

### Valve Seat Inspection and Service

Clean up all carbon deposits onto intake and exhaust valves.

Apply with emery slightly onto valve contact face. Grind valve seat with a rubber hose or other manual grinding tool.

#### Caution

- Do not let emery enter into between valve stem and valve guide.
- Clean up the emery after corrected, and apply with engine oil onto contact faces of valve and valve seat.

Remove the valve and check its contact face.

#### Caution

Replace the valve with new one if valve seal is roughness, wear out, or incomplete contacted with valve seat.

### Valve seat inspection

If the valve seat is too width, narrow or rough, corrects it.

### Valve seat width

**Service limit: 1.6mm**

Check the contact condition of valve seat.

### Valve seat grinding

The worn valve seat has to be ground with valve seat chamfer cutter.

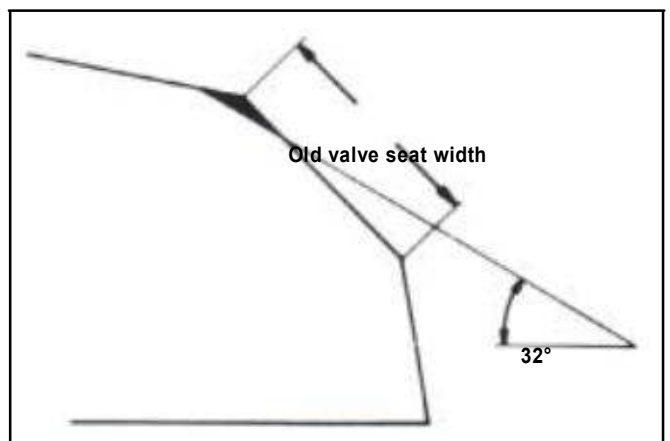
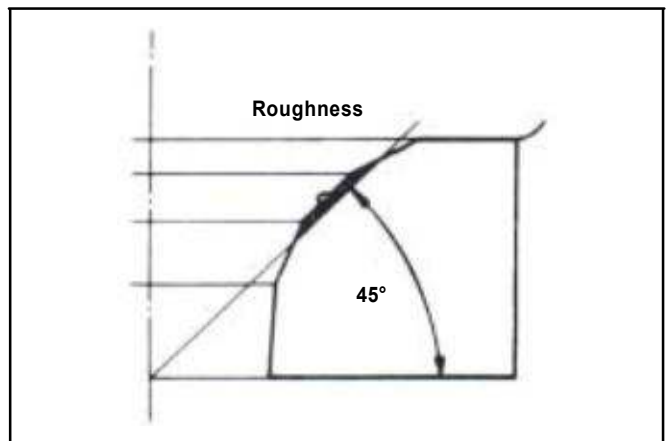
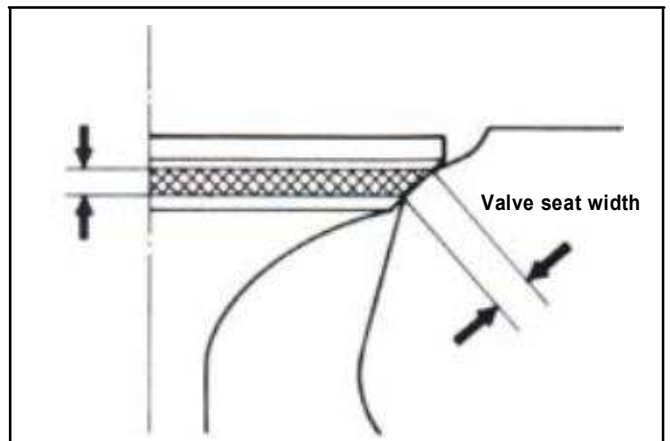
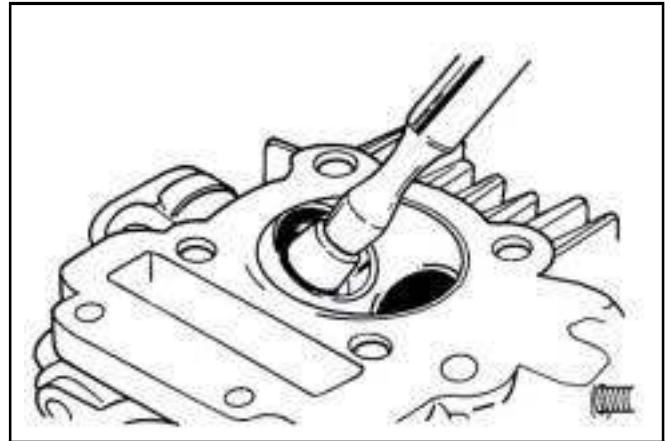
Refer to operation manual of the valve seat chamfer cutter.

Use 45° valve seat chamfer cutter to cut any rough or uneven surface from valve seat.

#### Caution

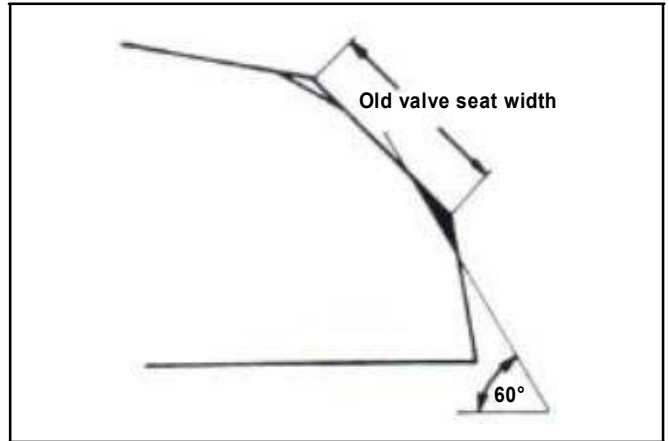
After valve guide had been replaced, it has to be ground with 45° valve seat chamfer cutter to correct its seat face.

Use 32° cutter to cut a quarter upper parts out.



## 6. CYLINDER HEAD/VALVE

Use 60° cutter to cut a quarter lower parts out.  
Remove the cutter and check new valve seat.

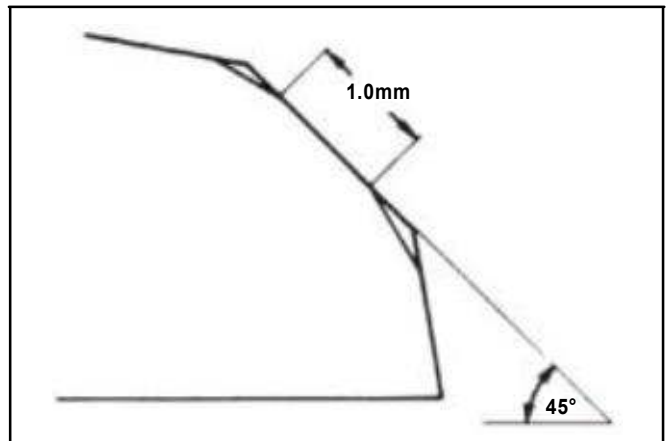


Use 45° cutter to grind the valve seat to specified width.

**⚠ Caution**

Make sure that all roughness and uneven faces had been ground.

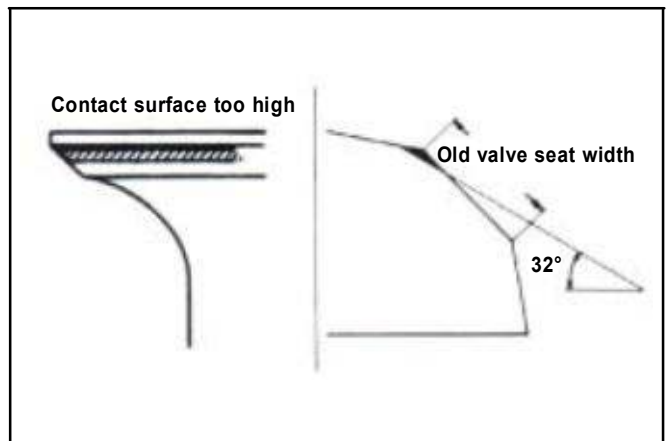
Grind valve seat again if necessary.



Coat the valve seat surface with red paint.  
Install the valve through valve guide until the valve contacting with valve seat, slightly press down the valve but do not rotate it so that a seal track will be created on contact surface.

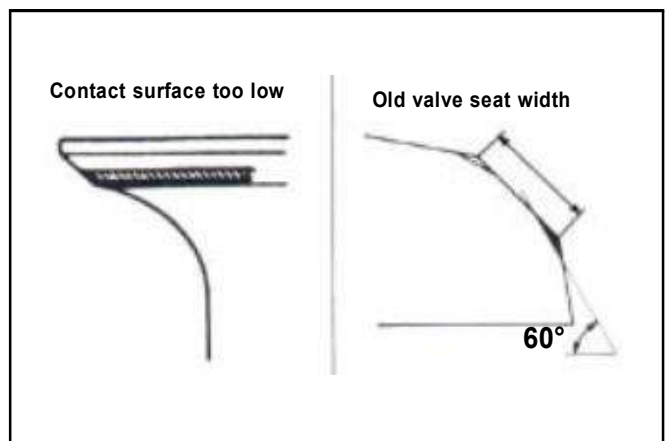
**⚠ Caution**

The contact surfaces of valve and valve seat are very important to the valve sealing capacity.

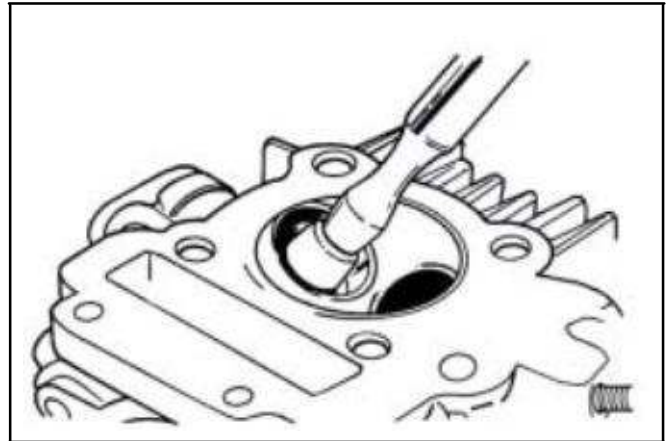


If the contact surface too high, grind the valve seat with 32° cutter.  
Then, grind the valve seat to specified width.

If the contact surface too low, grind the valve seat with 60° cutter.  
Then, grind the valve seat to specified width.



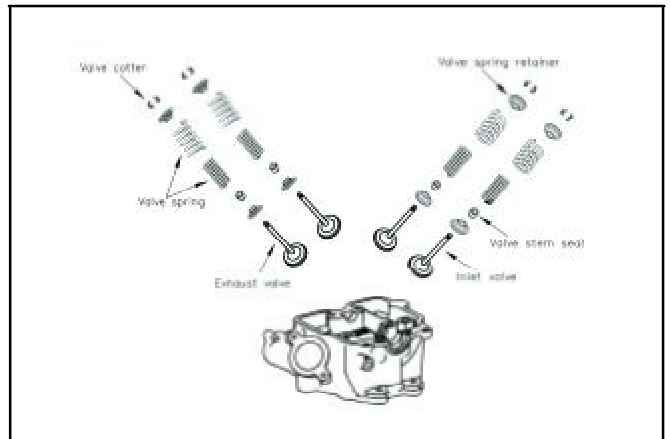
After the valve seat ground, coat valve seat surface with emery and then slightly press the ground surface.  
Clean up all emery coated onto cylinder and valve after ground.



**Cylinder Head Reassembly** Lubricate valve stem with engine oil, and then insert the valve into valve guide.  
Install new valve stem oil seal.  
Install valve springs and retainers.

**⚠ Caution**

The closed coils of valve spring should face down to combustion chamber.

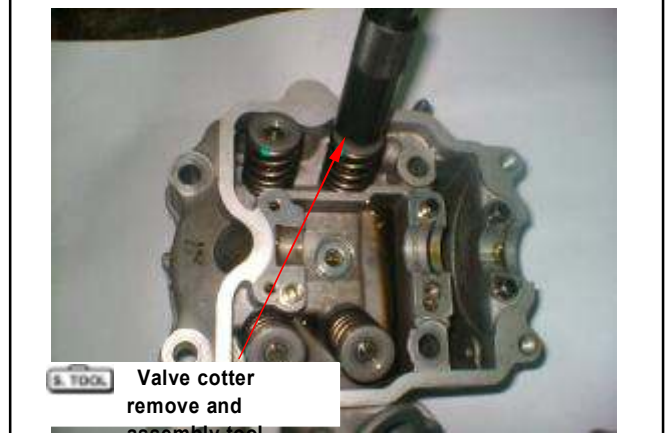


Use a valve cotter remove & assembly tool to press the valve spring, and then remove valves.

**⚠ Caution**

In order to avoid damaging the valve stem and the cylinder head, in the combustion chamber place a rag between the valve spring remover/installer as compressing the valve spring directly.

**Special Service Tool:**  
**Valve cotter remove & assembly tool**



Tap the valve stems gently with a plastic hammer to make sure valve retainer and valve cotter is settled.

**⚠ Caution**

Place and hold cylinder head on to working table so that can prevent from valve damaged.



## 6. CYLINDER HEAD/VALVE

### Cylinder Head Installation

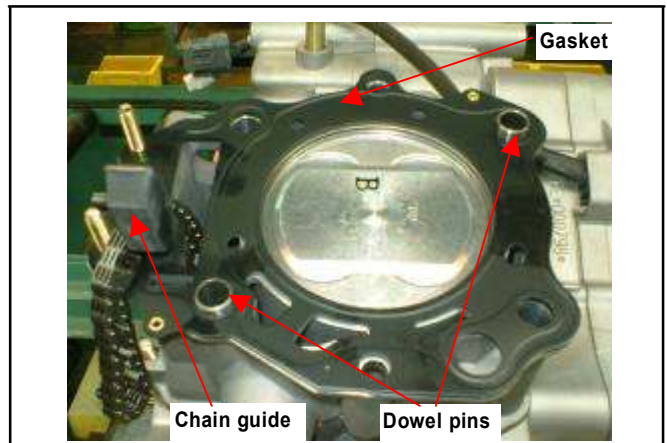
Clean up all residues and foreign materials onto the matching surfaces of both cylinder and cylinder head.

Install chain guide, dowel pins and a new cylinder head gasket onto the cylinder.

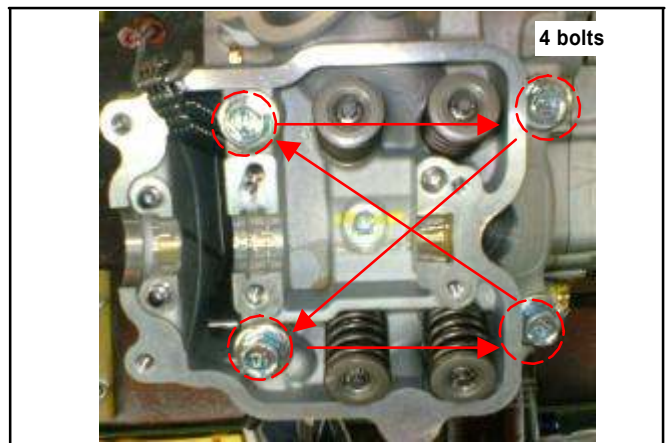
#### Caution

Do not damage the matching surfaces of cylinder and cylinder head.

Avoid residues of gasket or foreign materials falling into crankcase as cleaning.



Install 4 washers and tighten 4 bolts on the cylinder head upper side, and then tighten 4 cylinder head nuts to the specified torque.(2 M6,2 M8).

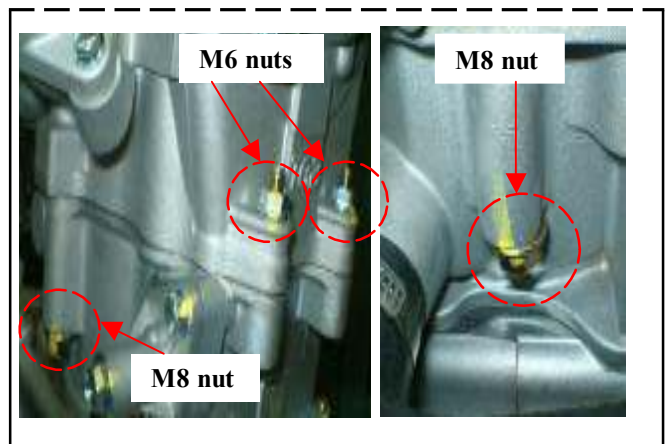


#### Cylinder head bolt

**Bolt: 3.6~4.0kgf-m**

**Nut: M6:1.0~1.4kgf-m**

**M8: 2.0~2.5kgf-m**



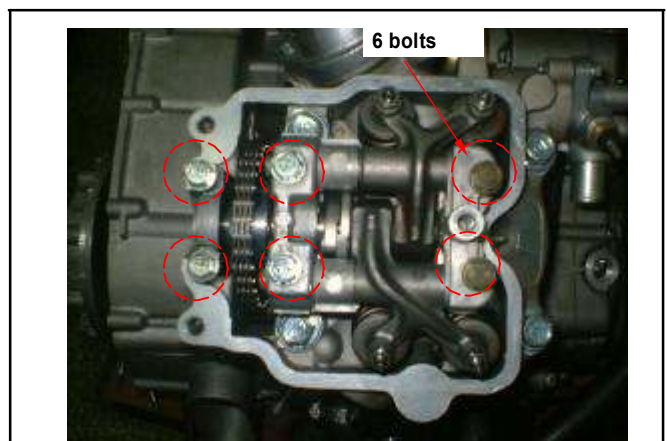
Install camshaft into cylinder head.

Install rocker arm, rocker arm shaft.

Install cam chain tensioner into cylinder head

Install 6 bolts on the stand for spindle, cam.

**Bolt: 1.0~1.4 kgf-m.**



Install cam chain on to sprocket and align the timing mark on the sprocket with that of cylinder head.

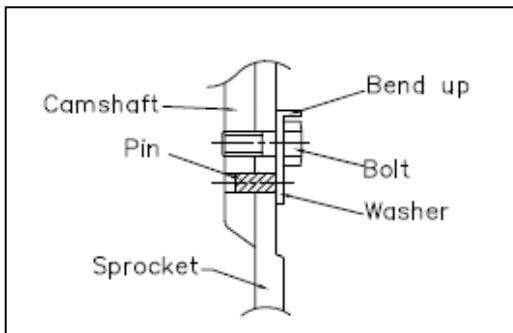
Align sprocket bolt hole with camshaft bolt hole. Tighten the sprocket mounting bolts.

**⚠ Caution**

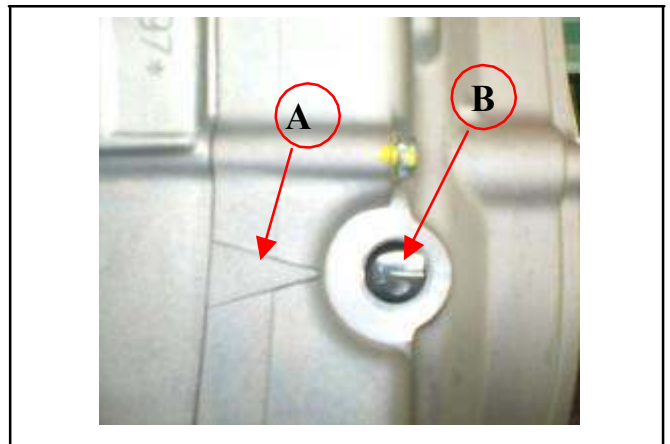
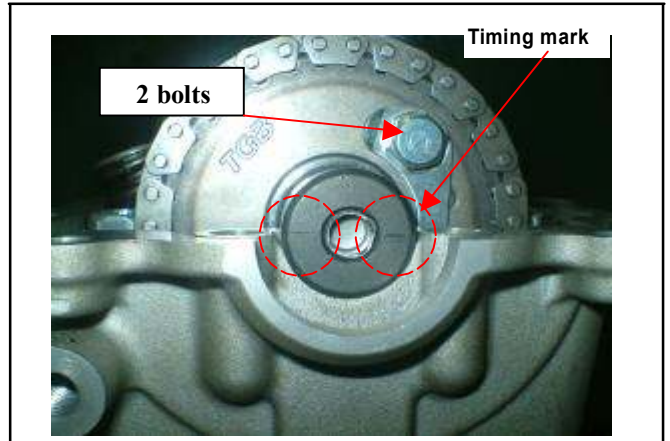
Make sure timing marks are matched.

Install the lock washer so that it is covering the locating pin.

Bend up the washer tongue positively to lock bolts.

