# A GENERAL INFORMATION

# 1 HOW TO USE THIS MANUAL

## 1-1 SCOPE OF DESCRIPTION IN THIS MANUAL

This manual describes the "Disassembling and Assembling Procedure" for Type 1KR-FE engine assembly. As for the procedure for removal and installation from and to the vehicle as well as the procedures for oil supply, checks and adjustment after completion of mounting on the vehicle, these procedures are described in the repair manual of respective vehicle models.

## 1-2 ARTICLES TO BE PREPARED

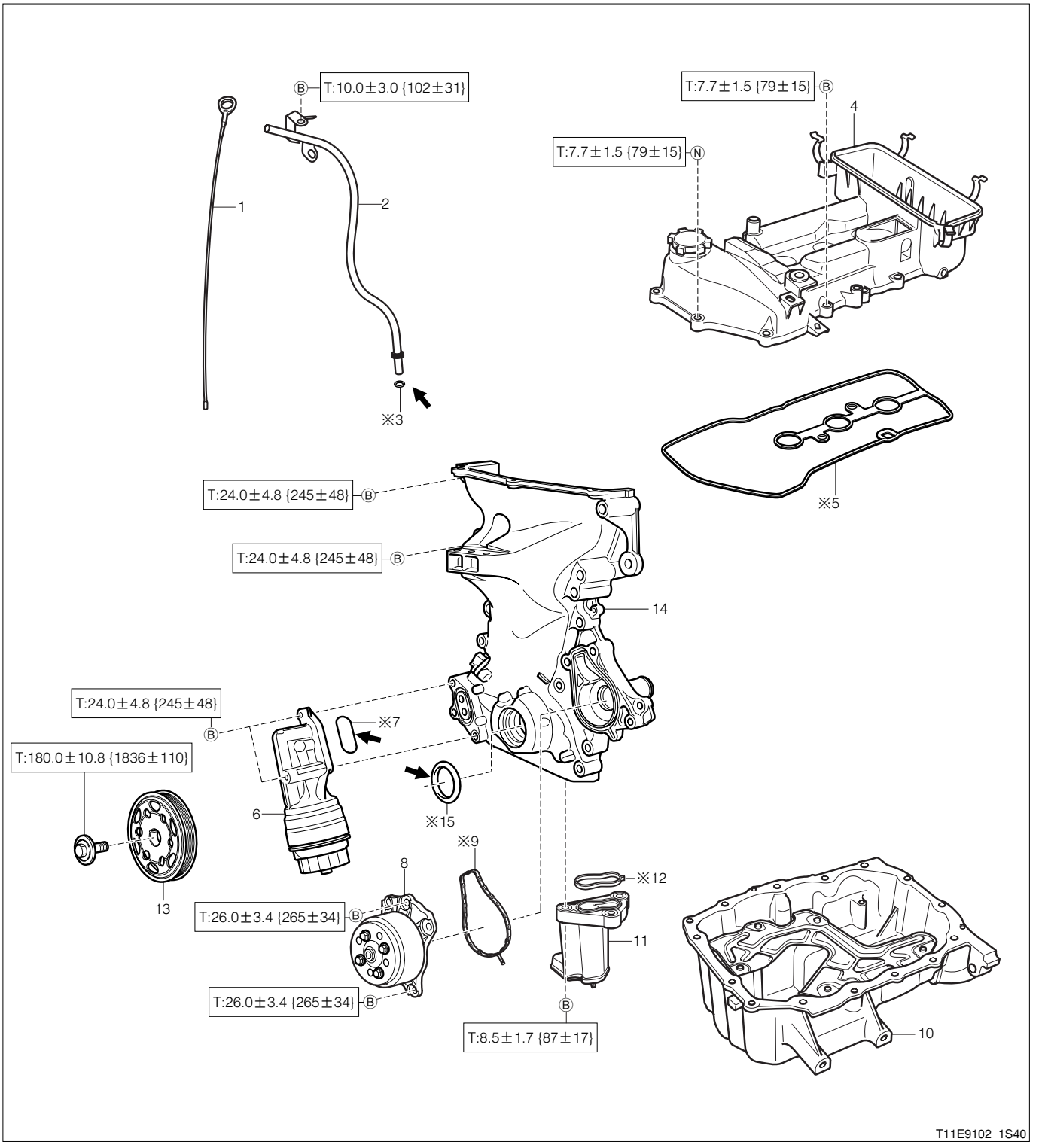
When SST, tool, measuring instrument, a sort of fat and oil to be prepared before operation are necessary, those are described by compiling in the table as preparation tools at the beginning of each item.

However, the general tools, jacks, fixtures as considered being equipped always at the service shop are usually omitted.

## 1-3 COMPONENTS

1. The cross-sectional views and component diagrams are provided, thus showing the installation condition of each part.
2. Non-reusable parts are also described in the component diagrams. The explanation of relevant numerals is given below the component diagrams.
3. The removal, disassembling and assembling procedure list is shown just beneath of components figure.

