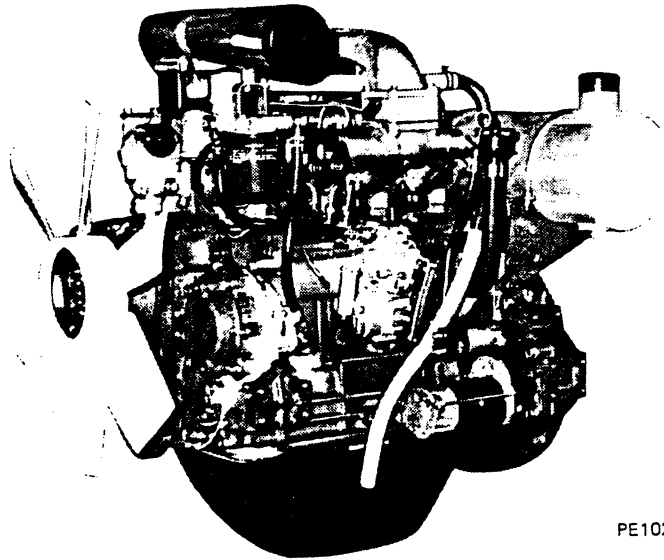
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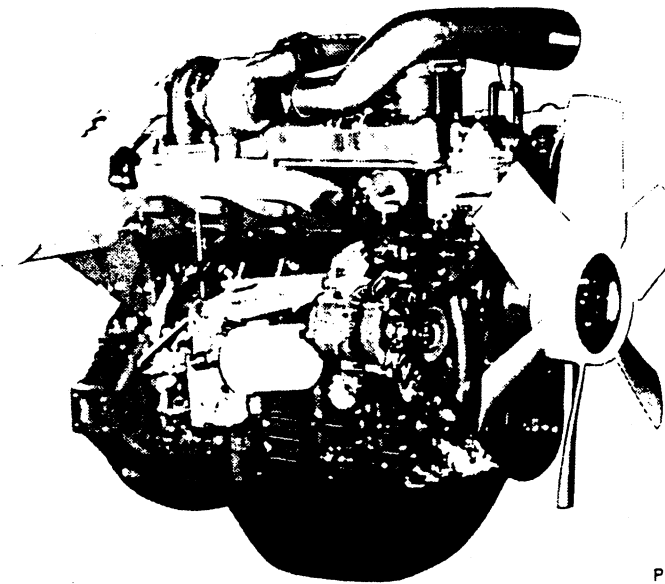
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4D31-T Model

