# WSM

## WORKSHOP MANUAL
## UTILITY VEHICLE

# RTV-X1100C

Kubota

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KiSC issued 12, 2013 A

# INFORMATION

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# 1. SAFETY FIRST

## ⚠ SAFETY FIRST

- **This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.**
- **It is essential that you read the instructions and safety regulations before you try to repair or use this unit.**

**⚠ DANGER**
- **Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

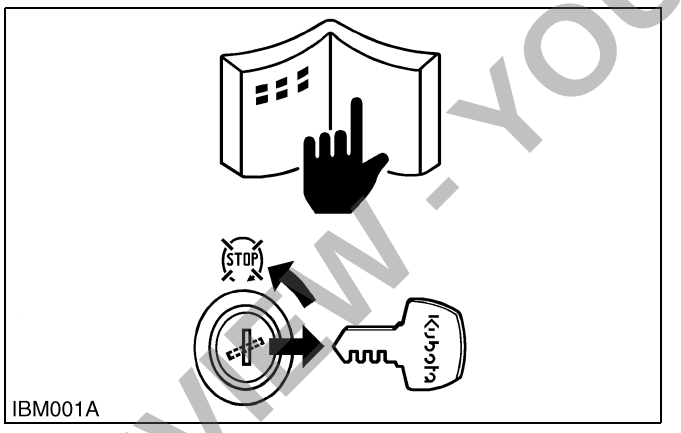
**⚠ WARNING**
- **Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

**⚠ CAUTION**
- **Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

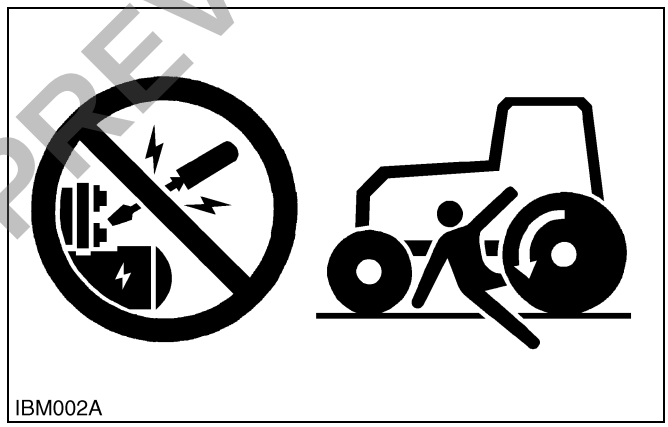
**■ IMPORTANT**
- **Indicates that equipment or property damage could result if instructions are not followed.**

**■ NOTE**
- **Gives helpful information.**

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IBM001A


IBM002A

## BEFORE YOU START SERVICE

- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a stable and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, then remove the key.
- Disconnect the battery negative cable.
- Hang a **"DO NOT OPERATE"** tag in the operator station.

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## START SAFELY

- Do not do the procedures below when you start the engine.
  - short across starter terminals
  - bypass the safety start switch
- Do not alter or remove any part of machine safety system.
- Before you start the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
- Do not start the engine when you stay on the ground. Start the engine only from operator's seat.

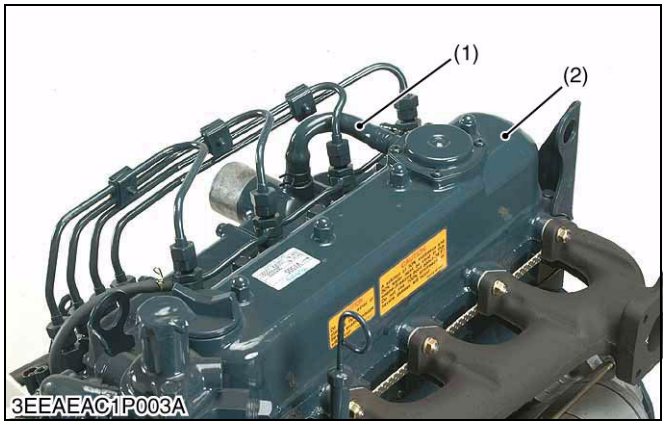
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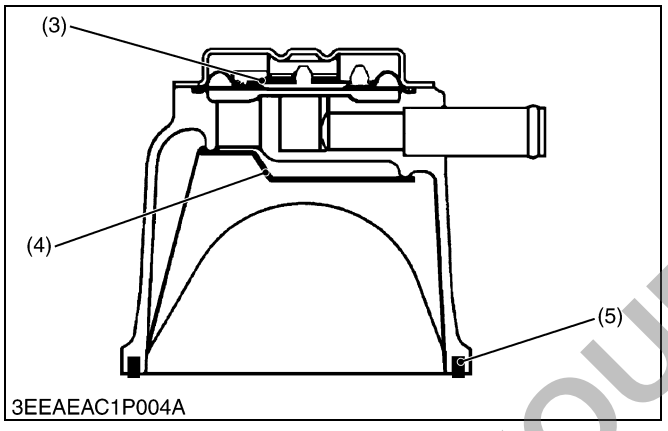
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# 1. ENGINE BODY

## [1] CLOSED BREATHER




Closed breather system has been adopted to prevent the release of blow-by gas into the atmosphere.

After its oil content is filtered by oil shield (4), the blow by gas in fed back to the intake manifold through breather valve (3) to be used for re-combustion.

(1) Breather Tube
(2) Cylinder Head Cover
(3) Breather Valve
(4) Oil Shield
(5) Rubber Packing

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# 1. TROUBLESHOOTING

| Symptom | Probable Cause | Solution | Reference Page |
|---|---|---|---|
| **Engine Does Not Start** | No fuel | Fill fuel | G-8 |
| | Air in the fuel system | Bleed | G-56 |
| | Water in the fuel system | Change fuel and repair or replace fuel system | G-37 |
| | Fuel pipe clogged | Clean | G-37 |
| | Fuel filter clogged | Change | G-37 |
| | Excessively high viscosity of fuel or engine oil at low temperature | Use specified fuel or engine oil | G-8, G-10, G-11 |
| | Fuel with low cetane number | Use specified fuel | G-8, G-10, G-11 |
| | Fuel leak due to loose injection pipe retaining nut | Tighten retaining nut | 1-S34 |
| | Incorrect injection timing | Adjust | 1-S18 |
| | Fuel camshaft worn | Replace | 1-S40 |
| | Injection nozzle clogged | Repair or replace | 1-S14 |
| | Injection pump malfunctioning | Replace | 1-S39 |
| | Seizure of crankshaft, camshaft, piston, cylinder or bearing | Replace | 1-S41, 1-S43 |
| | Compression leak from cylinder | Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder | 1-S11, 1-S36 |
| | Improper valve timing | Correct or replace timing gear | 1-S40 |
| | Piston ring and cylinder worn | Replace | 1-S42, 1-S61 |
| | Excessive valve clearance | Adjust | 1-S12 |
| | Engine stop solenoid malfunctioning | Replace | 8-S13 |
| **Starter Does Not Run** | Battery discharged | Charge | 8-S8 |
| | Starter malfunctioning | Repair or replace | 8-S11 |
| | Key switch malfunctioning | Repair or replace | 8-S9 |
| | Safety switch malfunctioning | Adjust or replace | 8-S12 |
| | Wiring disconnected | Connect | 8-M1, 8-M3 |
| **Engine Revolution Is Not Smooth** | Fuel filter clogged or dirty | Replace | G-37 |
| | Air cleaner clogged | Clean or replace | G-38 |
| | Fuel leak due to loose injection pipe retaining nut | Tighten retaining nut | 1-S34 |
| | Injection pump malfunctioning | Replace | 1-S19, 1-S39 |
| | Incorrect nozzle injection pressure | Adjust | 1-S14 |
| | Injection nozzle stuck or clogged | Repair or replace | 1-S14 |
| | Governor malfunctioning | Repair | 1-S39 |

