

# 1.GENERAL INFORMATION

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## GENERAL INFORMATION

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## SERIAL NUMBER



(1)

(1) Location of Frame Serial Number  
(Vehicle Identification Number)



(2)

(2) Location of Engine Serial Number

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## SPECIFICATIONS

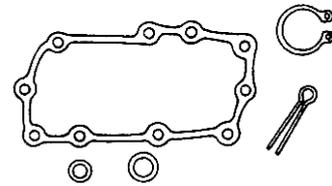
Name & model No.		SP450(EFI)		
Motorcycle Name & Type		SPORT		
Overall length		1825 mm (71.8 in)		
Overall width (mm)		1205 mm (47.4in)		
Overall height (mm)		1255 mm (49.4 in)		
Wheel base (mm)		1270 mm (50 in)		
Engine type		Four-stroke, DOHC, Liquid-cooled		
Displacement		448.8 cm <sup>3</sup>		
Fuel Used		95# nonleaded gasoline		
Dry weight	Front wheel	109 kg (240 lbs)		
	Rear wheel	110 kg (242 lbs)		
	Total	219 kg (482 lbs)		
Curb weight	Front wheel	111 kg (224 lbs)		
	Rear wheel	118 kg (260 lbs)		
	Total	229 kg (504 lbs)		
Tires	Front wheel	21*7-10		
	Rear wheel	20*11-9or20*11-10		
Ground clearance		260 mm (10.2 in)		
Engine	Starting system		Electric starter	
	Type		4-stroke	
	Cylinder arrangement		Single cylinder	
	Valve arrangement		D.O.H.C., 4 valve	
	Bore × stroke (mm)		96 × 62 mm (3.78 × 2.44 in)	
	Compression ratio		11.8 : 1	
	Compression pressure		16±2kgf/cm(at500rpm)	
	Valve clearance (cold)	Intake	0.1~0.15 mm (0.004~0.006 in)	
		Exhaust	0.15~0.2 mm (0.06~0.008 in)	
	Idle speed (rpm)		1600±100 rpm	
	Lubrication system	Lubrication type		Wet sump
		Oil change		2.6 L
		Oil and filter change		2.7 L
		Engine overhaul		2.8 L
	Cooling Type		Liquid cooled	

Fuel System	Air cleaner type		Dry type element
	Fuel capacity		14 L
Fuel delivery		Fuel injection(FI)42MM	
Electrical equipment	Ignition System	Type	Full transistor digital ignition
		Ignition timing	6°BTDC/1500rpm
		Spark plug	CR8E
		Spark plug gap	0.7~0.8mm (0.028~0.032in)
Battery	Capacity	12V/10AH	
Power Drive System	Clutch	Type	Wet multi-plate
	Transmission operation	5-forward and 1-reverse Type	
		Gearshift pattern	Forward
	Reverse		Foot / hand operated
	Gear ratio	1st	2.538
		2st	1.684
		3st	1.261
		4st	1.040
		5st	0.885
		reverse	2.231
Final reduction		3.143	
Drive chain		520 O-Ring Chain	
Moving Device	FR/RR tire rolling circumference		1676/1596 mm(66/62.8 in)
	Tire pressure	Front	0.32 kg/cm <sup>2</sup> (35 Kpa,5 psi)
		Rear	
	Turning angle	Left	40°
Right		40°	
Brake system type	Rear	Disk brake	
	Front	Disk brake	
Damping Device	Suspension type	Front	Independent, double A-arm
		Rear	Linkage-type

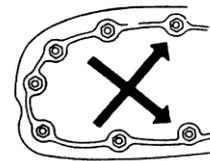
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## SERVICE PRECAUTIONS

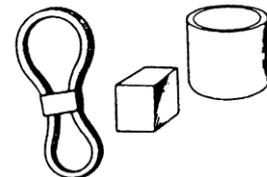
- When reassembling make sure to install new gaskets,
- O-rings,circlips, cotter pins, etc.



- When tightening bolts or nuts, begin with larger-diameter to smaller ones at several times, and tighten to the specified torque diagonally.



- Use genuine parts and lubricants.



- When servicing the machine, be sure to use special tools for removal and installation.

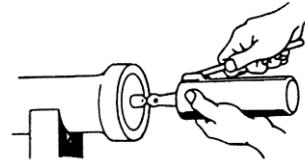


- After disassembly, clean removed parts. lubricate sliding surface with engine oil before reassembly.

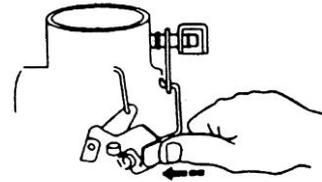


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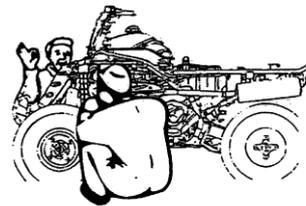
- Apply or add designated greases and lubricants to the specified lubrication points.



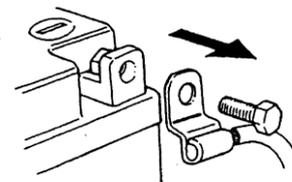
- After reassembly, check all parts for proper tightening and operation.



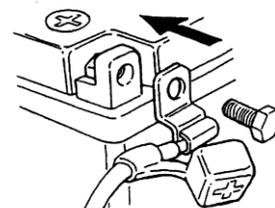
- When two persons work together, pay attention to the mutual working safety.



- Disconnect the battery negative (-) terminal before operation.
- When using a spanner or other tools, make sure not to damage the motorcycle surface.



- After operation, check all connecting points, fasteners, and lines for proper connection and installation.
- When connecting the battery, the positive (+) terminal must be connected first.
- After connecting, apply grease to the battery terminals.
- Terminal caps shall be installed securely.



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- If the fuse is burned out, find the cause and repair it. Replace it with a new one according to the specified capacity.



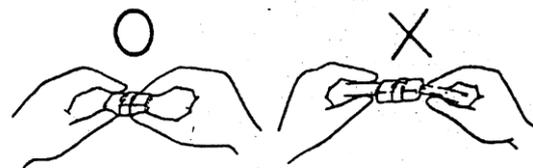
- After operation, terminal caps shall be installed securely.



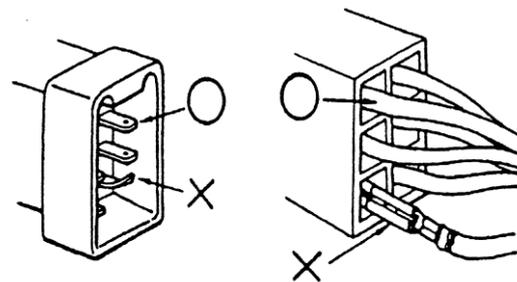
- When taking out the connector, the lock on the connector shall be released before operation.



- Hold the connector body when connecting or disconnecting it.
- Do not pull the connector wire.

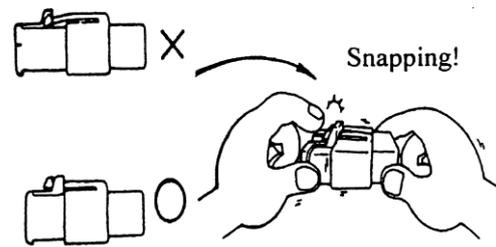


- Check if any connector terminal is bending, protruding or loose.

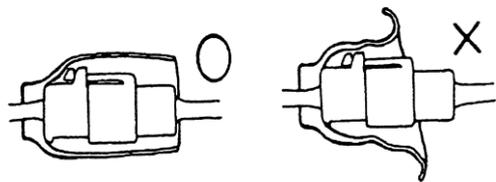


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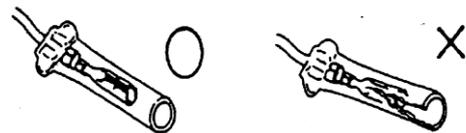
- The connector shall be inserted completely.
- If the double connector has a lock, lock it at the correct position.
- Check if there is any loose wire.



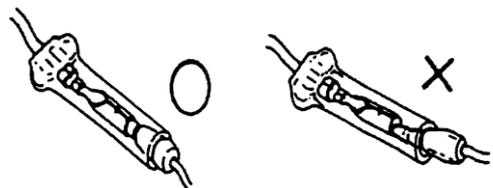
- Before connecting a terminal, check for damaged terminal cover or loose negative terminal.