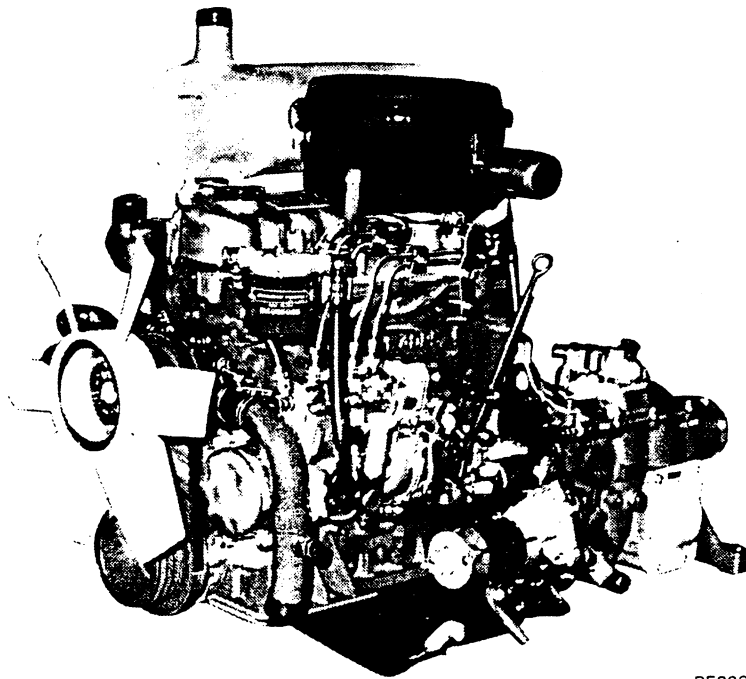


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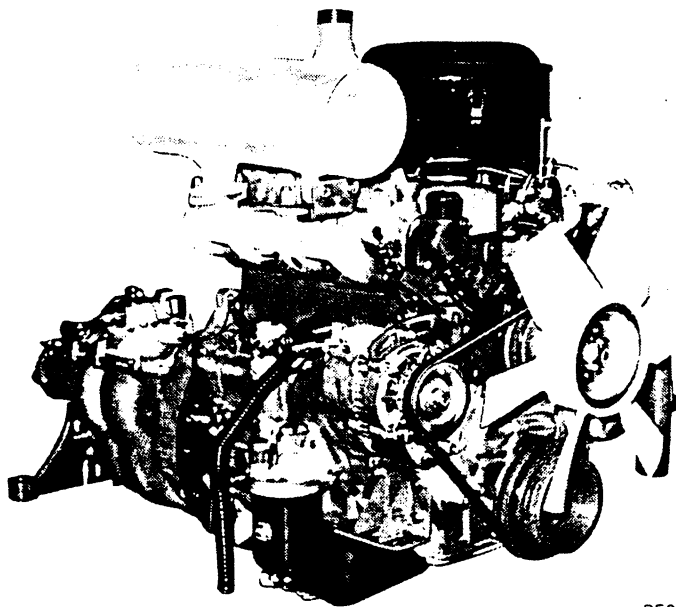


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4DR5 Model 1

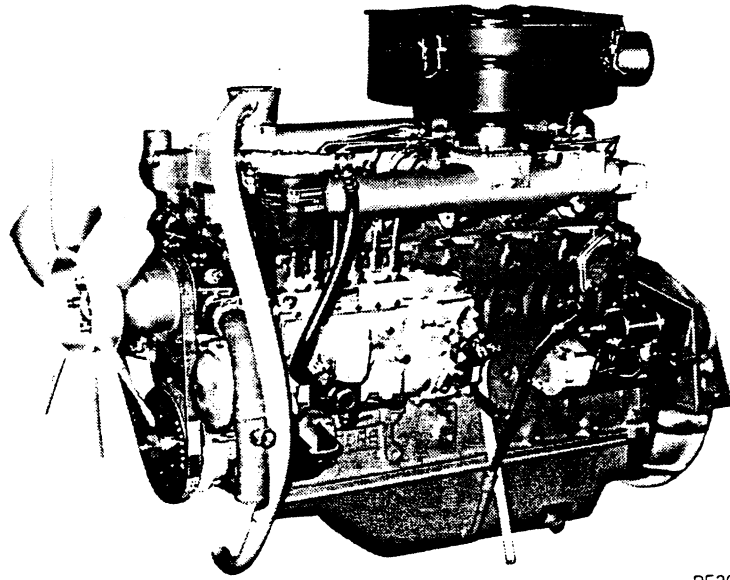


PE2061

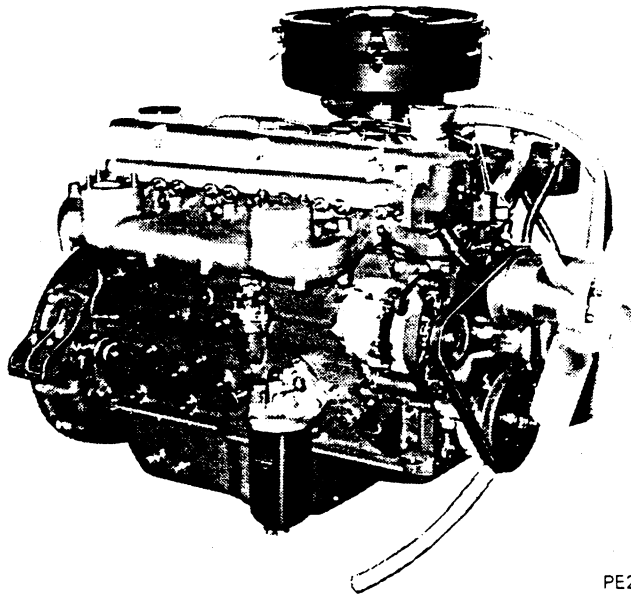


PE2062

6DR5 Model



PE2059



PE2060

**2. MAJOR SPECIFICATIONS****2-1 Major Specifications**

| Item                            | Specifications   |                                       |               |          |           |
|---------------------------------|------------------|---------------------------------------|---------------|----------|-----------|
| Model                           | 4D31             | 4D31-T                                | 4D30          | 4DR5     | 6DR5      |
| Combustion method               | Direct injection | Direct injection (with turbo-charger) | Swirl chamber | ←        | ←         |
| No. and arrangement of cylinder | 4 in-line        | ←                                     | ←             | ←        | 6 in-line |
| Cylinder bore x stroke mm       | 100 x 105        | ←                                     | ←             | 92 x 100 | ←         |
| Total displacement cc           | 3 298            | ←                                     | ←             | 2 659    | 3 988     |
| Empty weight kg*                | 320              | 330                                   | 320           | 255      | 370       |

\* Empty weight as measured according to Mitsubishi Motors Corporation standard