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# 3. SPECIFICATIONS

| Model | | | RTV-X1100C | |
|---|---|---|---|---|
| | | | Worksite / Orange | Worksite / Camo |
| Engine | Make | | D1105 | |
| | Type | | 3 cylinders, 4-cycle, diesel, OHV | |
| | Displacement | | 1.123 L (68.530 cu. in.) | |
| | Horsepower | | 18.5 kw (24.8 HP) | |
| | Rated revolution | | 3000 $min^{-1}$ (rpm) | |
| | Low idling revolution | | 1350 to 1450 $min^{-1}$ (rpm) | |
| Fuel Capacity | | | 30 L (7.9 U.S.gals, 6.6 Imp.gals) | |
| Transmission | | | Continuously variable hydro transmission (VHT) | |
| Wheels, Drive system | | | 4, Rear 2WD or 4WD | |
| Differential lock | | | Standard; foot operated with mechanical holder | |
| Gear selection | | | Hi-Low range forward, neutral, reverse | |
| Brakes | Front / Rear | | Wet disk brake | |
| | Parking brake | | Rear wheel, hand lever | |
| Steering | | | Hydrostatic power | |
| Suspension | Front | | Independent, Dual A-Arm type | |
| | Rear | | Independent, Dual A-Arm type | |
| Dimensions | Length | | 3110 mm (122.5 in.) | |
| | Width | | 1660 mm (65.4 in.) | |
| | Height, overall | | 2090 mm (82.3 in.) | |
| | Front tread centers | | 1240 mm (48.8 in.) HDWS, ATV, 1290 mm (50.8 in.) Turf | |
| | Rear tread centers | | 1240 mm (48.8 in.) HDWS, ATV, 1290 mm (50.8 in.) Turf | |
| | Wheelbase | | 2045 mm (80.5 in.) | |
| | Ground clearance | front axle | 266 mm (10.5 in.) | |
| | | rear axle | 263 mm (10.4 in.) | |
| | Turning diameter | | 8.0 m (26.2 ft) | |
| Max. Rolling weight (Towing capacity) | | | Rear: 590 kg (1300 lbs), Front: 295 kg (650 lbs) | |
| Payload capacity | | | 734 kg (1618 lbs) | |
| Weight | | | 1075 kg (2370 lbs) | |
| Gross Vehicle Weight Rating (GVWR) | | | 1814 kg (3999 lbs) | |
| Cargo bed | Width | | 1465 mm (57.7 in.) | |
| | Length | | 1030 mm (40.5 in.) | |
| | Depth | | 285 mm (11.2 in.) | |
| | Volume | | 0.43 $m^3$ (15.2 cu.ft.) | |
| | Bed height (unloaded) | | 887 mm (34.9 in.) | |
| | Cargo bed capacity | | 500 kg (1102 lbs) | |
| Sound level, operator ear | | | 83 db (A) | |
| Tire | Front | | 25 × 10-12 HDWS, 6PLY<br>25 × 10-12 ATV, 6PLY<br>25 × 12-12 Turf, 4PLY | 25 × 10-12 HDWS, 6PLY<br>25 × 10-12 ATV, 6PLY |
| | Rear | | 25 × 10-12 HDWS, 6PLY<br>25 × 10-12 ATV, 6PLY<br>25 × 12-12 Turf, 4PLY | 25 × 10-12 HDWS, 6PLY<br>25 × 10-12 ATV, 6PLY |
| Tilt steering wheel | | | Standard | |
| Seat belt | | | 2 point type | |
| Front deluxe guard | | | – | – |
| Front deluxe guard with light guard | | | Standard | Standard |
| Body color | | | Orange | Camo |
| Bed lift | | | Standard | Standard |
| Speedometer | | | Standard | Standard |
| Door | | | Standard | Standard |
| Seat slide | | | Standard | Standard |

■ **NOTE**
- **The company reserves the right to change the specifications without notice.**
- **The values in "Ground clearance" and "Weight" are those of the machine equipped with the tires in the table above.**

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# 6. MAINTENANCE CHECK LIST

**⚠ WARNING**

**To avoid serious injury and vehicle damage:**

- **Be sure you have sufficient knowledge, experience, the proper replacement parts and tools before you attempt any vehicle maintenance task.**