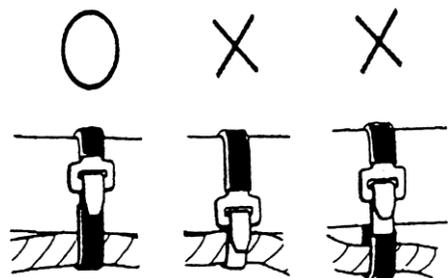
- Check the double connector cover for proper coverage and installation.



- Insert the terminal completely.
- Check the terminal cover for proper coverage.
- Do not make the terminal cover opening face up.



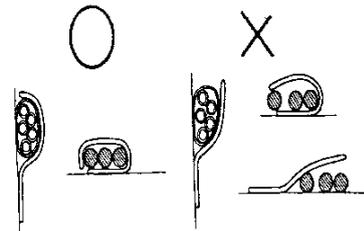
- Secure wire harnesses to the frame with their respective wire bands at the designated locations.



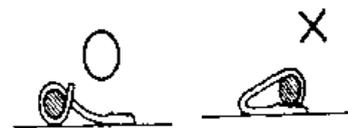
- Tighten the bands so that only the insulated surfaces contact the wire harnesses.

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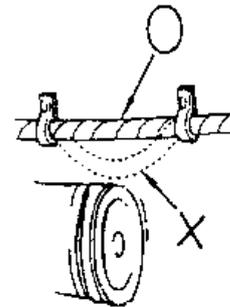
- After clamping, check each wire to make sure it is secure.



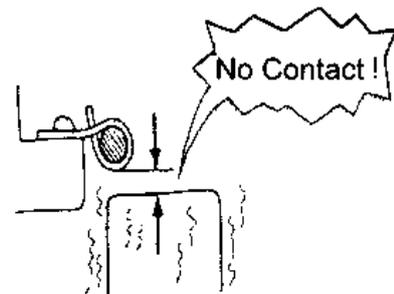
- Do not squeeze wires against the weld or its clamp.



- After clamping, check each harness to make sure that it is not interfering with any moving or sliding parts.



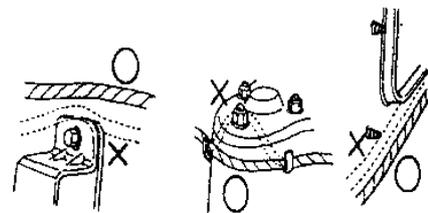
- When fixing the wire harnesses, do not make it contact the parts which will generate high heat.



- Route wire harnesses to avoid sharp edges or corners.

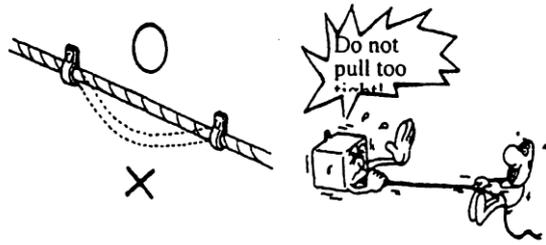
Avoid the projected ends of bolts and screws.

- Route wire harnesses passing through the side of bolts and screws. Avoid the projected ends of bolts and screws.

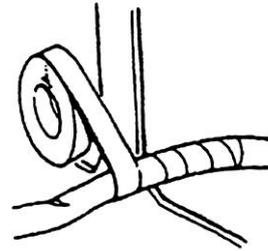


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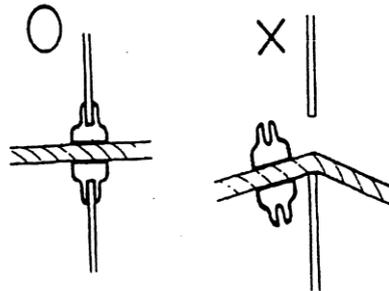
- Route harnesses so they are neither pulled tight nor have excessive slack.



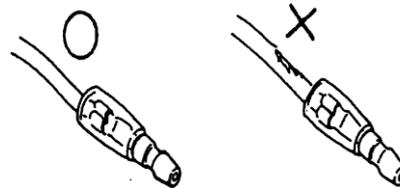
- Protect wire and harnesses with electrical tape or tube if they contact a sharp edge or corner.



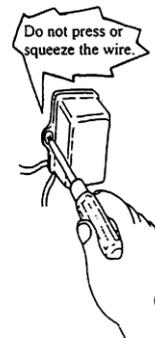
- When rubber protecting cover is used to protect the wire harnesses, it shall be installed securely.



- Do not break the sheath of wire.
- If a wire or harnesses is with a broken sheath, repair by wrapping it with protective tape or replace it.

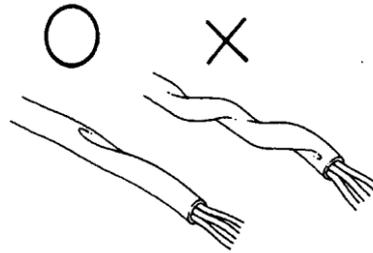


- When installing other parts, do not press or squeeze the wires.



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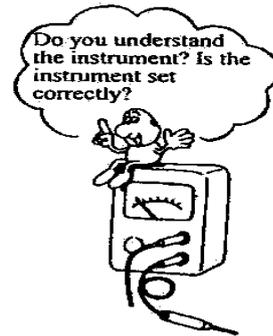
- After routing check that the wire harnesses are twisted or kinked.



- Wire harnesses routed along with handlebar should not to be pulled tight, have excessive slack or interfere with adjacent or surrounding parts in all steering positions.



- When a testing device is used, make sure to understand the operating methods thoroughly and operate according to the operating instructions.



- Be careful not to drop any parts.



- When rust is found on a terminal, remove the rust with sand paper or equivalent before connecting.



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## ■ Symbols :

The following symbols represent the servicing methods and cautions included in this service manual.



Engine oil

: Apply engine oil to the specified points ◦  
(Use designated engine oil for lubrication ◦ )



Grease

: Apply grease for lubrication ◦



Gear Oil

: Transmission Gear Oil ◦  
( SAE80W90 )

Special Tool:

: Use special tool ◦



: Caution



: Warning

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## TORQUE VALUES

### STANDARD TORQUE VALUES

Item	Torque kgf-m (N-m, lbf-ft)	Item	Torque kgf-m (N-m, lbf-ft)
5mm bolt and nut	0.5 (5, 3.6)	4mm screw	0.3 (3, 2.2)
6mm bolt and nut	1 (10, 7.2)	5mm screw	0.4 (4, 2.9)
8mm bolt and nut	2.2 (22, 16)	6mm screw, SH bolt	0.9 (9, 6.5)
10mm bolt and nut	3.5 (35, 25)	6mm flange bolt and nut	1.2 (12, 9)
12mm bolt and nut	5.5 (55, 40)	8mm flange bolt and nut	2.7 (27, 20)
14mm bolt and nut	7 (70, 50)	10mm flange bolt and nut	4 (40, 29)

Torque specifications listed below are for important fasteners.