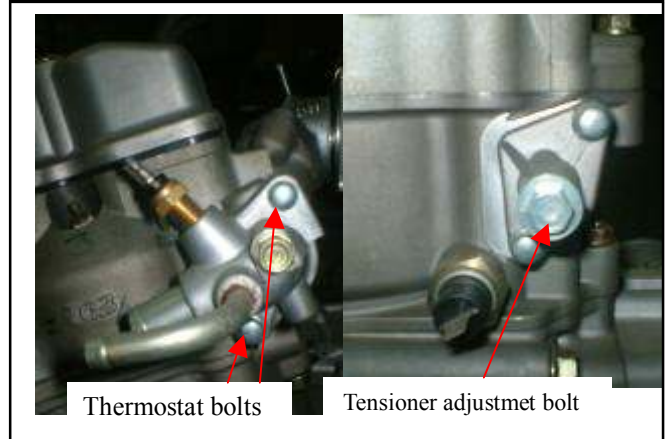


Align the line **Ⓐ** on the generator rotor with the index mark **Ⓑ** on the crankcase.

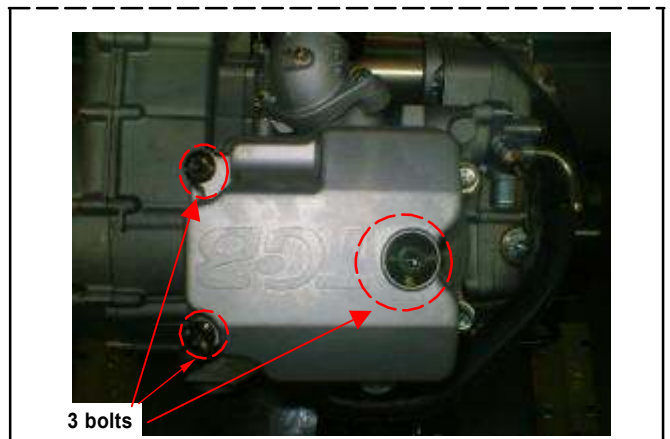


Loosen auto tensioner adjustment bolt and remove bolt and spring. Install tensioner and install spring and adjustment bolt.

Install thermostat(2 bolts)



Install cylinder cover (3 bolts).



## 6. CYLINDER HEAD/VALVE

Install and tighten spark plug

**Torque value: 1.0~2.0kgf-m**

**Caution**

This model is equipped with more precision 4-valve mechanism so its tighten torque can not be exceeded standard value in order to avoid causing cylinder head deformation, engine noise and leaking so that motorcycle's performance be effected.

Install the engine onto frame (refer chapter 5).

### Valve Clearance Adjustment

Remove cylinder head cover.(3 bolts)

Align the line **Ⓐ** on the generator rotor with the index mark **Ⓑ** on the crankcase.

Loosen valve clearance adjustment nuts and bolts located on valve rocker arm.

Measure and adjust valve clearance with feeler gauge.

After valve clearance had been adjusted to standard value, hold adjustment bolt and then tighten the Adjustment nut.

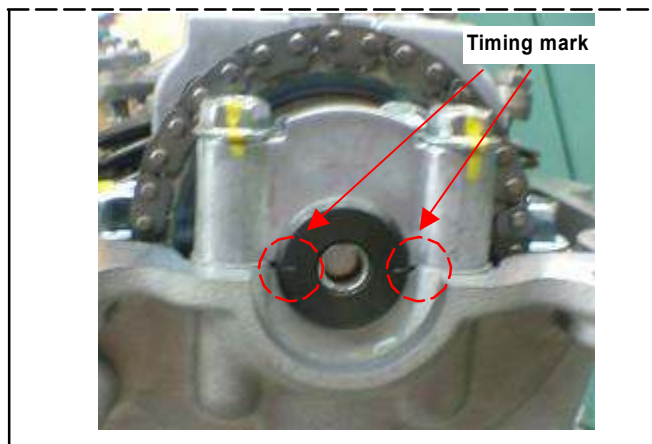
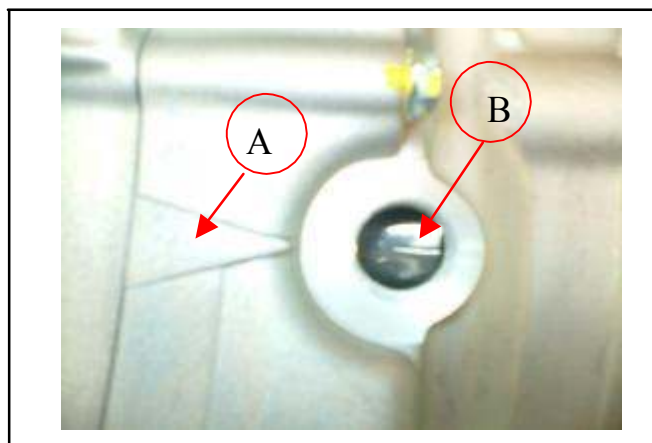
**Standard Value: IN  $0.10 \pm 0.02$  mm**  
**EX  $0.15 \pm 0.02$  mm**

Start the engine and make sure that engine oil flows onto the cylinder head.

Stop the engine after confirmed, and then install the cylinder head cover .

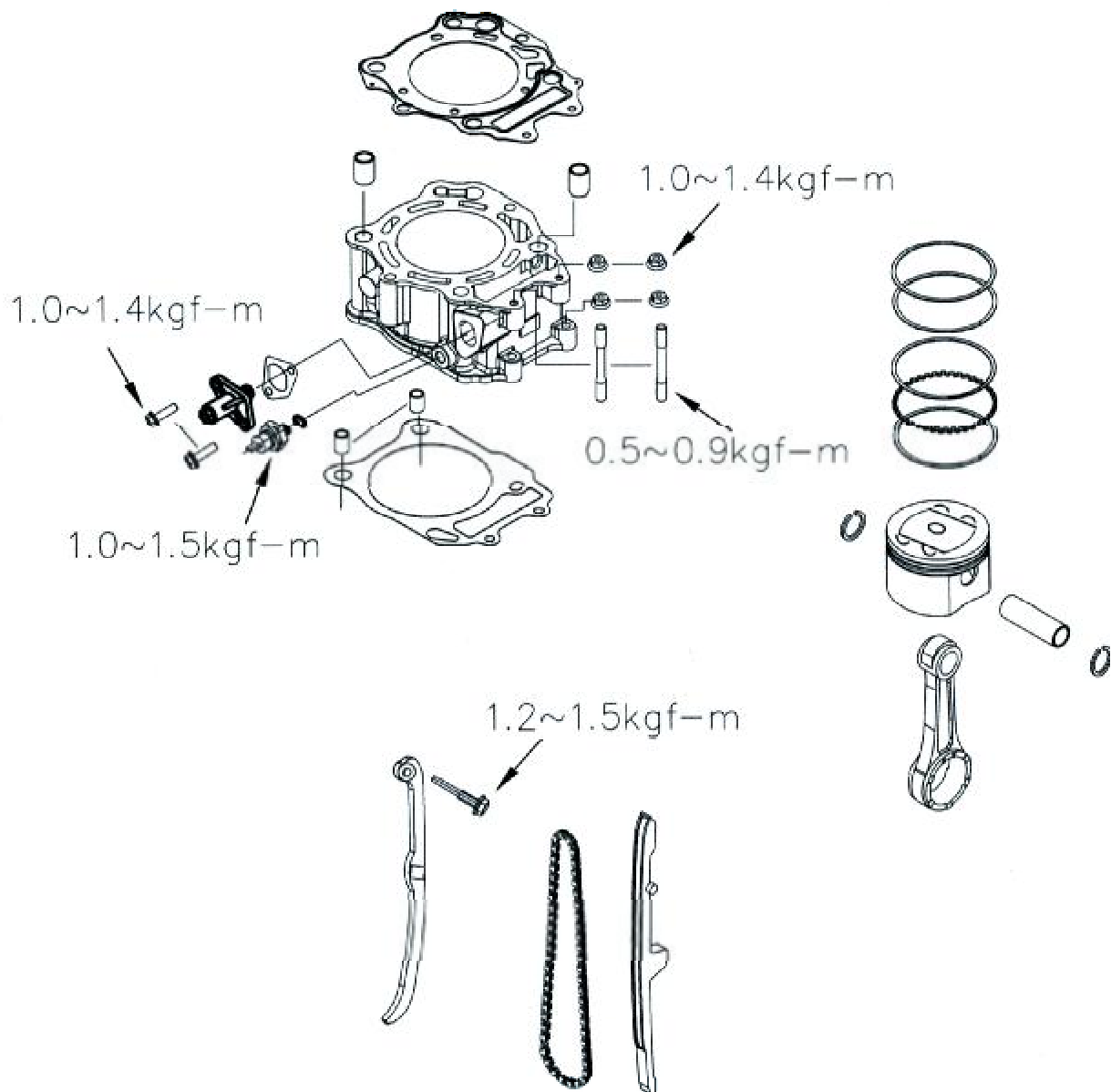
**Caution**

- If lubricant does not flow to cylinder head, engine components will be worn out seriously. Thus, it must be confirmed.
- When checking lubricant flowing condition, run the engine in idle speed. Do not accelerate engine speed.



Mechanism Diagram.....	7-1	Piston Ring Installation .....	7-6
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**Mechanism Diagram**



## Precautions in Operation

### General Information

#### Specification

Unit : mm

Item		Standard	Limit	
Cylinder	ID	86.022~86.052	86.100	
	Bend	-	0.050	
Piston/ Piston ring	Clearance between piston rings	Top ring	0.04~0.075	
		2 <sup>nd</sup> ring	0.02~0.055	
	Ring-end gap	Top ring	0.150~0.300	
		2 <sup>nd</sup> ring	0.300~0.450	
		Oil ring side rail	0.200~0.700	
	OD of piston (2 <sup>nd</sup> )		85.30~85.50	85.25
	Clearance between piston and cylinder		0.04~0.058	0.120
ID of piston pin boss		20.001~20.006	20.020	
OD of piston pin		19.996~20.000	19.960	
Clearance between piston and piston pin		0.001~0.010	0.020	
ID of connecting rod small-end		20.002~20.01	20.040	

## Trouble Diagnosis

### Low or Unstable Compression Pressure

- Cylinder or piston ring worn out

### Knock or Noise

- Cylinder or piston ring worn out
- Carbon deposits on cylinder head top-side
- Piston pin hole and piston pin wear out

### Smoking in Exhaust Pipe

- Piston or piston ring worn out
- Piston ring installation improperly
- Cylinder or piston damage

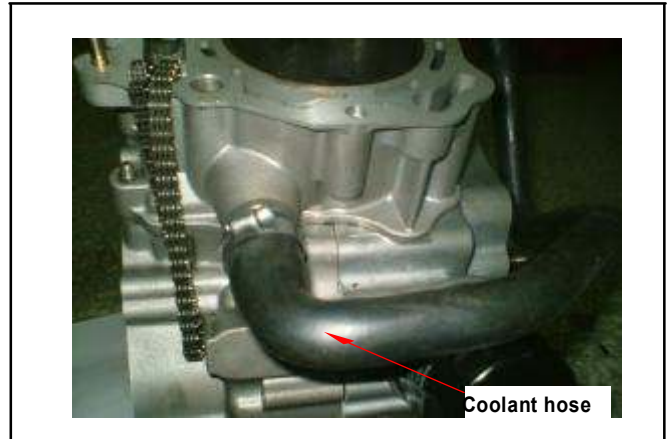
### Engine Overheat

- Carbon deposits on cylinder head top side
- Cooling pipe clogged or not enough in coolant flow



### Cylinder and Piston Removal

Remove cylinder head (refer to chapter 6).  
 Remove coolant hose from cylinder.  
 Remove cylinder.



Cover the holes of crankcase and cam chain with a piece of cloth.  
 Remove piston pin clip, and then remove piston pin and piston.



Remove cylinder gasket and dowel pin.  
 Clean up all residues or foreign materials from the two matching surfaces of cylinder and crankcase.

**Caution**

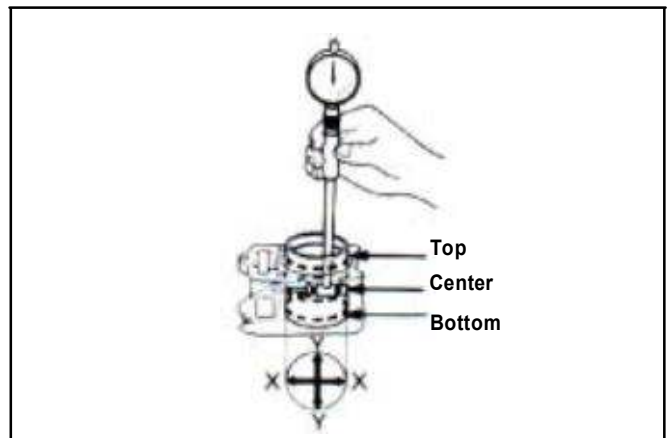
- Soap the residues into solvent so that the residues can be removed more easily.



### Inspection

Check if the inner diameter of cylinder is wear out or damaged.  
 In the 3 positions, top, center and bottom, of cylinder, measure the X and Y values respective in the cylinder.

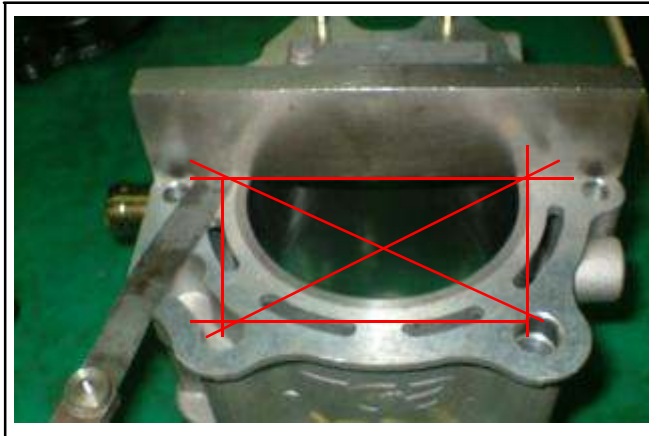
**Service limit: 86.100 mm**



## 7. CYLINDER/PISTON

Check cylinder if warp.

**Service limit: 0.05 mm**



Measure clearance between piston rings and grooves.

**Service Limit: Top ring: 0.09 mm**  
**2<sup>nd</sup> ring: 0.09 mm**



### Remove piston rings

Check if the piston rings are damaged or its grooves are worn.

**Caution**

Pay attention to remove piston rings because they are fragile.



Place piston rings respective into cylinder below 20 mm of cylinder top. In order to keep the piston rings in horizontal level in cylinder, push the rings with piston.

**Service Limit: Top ring: 0.50 mm**  
**2<sup>nd</sup> ring: 0.65 mm**



Measure the outer diameter of piston pin.

**Service Limit: 19.96 mm**



Measure the inner diameter of connecting rod small end.

**Service Limit: 20.065 mm**



Measure the inner diameter of piston pin hole.

**Service Limit: 20.02 mm**

Calculate clearance between piston pin and its hole.

**Service Limit: 0.02 mm**



Measure piston outer diameter.

**Caution**

The measurement position is 8 mm distance from piston bottom side, and 90° to piston pin.

**Service limit : 85.850 mm**

Compare measured value with service limit to calculate the clearance between piston and cylinder.



## 7. CYLINDER/PISTON

### Piston Ring Installation

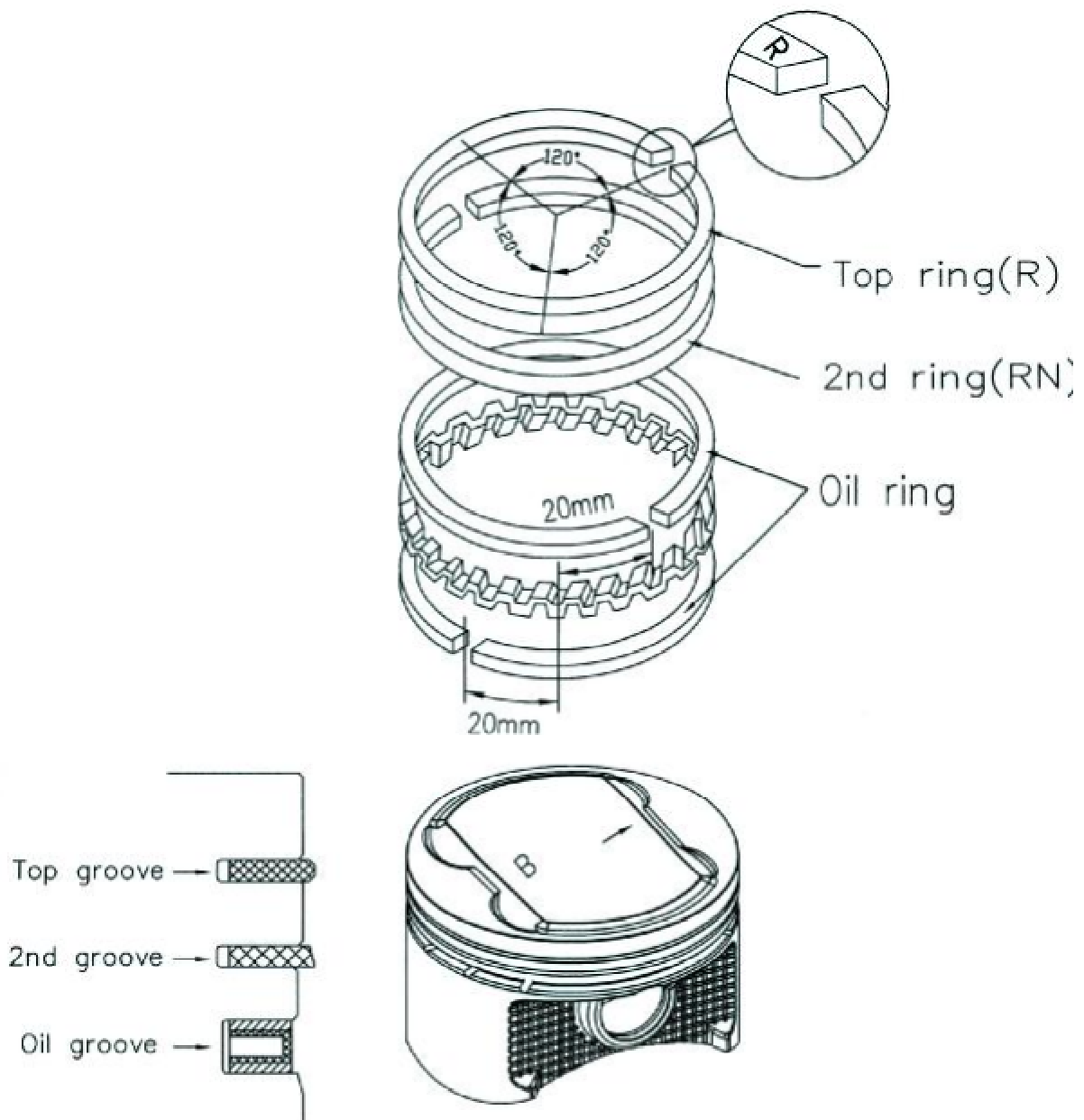
Clean up piston top, ring groove, and piston surface.

Install the piston ring onto piston carefully.

Place the openings of piston ring as diagram shown.

#### Caution

- Do not damage piston and piston rings as installation.
- All marks on the piston rings must be forwarded to up side.
- Make sure that all piston rings can be rotated freely after installed.



Clean up all residues and foreign materials on the matching surface of crankcase. Pay attention to not let these residues and foreign materials fall into crankcase.

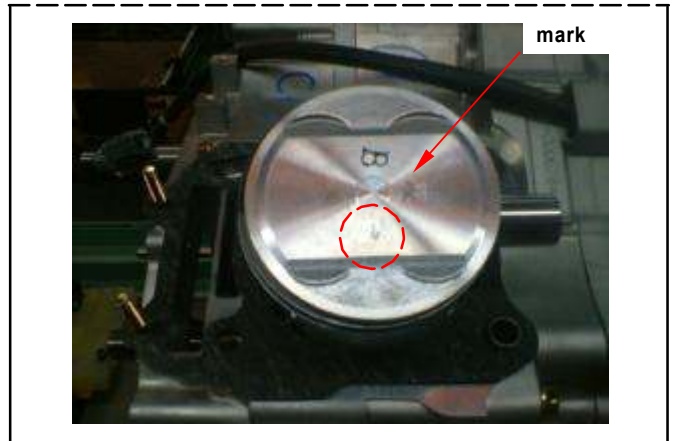
**⚠ Caution**

Soap the residues into solvent so that the residues can be removed more easily.



### Piston Installation

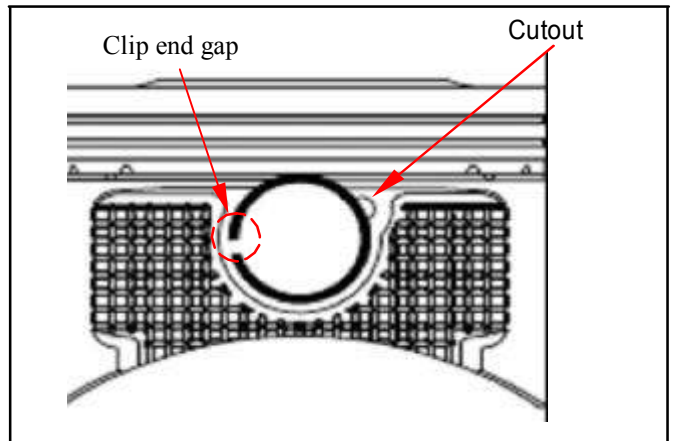
Install piston and piston pin, and place the marks on the piston top side forward to exhaust valve.