**SERVICE INTERVALS**

■ **IMPORTANT**

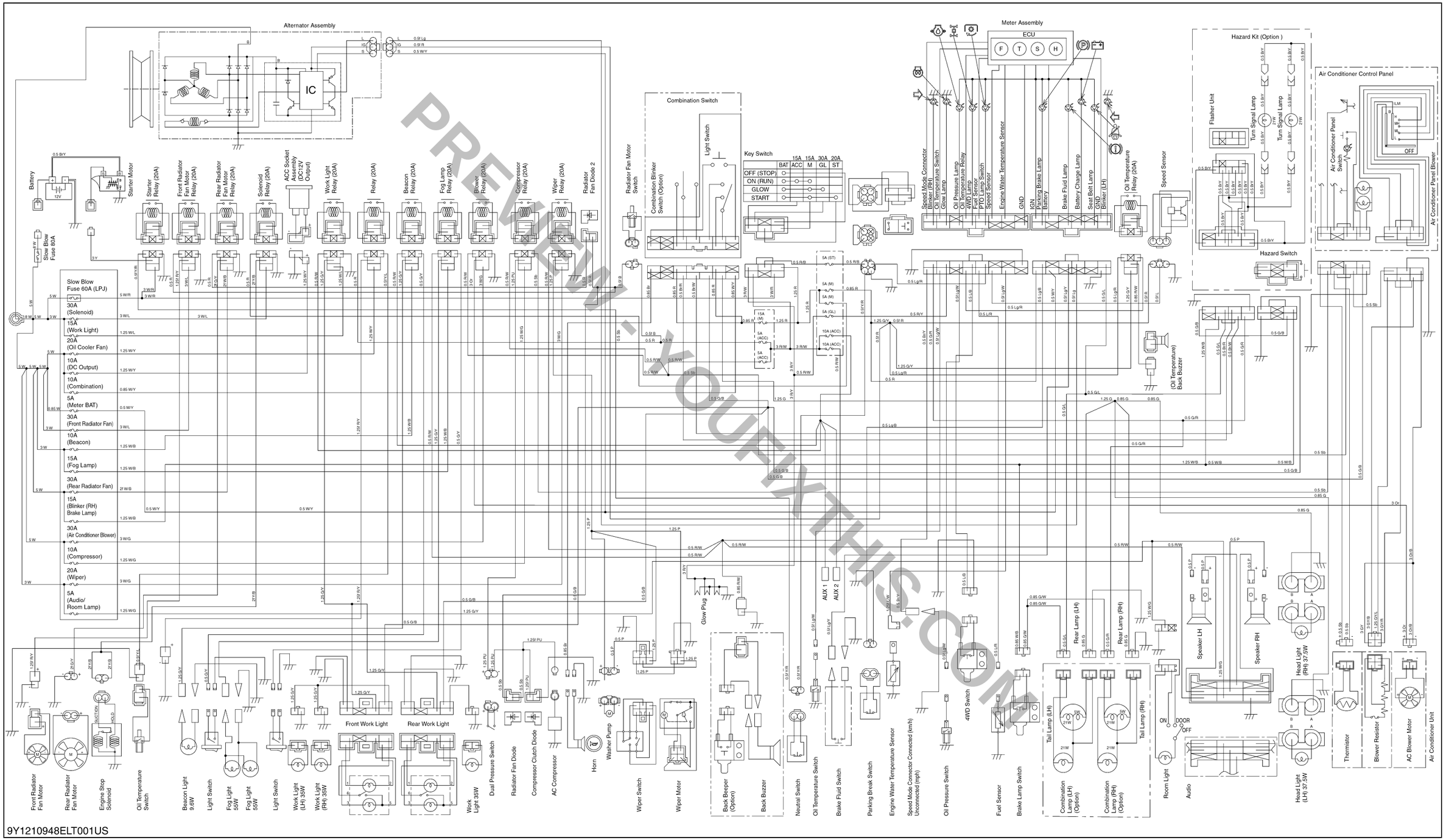
- **The jobs indicated by ★ must be done after the first 50 hours of operation.**
  ***1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.**
  ***2 Every year or every 6 times of cleaning.**
  ***3 Replace only if necessary.**
  ***4 When the battery is used for less than 100 hours per year, check the battery condition by reading the indicator annually.**
- **The items listed below (@marked) are registered as emission related critical parts by KUBOTA in the U.S.EPA non road emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the below instruction. Please see Warranty Statement in detail.**

| No. | Item | | Service Interval | | | | | | | | | | | | | | After since | Reference page | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | | | | |
| 1 | Engine start system | Check | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | every 50 hrs | G-30 | | |
| 2 | Greasing | Apply | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | every 50 hrs | G-31 | | |
| 3 | Engine oil | Change | ★ | | | ☆ | | | | ☆ | | | | ☆ | | | every 200 hrs | G-39 | | |
| 4 | Muffler [Spark arrester] | Clean | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-33 | | |
| 5 | Wheel fastener torque | Check | ★ | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-33 | | |
| 6 | Battery condition | Check | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-34 | *4 | |
| 7 | Alternator belt | Adjust | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-36 | | |
| 8 | VHT neutral spring | Check | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-36 | | |
| 9 | VHT pressure release | Check | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-36 | | |
| 10 | Toe-in | Adjust | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-37 | | |
| 11 | Fuel filter element | Check | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-37 | | |
| | | Replace | | | | | | | | | | ☆ | | | | | every 500 hrs | G-51 | | @ |
| 12 | Fuel line | Check | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-37 | | @ |
| | | Replace | | | | | | | | | | | | | | | every 2 years | G-52 | *3 | |
| 13 | Air cleaner element | Clean | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | | ☆ | every 100 hrs | G-38 | *1 | @ |
| | | Replace | | | | | | | | | | | | | | | every 1 year | G-51 | *2 | |
| 14 | Engine oil filter | Replace | ★ | | | ☆ | | | | ☆ | | | | ☆ | | | every 200 hrs | G-39 | | |
| 15 | Transmission oil filter (VHT) (Yellow color) | Replace | ★ | | | ☆ | | | | ☆ | | | | ☆ | | | every 200 hrs | G-40 | | |
| 16 | Transmission oil filter (Suction) (Black color) | Replace | ★ | | | ☆ | | | | ☆ | | | | ☆ | | | every 200 hrs | G-40 | | |
| 17 | Brake pedal | Check | ★ | | | ☆ | | | | ☆ | | | | ☆ | | | every 200 hrs | G-41 | | *4 |
| 18 | Parking brake | Adjust | ★ | | | ☆ | | | | ☆ | | | | ☆ | | | every 200 hrs | G-41 | | |