## ENGINE

Item	Q'ty	Thread dia (mm)	Torque kgf-m (N-m, lbf ft)	Remarks
Water temperature switch.	1	10	1.3 (13, 9.4)	
Coolant drain bolt.	1	6	1.1~1.4 (11~14, 8~10)	
Cooling fan thermo mounting bolt.	1	10	1.3 (13, 9.4)	
Magneto rotor nut.	1	12	12 (120, 86.8)	
Magneto cover bolt.	8	6	1.0 (10, 7.2)	
Cylinder head bolt.	4	10	4.7 (47, 34)	
Cylinder head cover bolt.	3	7	1.4 (14, 10)	
Cylinder head base bolt.	1	6	1.0 (10, 7.2)	
Cylinder base nut.	2	6	1.0 (10, 7.2)	
Engine sprocket bolt.	2	6	1.1~1.3(11~13, 8~9.4)	
Engine oil check plug.	1	12	1.8(18, 13)	
Engine oil drain plug.	1	14	2.1(21, 15)	<b>Crankcase</b>
Engine oil drain plug.	1	14	1.2(12, 8.7)	<b>Oil tank</b>
Engine oil inlet hose union bolt.	1	12	2.3(23, 16.6)	
Spark plug.	1	12	1.1 (11, 8)	
Camshaft housing bolt.	8	6	1.0 (10, 7.2)	
Cam chain tensioner mounting bolt.	1	6	1.0 (10, 7.2)	
Cam chain tension adjuster mounting bolt.	2	6	1.0 (10, 7.2)	
Cam chain tension adjuster bolt.	1	6	2.0(20, 14.5)	
Crankcase bolt.	10	6&8	1.1 (11, 8)	
Clutch sleeve hub nut.	1	20	9.0(90, 65)	
Primary drive gear nut.	1	14	14(140, 101)	
Gearshift cam stopper.	1	6	3.2(32, 23)	
Gear position switch bolt.	1	5	0.65(6.5, 4.7)	

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## FRAME

Item	Q 'ty	Thread dia (mm)	Torque kgf-m (N-m, lbf ft)	Remarks
Steering stem nut	1	14	7 (70, 50)	
Front swing arm nut	8	10	4.5 (45, 32)	
Front wheel nut	8	10	4.5 (45, 32)	
Rear wheel nut	8	10	4.5 (45, 32)	
Front wheel hub nut	2	14	7 (70, 50)	
Rear wheel hub nut	2	18	10 (100, 72)	
Front shock absorber upper mount bolt	2	10	4 (40, 29)	
Front shock absorber lower mount bolt	2	10	4 (40, 29)	
Rear shock absorber upper mount bolt	1	10	4 (40, 29)	
Rear shock absorber lower mount bolt	1	10	4 (40, 29)	
Rear swing arm axle	1	16	9 (90, 66)	
Rear hub nut	4	12	6 (60, 43)	
Rear wheel shaft nut	2	38	12 (120, 86)	
Front engine bracket upper bolt	1	10	4.5 (45, 32)	
Rear engine bracket lower bolt	1	10	4.5 (45, 32)	
Engine hanger bracket bolt	1	10	4.5 (45, 32)	
Engine hanger bracket bolt	1	14	7 (70, 50)	
Exhaust muffler lock bolt (frame)	1	10	4.5 (45, 32)	
Exhaust muffler lock nut (engine)	2	8	2 (20, 14.4)	

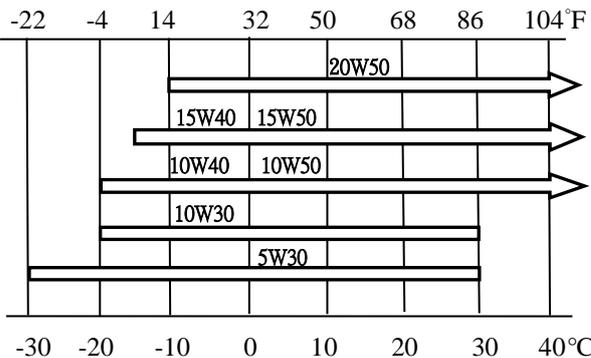
## SPECIAL TOOLS

Tool Name	Tool No.	Remarks Ref. Page
Clutch sleeve hub holder	71600-E12-000	<b>4-5,9-5</b>
Valve spring compressor	71605-E12-000	<b>7-12</b>
Rotor remover	71604-E12-000	<b>9-9</b>
Conrod holder	71612-E12-000	<b>9-9,9-30,9-31</b>
Crankshaft installer	71613-E12-000	<b>9-26</b>
Crank case separator	71607-E03-000	<b>9-11,9-13</b>
Bearing puller	71606-E10-000	
Ball join remover	71608-A03-000	<b>12-9</b>
Oil seal and bearing install	71620-E10-000	<b>12-6</b>

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## LUBRICATION POINTS

### ENGINE

Lubrication Points	Lubricant
Valve guide/valve stem movable part Cam lobes Valve rocker arm friction surface Cam chain Cylinder lock bolt and nut Piston surroundings and piston ring grooves Piston pin surroundings Cylinder inside wall Connecting rod/piston pin hole Connecting rod big end Crankshaft right side oil seal Oil pump drive chain Balance gear A.C. generator Starter one-way clutch Bearing movable part O-ring face Oil seal lip	<ul style="list-style-type: none"> <li>● Engine Oil (SAE20W-50)</li> <li>● API SL Engine Oil</li> </ul>  <p>The chart displays the following temperature ranges for each oil grade:</p> <ul style="list-style-type: none"> <li>20W50: -22°F to 104°F</li> <li>15W40: -4°F to 104°F</li> <li>15W50: 14°F to 104°F</li> <li>10W40: -4°F to 86°F</li> <li>10W50: 14°F to 86°F</li> <li>10W30: -4°F to 68°F</li> <li>5W30: -22°F to 68°F</li> </ul>

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## FRAME

The following is the lubrication points for the frame.

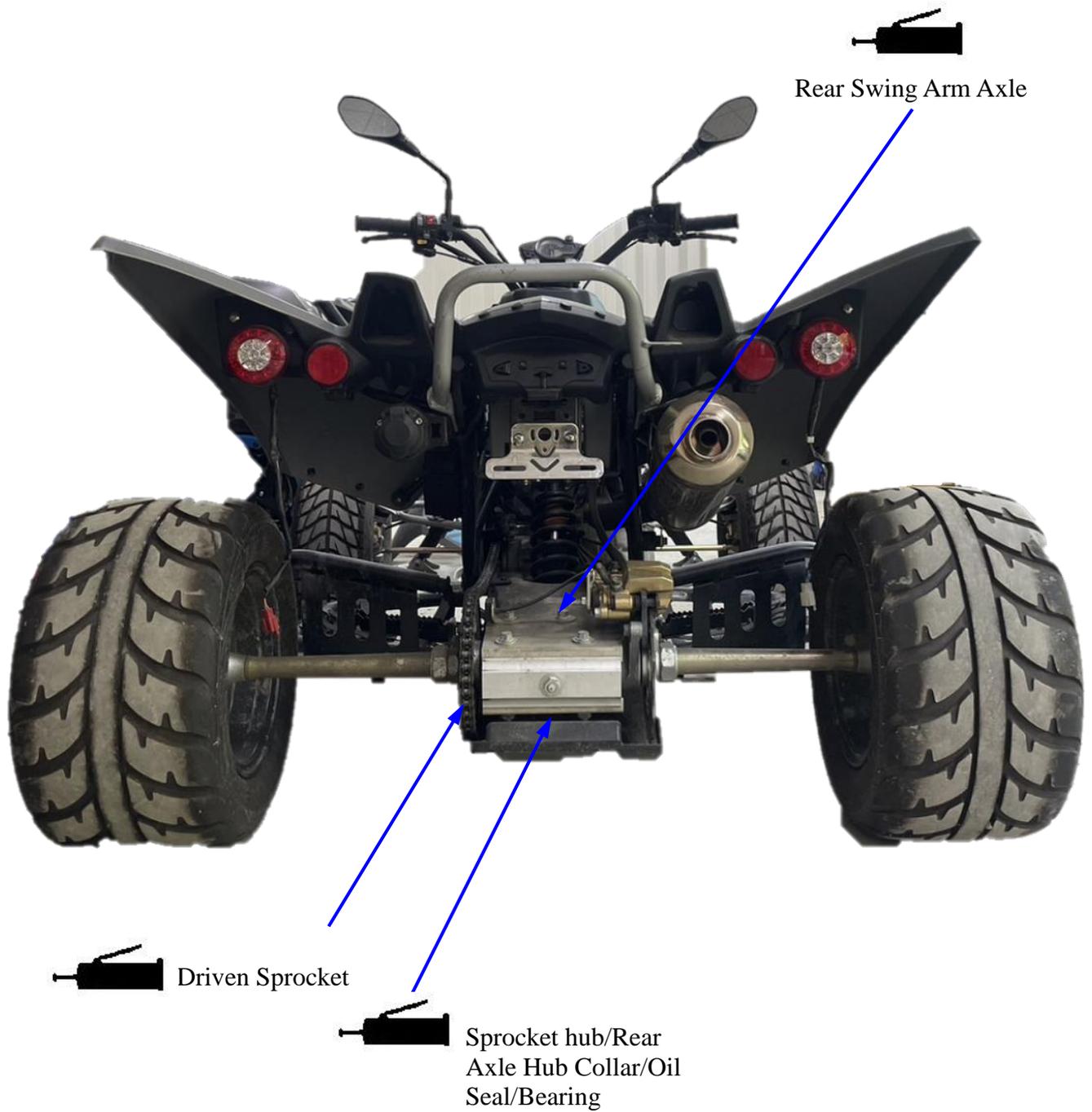
Use general purpose grease for parts not listed.