Install new piston pin clip.

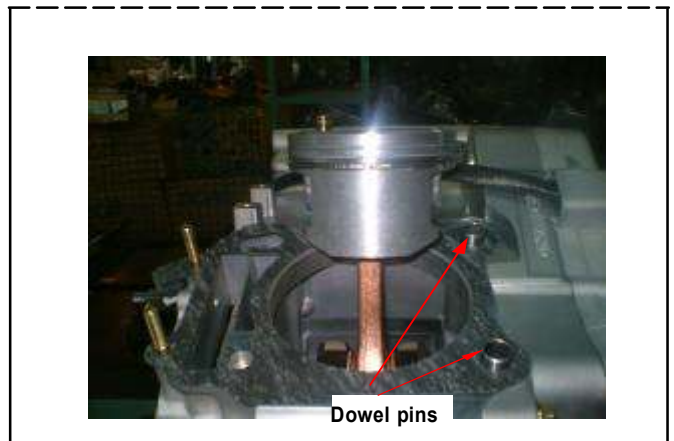
**⚠ Caution**

- Do not let the opening of piston pin clip align with the piston cutout.
- Place a piece of cloth between piston and crankcase in order to prevent snap ring from falling into crankcase as operation.



### Cylinder Installation

Install dowel pins and new gasket.



## 7. CYLINDER/PISTON

Coat some engine oil to inside of cylinder, piston and piston rings.

Care to be taken when installing piston into cylinder. Press piston rings in one by one as installation.



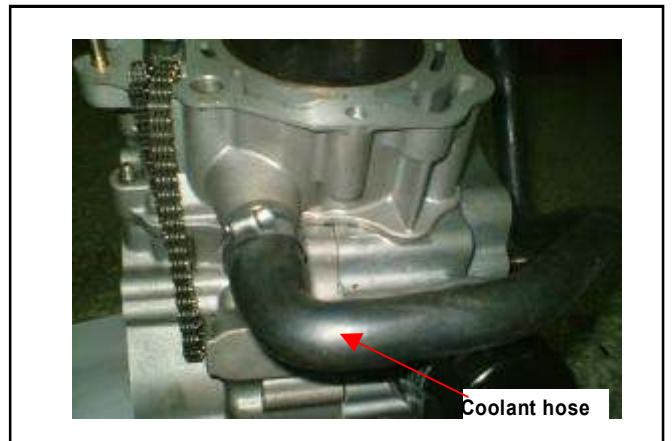
### Caution

Do not push piston into cylinder forcefully because piston and piston rings will be damaged.



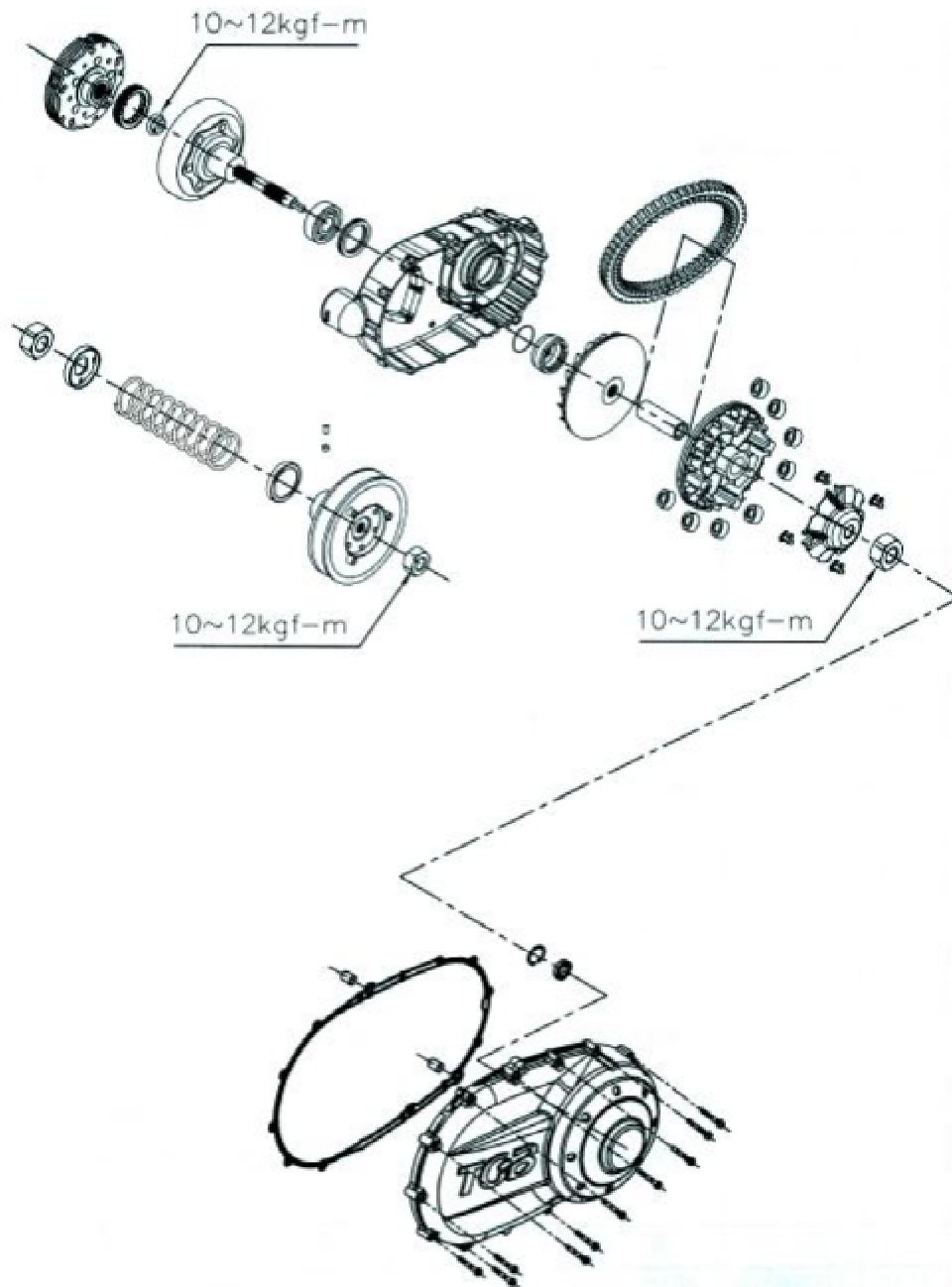
Install coolant hose onto cylinder.

Install cylinder head (refer to Chapter 6).



Mechanism Diagram ..... 8-1	Drive Belt .....8-5
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## Mechanism Diagram



## 8. V-BELT DRIVING SYSTEM

### Maintenance Description

#### Precautions in Operation

##### General Information

- Drive face, clutch outer, and driven pulley can be serviced on the motorcycle.
- Drive belt and drive pulley must be free of grease.

#### Specification

Item	Standard value	Limit
Driving belt width	28.500 mm	27.000 mm
OD of movable drive face boss	26.946~26.980 mm	26.926 mm
ID of movable drive face	27.000~27.040 mm	27.060 mm
OD of weight roller	25.800~26.000 mm	25.000 mm
ID of clutch outer	140.000~140.200 mm	140.500 mm
Free length of driven pulley spring	230.000 mm	225.000 mm
OD of driven pulley boss	44.965~44.985 mm	40.935 mm
ID of driven face	45.000~45.035 mm	45.600 mm
Weight of weight roller	13.300~13.700 g	12.800 g

#### Torque value

- Drive face nut: 10~12kgf-m
- Clutch outer nut: 10~12.0kgf-m
- Drive plate nut: 10~12kgf-m

#### Special Service Tools

Clutch spring compressor:  
 Inner bearing puller: TGB-  
 Clutch nut wrench 27 x 15 mm: TGB-  
 Universal holder: TGB-  
 Bearing driver: TGB-

### Trouble Diagnosis

#### Engine can be started but motorcycle can not be moved

1. Worn drive Belt
2. Worn drive face
3. Worn or damaged clutch weight
4. Broken driven pulley

#### Insufficient horsepower or poor high speed performance

1. Worn drive belt
2. Insufficient spring force of driven pulley
3. Worn roller
4. Driven pulley operation un-smoothly

#### Shudder or misfire when driving

1. Broken clutch weight
2. Worn clutch weight



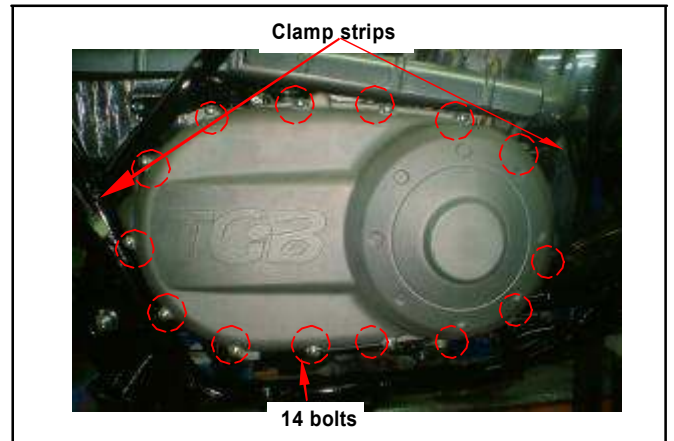
## Clutch Cover

### Clutch cover removal

Release the 2 clamp strips of clutch cover ducts, and then remove the ducts.

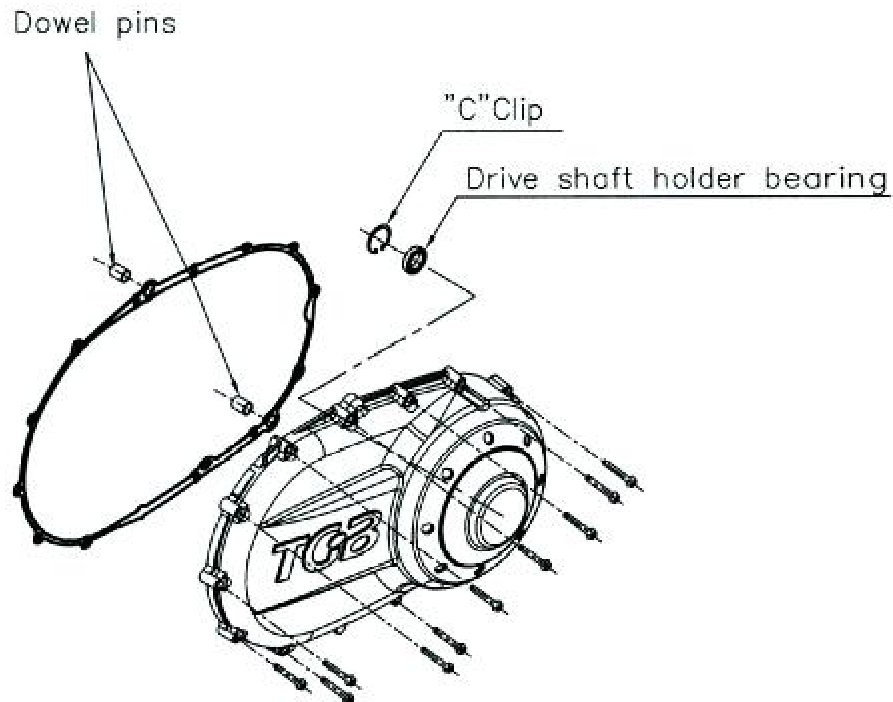
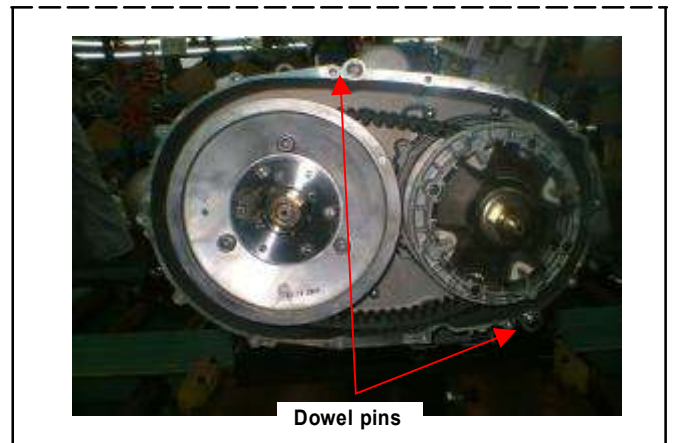
Remove clutch cover. (14 bolts)

Remove 2 dowel pin and gasket.



### Clutch cover install

Install left clutch cover in the reverse procedures of removal.



## 8. V-BELT DRIVING SYSTEM

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### Clutch over inspection

Check bearing on clutch cover. Rotate

bearing's inner ring with fingers.

Check if bearings can be turned in smooth and silent, and also check if bearing outer ring is mounted on cover tightly

If bearing rotation is uneven, noising, or loose bearing mounted, then replace it.



### Drive Belt

#### Removal

Remove left crankcase cover.  
Hold drive face with universal holder, and remove nut and drive face.

**Special Tool** : universal holder

Hold clutch outer with universal holder, and remove nut, and clutch outer.

#### Caution

- Using special service tools for tightening or loosening the nut.
- Fixed rear wheel or rear brake will damage reduction gear system.

Push the drive belt into belt groove as diagram shown so that the belt can be loosened, and then remove the driven pulley.

Remove driven pulley. Do not remove drive belt.  
Remove the drive belt from the groove of driven pulley.

#### Inspection

Check the drive belt for crack or wear. Replace it if necessary.

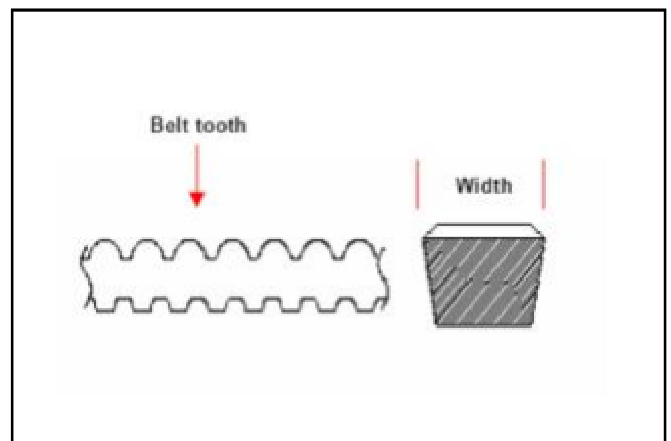
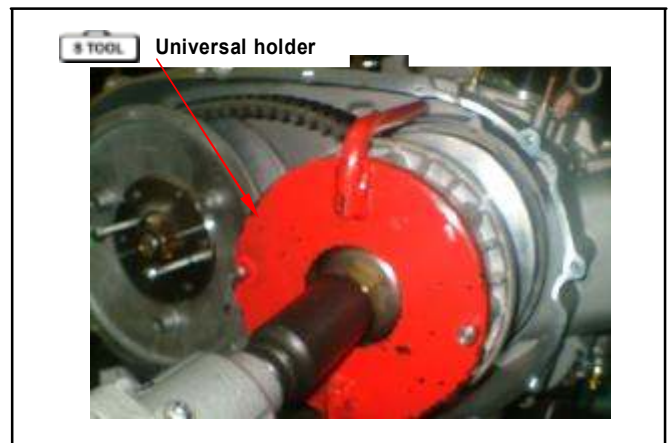
Measure the width of drive belt as diagram shown.

**Service Limit: 27.0 mm**

Replace the belt if exceeds the service limit.

#### Caution

- Using the genuine parts for replacement.
- The surfaces of drive belt or pulley must be free of grease.
- Clean up all grease or dirt before installation.



## 8. V-BELT DRIVING SYSTEM

### Installation

#### Caution

- Pull out driven face to avoid it closing.
- Cannot oppress friction plate comp in order to avoid creates the distortion or the damage.

Install drive belt onto driven pulley.

Install the driven pulley that has installed the belt onto drive shaft.

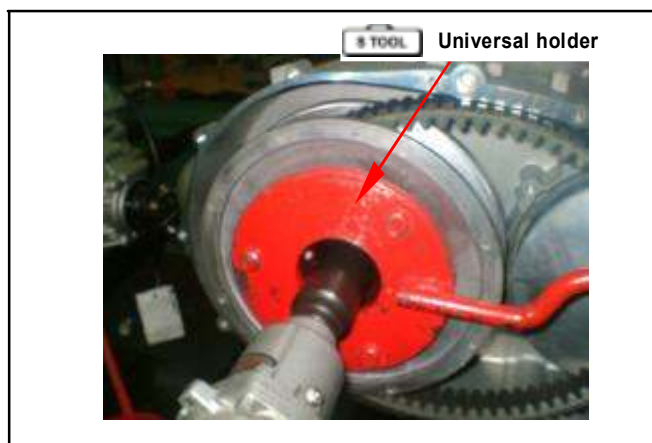
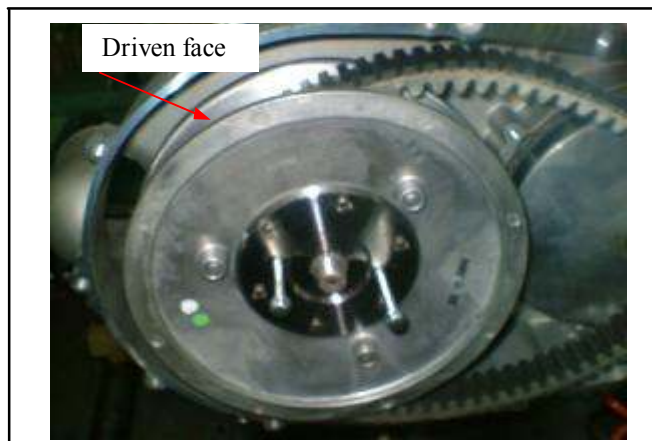
On the drive belt another end to the movable drive face.

Install the clutch outer . Hold the clutch outer whit universal holder, and then tighten nut to specified torque value. **Torque value: 10~12kgf-m**

Install the drive face, washer and drive face nut.

Hold drive face with universal holder, and then tighten nut to specified torque value.

**Torque value: 10~12kgf-m**



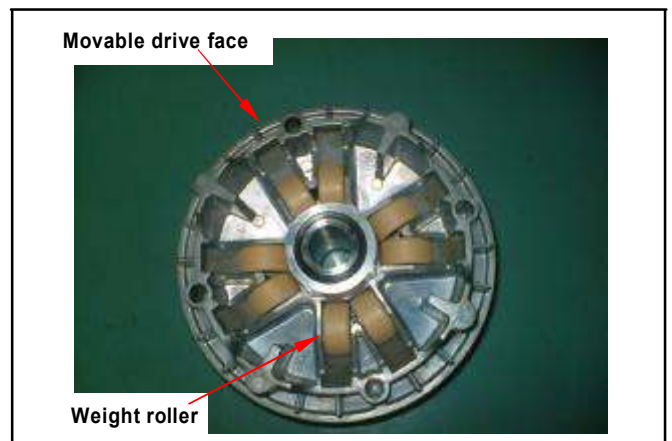
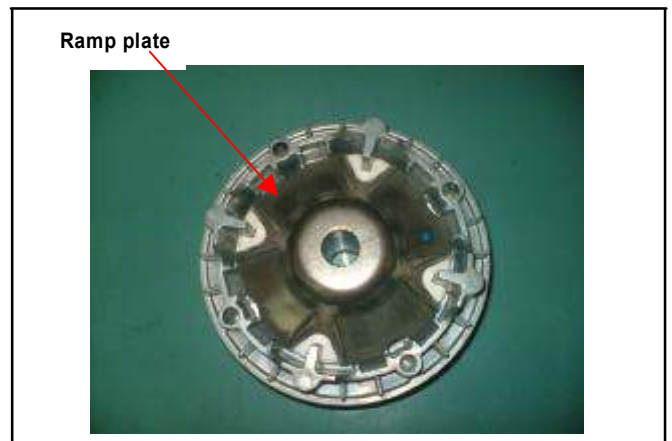
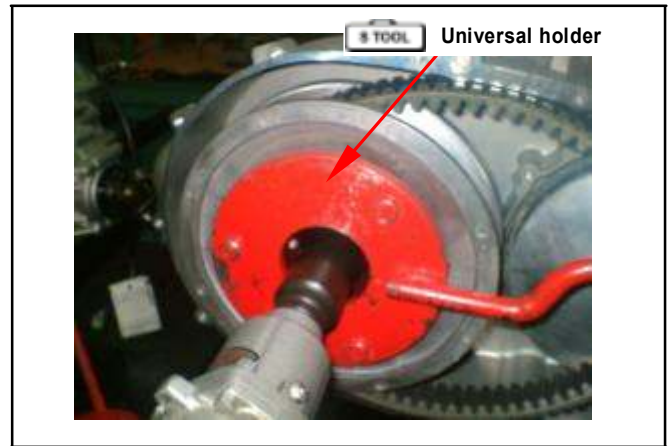
**Drive Face****Removal**

Remove left crankcase cover.  
Hold drive face with universal holder, and then  
remove drive face nut.  
Remove drive face and drive belt.