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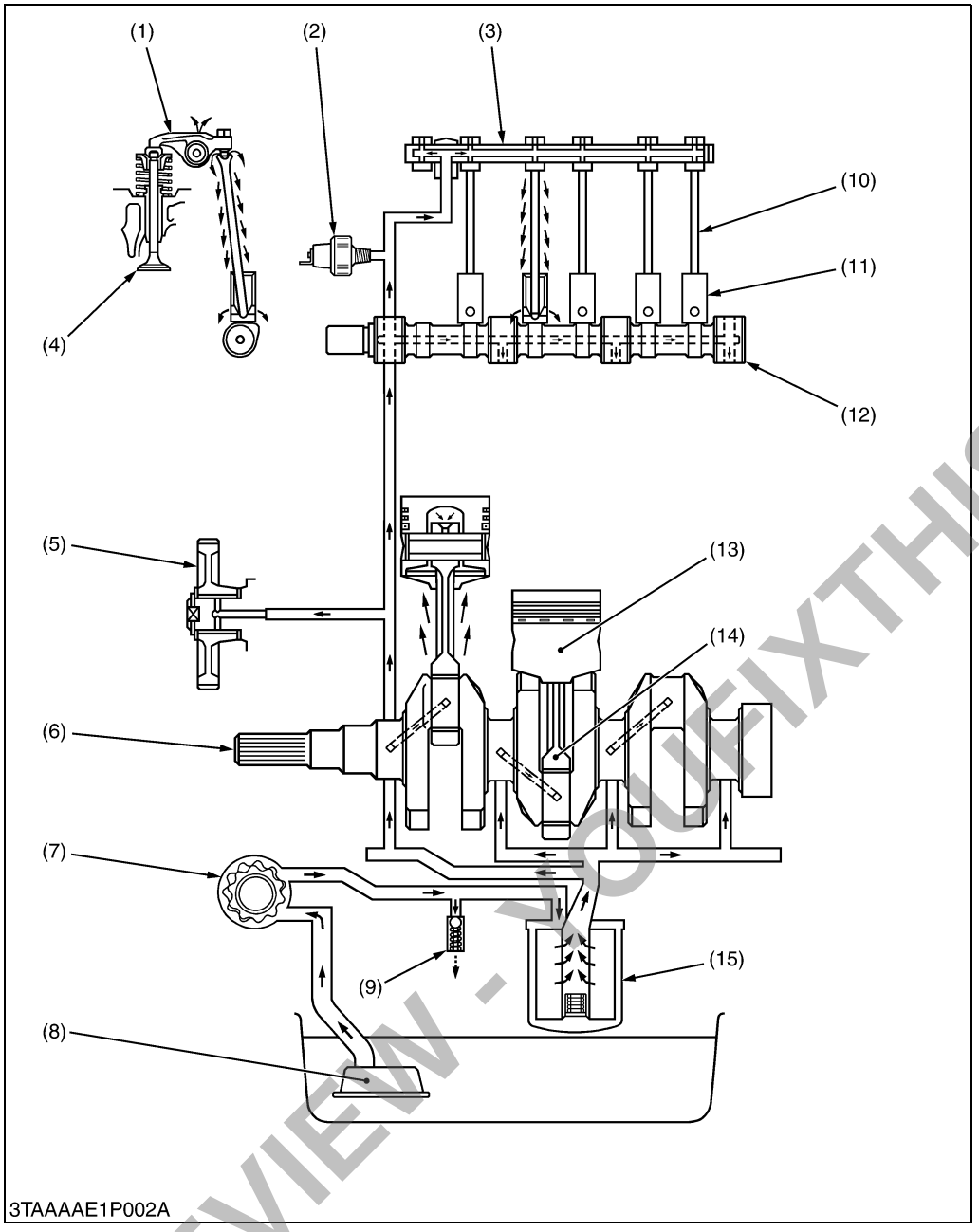
# 1. WIRING DIAGRAM




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# 2. LUBRICATING SYSTEM




(1) Rocker Arm
(2) Oil Pressure Switch
(3) Rocker Arm Shaft
(4) Valve
(5) Idle Gear
(6) Crankshaft
(7) Oil Pump
(8) Oil Strainer
(9) Relief Valve
(10) Push Rod
(11) Tappet
(12) Camshaft
(13) Piston
(14) Connecting Rod
(15) Oil Filter Cartridge

This engine's lubricating system consists of oil strainer (8), oil pump (7), relief valve (9), oil filter cartridge (15) and oil pressure switch (2).

The oil pump sucks lubricating oil from the oil pan through the oil strainer and the oil flows down to the filter cartridge, where it is further filtered. Then the oil is forced to crankshaft (6), connecting rods (14), idle gear (5), camshaft (12) and rocker arm shaft (3) to lubricate each part.

Some part of oil, splashed by the crankshaft or leaking and dropping from gaps of each part, lubricates these parts: piston (13), cylinders, small ends or connecting rods, tappets (11), push rods (10), inlet and exhaust valves (4) and timing gears.

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# 4. CHECKING, DISASSEMBLING AND SERVICING

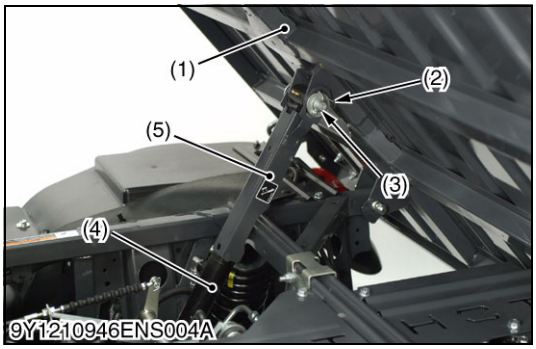
## [1] CHECKING AND ADJUSTING

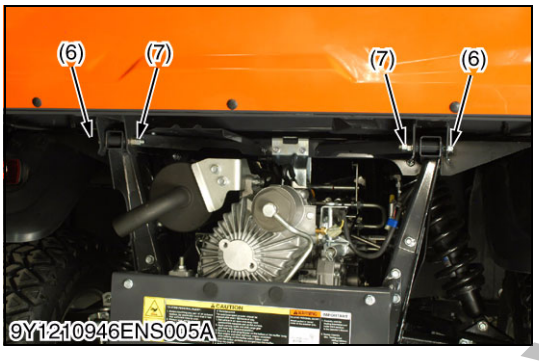
**CAUTION**

- **Be sure to check that the speed is neutrality before the following checks.**
- **When checking, park the machine on flat ground and apply the parking brake.**

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### (1) Engine Body




**Preparation for Compression Pressure**

1. Lift up the cargo bed (1) and support it so that the hydraulic cylinder (4) should not drop. (If hydraulic cylinder equipped.)
2. Remove the cotter pin (2), clevis pin (3) and cylinder lock (5). (If hydraulic cylinder equipped.)
3. Loosen the lock nuts (7) and remove the bolts (6).
4. Remove the cargo bed (1).

**(When reassembling)**

- Install the cotter pin both side bending.