Apply clean engine oil or grease to cables and movable parts not specified.

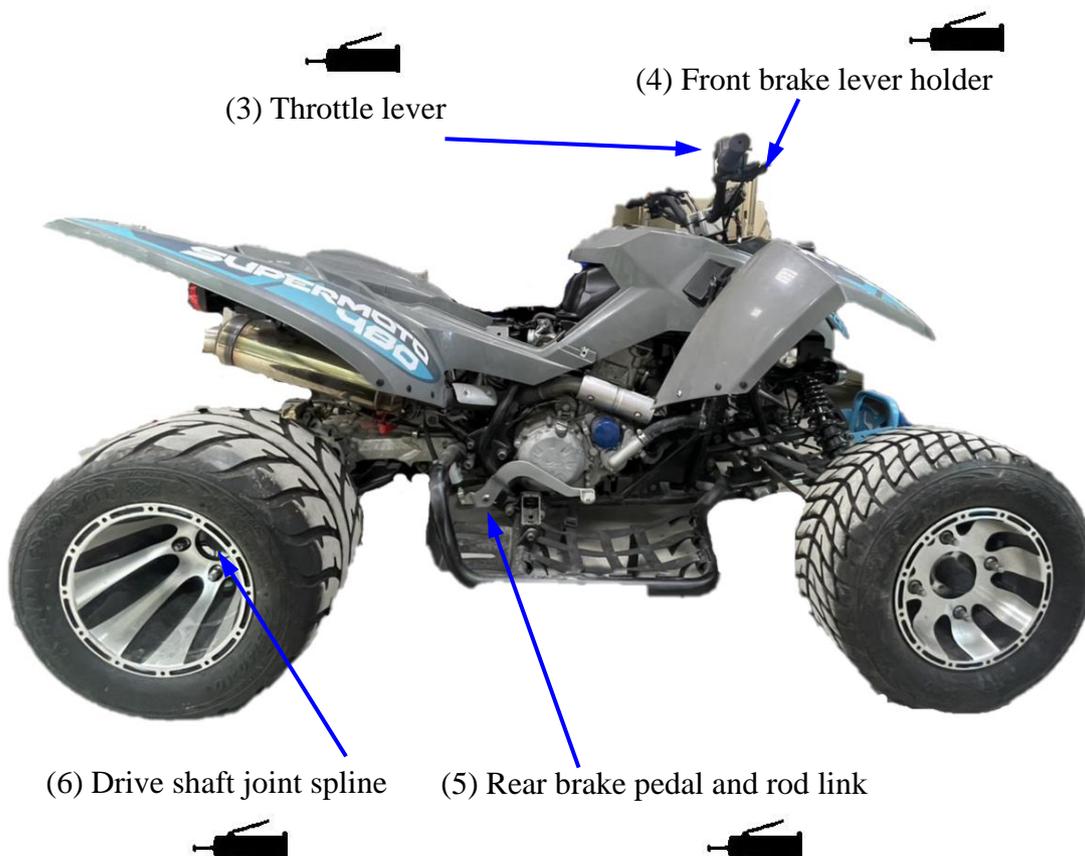
This will avoid abnormal noise and rise the durability of the ATV.



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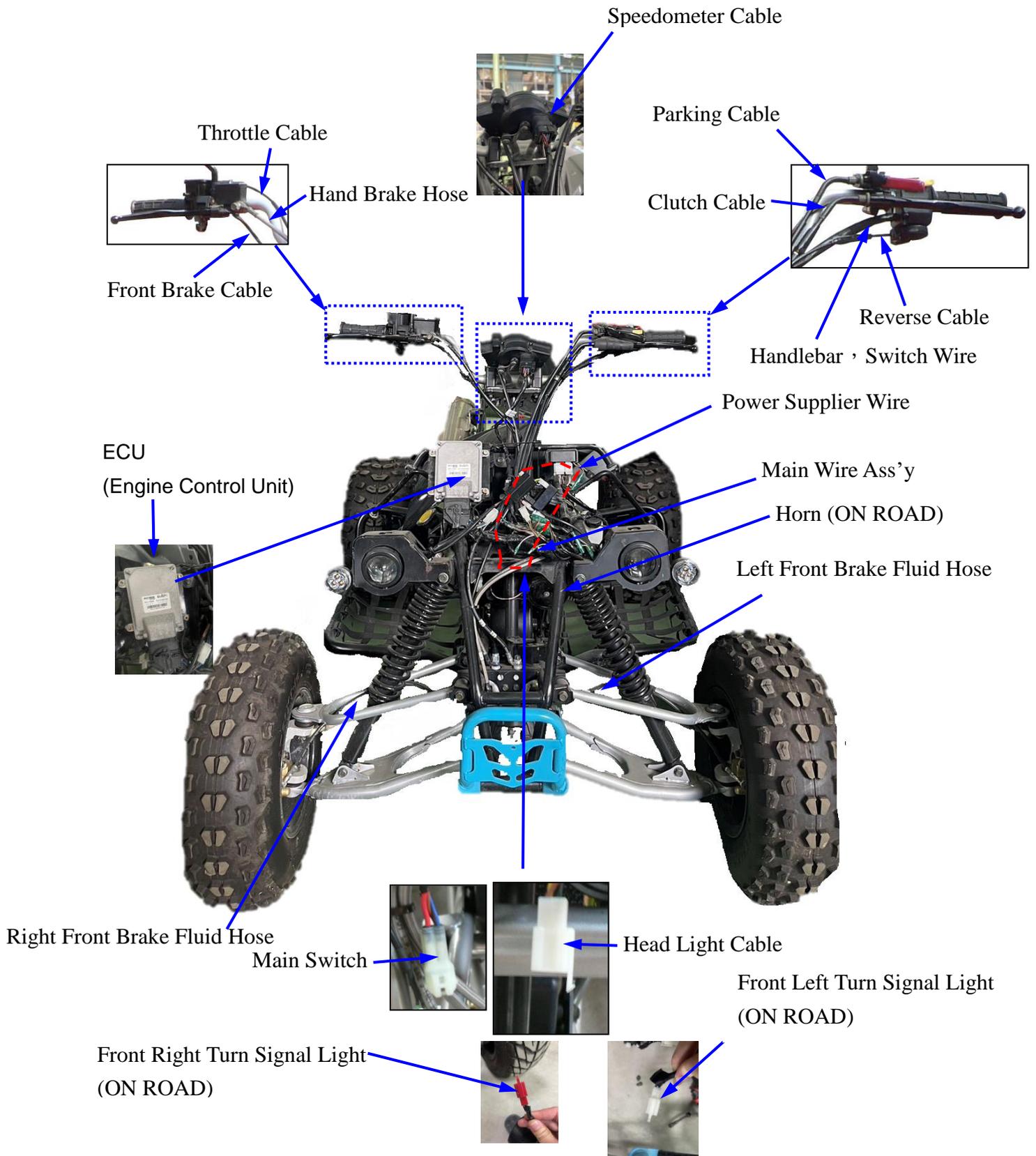