Remove movable drive face comp and drive face  
boss from crankshaft.

Remove ramp plate.

Remove weight rollers from movable drive face.



## 8. V-BELT DRIVING SYSTEM

### Inspection

The weight rollers are to press movable drive face by means of centrifuge force.

Thus, if weight rollers are worn out or damaged, the centrifuge force will be affected.

Check if rollers are worn or damaged. Replace it if necessary.

Measure each roller's outer diameter. Replace it if exceed the service limit.

**Service limit: 25.0 mm**

**Weight: 12.5g**

Check if drive face boss is worn or damaged and replace it if necessary.

Measure the outer diameter of movable drive face boss, and replace it if it exceed service limit.

**Service limit: 26.962 mm**

Measure the inner diameter of movable drive face, and replace it if it exceed service limit.

**Service limit: 27.060 mm**

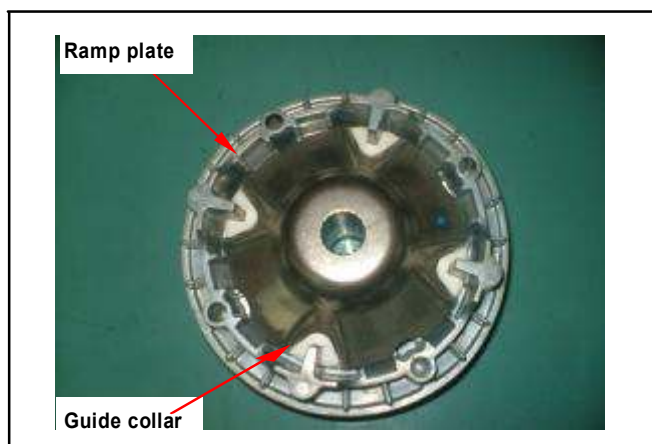
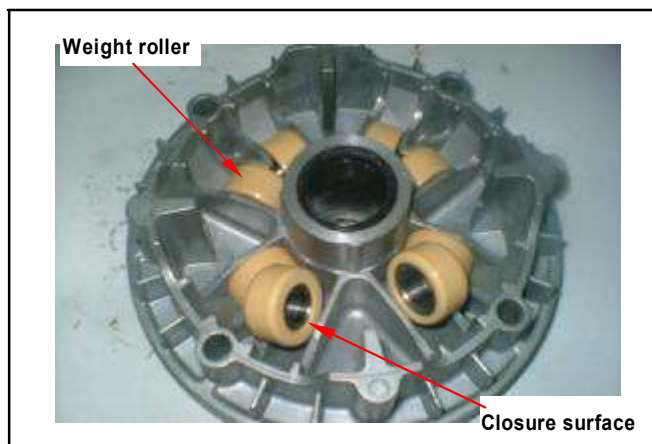
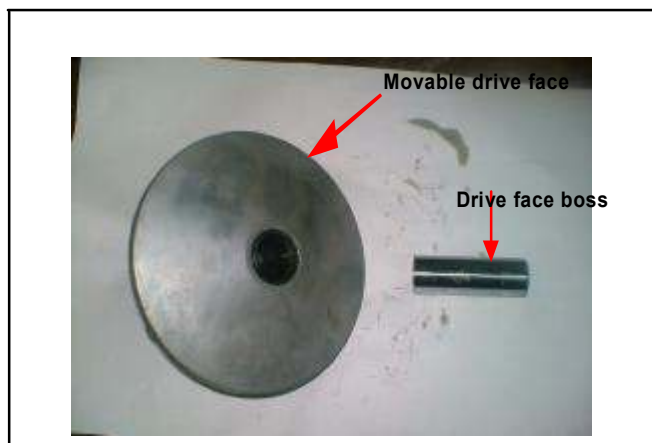
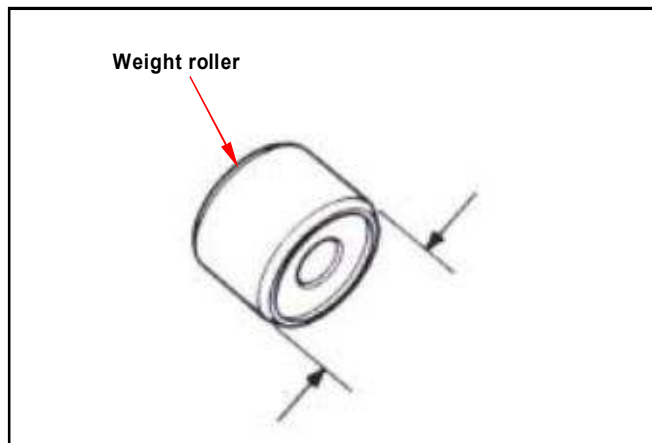
Reassembly/installation

Install weight rollers.

### Caution

The weight roller two end surfaces are not certainly same. In order to lengthen the roller life and prevented exceptionally wears the occurrence, Please end surface of the closure surface counter clockwise assembles onto movable drive face.

Install ramp plate.

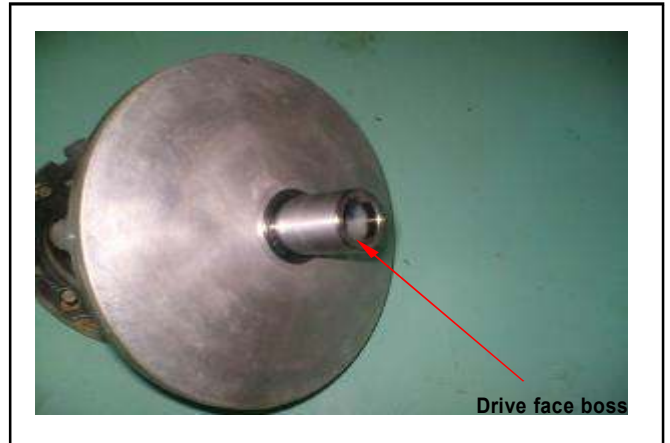


With 4~5g grease spreads wipes drives in the movable drive face axis hole.

Install drive face boss.

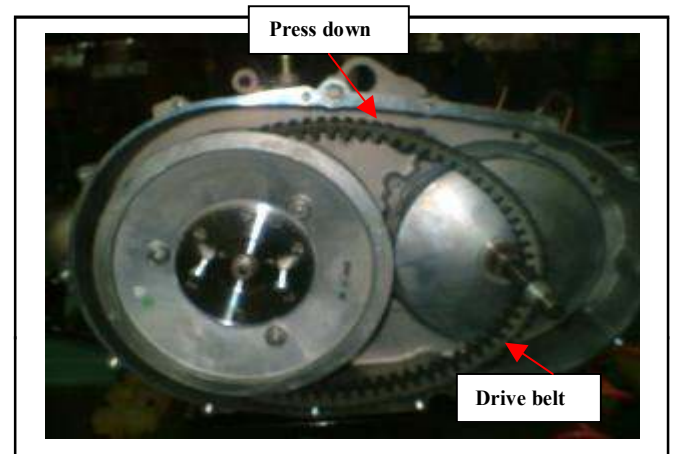
**Caution**

The movable drive face surface has to be free of grease. Clean it with cleaning solvent.



### Driven pulley installation(By 2 screw)

Press drive belt into pulley groove, and then pull the belt onto drive shaft.



Install Movable drive face, and nut.  
Loosen the 2 screw.

**Caution**

Make sure that two sides of pulley surfaces have to be free of grease. Clean it with cleaning solvent.

Hold drives face with universal holder.

Tighten nut to specified torque.

**Torque value: 10~12kgf-m**

Install left crankcase cover.



## 8. V-BELT DRIVING SYSTEM

### Clutch Outer/Driven Pulley

#### Disassembly

Remove drive belt, and driven pulley. Install clutch spring compressor onto the pulley assembly, and operate the compressor to let the wrench be installed more easily.

#### Caution

Do not press the compressor too much.

Hold the clutch spring compressor onto bench vise, and then remove mounting nut with special service tool.

Release the clutch spring compressor and remove movable driven sheave and spring from driven pulley.

Remove seal collar from driven pulley.

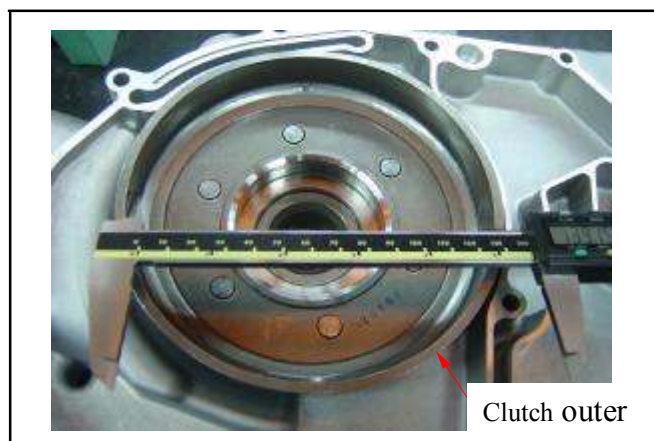
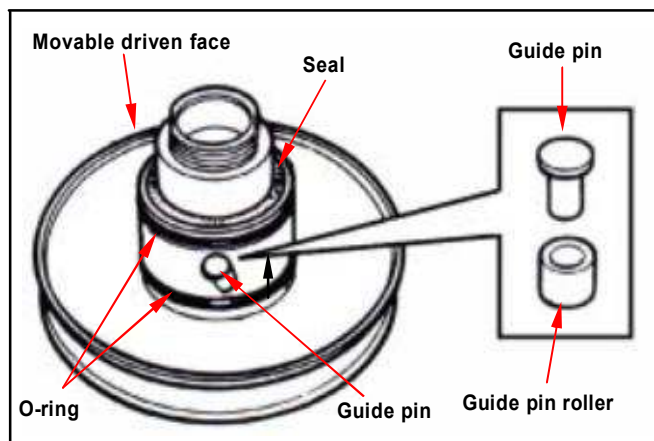
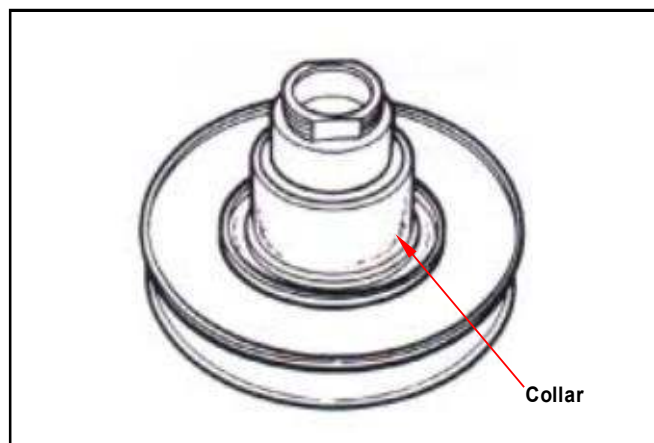
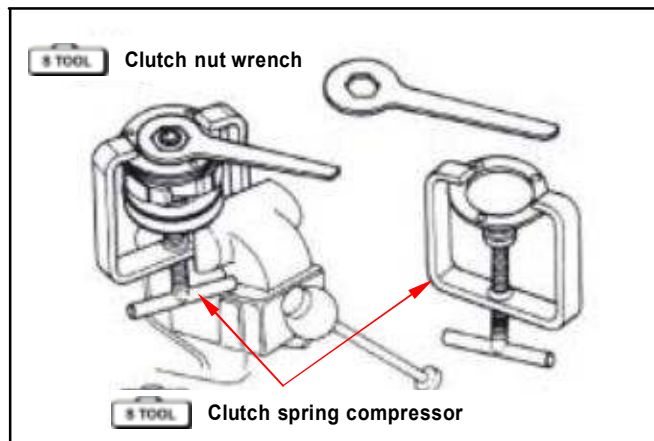
Remove guide pin, guide pin roller, and movable driven face, and then remove O-ring & oil seal seat from movable driven face.

#### Inspection

##### Clutch outer

Measure the inner diameter of clutch outer.  
Replace the clutch outer if exceed service limit.

**Service limit: 140.50 mm**



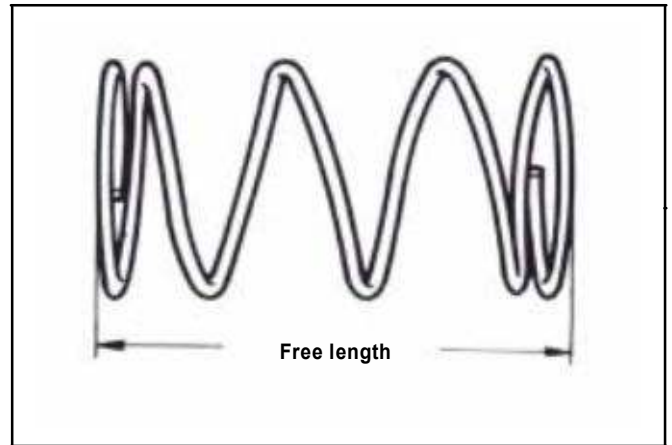


### Driven pulley spring

Measure the length of driven pulley spring.

Replace it if exceeds service limit.

**Service limit: 225 mm**



### Driven pulley

Check following items:

If both surfaces are damaged or worn.

If guide pin groove is damaged or worn.

Replace damaged or worn components.

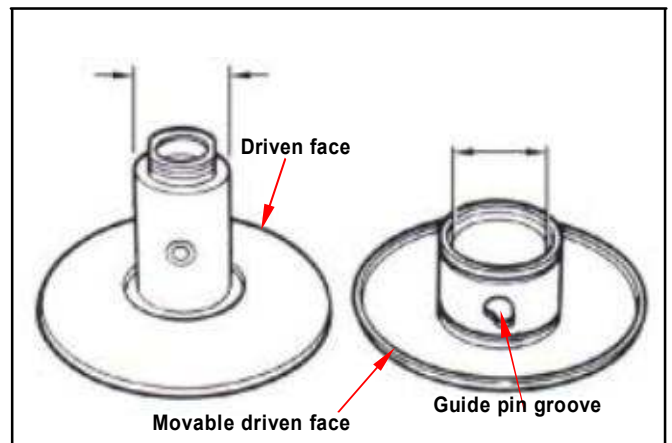
Measure the outer diameter of driven face and the inner diameter of movable driven face.

Replace it

if exceeds service limit.

**Service limit: Outer diameter 44.93 mm**

**Inner diameter 45.60 mm**

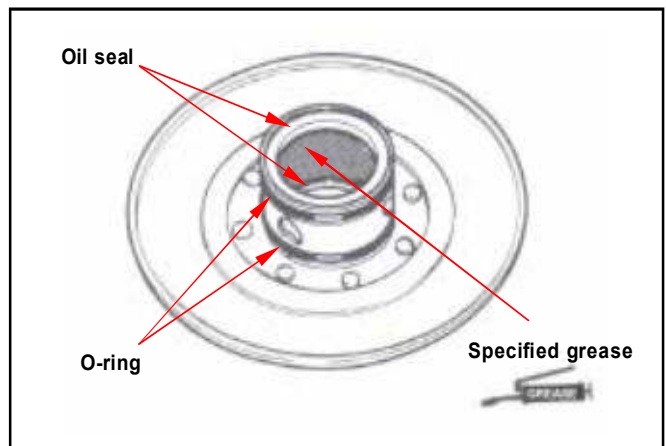


## 8. V-BELT DRIVING SYSTEM

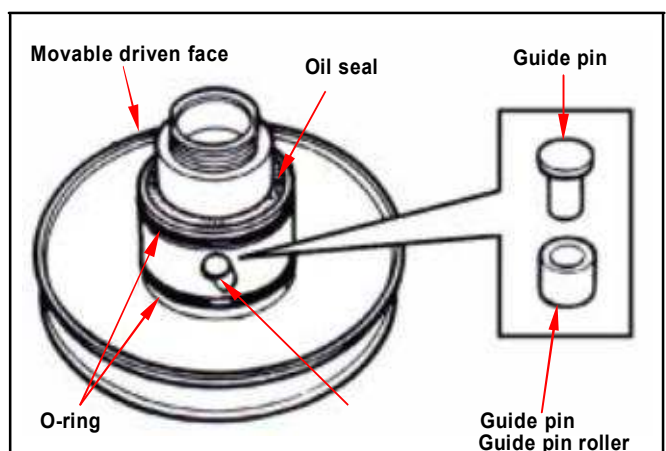
### Installation of Clutch OUTER/Driven Pulley Assembly

Install new oil seal and O-ring onto movable driven face.

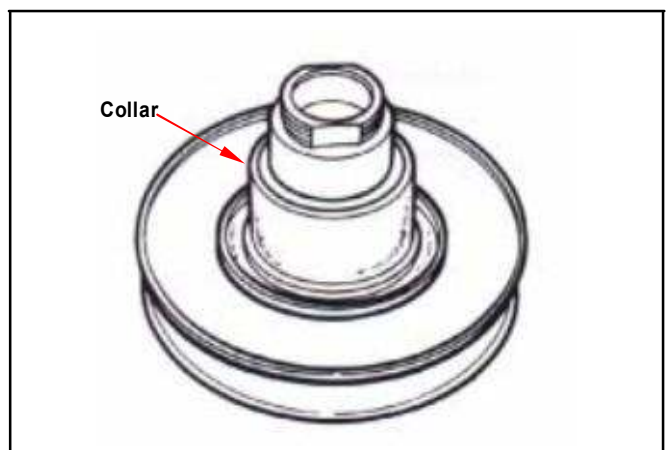
Apply with specified grease to lubricate the inside of movable driven face.



Install the movable driven face onto driven face.  
Install the guide pin and guide pin roller.



Install the collar.



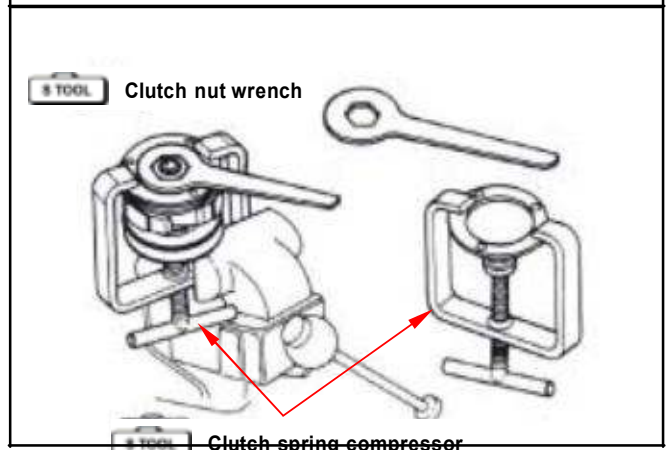
Install friction plate, spring and into clutch spring compressor, and press down the assembly by turning manual lever until mounting nut that can be installed.

Hold the compressor by bench vise and tighten the mounting nut to specified torque with clutch nut wrench.

Remove the clutch spring compressor.

**Torque value: 5.0~6.0kgf-m**

Install driven pulley and drive belt onto drive shaft.



**Transmission system****Remove**

Remove the driven output rear shaft and front shaft.  
Separate the driven output rear shaft and front shaft.



Remove the c-ring from the universal joint assy.  
Remove the driven output front shaft with a chisel.



Remove the joint parts.



Using a vise let the driven output rear shaft held in movable.

**Replace the removed nut and use a new one when reassemble.**



## 9. FINAL DRIVING MECHANISM

Unlock the nut with a chisel



Remove the nut.



Remove the bearing by tapping with the hammer and tool.

Remove the universal joint assy.

Remove the parts.



Rear universal joint disassembly.

Remove the c-rings from the universal joint assy.



Remove the parts.



Using a vise held the driven output rear shaft and remove the nut.

**When reassemble with a new nut.**



Unlock the nut with a chisel.

**Must be replaced the new bearing and oil seal when reassembly**



Remove the NTT from Driven output front shaft



## 9. FINAL DRIVING MECHANISM

Disassembly the bevel gear  
Unlock the nut with a chisel.



Using a vise held the driven output front shaft and  
remove the nut.  
Remove the washer driven bevel gear and bearing.



Remove the parts.

Replace the new nut fro reassemble.

Must be replaced the new bearing and oil seal for reassemble.



**Inspection:**

Check the bearings and joint surface. If any defects (damage, wear or scuffing) replace the bearings and joint assy.

Install the parts as show.



Insert the bearing to the joint and turning the joint. If excessive play is noted, must be replace the new bearing.



Reassemble the driven output rear shaft and front shaft. In the reverse order of disassembly. Pay attention to the following items.



Stake the nut with a punch. After The tooth contact and backlash have been adjusted and checked.



## 9. FINAL DRIVING MECHANISM

Reassembly driven output rear shaft  
Before reassembly thoroughly clean all parts with solvent.



Using a vise hold the bevel gear.  
Tighten the new nut to the specified torque.

**Torque: 100N-m (10kgf-m, 73lb-ft)**



Stake the nut with a punch.



Apply grease to the bearing and seal lip.





Apply grease to the oil seal lip.  
 Install the oil seal to the joint yoke.  
 (The oil seal lip should be positioned joint yoke side.)  
 Using a vise hold the driven output rear shaft. Tighten the new nut to the specified torque.