(1) Cargo Bed
(2) Cotter Pin
(3) Clevis Pin
(4) Hydraulic Cylinder
(5) Cylinder Lock
(6) Bolt
(7) Lock Nut

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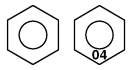
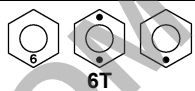
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# 5. TIGHTENING TORQUES

## [1] GENERAL USE SCREWS, BOLTS AND NUTS

**Tighten screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual according to the table below.**

| Indication on top of bolt |  No-grade or 4T | | | | | |  7T | | | | | |  9T | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indication on top of nut |  No-grade or 4T | | | | | | | | | | | |  6T | | |
| Material of opponent part | Ordinariness | | | Aluminum | | | Ordinariness | | | Aluminum | | | Ordinariness | | |
| Unit | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft |
| M6 | 7.9 to 9.3 | 0.80 to 0.95 | 5.8 to 6.8 | 7.9 to 8.8 | 0.80 to 0.90 | 5.8 to 6.5 | 9.81 to 11.2 | 1.00 to 1.15 | 7.24 to 8.31 | 7.9 to 8.8 | 0.80 to 0.90 | 5.8 to 6.5 | 12.3 to 14.2 | 1.25 to 1.45 | 9.05 to 10.4 |
| M8 | 18 to 20 | 1.8 to 2.1 | 13 to 15 | 17 to 19 | 1.7 to 2.0 | 13 to 14 | 24 to 27 | 2.4 to 2.8 | 18 to 20 | 18 to 20 | 1.8 to 2.1 | 13 to 15 | 30 to 34 | 3.0 to 3.5 | 22 to 25 |
| M10 | 40 to 45 | 4.0 to 4.6 | 29 to 33 | 32 to 34 | 3.2 to 3.5 | 24 to 25 | 48 to 55 | 4.9 to 5.7 | 36 to 41 | 40 to 44 | 4.0 to 4.5 | 29 to 32 | 61 to 70 | 6.2 to 7.2 | 45 to 52 |
| M12 | 63 to 72 | 6.4 to 7.4 | 47 to 53 | – | – | – | 78 to 90 | 7.9 to 9.2 | 58 to 66 | 63 to 72 | 6.4 to 7.4 | 47 to 53 | 103 to 117 | 10.5 to 12.0 | 76.0 to 86.7 |
| M14 | 108 to 125 | 11.0 to 12.8 | 79.6 to 92.5 | – | – | – | 124 to 147 | 12.6 to 15.0 | 91.2 to 108 | – | – | – | 167 to 196 | 17.0 to 20.0 | 123 to 144 |
| M16 | 167 to 191 | 17.0 to 19.5 | 123 to 141 | – | – | – | 197 to 225 | 20.0 to 23.0 | 145 to 166 | – | – | – | 260 to 304 | 26.5 to 31.0 | 192 to 224 |
| M18 | 246 to 284 | 25.0 to 29.0 | 181 to 209 | – | – | – | 275 to 318 | 28.0 to 32.5 | 203 to 235 | – | – | – | 344 to 402 | 35.0 to 41.0 | 254 to 296 |
| M20 | 334 to 392 | 34.0 to 40.0 | 246 to 289 | – | – | – | 368 to 431 | 37.5 to 44.0 | 272 to 318 | – | – | – | 491 to 568 | 50.0 to 58.0 | 362 to 419 |

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## [2] STUD BOLTS

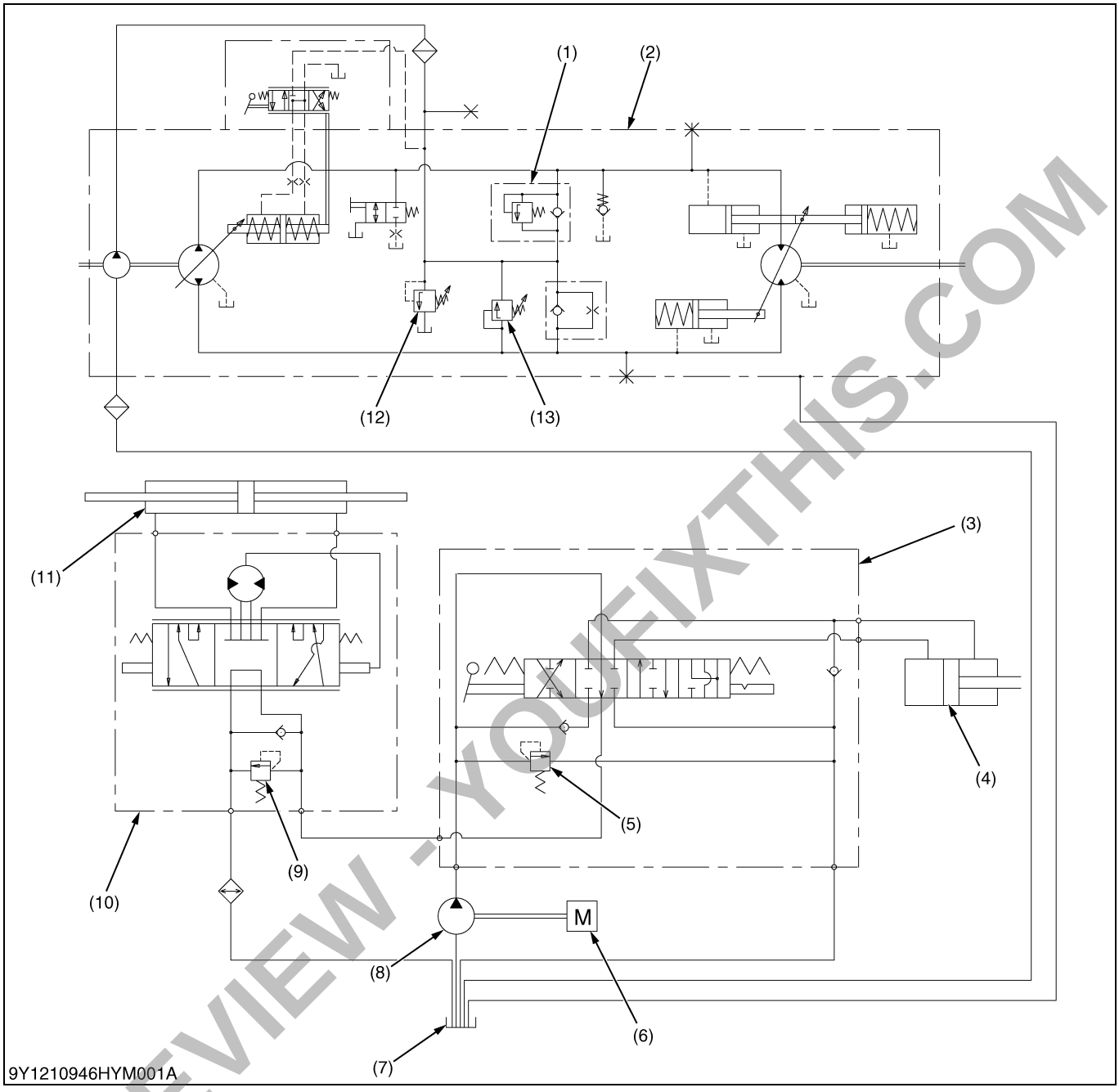
| Material of opponent part | Ordinariness | | | Aluminum | | |
|---|---|---|---|---|---|---|
| Unit | N·m | kgf·m | lbf·ft | N·m | kgf·m | lbf·ft |
| M8 | 12 to 15 | 1.2 to 1.6 | 8.7 to 11 | 8.9 to 11 | 0.90 to 1.2 | 6.5 to 8.6 |
| M10 | 25 to 31 | 2.5 to 3.2 | 18 to 23 | 20 to 25 | 2.0 to 2.6 | 15 to 18 |
| M12 | 30 to 49 | 3.0 to 5.0 | 22 to 36 | 31 | 3.2 | 23 |
| M14 | 62 to 73 | 6.3 to 7.5 | 46 to 54 | – | – | – |
| M16 | 98.1 to 112 | 10.0 to 11.5 | 72.4 to 83.1 | – | – | – |
| M18 | 172 to 201 | 17.5 to 20.5 | 127 to 148 | – | – | – |