## 1-3-1 ENTRY EXAMPLE




➡Engine oil
Unit: N·m{kgf·cm}
※: Non-reusable parts

| | | | |
|---|---|---|---|
| 1 | Gage S/A, oil level | 9 | Gasket, water pump |
| 2 | Guide S/A, oil level gage | 10 | Pan S/A, oil |
| 3 | Ring, O | 11 | Plate, oil pan baffle |
| 4 | Cover Ay, cylinder head | 12 | Strainer S/A, oil |
| 5 | Gasket, cylinder head cover | 13 | Gasket, oil strainer |
| 6 | Bracket, oil filter | 14 | Pulley, crankshaft |
| 7 | Gasket, oil filter | 15 | Cover Ay, timing chain |
| 8 | Pump Ay, water | 16 | Seal, type T oil |

## 1-4 CONTENTS NOT DESCRIBED IN THIS MANUAL

The description of the next elemental operation may omit in this service manual, but please perform in an actual operation.

1.Jacking operation and lifting operation
2.Cleaning and cleansing of removed parts to perform at need
3.Visual inspection

## 1-5 DEFINITIONS OF TERMS

| | |
|---|---|
| SPECIFIED VALUE | This mark shows the standard value at the time of the check or adjustment. |
| ALLOWABLE LIMIT | This mark shows the maximum or minimum value at the time of the check or adjustment. |
| DEVIATION | This value refers to the difference between the maximum clearance and the minimum clearance. |
| WARNING | This symbol means that there is the possibility of personal injury of the operator himself or the nearby workers if the operator fails to follow the operating procedure prescribed in this manual. |
| CAUTION | This symbol means that there is the possibility of damage to the component being repaired if the operator fails to follow the operating procedure prescribed in this manual. |
| NOTE | Supplementary explanation which facilitates the operation is posted separately from the explanation. Because of difficulties in measurements to determine specified values, there may be cases where the specified values for simple measurement methods are indicated if malfunctions are unlikely to take place actually. |

## 1-6 ABBREVIATION CODES

The abbreviation codes that appear in this manual stand for the following, respectively.

| Abbreviation codes | Original terms | Meaning |
|---|---|---|
| Ay | Assembly | Assembly |
| J | Journal | Journal |
| FR | Front | FRONT |
| LH | Left Hand | Left side |
| RH | Right Hand | Right side |
| S/A | Sub Assembly | Combined parts |
| SST | Special Service Tool | Special Service Tool |
| T | Torque | Tightening torque |
| Ⓑ | Bolt | BOLT |
| Ⓢ | Screw | Screw |
| Ⓝ | Nut | Nut |
| Ⓦ | Washer | Washer |
| Ⓒ | Clip | Clip |

# 2 UNIT

The units are the SI units [International System of Units]. (The hitherto-employed units are also indicated.)

Example : 33.25±13.25N·m{340±135kgf·cm}

## 2-1 NEW UNIT BECAUSE OF THE INTRODUCTION OF THE SI UNIT

As a result of the introduction of the SI units, the hitherto-employed typical units will be changed as follows.

| Detected item | New units | Conventional units | Convention table |
|---|---|---|---|
| Force | N (newton) | kgf | 1 kgf = 9.80665N |
| Torque | N·m (newton meter) | kgf·cm | 1 kgf·cm = 0.0980665N·m |
| Spring constant | N/mm | kgf/mm | 1 kgf/mm = 9.80665N/mm |
| Pressure | Pa (Pascal) | $kgf/cm^2$ | 1 $kgf/cm^2$ = 98.0665kPa |
| | | mmHg | 1 mmHg = 0.133322kPa |

## 2-2 PREFIX USER IN SI UNIT

The following are typical prefixes used in SI Unit (10 to the power of n).

| | |
|---|---|
| M(mega) | $10^6$ |
| k(kilo) | $10^3$ |
| h(hecto) | $10^2$ |
| da (deca) | $10^1$ |
| d (deci) | $10^{-1}=0.1$ |
| c(centi) | $10^{-2}=0.01$ |
| m(milli) | $10^{-3}=0.001$ |
| $\mu$(micro) | $10^{-6}=0.000001$ |

# 3 HOW TO GRASP SPECIFIED TIGHTENING TORQUE FOR GENERAL STANDARD BOLT AND NUT

## 3-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR GENERAL STANDARD BOLTS AND NUTS

### 3-1-1 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR BOLTS

Determine the strength division of bolts, based on the table below.

Then, obtain the value, based on the tightening torque table.

### 3-1-2 DETERMINING PROCEDURE FOR TIGHTENING TORQUE FOR NUTS

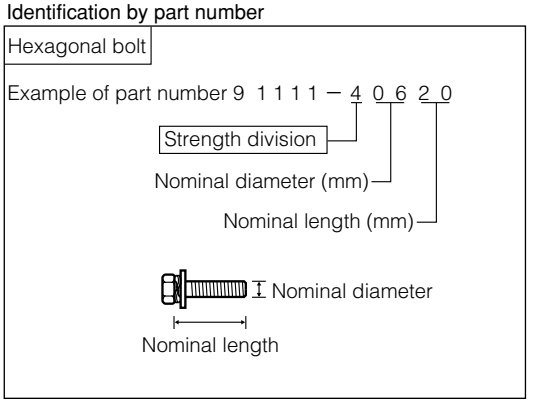
Determine with the aforesaid method, based on the mating bolt.