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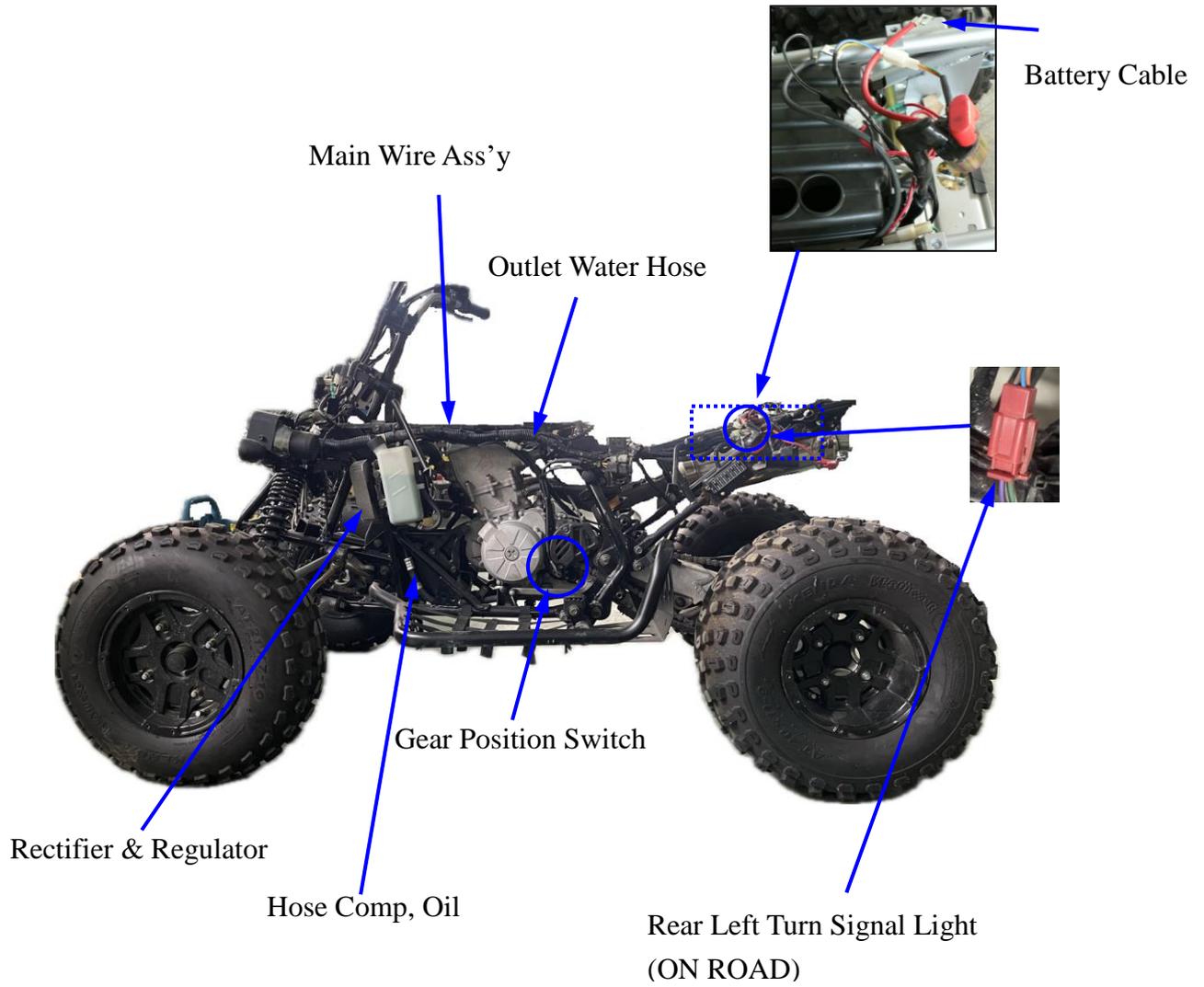


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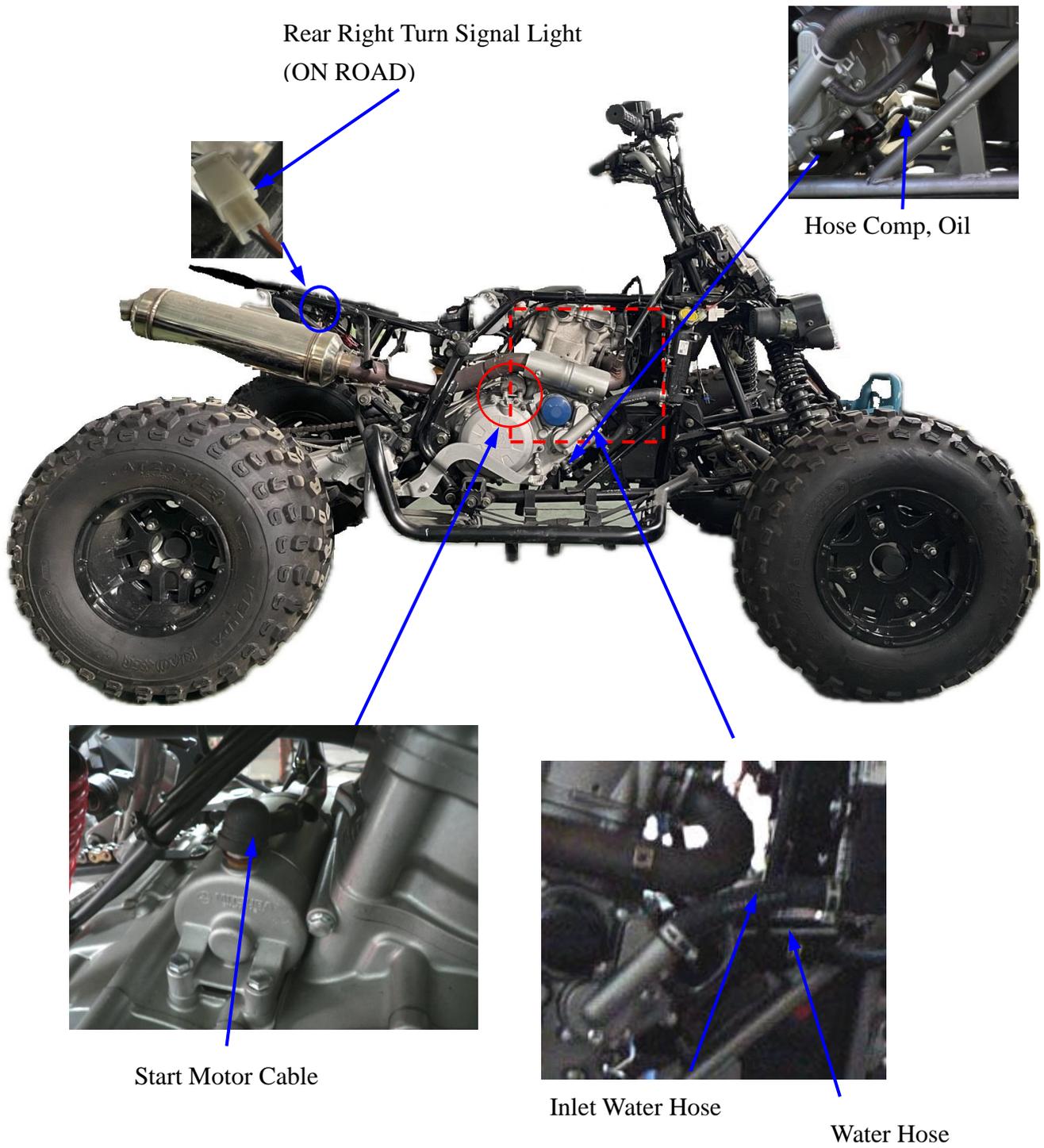
## CABLE & HARNESS ROUTING