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# 2. HYDRAULIC CIRCUIT




(1) Check and High Pressure Relief Valve
(2) HST Assembly
(3) Hydraulic Control Valve
(4) Lift Cylinder
(5) Hydraulic Control Valve
(6) Engine
(7) Oil Tank
(8) Hydraulic Pump
(9) Power Steering Controller Relief Vale
(10) Power Steering Controller
(11) Steering Cylinder
(12) Charge Relief Vale
(13) High Pressure Relief Valve

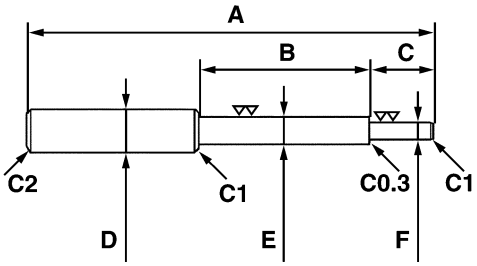
**Specifications**

| | | | |
|---|---|---|---|
| (1) | 24.5 to 27.5 MPa (250 to 280 kgf/cm$^2$, 3560 to 3980 psi) | (9) | 8.00 to 9.00 MPa (81.6 to 91.7 kgf/cm$^2$, 1160 to 1300 psi) at 3000 min$^{-1}$ (rpm) |
| (5) | 12.5 to 13.5 MPa (128 to 137 kgf/cm$^2$, 1820 to 1950 psi) at 3000 min$^{-1}$ (rpm) | (12) | 0.43 to 0.85 MPa (4.4 to 8.6 kgf/cm$^2$, 63 to 120 psi) |
| (8) | 9.0 L/min. (2.4 U.S.gals/min, 2.0 Imp.gals/min.) at 3000 min$^{-1}$ (rpm) | (13) | 15.0 to 17.0 MPa (153 to 173 kgf/cm$^2$, 2180 to 2460 psi) |

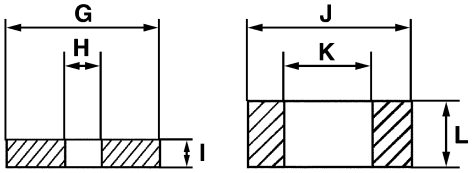
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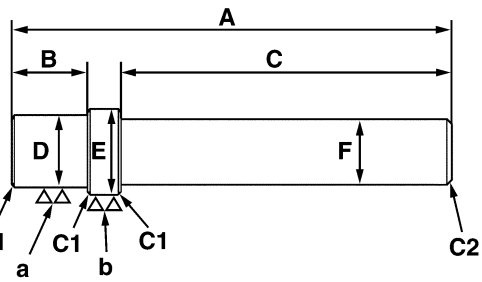
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3TMABAB0P063B



3TMABAB0P064B



3EEABAB1P038A

## Valve Guide Replacing Tool

### Application

- Use to press out and press fit the valve guide.

| | |
|---|---|
| **A** | 225 mm (8.86 in.) |
| **B** | 70 mm (2.8 in.) |
| **C** | 45 mm (1.8 in.) |
| **D** | 20 mm dia. (0.79 in. dia.) |
| **E** | 11.7 to 11.9 mm dia. (0.461 to 0.468 in. dia.) |
| **F** | 6.50 to 6.60 mm dia. (0.256 to 0.259 in. dia.) |
| **G** | 25 mm dia. (0.98 in. dia.) |
| **H** | 6.70 to 7.00 mm dia. (0.264 to 0.275 in. dia.) |
| **I** | 5.0 mm (0.20 in.) |
| **J** | 20 mm dia. (0.79 in. dia.) |
| **K** | 12.5 to 12.8 mm dia. (0.493 to 0.503 in. dia.) |
| **L** | 8.90 to 9.10 mm (0.351 to 0.358 in.) |
| **C1** | Chamfer 1.0 mm (0.039 in.) |
| **C2** | Chamfer 2.0 mm (0.079 in.) |
| **C0.3** | Chamfer 0.30 mm (0.012 in.) |

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## Bushing Replacing Tool

### Application

- Use to press out and press fit the bushing.

**[For small end bushing]**

| | |
|---|---|
| **A** | 157 mm (6.18 in.) |
| **B** | 24 mm (0.94 in.) |
| **C** | 120 mm (4.72 in.) |
| **D** | 21.8 to 21.9 mm dia. (0.859 to 0.862 in. dia.) |
| **E** | 24.8 to 24.9 mm dia. (0.977 to 0.980 in. dia.) |
| **F** | 20 mm dia. (0.79 in. dia.) |
| **a** | 6.3 µm (250 µin.) |
| **b** | 6.3 µm (250 µin.) |
| **C1** | Chamfer 1.0 mm (0.039 in.) |
| **C2** | Chamfer 2.0 mm (0.079 in.) |

**[For idle gear bushing]**

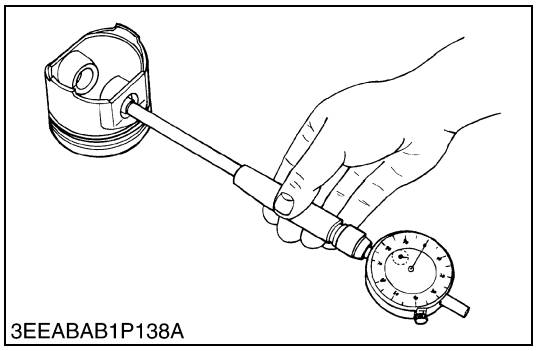
| | |
|---|---|
| **A** | 196 mm (7.72 in.) |
| **B** | 26 mm (1.0 in.) |
| **C** | 150 mm (5.91 in.) |
| **D** | 25.80 to 25.90 mm dia. (1.016 to 1.019 in. dia.) |
| **E** | 28.80 to 28.90 mm dia. (1.134 to 1.137 in. dia.) |
| **F** | 20 mm dia. (0.79 in. dia.) |
| **a** | 6.3 µm (250 µin.) |
| **b** | 6.3 µm (250 µin.) |
| **C1** | Chamfer 1.0 mm (0.039 in.) |
| **C2** | Chamfer 2.0 mm (0.079 in.) |