**Torque: 100N-m (10kgf-m, 73lb-ft)**



Stake the nut with a punch. After The tooth contact and backlash have been adjusted and checked.



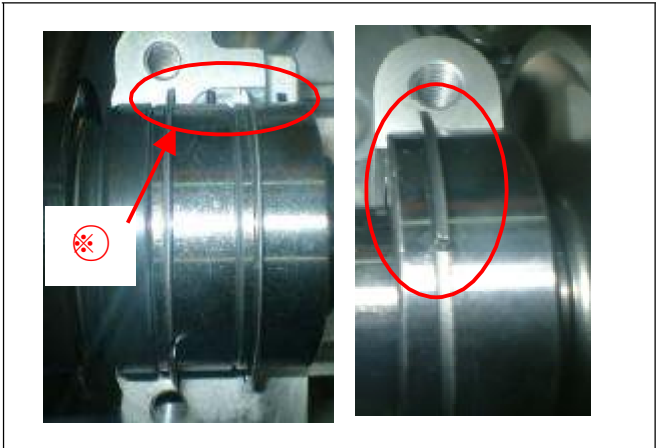
Put the bearing rings and shaft in the crankcase.  
 Position the bearing pin to the pin grooves in the crankcase.  
 Check the gear backlash and tooth contact correctly.  
 (Tooth face contact 80% up)  
 Remove the driven output Rear/Front shaft.  
 Remove the bevel gear.  
 Clean tooth face.  
 Tighten the bevel gear nut and output rear shaft to the specified torque.

**Torque: 100N-m(10kgf-m, 73lb-ft)**



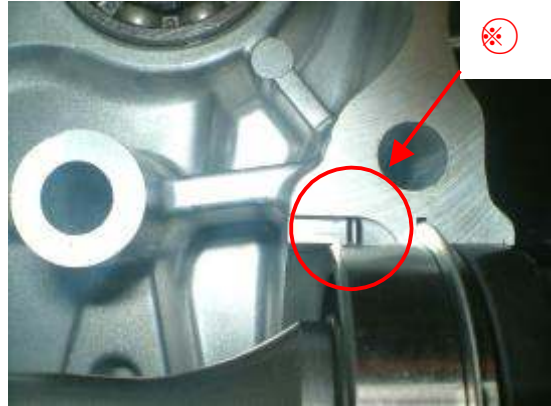
Stake the nut with a punch

The bearing knock-pin⊗ should be outside.



## 9. FINAL DRIVING MECHANISM

**Tooth contact: face contact 80% up**



Using the tool to install the bearings and joint.  
Reassemble the universal joint. When the tooth contact and backlash have been adjusted or checked.

**Tool: 440668**



Install the new c-ring by tapping and hammer. ( copper )

**Using the new c-ring for reassembly.**



After reassembling the universal joint assy. Check the joint assy. Movement smoothly. If movement have a large resistance. Tapping the bearing with the plastic mallet lightly.



### FINAL ASSEMBLY

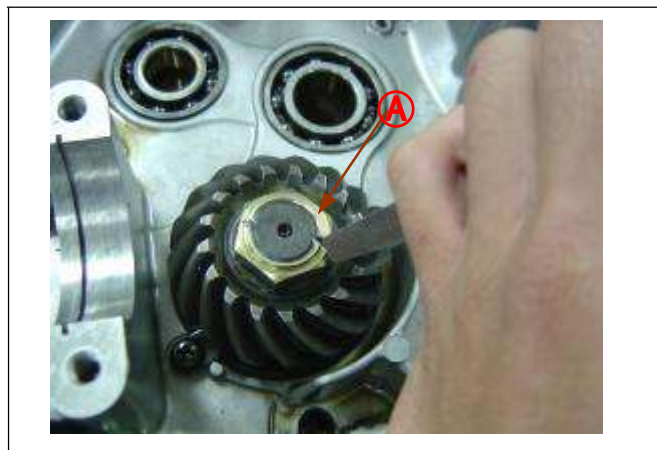
- After adjusting tooth contact correctly, remove the Front and rear output shafts and drive bevel gear.
- Clean off any dye or paste from the gear teeth, and lubricate the teeth with engine oil.
- Tighten the drive bevel gear nut and rear output Shaft nut to the specified torque.



Rear output shaft nut: 100 N. M (10.0 kgf- m, 73 lb-ft)  
 Drive bevel gear nut: 100 N. M (10.0 kgf- m, 73 lb-ft)



- Stake the collar of the nut **A** into the notch in the shaft.



### NOTE:

*After the tooth contact have been checked and adjusted reassemble the joint.*



## 9. FINAL DRIVING MECHANISM

### ENGINE REASSEMBLY

#### NOTE:

When reassembly the engine pay attention, apply engine oil to sliding parts and running parts before re-assembling.

#### CAUTION

Be sure keep the drive belt, drive face and driven face away from any greasy matter.

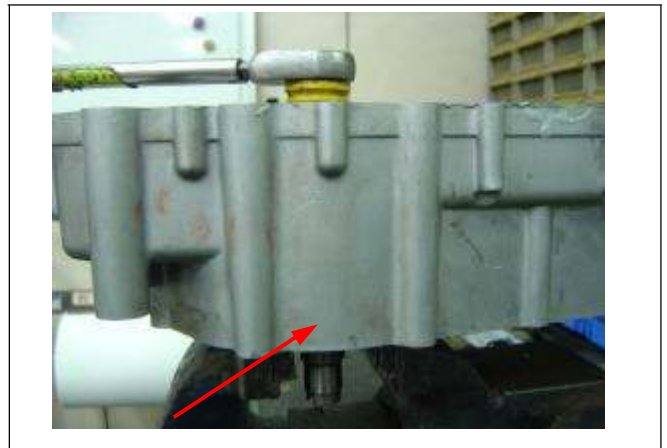


- Install the output shaft assembly with a plastic mallet.
- Install the shim drive bevel gear and washer.



- Tighten the bevel gear nut to the specified torque.

Bevel gear nut torque: 100 N. M (10.0 kgf- m, 73 lb-ft)



- Use a center punch stake the nut.

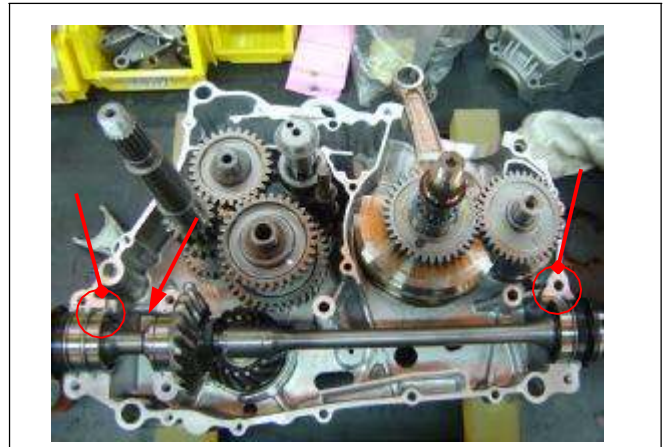


**DRIVE TRAIN**

- Install the rear and front out put shaft.
- Install the C-ring.

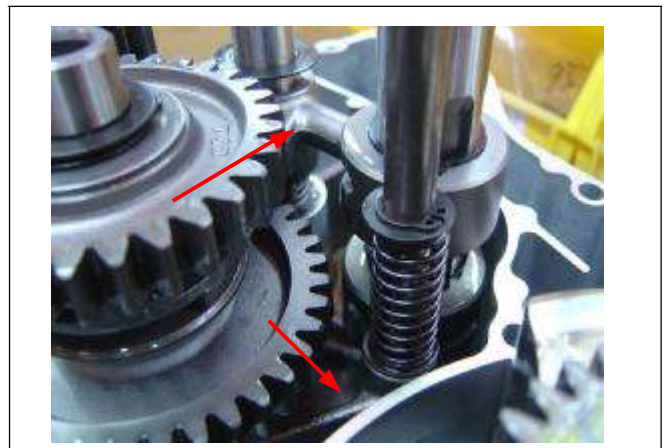
**NOTE:**

*Must fit the pins on the bearing into the groove of the crankcase.*

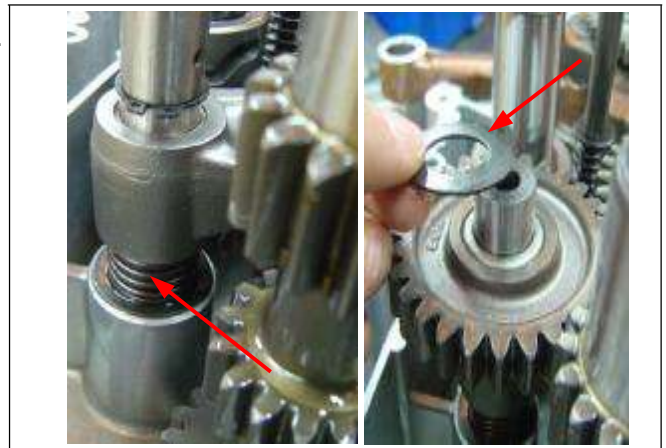


**TRANSFER/GEARSHIFT**

- Install the transfer related parts.



- Install the spacer spring, shaft and reverse idle gear.
- Install the washer.



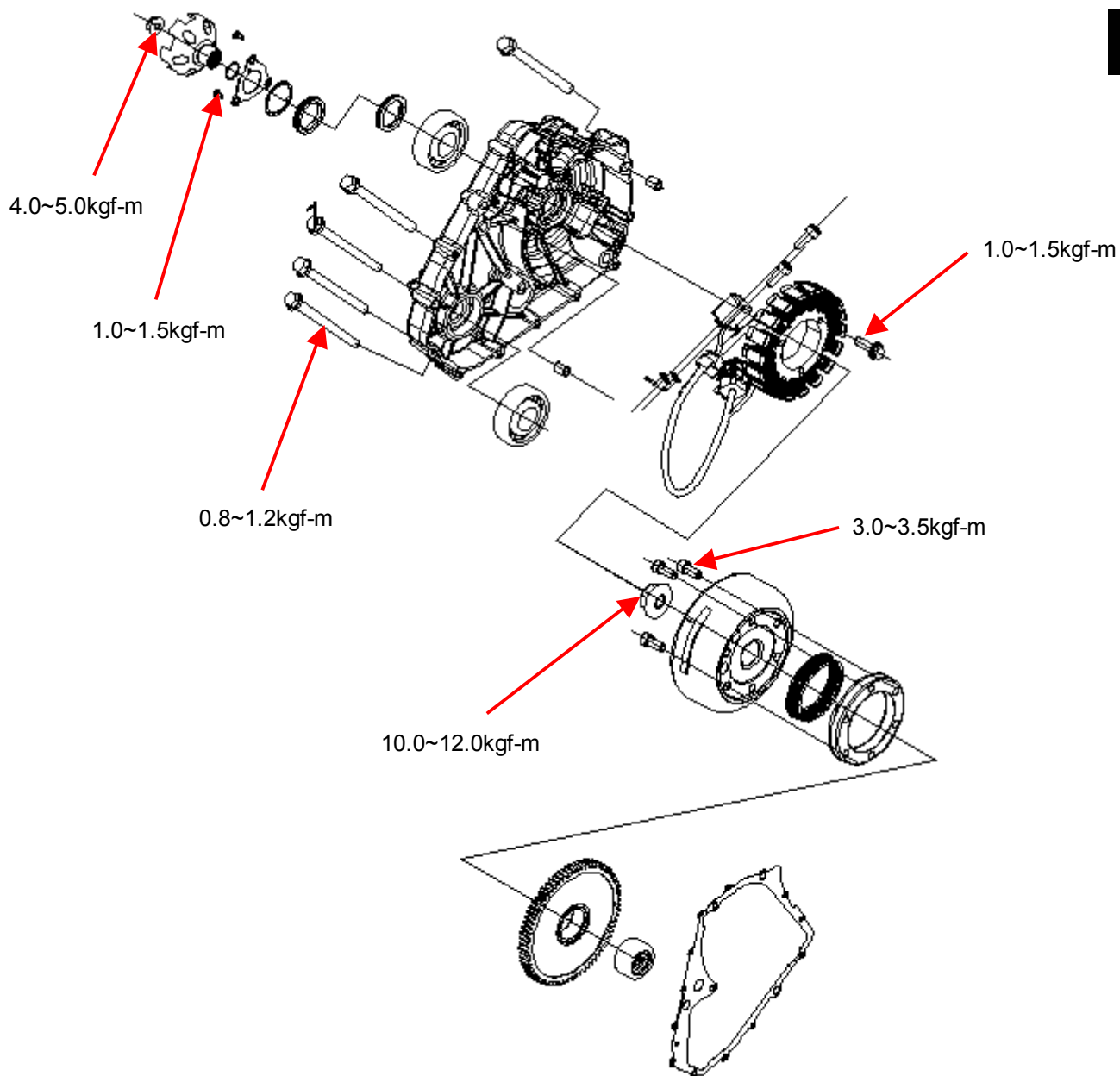
**CRANKCASE**

- Clean R and L crankcase surfaces with cleaning solvent.
- Fit the dowel pins on the hole.
- Apply engine oil to the gears and conrod.



Mechanism Diagram .....	10-1	Flywheel Removal .....	10-4
Precautions in Operation .....	10-2	Starting Clutch .....	10-5
Right Crankcase Cover Removal .....	10-3	Flywheel Installation .....	10-7
A.C.G. Set Removal .....	10-3	A.C.G. Set Installation .....	10-8
Lift Cover Bearing .....	10-3	Right Crankcase Cover Installation .....	10-8

**Mechanism Diagram**



## Precautions in Operation

### General information

- Refer to chapter 17: The troubleshooting and inspection of alternator
- Refer to chapter 17: The service procedures and precaution items of starter motor

### Specification

Item	Standard value (mm)	Limit (mm)
ID of starting clutch gear	29	
OD of starting clutch gear	52.548~52.445	

### Torque value

Flywheel nut	10~12kgf-m
Starting clutch hexagon bolt	1.2~1.5kgf-m with adhesive
8 mm bolts	2.8~3.0kgf-m
12 mm bolts	1.0~1.4kgf-m

### Tools

#### Special tools

A.C.G. flywheel puller: 440659

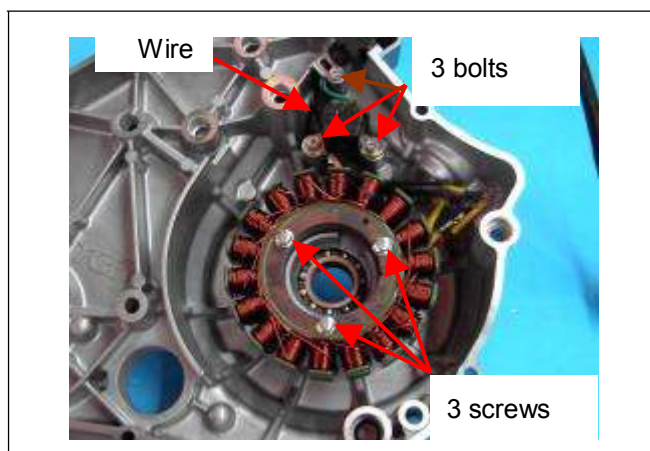
**Left Crankcase Cover Removal**

Remove left footrest.  
 Drain out the engine oil and coolant, and then remove coolant hoses.  
 Remove water pump (2 bolts).  
 Remove 15 bolts from the left crankcase cover.  
 Remove the left crankcase cover.  
 Remove dowel pin and gasket.



**A.C.G. Set Removal**

Remove 3 mounted screws from pulse generator and then remove it.  
 Remove 3 screws from left crankcase cover and then remove generator coil set.



**Left Cover Bearing**

**Inspection**

Rotate the bearing with finger to check if the bearing rotation is in smooth and silent.  
 Check if the bearing outer parts are closed and fixed.  
 Replace it if necessary.



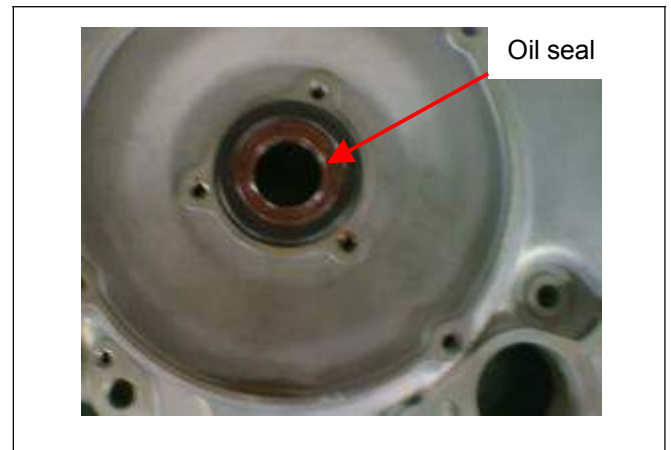
Remove the bearing.





## 10. ALTERNATOR/STARTING CLUTCH

Check the oil seal for wear or damage.  
Replace it if necessary.

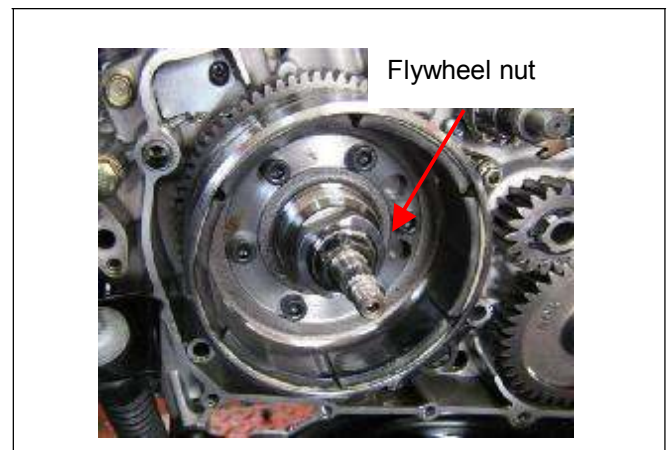


Install a new one bearing (16005) by bearing driver.



### Flywheel Removal

Remove left crankcase cover.



Remove starter reduction gear and shaft. Pull out flywheel with A.C.G. flywheel puller.

**Special tool:**

**A.C.G. Flywheel puller**

Remove flywheel and starting driven gear.



## Starting Clutch

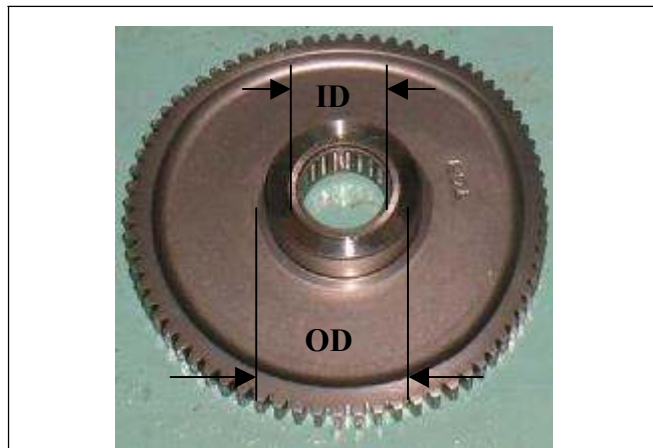
### Starting Clutch Inspection

Remove starting clutch driven gear. Check the gear for wear or damage.

Measure the ID and OD of the starting clutch driven gear.

**Service Limit: ID: 29 mm**

**OD: 52.54mm**



Check the starting reduction gear and shaft for wear or damage.



Check each roller for wear or damage.



Install starting clutch driven gear onto one way clutch.  
 Hold flywheel and rotate starting clutch gear.  
 The starting clutch gear should be rotated in C.C.W  
 direction freely, but not C.W direction.  
 (View as shown in this figure.)



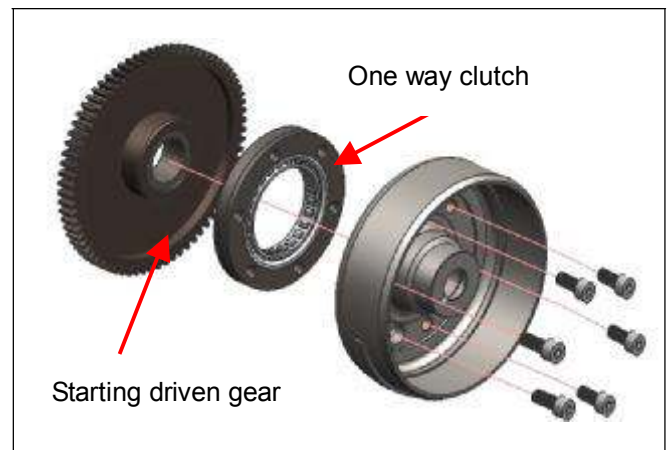
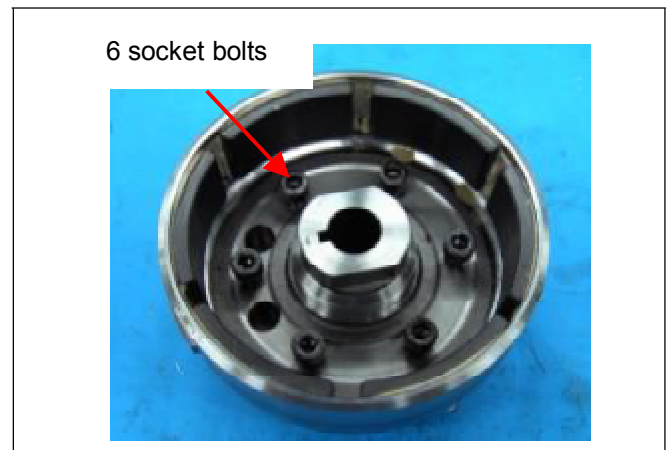
## 10. ALTERNATOR/STARTING CLUTCH

### One way clutch removal

Remove starting driven gear.