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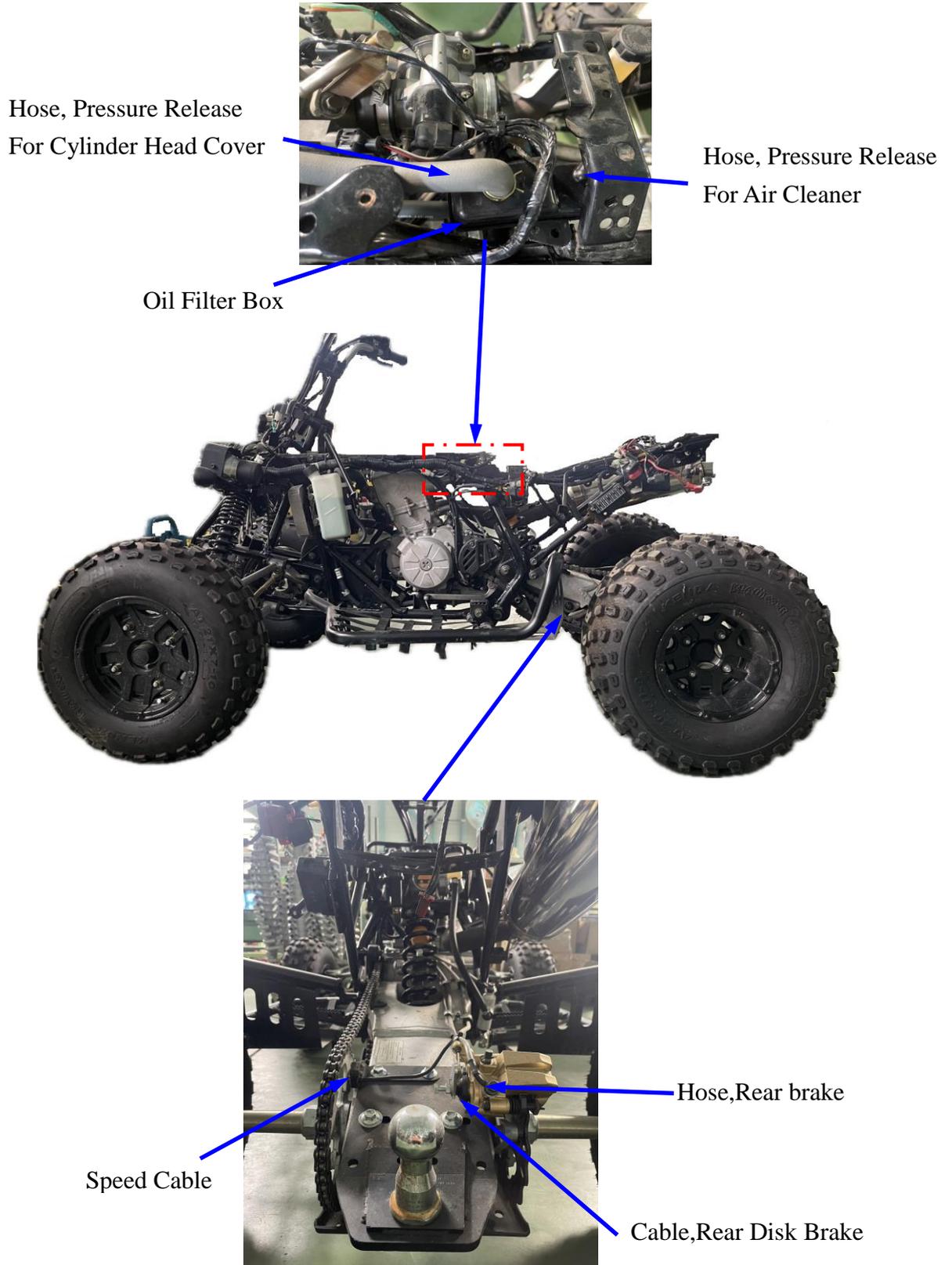


Footbrake Switch Wire

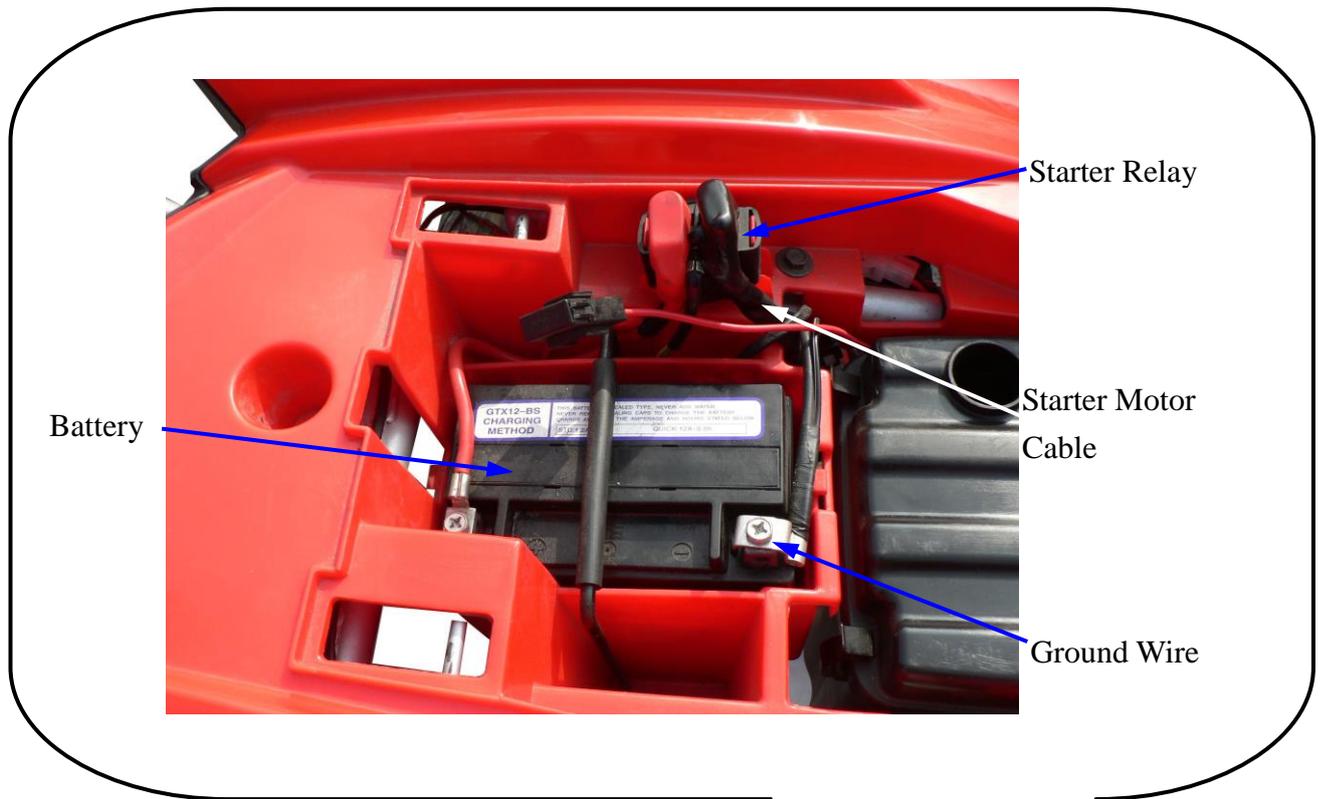


Hose, Foot brake  
Hydraulic Pump

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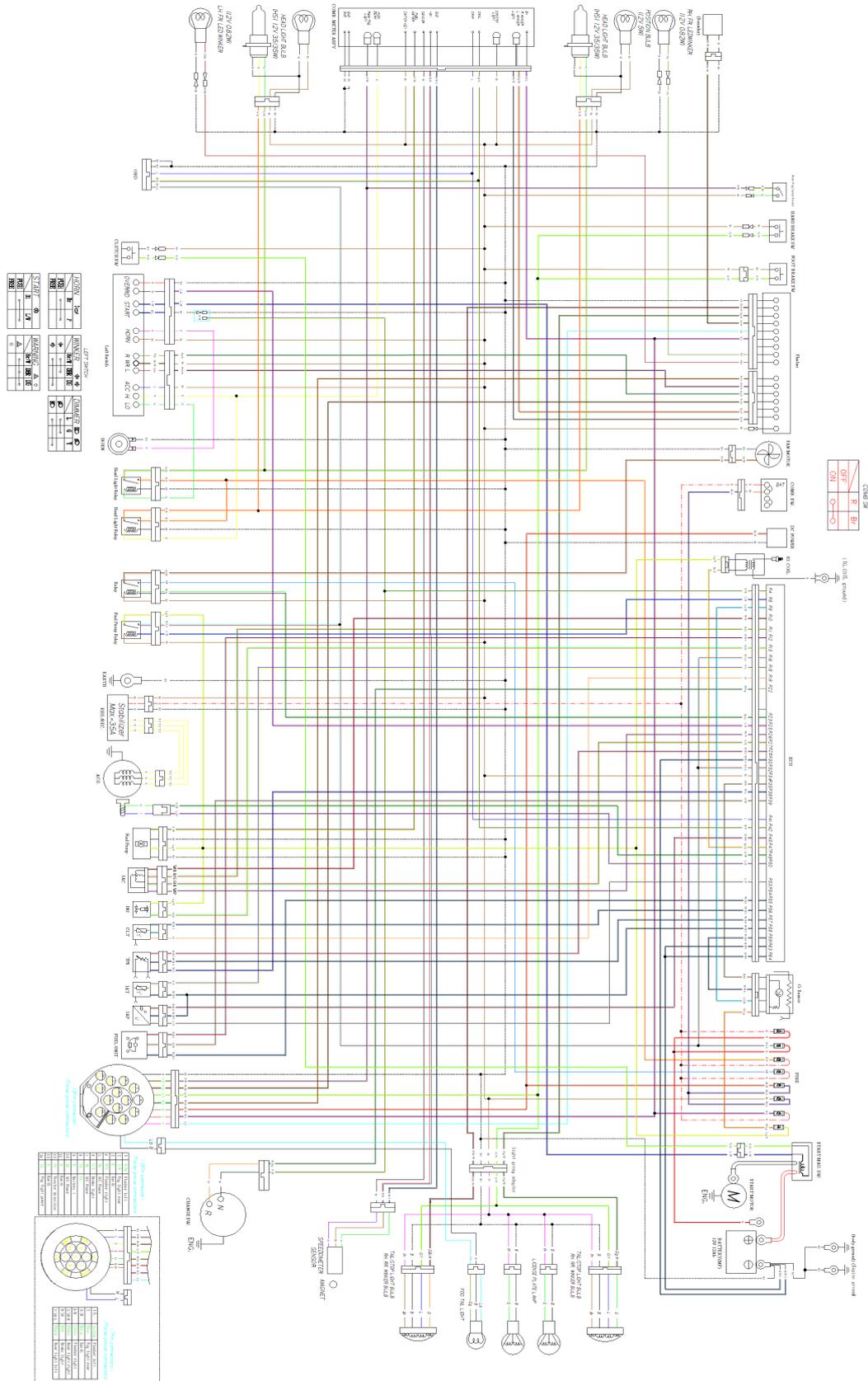