### 3-1-3 IDENTIFICATION

Identification of strength division by checking bolts themselves

| Classification (Strength division) | Shape of head (how to know strength division) | |
|---|---|---|
| | Bolt without collar | Bolt with collar |
| 4 T |   |   |
| 5 T |   | —— |
| 6 T | —— <br> —— |   |
| 7 T |   | —— |

Identification by part number

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## 3-1-4 TIGHTENING TORQUE TABLE FOR GENERAL STANDARD BOLTS

| Strength division | Nominal diameter (mm) | Pitch (mm) | Standard tightening torque (N·m{kgf·cm}) | |
|---|---|---|---|---|
| | | | Bolt without flange | Bolt with flange |
| 4 T | 6 | 1 | 5.4 {55} | 5.9 {60} |
| | 8 | 1.25 | 13 {130} | 14 {145} |
| | 10 | 1.25 | 25 {260} | 28 {290} |
| | 12 | 1.25 | 47 {480} | 53 {540} |
| | 14 | 1.5 | 74 {760} | 83 {850} |
| | 16 | 1.5 | 113 {1150} | — |
| 5 T | 6 | 1 | 6.4 {65} | — |
| | 8 | 1.25 | 16 {160} | — |
| | 10 | 1.25 | 32 {330} | — |
| | 12 | 1.25 | 59 {600} | — |
| | 14 | 1.5 | 91 {930} | — |
| | 16 | 1.5 | 137 {1400} | — |
| 6 T | 6 | 1 | 7.8 {80} | 8.8 {90} |
| | 8 | 1.25 | 19 {195} | 20.5 {210} |
| | 10 | 1.25 | 39 {400} | 43 {440} |
| | 12 | 1.25 | 72 {730} | 79 {810} |
| | 14 | 1.5 | 109 {1100} | 123 {1250} |
| 7 T | 6 | 1 | 11 {110} | 12 {120} |
| | 8 | 1.25 | 25 {260} | 28 {290} |
| | 10 | 1.25 | 52 {530} | 58 {590} |
| | 12 | 1.25 | 95 {970} | 103 {1050} |
| | 14 | 1.5 | 147 {1500} | 167 {1700} |
| | 16 | 1.5 | 225 {2300} | — |

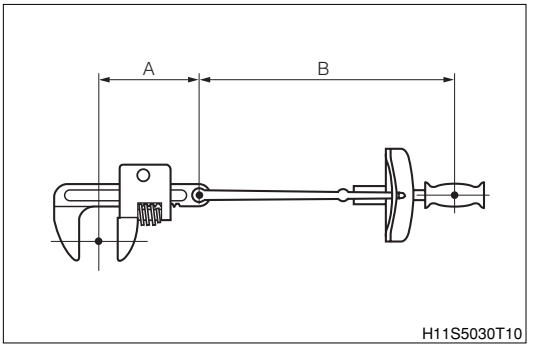
### 3-1-5 WHEN AN EXTENSION TOOL IS USED

1.When tightening with the SST or a tool connected to the torque wrench for a drive-end extension, a higher tightening torque will result, if tightened until the reading on the torque wrench indicates the specified torque.

2.This manual contains specified torques only. When using the SST or an extension tool, the torque wrench reading must be computed using the following formula.

3.Calculation formula: $T' = T \times B / (A + B)$

| Abbreviation code | Meaning | UNIT |
|---|---|---|
| T′ | Torque wrench reading | N·m{kgf·cm} |
| T | Specified tightening torque | N·m{kgf·cm} |
| A | Length of the SST or a tool | cm |
| B | Torque wrench length | cm |



# 4 INSTRUCTIONS ON SERVICING OPERATIONS OF ENGINE AY

1.Prior to the disassembling, be sure to wash away sands and mud that have adhered to the external of the engine Ay so that they will not be admitted to the inside at the time of the disassembling and assembling.
2.When the joint section of light-alloy parts is to be disassembled, do not pry using a screwdriver or the like, but perform the disassembling by lightly tapping by means of a plastic hammer.
3.Place the disassembled parts in order at all times. Keep them away from dust.
4.Thoroughly wash each part before assembling. After drying, apply the designated oil.
5.Never wash aluminum and rubber parts with alkali chemicals.
6.Never wash rubber parts, such as O-rings and oil seals, with cleaning oil (white gasoline or the like).
7.Be sure to apply the designated oil to sliding surfaces and rotating surfaces before assembling them.
8.When a part is to be secured in a vise, be sure to secure it with aluminum sheets interposed.
9.Replace any snap ring that has been scratched or deformed with a new one.
10.Utmost care must be exercised so that the mating surface of the case will not be damaged, for the damaged mating surface will lead to oil leakage.
11.Prior to the application of seal agent, be sure to completely remove the oil seal agent remaining on the seal section. Then, wash the seal agent application section with white gasoline.
12.After the seal section has been assembled, wait for at least one hour, until the seal agent dries completely. Then, fill oil.