Remove 6 socket bolts, and then remove one way clutch.



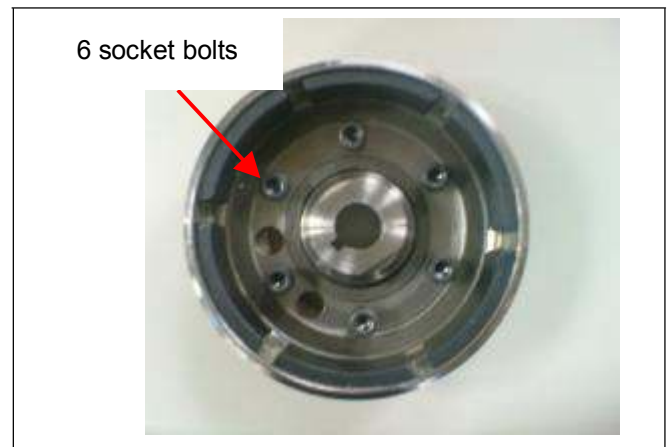
### One way clutch Installation

Install the components in the reverse procedures of removal.

#### Caution

Tape a tightening tape onto the thread of hexagon bolt.

Torque value: 3.0~3.5kgf-m



Install starting driven gear.



### Flywheel Installation

Align the key on crankshaft with the flywheel groove, and then install the flywheel.

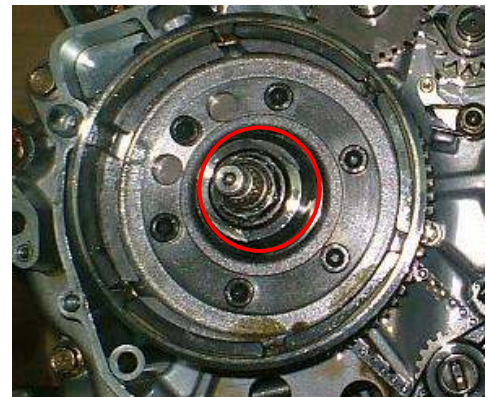


Hold the flywheel by drive face with universal holder, and tighten flywheel nut.

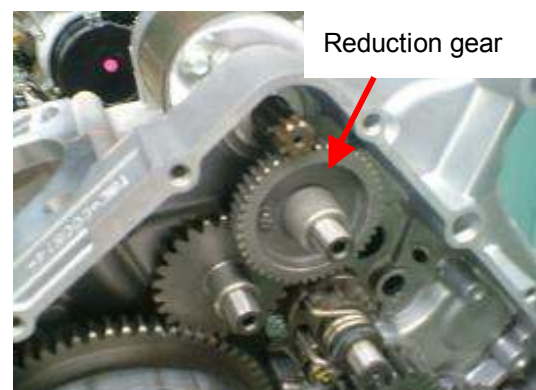
**Torque value:10.0~12.0kgf-m**

**Special tool:**

**Universal Holder**



Install reduction gear shaft and reduction gear.



## 10. ALTERNATOR/STARTING CLUTCH

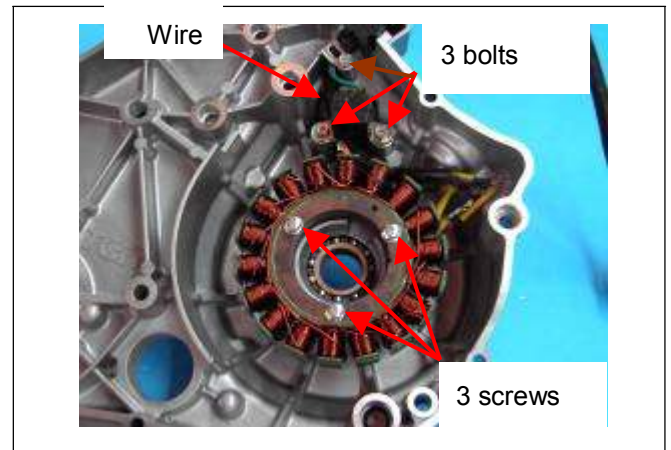
### A.C.G. Set Installation

Install the A.C.G. coil set onto right crankcase cover (3 screws).

Install pulse generator (3 screws).

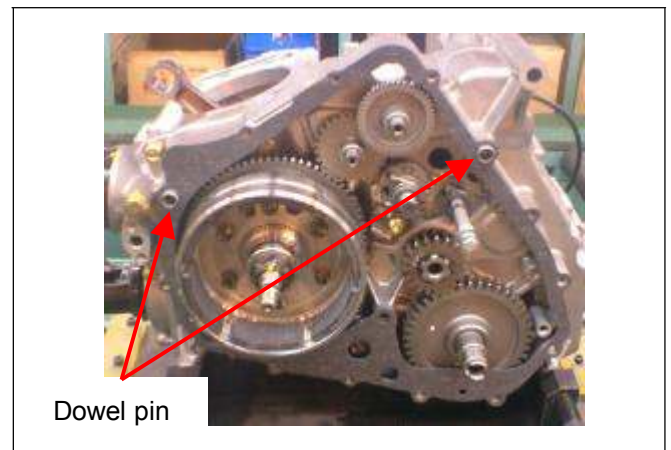
Tie the wire harness securely onto the indent of crankcase.

**Make sure that the wire harness is placed under pulse generator.**



### Left Crankcase Cover Installation

Install dowel pin and new gasket.



Remove water pump cover.

Install left crankcase cover onto the crankcase.



Note: Align the water pump shaft indent with the water pump gear shaft.



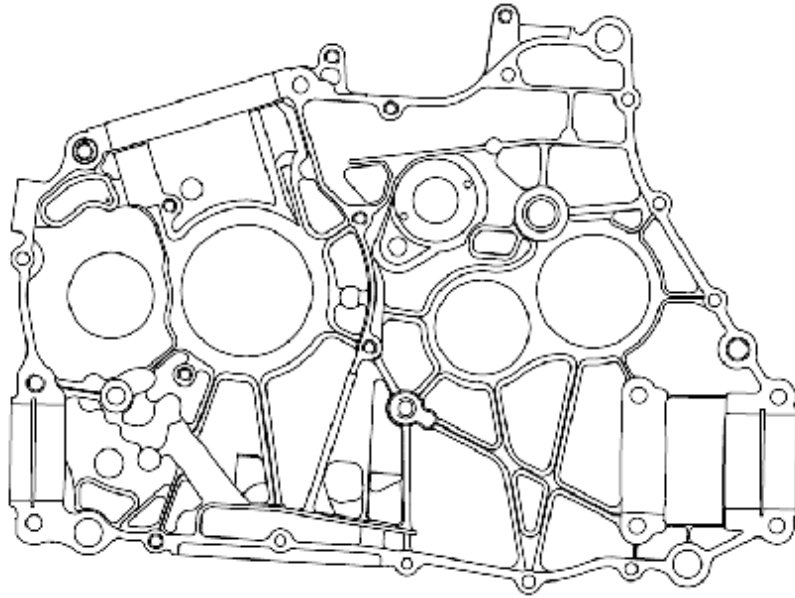
Install left crankcase cover (15 screws).

Install the dowel pin, new gasket and water pump cover onto left crankcase cover.

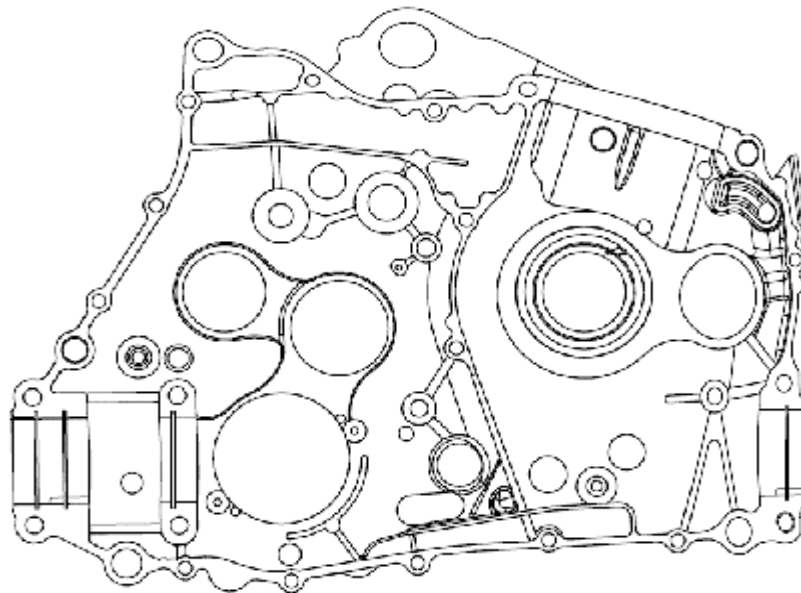


Note:

L CASE



R CASE





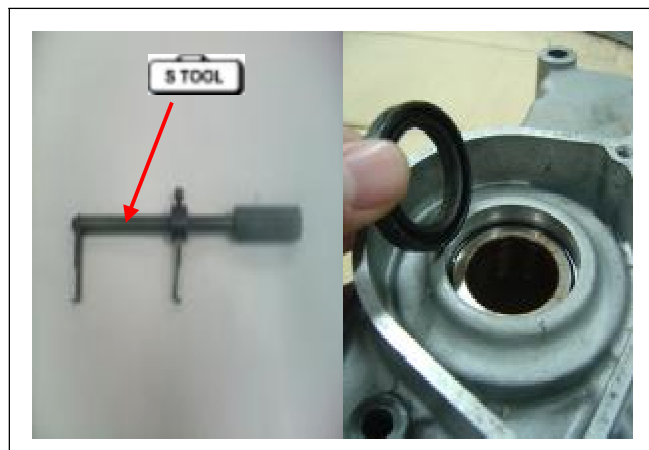


## Oil SEAL

- Remove the oil seal with the special tool.



Oil seal remover 440656



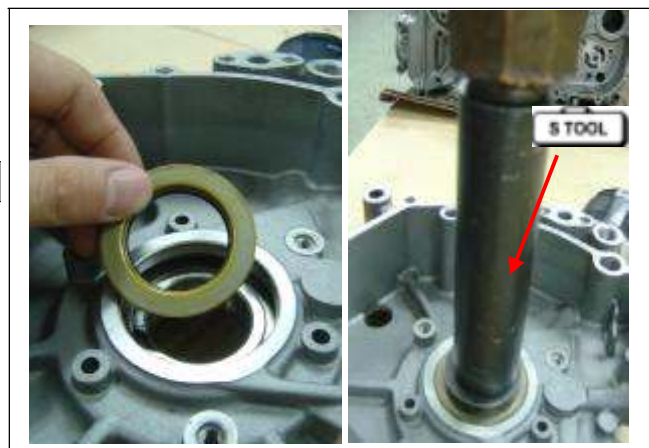
- Install the oil seal with the special tool.



Bearing installer set 440655

### CAUTION

Change the new oil seal to prevent oil leakage.



### NOTE:

Be sure the stamped mark on the oil seal faces outside.



## OIL SEPARATOR

- When installing the oil guide plate, apply a small quantity of Loctite 262™ (Thread locker) to the screw.



## BEARING REASSEMBLY

- Install the bearing.

### NOTE:

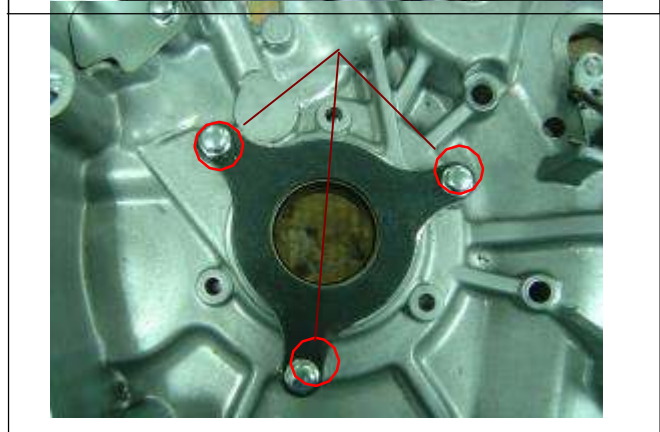
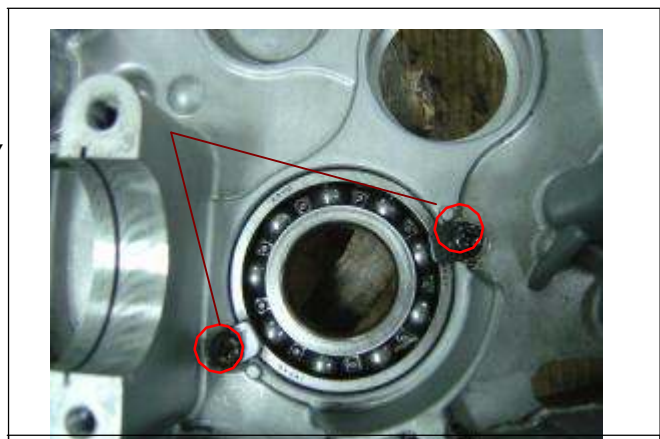
*Be sure The sealed cover of the bearing must face outside.*



- Install the chuck, Bearing.

### NOTE:

*When installing the Bearing chuck, apply a small quantity of Loctite 262™ (Thread locker) to the screws.*





## DRIVE BELT COVER

- Remove the snap ring with the snap ring pliers.

### NOTE:

*If any damage the bearing, replace the new one.*



- Remove the bearing.



## REASSEMBLY

- Install the bearing.



- Install the snap ring with snap ring pliers.



## L CRANK CASE COVER

- Remove the oil pressure valve

When installing the oil valve ,tighten it to the specified Torque.

Oil pressure value:25N · M(2.5kgf-m,17lb-ft)

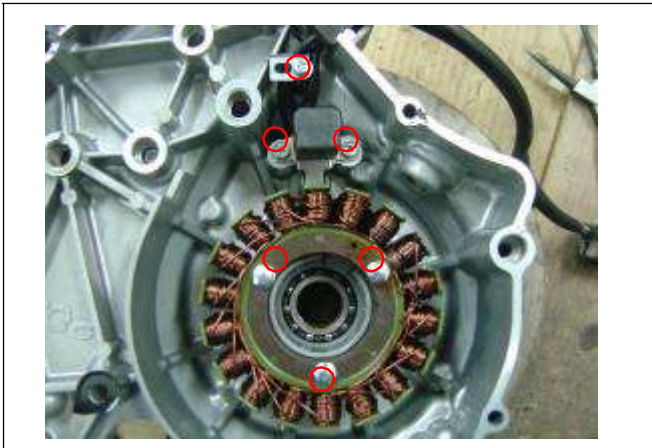


Using an shaped tool to check the oil pressure valve Operation. If the piston does not operate, replace the new one.



## ASSEMBLY

Remove the generator stator.



Remove the oil seal retainer of crank case cover.

### NOTE:

*If the bearing is not abnormal noise, these is not necessary to replace the new one.*





- Remove the oil seal.



## REASSEMBLY

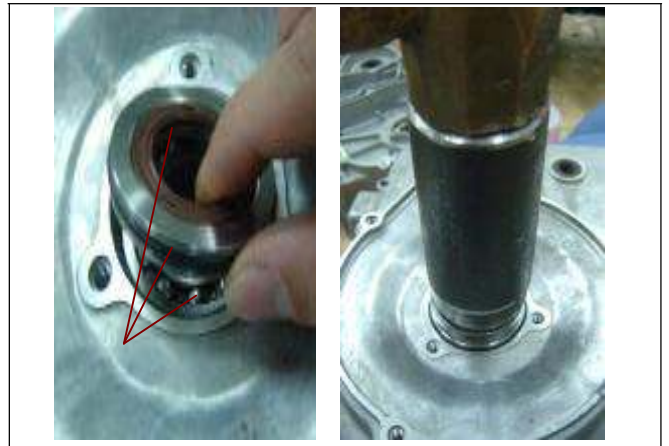
- Install the bearing.



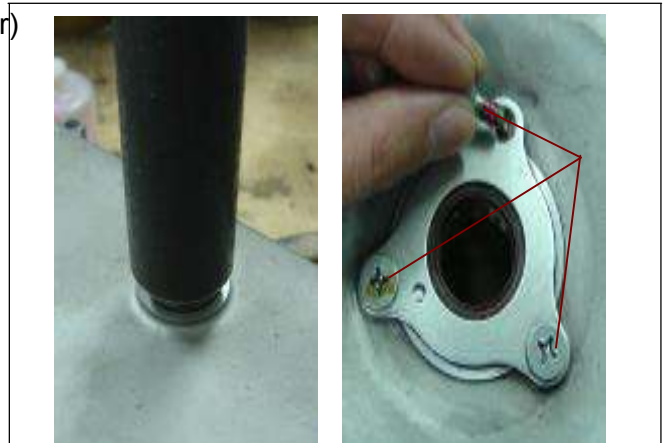
- Apply Grease to the bearing, O-ring and Oil seal lip.
- Install the oil seal.

### NOTE:

*When installing the oil seals, be sure the stamped mark on the oil seal faces outside.*

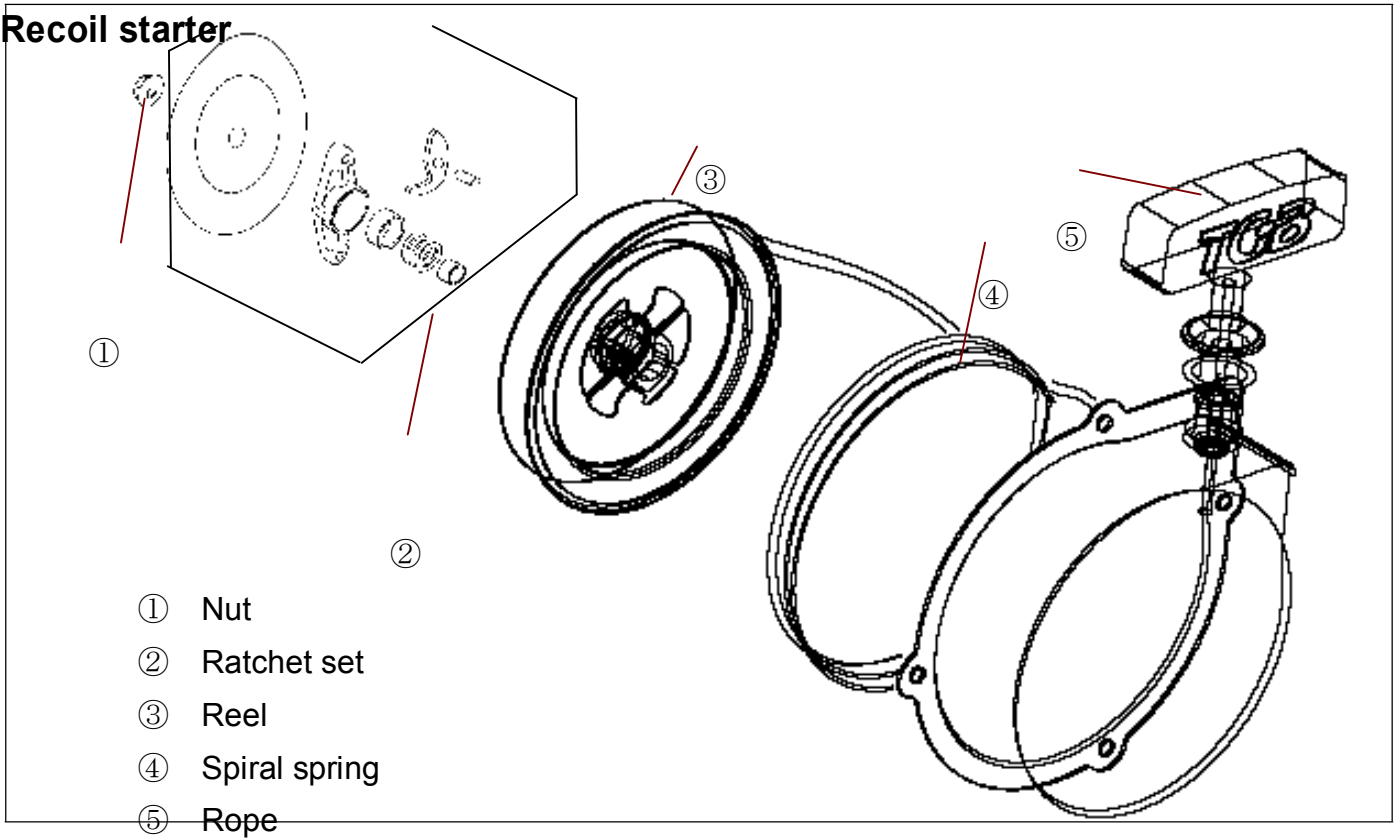


- Apply a small quantity of Loctite 262™ (Thread locker) to the screws and install the bearing retainer.