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## WIRING DIAGRAM (ON ROAD)



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## TROUBLESHOOTING

### ENGINE

Complaint	Symptom and possible causes	Remedy
Engine will not start, or is hard to start	<p><b>Compression too low</b></p> <ol style="list-style-type: none"> <li>1. Valve clearance out of adjustment</li> <li>2. Worn valve guides or poor seating of valve</li> <li>3. Valve mistiming</li> <li>4. Piston rings excessively worn</li> <li>5. Worn-down cylinder bore</li> <li>6. Poor seating of spark plug</li> <li>7. Starter motor cranks but too slowly</li> </ol> <p><b>Plug not sparking</b></p> <ol style="list-style-type: none"> <li>1. Fouled spark plug</li> <li>2. Wet spark plug</li> <li>3. Defective ignition coil</li> <li>4. Open or short circuit in high tension cord</li> <li>5. Defective magneto</li> <li>6. Defective igniter</li> </ol>	<p>Adjust</p> <p>Repair or replace</p> <p>Adjust</p> <p>Replace</p> <p>Replace or rebore</p> <p>Retighten</p> <p>Consult "electrical complaints"</p> <p>Clean or replace</p> <p>Clean and dry</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p>
Engine stalls easily	<ol style="list-style-type: none"> <li>1. Fouled spark plug</li> <li>2. Clogged fuel hose</li> <li>3. Valve clearance out of adjustment</li> </ol>	<p>Clean</p> <p>Clean</p> <p>Adjust</p>
Noisy engine	<p><b>Excessive valve chatter.</b></p> <ol style="list-style-type: none"> <li>1. Valve clearance too large</li> <li>2. Weakened or broken valve springs</li> <li>3. Worn down camshaft</li> </ol>	<p>Adjust</p> <p>Replace</p> <p>Replace</p>

# 1.GENERAL INFORMATION

Complaint	Symptom and possible causes	Remedy
Noisy engine	<p><b>Noise appears to come from piston</b></p> <ol style="list-style-type: none"> <li>1. Piston cylinder worn down</li> <li>2. Weakened or broken valve springs</li> <li>3. Worn down piston pin or piston pin bore</li> <li>4. Piston rings or ring groove worn.</li> </ol> <p><b>Noise seems to come from camshaft drive chain</b></p> <ol style="list-style-type: none"> <li>1. Stretched camshaft drive chain</li> <li>2. Worn camshaft sprockets</li> <li>3. Cam chain tensioner adjuster not working</li> </ol> <p><b>Noise seems to come from clutch</b></p> <ol style="list-style-type: none"> <li>1. Worn splines of countershaft or hub</li> <li>2. Worn teeth of clutch plates</li> <li>3. Distorted clutch plates, driven and drive</li> </ol> <p><b>Noise seems to come from crankshaft</b></p> <ol style="list-style-type: none"> <li>1. Worn or broken bearings</li> <li>2. Big-end bearings worn and broken</li> <li>3. Thrust clearance too large</li> </ol> <p><b>Noise seems to come from transmission</b></p> <ol style="list-style-type: none"> <li>1. Gears worn or rubbing</li> <li>2. Badly worn splines</li> <li>3. Primary gears worn or rubbing</li> <li>4. Badly worn bearings</li> </ol> <p><b>Noise seems to come from water pump</b></p> <ol style="list-style-type: none"> <li>1. Too much play on pump shaft bearing</li> <li>2. Worn or damaged impeller shaft</li> <li>3. Contact between pump case and impeller</li> </ol>	<p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace or replace</p> <p>Replace</p>
Slipping clutch	<ol style="list-style-type: none"> <li>1. Clutch control out of adjustment or too much play</li> <li>2. Weakened clutch springs</li> <li>3. Worn or distorted pressure plate</li> <li>4. Distorted clutch plates, driven and drive</li> </ol>	<p>Adjust</p> <p>Replace</p> <p>Replace</p> <p>Replace</p>

# 1.GENERAL INFORMATION

Complaint	Symptom and possible causes	Remedy
Dragging clutch	<ol style="list-style-type: none"> <li>1. Clutch control out of adjustment or too much play</li> <li>2. Weakened clutch springs</li> <li>3. Distorted clutch plates, driven and drive</li> </ol>	<p>Adjust</p> <p>Replace</p> <p>Replace</p>
Transmission will not shift	<ol style="list-style-type: none"> <li>1. Broken gearshift cam</li> <li>2. Distorted gearshift forks</li> <li>3. Worn gearshift pawl</li> </ol>	<p>Replace</p> <p>Replace</p> <p>Replace</p>
Transmission will not shift back	<ol style="list-style-type: none"> <li>1. Broken return spring on shift shaft</li> <li>2. Shift shaft are rubbing or sticky</li> <li>3. Distorted or worn gearshift forks</li> </ol>	<p>Replace</p> <p>Repair</p> <p>Replace</p>
Transmission jumps out of gear	<ol style="list-style-type: none"> <li>1. Worn shifting gears on driveshaft or countershaft</li> <li>2. Distorted or worn gearshift forks</li> <li>3. Weakened stopper pawl spring on gearshift cam</li> <li>4. Worn gearshift pawl</li> </ol>	<p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p>
Engine idles poorly	<ol style="list-style-type: none"> <li>1. Valve clearance out of adjustment</li> <li>2. Poor seating of valves</li> <li>3. Defective valve guides</li> <li>4. Defective pick-up coil</li> <li>5. Spark plug gap too wide</li> <li>6. Defective ignition coil resulting in weak sparking</li> <li>7. Clogged jets</li> </ol>	<p>Adjust</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Adjust or replace</p> <p>Replace</p> <p>Clean</p>
Engine runs poorly in high speed range	<ol style="list-style-type: none"> <li>1. Valve spring weakened</li> <li>2. Valve timing out of adjustment</li> <li>3. Worn cams</li> <li>4. Spark plug gap too narrow</li> <li>5. Defective ignition coil</li> <li>6. Float-chamber fuel level too low</li> <li>7. Clogged air cleaner element</li> </ol>	<p>Replace</p> <p>Adjust</p> <p>Replace</p> <p>Repair</p> <p>Replace</p> <p>Adjust</p> <p>Clean</p>
Dirty or heavy exhaust smoke	<ol style="list-style-type: none"> <li>1. Too much engine oil in the engine</li> <li>2. Worn piston rings or cylinder</li> <li>3. Worn valve guides</li> <li>4. Cylinder wall scored or scuffed</li> <li>5. Worn valve stems</li> <li>6. Defective stem seals</li> <li>7. Worn side rails</li> </ol>	<p>Check with inspection window, drain out excess oil</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p>