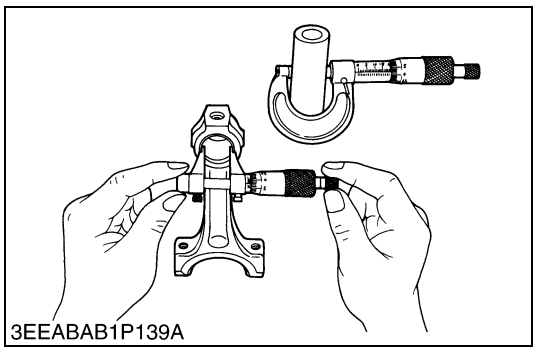
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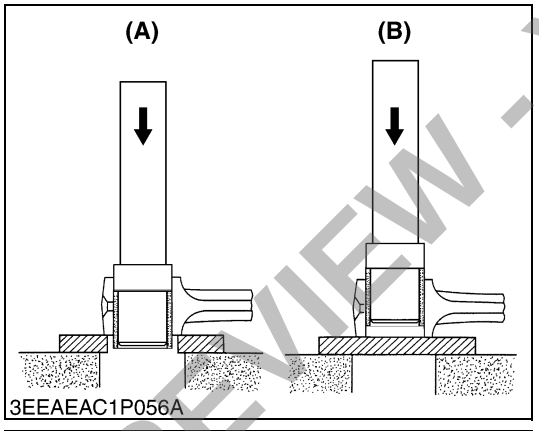
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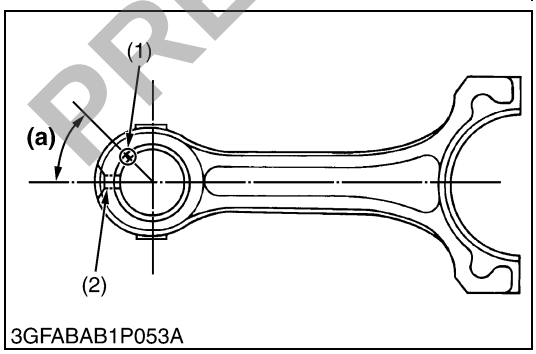
# [3] Piston and Connecting Rod


3EEABAB1P138A


3EEABAB1P139A



3EEAEAC1P056A



3GFABAB1P053A

**Piston Pin Bore I.D.**

1. Measure the piston pin bore I.D. in both the horizontal and vertical directions with a cylinder gauge.
2. If the measurement exceeds the allowable limit, replace the piston.

| | | |
|---|---|---|
| Piston pin bore I.D. | Factory specification | 22.000 to 22.013 mm<br>0.86615 to 0.86665 in. |
| | Allowable limit | 22.03 mm<br>0.8673 in. |

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**Oil Clearance between Piston Pin and Small End Bushing**

1. Measure the piston pin O.D. where it contacts the bushing with an outside micrometer.
2. Measure the small end bushing I.D. with an inside micrometer, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the bushing. If it still exceeds the allowable limit, replace the piston pin.

| | | |
|---|---|---|
| Oil clearance between piston pin and small end bushing | Factory specification | 0.014 to 0.038 mm<br>0.00056 to 0.0014 in. |
| | Allowable limit | 0.15 mm<br>0.0059 in. |

| | | |
|---|---|---|
| Piston pin O.D. | Factory specification | 22.002 to 22.011 mm<br>0.86622 to 0.86657 in. |
| Small end bushing I.D. | Factory specification | 22.025 to 22.040 mm<br>0.86713 to 0.86771 in. |

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**Replacing Small End Bushing**

**(When removing)**

1. Press out the used bushing using a small end bushing replacing tool. (See page G-64.)

**(When installing)**

1. Clean a new small end bushing and bore, and apply engine oil to them.
2. Using a small end bushing replacing tool, press fit a new bushing (service parts) taking due care to see that the connecting rod oil hole matches the bushing hole.

| | | |
|---|---|---|
| Oil clearance between piston pin and small end bushing (Spare parts) | Factory specification | 0.014 to 0.038 mm<br>0.00056 to 0.0014 in. |
| | Allowable limit | 0.15 mm<br>0.0059 in. |

| | | |
|---|---|---|
| Small end bushing I.D. (Spare parts) | Factory specification | 22.025 to 22.040 mm<br>0.86713 to 0.86771 in. |

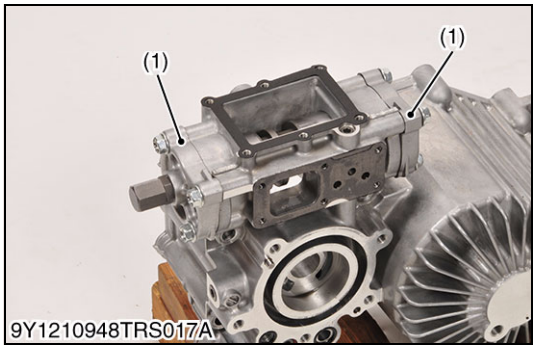
(1) Seam
(2) Oil Hole

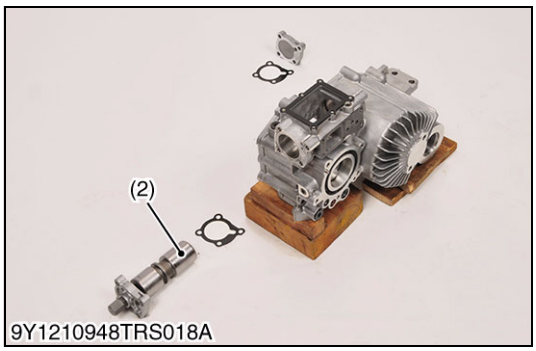
**(A) When Removing**
**(B) When Installing**
**(a) 0.79 rad (45 °)**

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## Servo Piston Assembly

1. Remove the servo piston assembly mounting hex. head screw.
2. Pull out the servo piston assembly (2) sightly by the hand.

**(When reassembling)**

- Replace the gasket with new one.