**Recoil starter**

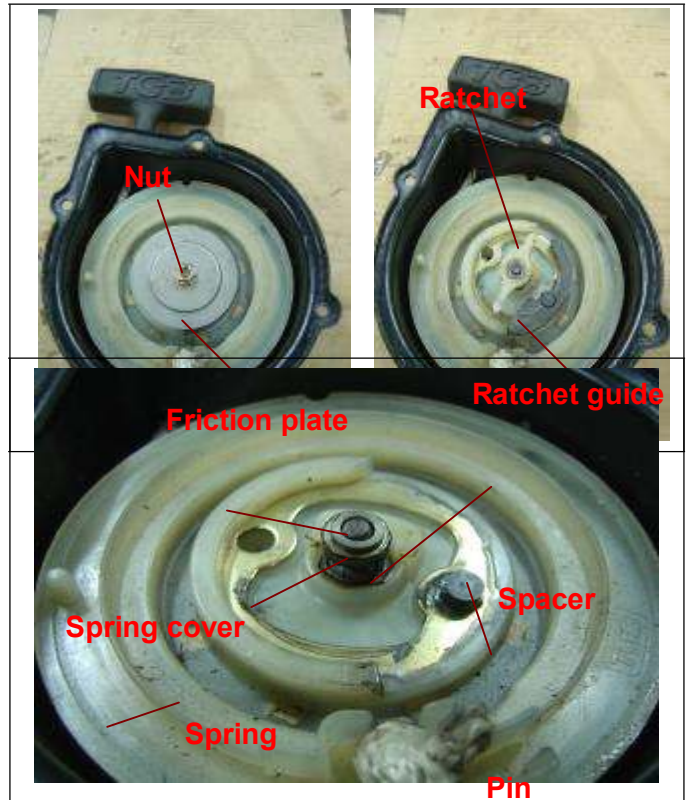


**DISASSEMBLY**

After removing the nut, take out the recoil starter related parts from the housing.

**⚠ WARNING**

When removing the plastics disc.  
 Wear eye and hand protection, because the spring may quickly unwind and cause an injury



**Reel**

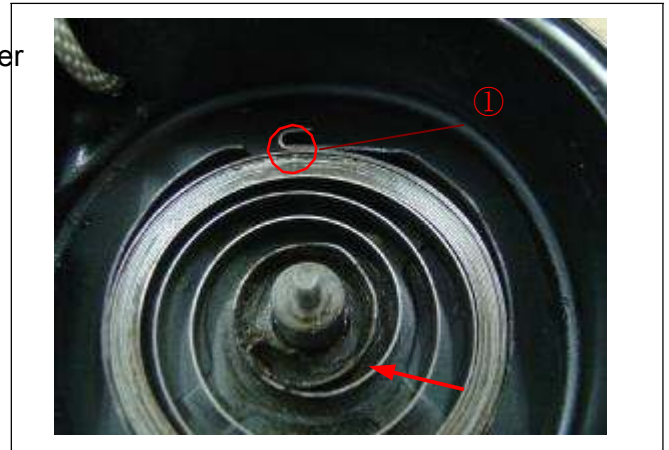


## REASSEMBLY

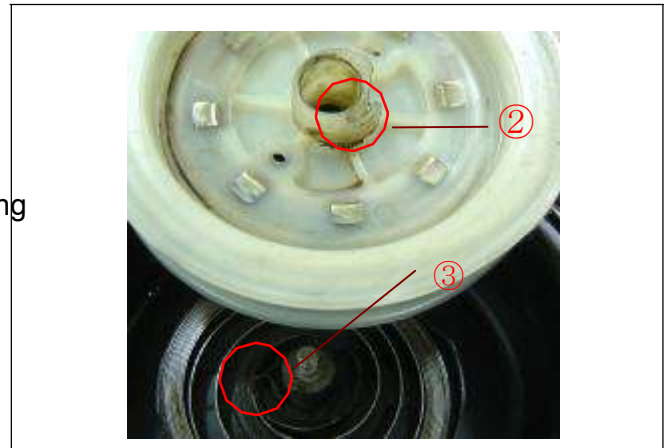
- Hook the spiral spring end ① with the recoil starter case.

### WARNING

Wear eye and hand protector when reassembly the reel, because the spring may quickly unwind and cause an injury.



- Apply Grease to the spiral spring.
- Turn the starter rope on the reel properly.
- Engage the part ② of the reel with the spiral spring End ③.



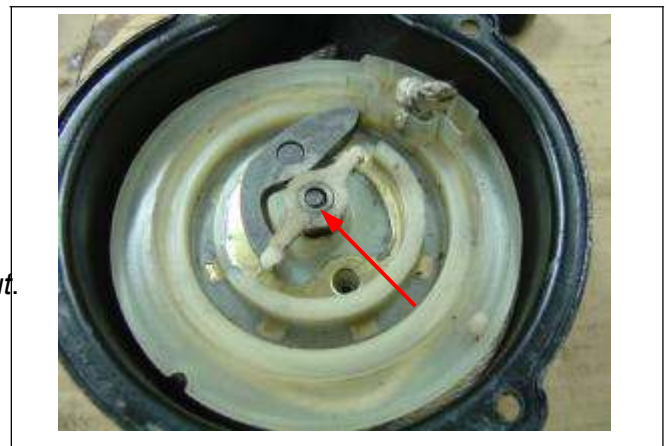
- Hook the rope onto the hook part ④ of the reel, turn the reel clockwise 5 times with the rope.



- Install the ratchet related parts.

### NOTE:

- *Apply the shaft and ratchet with Grease.*
- *Pull the rope and check that the ratchet is pushed out.*



## CRANKSHAFT

- Mounting the crankshaft in the crankcase.

### NOTE:

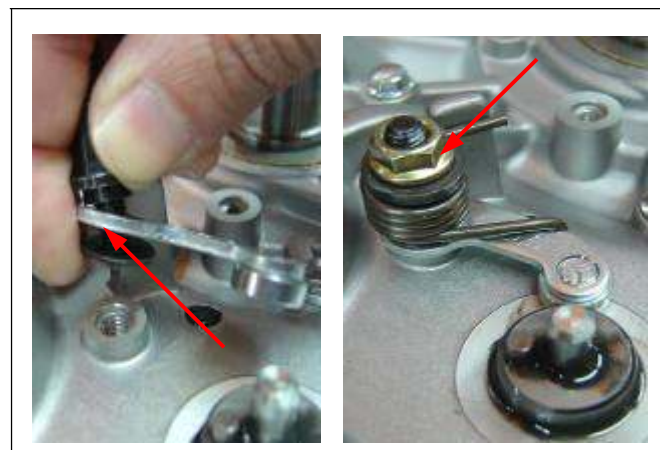
Use the front fork oil seal installer as an attachment.



**Front fork oil seal installer 440655**



- Apply a small quantity of Loctite 262™ (Thread locker) to the thread and install and the gearshift cam stopper.



## BALANCER

- Install the balancershaft.
- Install the key.

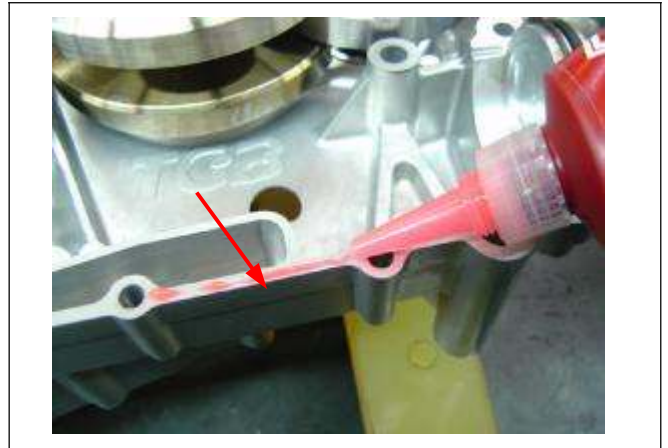


- Install the balancershaft driven gear.
- Install the driven gear balancershaft by aligning the punched marks.

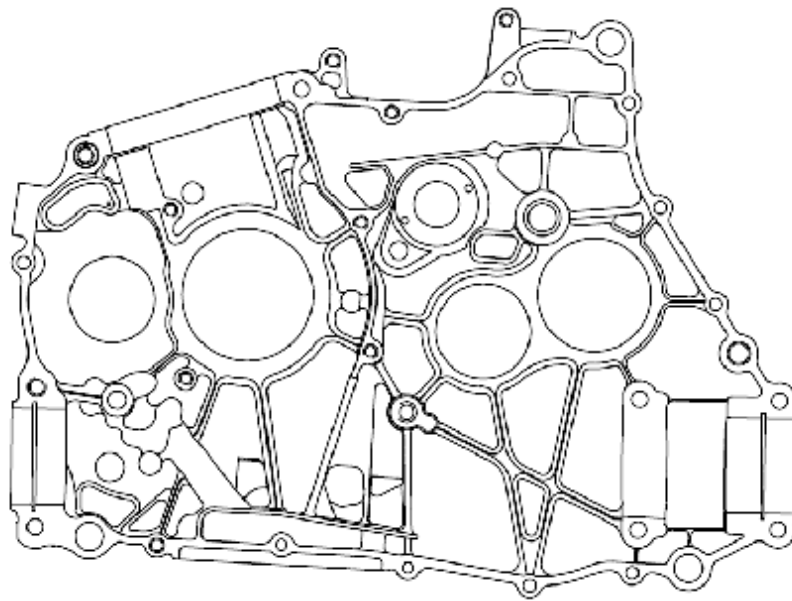




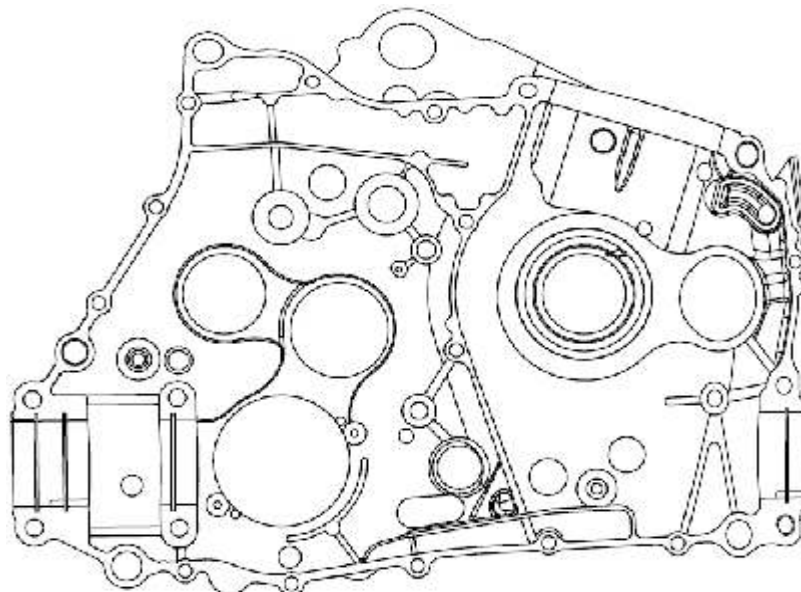
- Apply Loctite 510 (Flange sealant) to the mating surface of the left crankcase.



L CASE



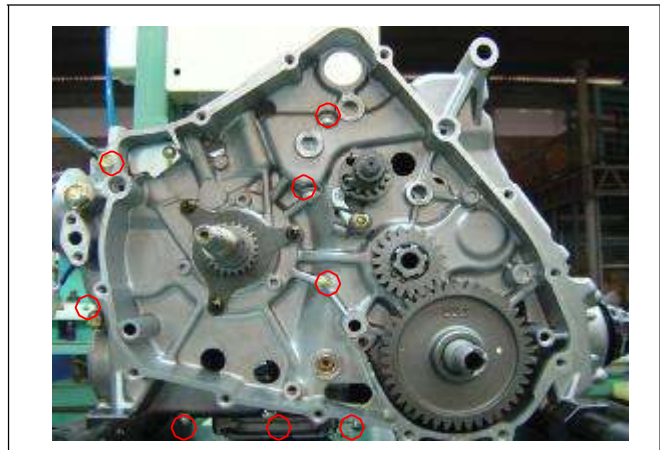
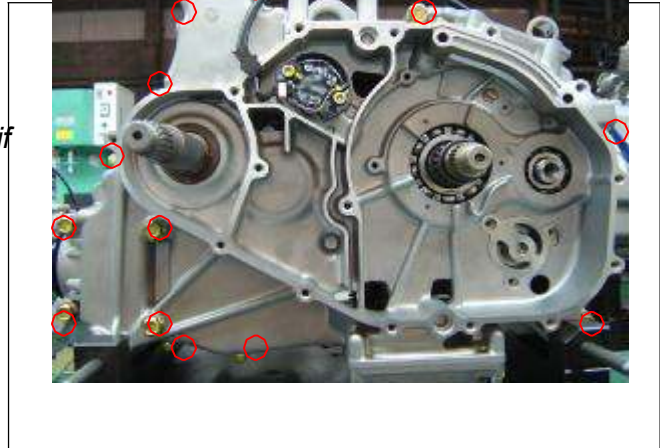
R CASE



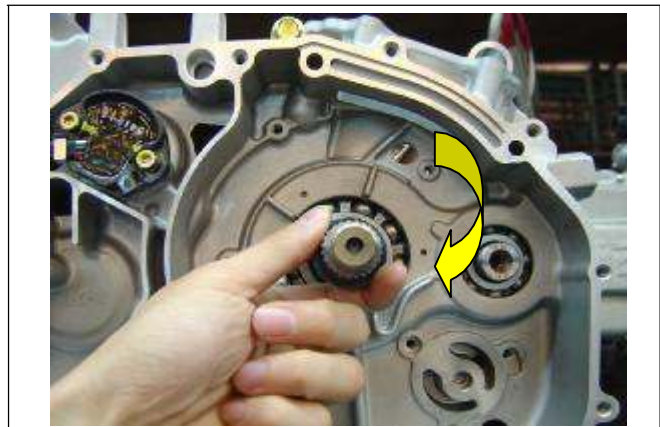
- Assemble the crankcase within few minutes.

**NOTE:**

- After crankcase screws have been tightened, check if crankshaft rotate smoothly.
- Fit the clamp to the bolt.



- Check the each shaft rotates smoothly after the crankcase bolts have been tightend.



**OIL PUMP**

- Install the oil pump.
- Install the washer and pin.
- Install the oil pump driven gear.
- Install the snap ring with snap ring pliers.

**NOTE:**

- Assemble the oil pump gear as show.





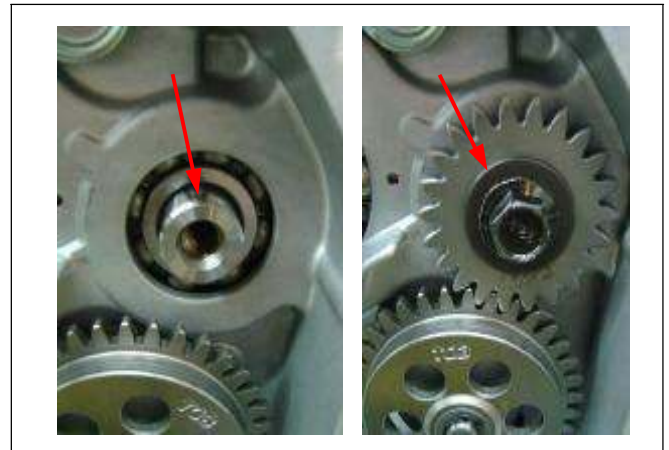


## OIL PUMP DRIVE GEAR

- Install the pin.
- Install the oil pump drive gear and washer.
- Apply lock tail to the oil pump drive gear bolt.

### NOTE:

*Flange side of the gear is positioned inside.*

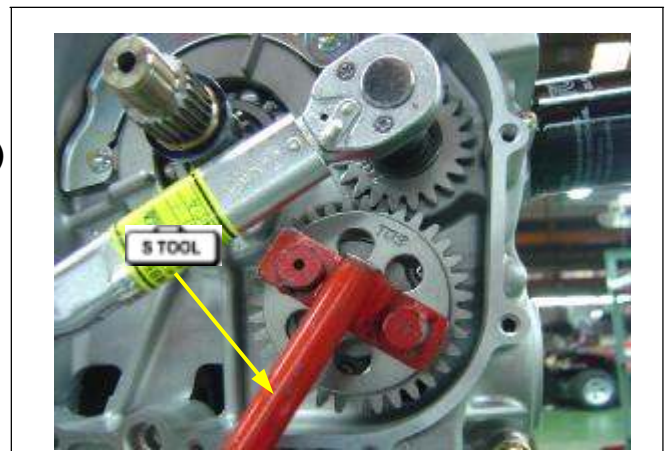


- Tighten the oil pump drive gear bolt to the specified torque.

**Oil pump drive gear bolt: 50 N. M( 5.0 kgf- m,37 lb-ft)**



**Rotor holder 440665**



## CAM CHAIN

- Install the cam chain.



## CLUTCH SHOE

- Install the clutch shoe assembly.
- Apply Loctite 262™ (Thread locker) to the clutch shoe nut.
- Tighten nut to the torque with the special tool.

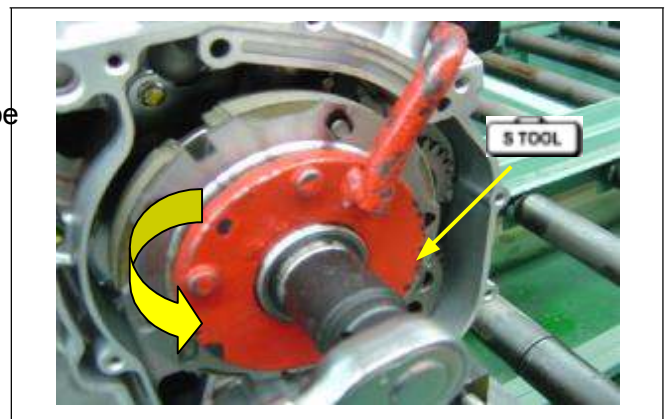
**Shoe nut torque: 120 N. M( 12.0 kgf- m, 88 lb-ft)**



**Rotor holder 440666**

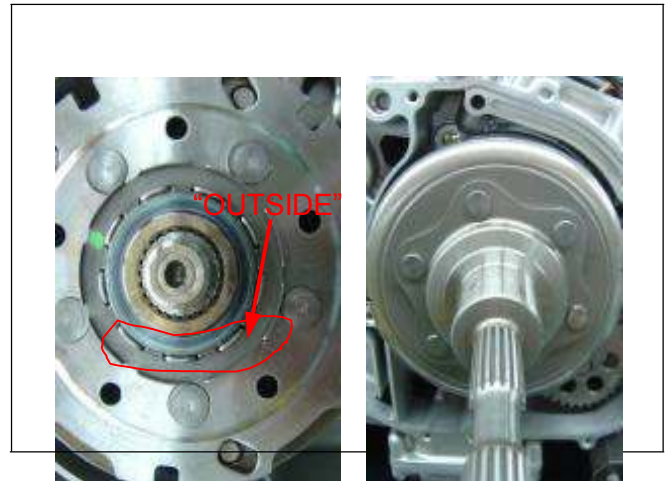
### CAUTION

**The nut of clutch shoe has left-hand threads.**



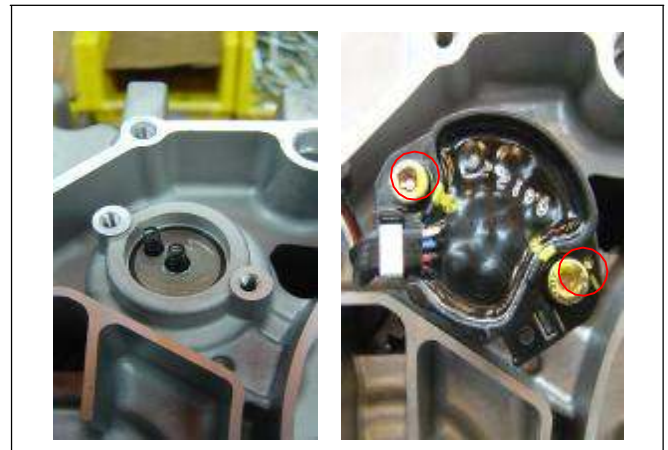
- Install the one way clutch outside.
- Install the clutch housing.

The one way clutch outside facing must on the shaft outside.



## NEUTRAL SWITCH

- Install the springs and switch contacts.
- Install the neutral switch.

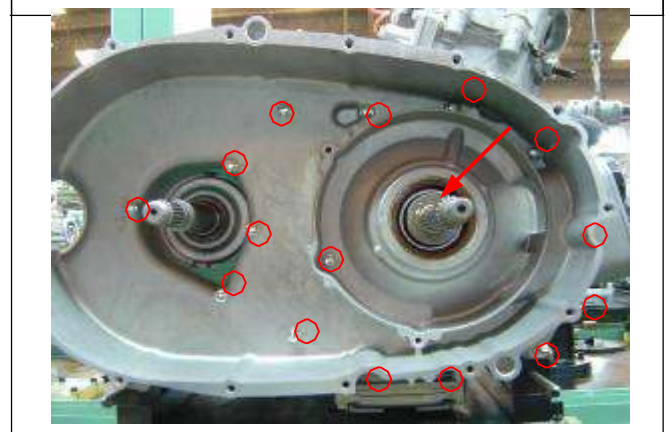


## CLUTCH CASE

- Install the dowel pins and put the new gasket.



- Tighten the clutch case bolts.
- Install the collar.





## FIXED DRIVE FACE

- Install the fixed drive face.



## MOVABLE DRIVE/DRIVEN FACE AND DRIVE BELT

- Install the drive belt, between the movable driven face and fixed driven face by tapping with a plastic mallet.

### CAUTION

The drive belt contact surface of the driven face should be thoroughly cleaned.



- Install the movable driven face assembly.



- Tighten the movable drive face nut to the specified torque with the special tool.

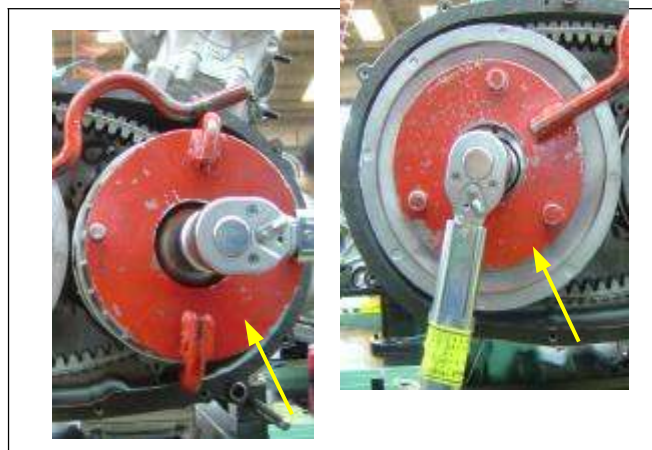
**Movable drive face nut: 115 N M( 11.5 kgf- m,85 lb-ft)**



**Rotor holder 440666**

**NOTE:**

*Turn the fixed drive face until the belt is seated in and both the drive and driven faces check the belt without slip.*



**CLUTCH COVER**

- Install the dowel pins and new gasket.



- Install the clutch cover.

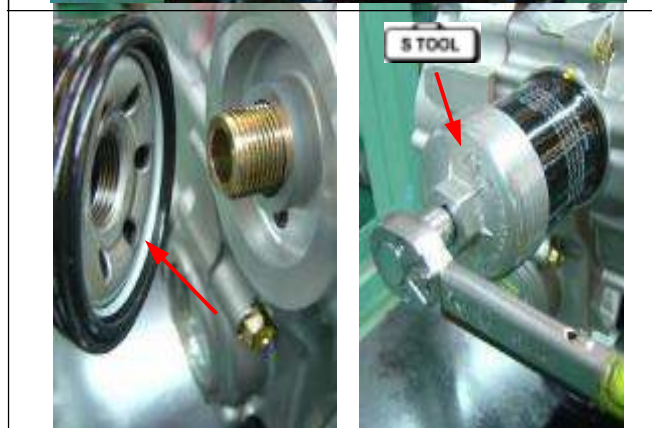


**OIL FILTER**

- Apply engine oil lightly to the O-ring.
- Install the oil filter turning it by hand until feeling that the filter gasket contacts the surface of case. Then Tighten it 2 turns using the oil filter wrench.



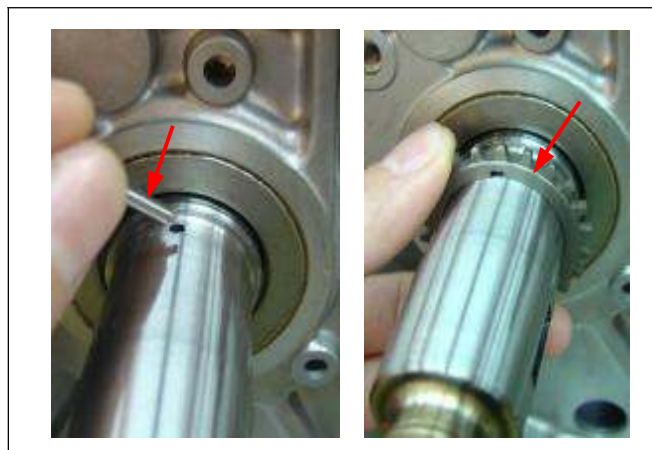
**Oil filter wrench 440670**





## WATER PUMP GEAR

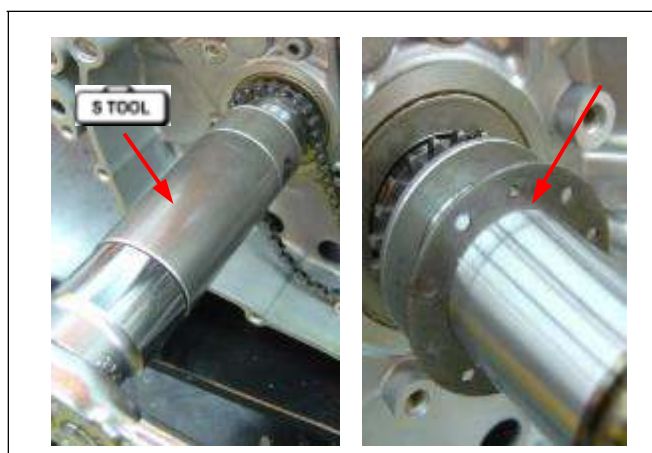
- Install the pin.
- Install the water pump chain to the two water pump gears as shown



- Install the water pump gears with special tool.
- Install the wash.



**Bearing installer set 440660**

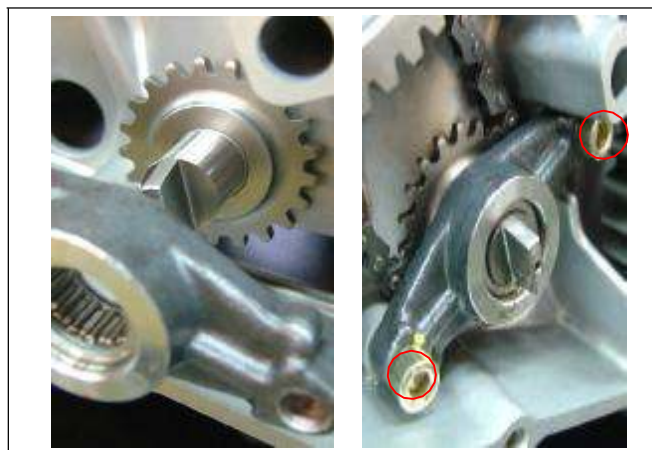


- Install the water pump gears and tighten the nut

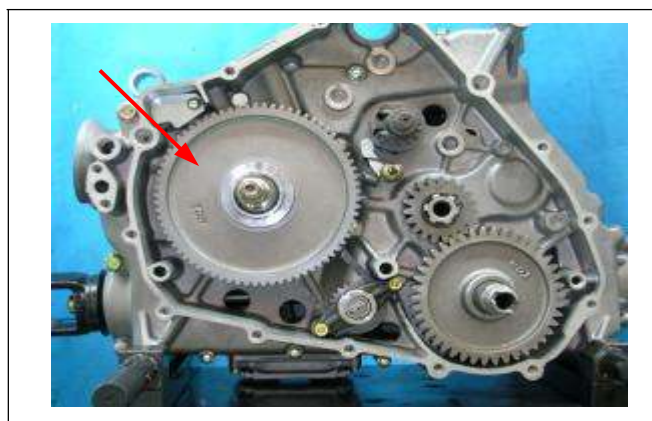
### NOTE:

*Make sure the crankshaft can turn smoothly.*

*If any resistance is felt, remove the screw, re-associate the screw again.*



- Install the wash.



## GENERATOR

- Install the key.



- Install the one way clutch and generator rotor sets.

### CAUTION

Be sure the one way clutch on the crankshaft is fitted into the generator rotor properly.

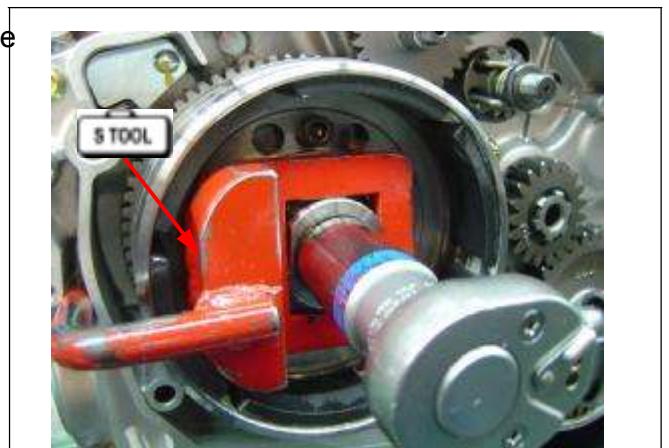


- Tighten the generator rotor nut to the specified torque with the special tool.

Generator rotor nut: 160 N. M( 16.0 kgf- m, 125 lb-ft)



**Rotor holder 440664**



- Install the output drive gear by installing the snap ring.





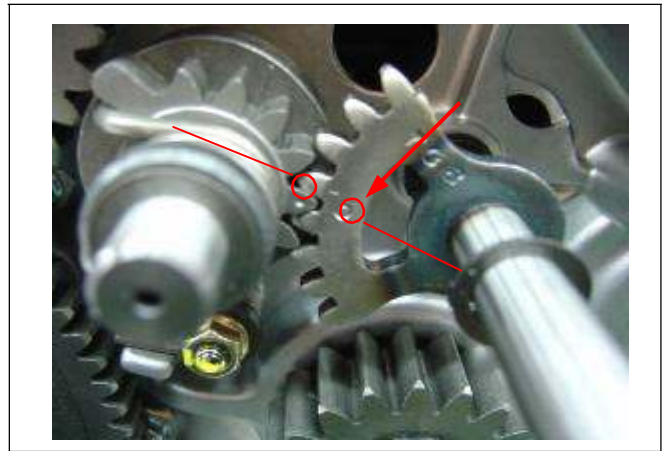


## GEARSHIFT

- Install the cam driven gear.
- Reassemble the gearshift shaft.

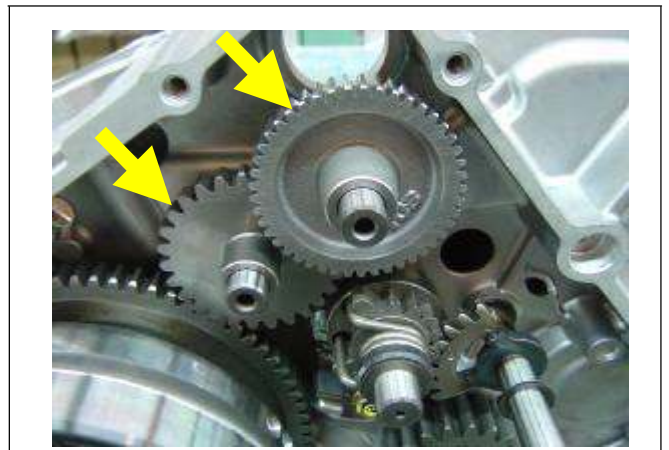


- Install the gearshift shaft by aligning the punched mark with the center of the cam driven gear.



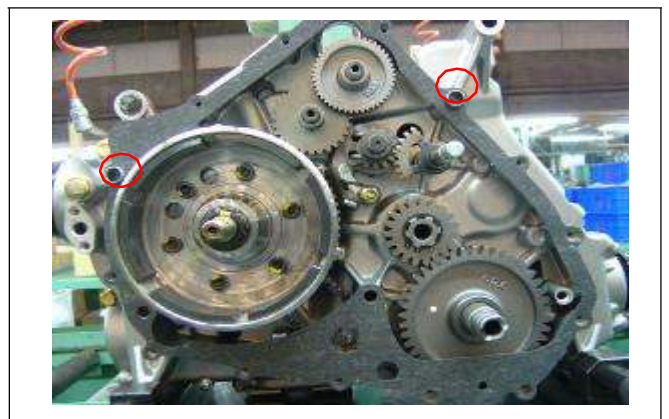
## STARTER DRIVEN GEAR/IDLE GEAR

- Install the starter idle gear and driver gear.



## LEFT CRANKCASE COVER

- Install the dowel pins and put the new gasket.



- Tighten the left crankcase cover bolt.

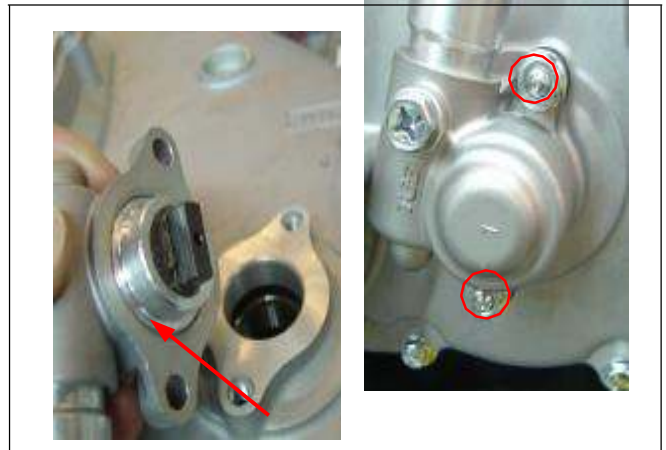
**NOTE:**

*Fit the clamp to the bolt.*



**SPEEDOMETER GEARBOX**

- Fit a new gasket and install the speedometer gearbox.



**WATER PUMP**

- Check the water pump shaft position with water pump gear shat.
- Apply engine oil on the O-ring of water pump.
- Install water pump.



- Tighten the screw.





## STARTER CUP

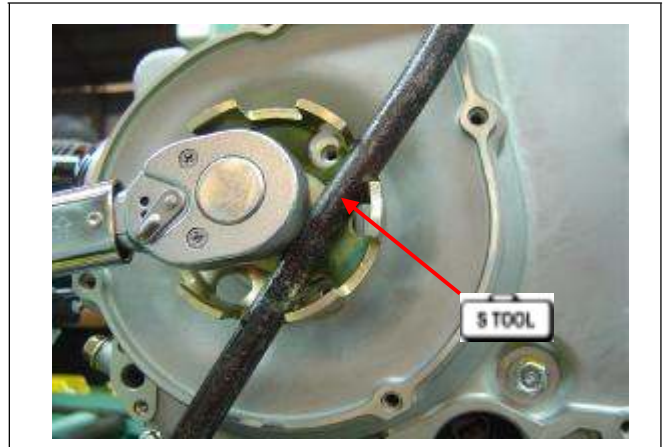
- Apply engine oil to the O-ring and lip of the oil seal.
- Install the starter cup.



- Tighten the starter cup nut by using a suitable bar.

**Starter cup nut: 35 N. M( 3.5 kgf- m, 25 lb-ft)**

 **Cup, Starter installer 440658**



## 12. COOLING SYSTEM

### General Information

#### General

#### Warning:

While the engine is running, never attempt to open the radiator filler cap, the pressurized hot coolant may shoot out and cause serious scalding injury. No maintenance work is allowed to perform unless the engine is completely cooled down.

- Refill the radiator with distilled water or specified additives.
- Add coolant to the reservoir.
- The cooling system can be serviced on the ATV.
- Never spill the coolant to the painted surface.
- Test the cooling system for any leakage after the repair.
- Please refer to Section 17 for inspection of the temperature sensor switch for the fan motor and the water thermometer.

#### Technical Specification

Item	Specification
Pressure to open filler cap	0.9±0.15 kgf/cm <sup>2</sup>
Capacity of coolant: Engine + radiator	2200c.c.
Reservoir upper	1200c.c.
Thermostat	Begins to activate at 65~72 °C Stroke: 0.05~5m
Thermos switch (fan)	Begins to activate at 85±3 °C
Boiling point	Not-pressure: 107.7 °C Pressurized: 125.6

#### Torque Value

For water pump impeller 1.0~1.4kgf-m

#### Tools Requirement

##### Special tools

Water pump bearing driver (6901): TGB-440640  
 Water pump oil seal driver (Inner): TGB-440641  
 Water pump mechanical seal driver: TGB-440642  
 Inner bearing puller: TGB-440645

### Trouble Diagnosis

#### The engine temperature is too high

- The water thermometer and the temperature sensor do not work properly.
- The thermostat is stuck to close.
- Insufficient coolant.
- The water hose and jacket are clogged.
- Fan motor malfunction.
- The filler cap of the radiator malfunction.
- Between cylinder head and cylinder do not be tighten

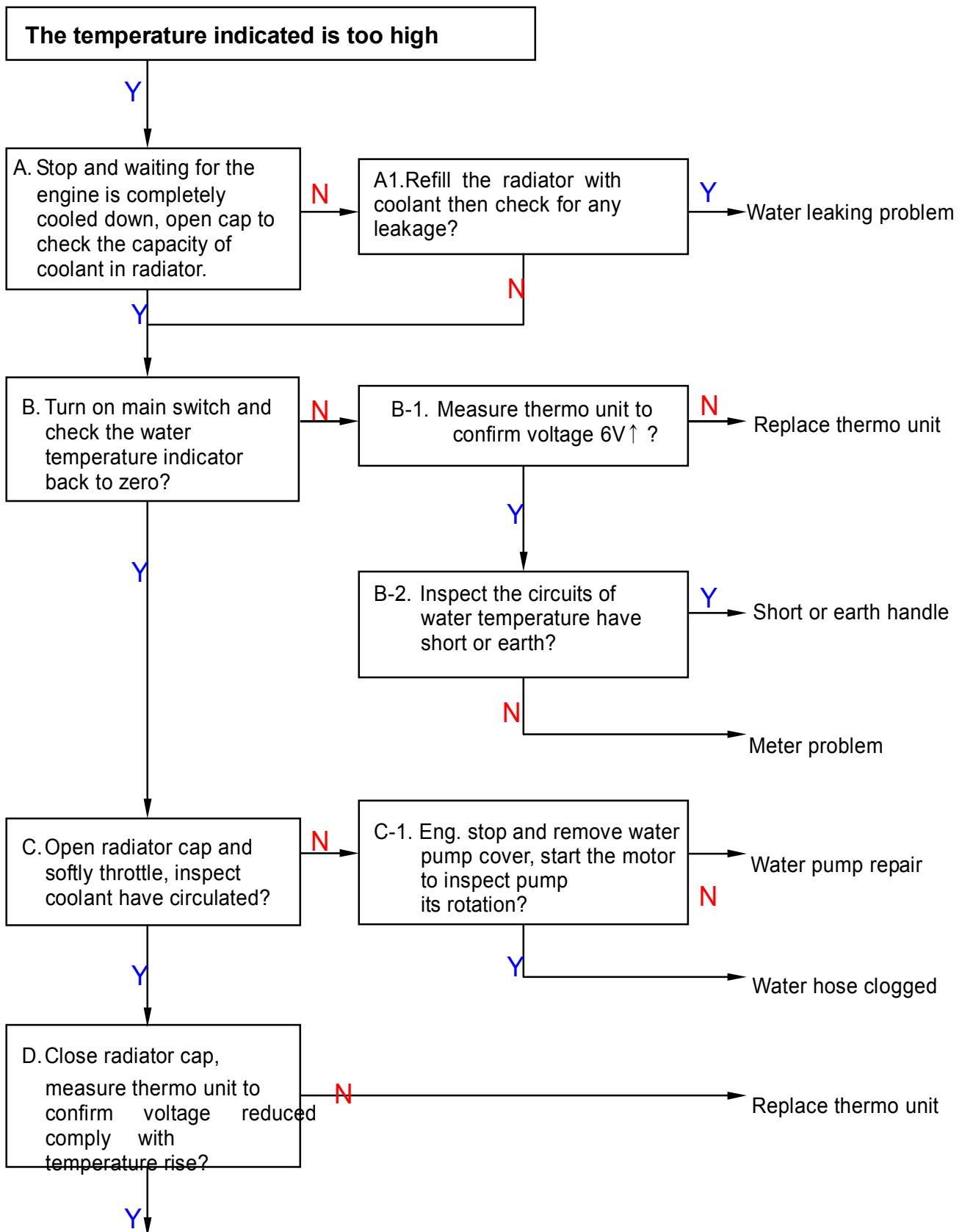
#### The engine temperature is too low

- The water thermometer and the temperature sensor malfunction.
- The thermostat is stuck to open.

#### Coolant is leaking

- The water pump mechanical seal does not function properly.
- The O ring is deteriorated.
- The water hose is broken or aged.

## Trouble Diagnosis for Cooling System



Next page

# 12. COOLING SYSTEM