■ **NOTE**

- **Be careful not to do damage the surface of servo piston.**
- **Do not disassemble the servo piston assembly, if the there is no problem.**

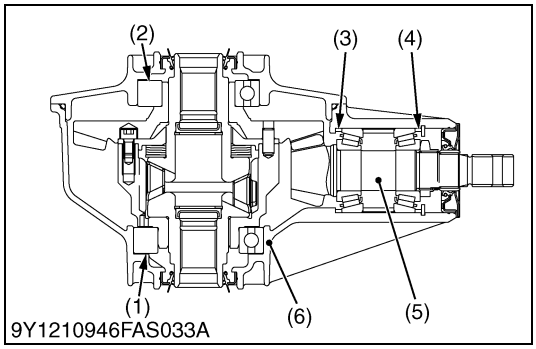
| | | |
|---|---|---|
| Tightening torque | Servo piston and cover mounting screw | 18 to 21 N·m<br>1.9 to 2.1 kgf·m<br>14 to 15 lbf·ft |

(1) Servo Piston Cover (2) Servo Piston Assembly

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**Backlash between Bevel Pinion Shaft and Bevel Gear**

1. Put the solder (0.5 mm (0.020 in.) thickness) on the position where the tooth proper contact of bevel pinon shaft.
2. Reassemble the differential assembly and front case cover, and rotate the bevel pinion shaft carefully.
3. Separate the front differential case cover and remove the differential assembly, again.
4. Measure the backlash by thickness of the point where solder is the thinnest.
5. When the backlash is too large, decrease the number of shims (LH) in the side of the bevel gear, and insert the shim (RH) of the same thickness as the removed ones to the opposite side.
6. When the backlash is too small, do the opposite way to increase backlash.
   Adjust the backlash properly by repeating the above procedure.

| | | |
|---|---|---|
| Backlash between bevel pinion shaft and bevel gear | Factory specification | 0.15 to 0.30 mm<br>0.0059 to 0.011 in. |

**(Reference)**

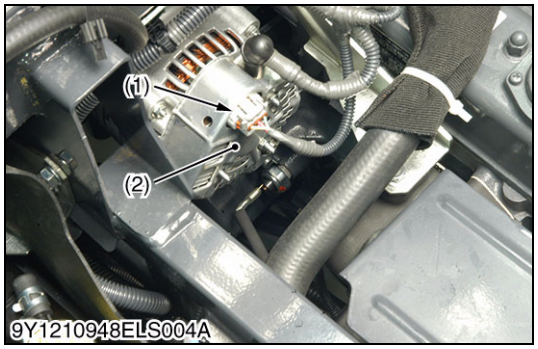
- Thickness of shims (1) (LH):
  0.20 mm (0.0079 in.)
  0.30 mm (0.012 in.)
  0.50 mm (0.020 in.)
- Thickness of shims (2) (RH):
  0.10 mm (0.0039 in.)
  0.20 mm (0.0079 in.)
  0.30 mm (0.012 in.)
  0.50 mm (0.020 in.)
- Thickness of adjusting collars (3), (4):
  3.40 mm (0.134 in.)
  3.60 mm (0.142 in.)
  3.80 mm (0.150 in.)
  3.90 mm (0.154 in.)
  4.00 mm (0.157 in.)
  4.10 mm (0.161 in.)
  4.20 mm (0.165 in.)
  4.40 mm (0.173 in.)
  4.50 mm (0.177 in.)
  4.60 mm (0.181 in.)

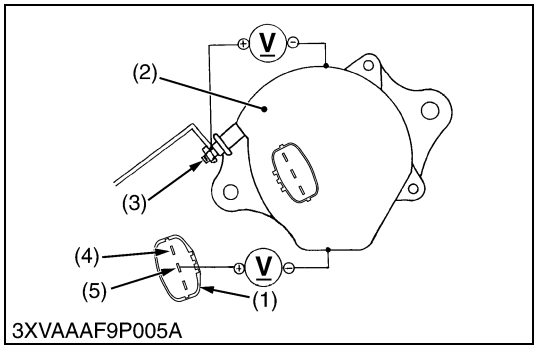
(1) Adjusting Shim
(2) Adjusting Shim
(3) Adjusting Collar
(4) Adjusting Collar
(5) Bevel Pinion Shaft
(6) Front Differential Case Cover

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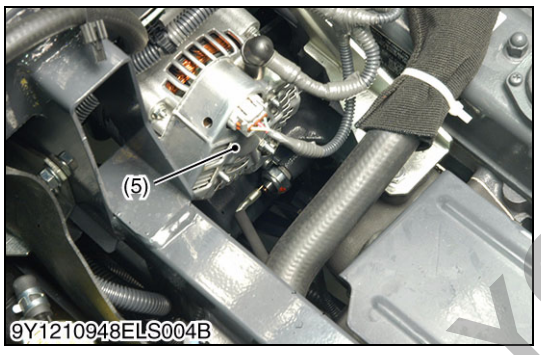

## Connector Voltage

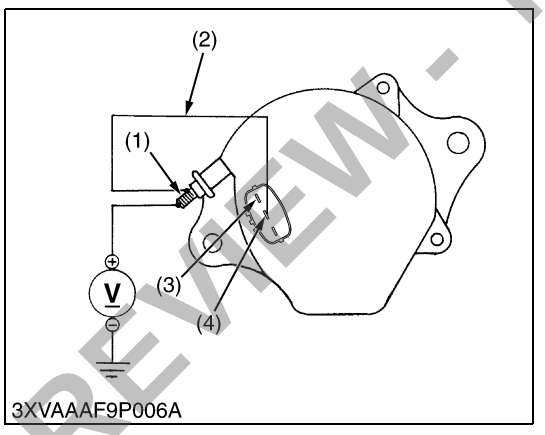
1. Disconnect the **3P** connector (1) from the alternator (2) after turning the main switch **OFF**.
2. Measure the voltage between the **B** terminal (3) and the chassis.
3. Turn the main switch **ON**. Measure the voltage between the **IG** terminal (5) and the chassis.

| | | |
|---|---|---|
| Voltage (Key switch at **OFF**) | **B** Terminal – Chassis | Approx. battery voltage |
| Voltage (Key switch at **ON**) | **IG** Terminal – Chassis | Approx. battery voltage |

(1) **3P** Connector
(2) Alternator
(3) **B** Terminal
(4) **L** Terminal
(5) **IG** Terminal

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## No-Load Test

1. Connect the **3P** connector to previous positions of the alternator after turning the main switch **OFF**.
2. Connect the jumper lead (2) between **IG** terminal (4) and **B** terminal (1).
3. Start the engine and then set at idling speed.
4. Disconnect the negative cable from the battery.
5. Measure the voltage between the **B** terminal (1) and the chassis.
6. If the measurement is less than the factory specification, disassemble the alternator and check the IC regulator.

| | | |
|---|---|---|
| Voltage | Factory specification | More than 14 V |

**(Reference)**

- Once the engine has started, the alternator temperature rises quickly up to an ambient temperature of 70 to 90 °C (158 to 194 °F). As the temperature goes higher than 50 °C (122 °F), the alternator voltage slowly drops; at higher than 100 °C (212 °F), it drops by about 1 V.

(1) **B** Terminal
(2) Jumper Lead
(3) **L** Terminal
(4) **IG** Terminal
(5) Alternator

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