# 1.GENERAL INFORMATION

Complaint	Symptom and possible causes	Remedy
Engine lacks power	<ol style="list-style-type: none"> <li>1. Loosen of valve clearance</li> <li>2. Weakened valve springs</li> <li>3. Valve timing out of adjustment</li> <li>4. Worn piston rings or cylinder</li> <li>5. Poor seating of valve</li> <li>6. Fouled spark plug</li> <li>7. Worn camshaft</li> <li>8. Spark plug gap incorrect</li> <li>9. Float-chamber fuel level out of adjustment</li> <li>10. Clogged air cleaner element</li> <li>11. Too much engine oil</li> <li>12. Defective air intake pipe</li> </ol>	Adjust Replace Adjust Replace Repair or replace Clean or replace Replace Adjust or replace Adjust  Clean Drain out excess oil Retighten or replace
Engine overheats	<ol style="list-style-type: none"> <li>1. Heavy carbon deposit on piston head</li> <li>2. Not enough oil in the engine</li> <li>3. Defective oil pump or clogged oil circuit</li> <li>4. Fuel level too low in float chamber</li> <li>5. Air leak from intake pipe</li> <li>6. Use of incorrect engine oil</li> <li>7. Defective cooling system</li> </ol>	Clean Add oil Repair or replace  Adjust Retighten or replace Change See “cooling system” section
No sparking or poor sparking.	<ol style="list-style-type: none"> <li>1. Defective ignition coil</li> <li>2. Defective spark plug</li> <li>3. Defective igniter</li> </ol>	Replace Replace Replace
Spark plug soon becomes fouled with carbon.	<ol style="list-style-type: none"> <li>1. Mixture too rich</li> <li>2. Idling speed set too high</li> <li>3. Incorrect gasoline</li> <li>4. Dirty element in air cleaner</li> <li>5. Spark plug too cold</li> </ol>	Adjust ECU Adjust ECU Change Clean or replace Replace by hot type plug
Spark plug become fouled too soon.	<ol style="list-style-type: none"> <li>1. Worn piston rings</li> <li>2. Pistons or cylinder worn</li> <li>3. Excessive clearance of valve stems in valve guides</li> <li>4. Worn stem oil seal</li> </ol>	Replace Replace Replace  Replace
Spark plug electrodes overheat or bum.	<ol style="list-style-type: none"> <li>1. Spark plug too hot</li> <li>2. The engine overheats</li> <li>3. Spark plug loose</li> <li>4. Mixture too lean</li> </ol>	Replace by cold type plug Tune up Retighten Adjust ECU

## **2.FRAME COVERS/EXHAUST MUFFLER**

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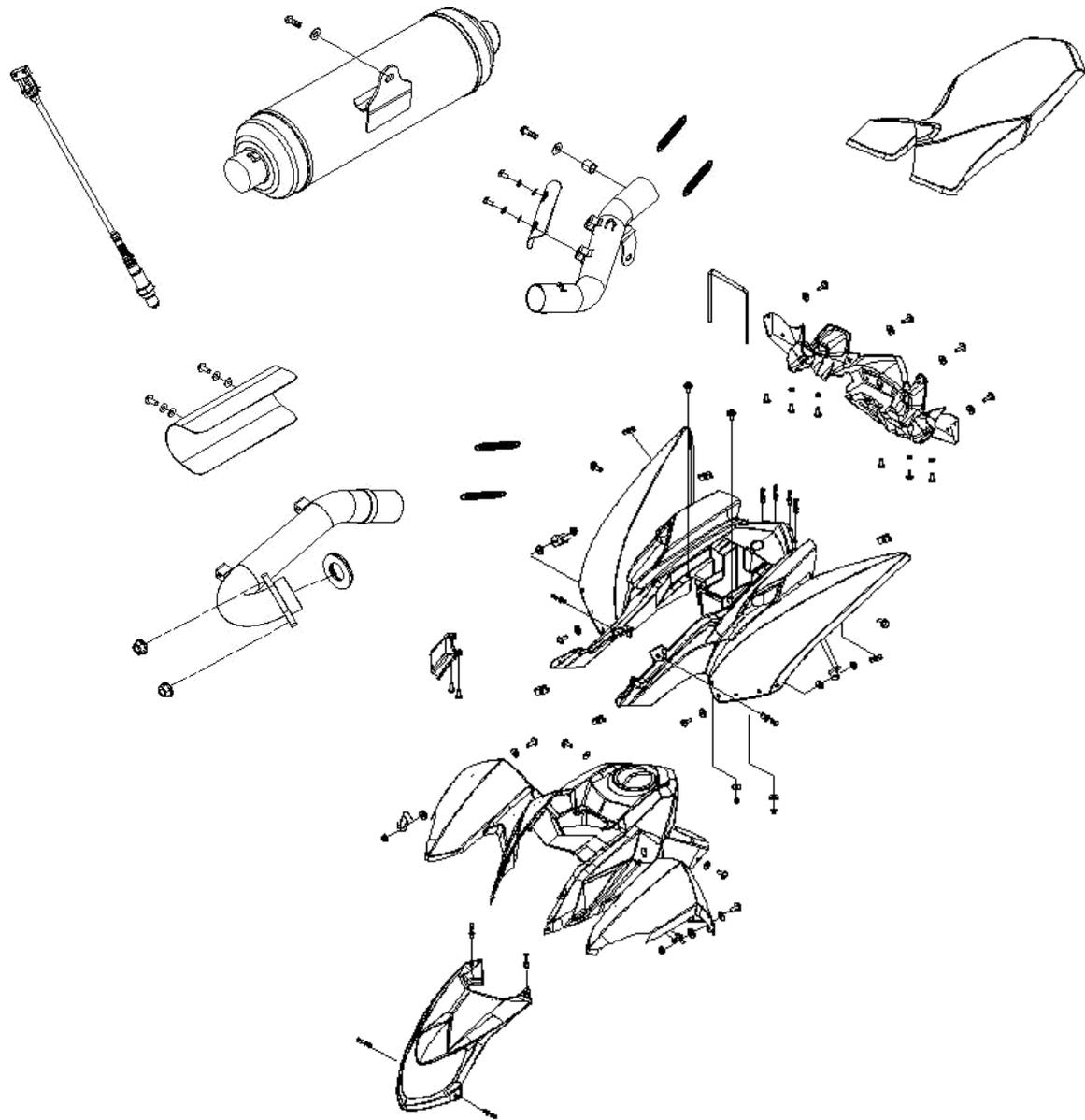
### **FRAME COVERS/EXHAUST MUFFLER**

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TROUBLESHOOTING .....	2-2
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EXHAUST MUFFLER REMOVAL .....	2-9

## 2.FRAME COVERS/EXHAUST MUFFLER

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## **2.FRAME COVERS/EXHAUST MUFFLER**

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### **SERVICE INFORMATION**

#### **GENERAL INSTRUCTIONS**

- When removing frame covers, use special care not to pull them by force because the cover joint claws may be damaged.
- Make sure to route cable and harnesses according to the cable and harness routing.

#### **TORQUE VALUES**

Exhaust muffler lock bolt	4.0 kgf-m (40 Nm, 29 lbf-ft)
Exhaust muffler lock nut	2.0 kgf-m (20 Nm, 14.4 lbf-ft)

#### **TROUBLESHOOTING**

##### **Noisy exhaust muffler**

- Damaged exhaust muffler
- Exhaust muffler joint air leaks

##### **Lack of power**

- Caved exhaust muffler
- Exhaust muffler air leaks
- Clogged exhaust muffler

## 2.FRAME COVERS/EXHAUST MUFFLER

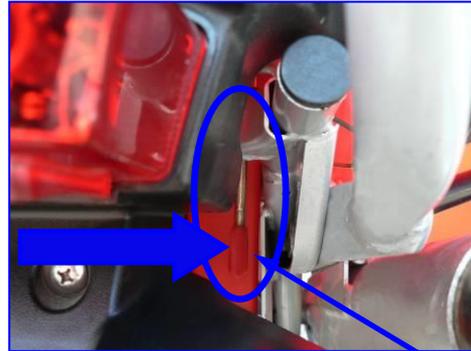
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### FRAME COVERS

#### SEAT REMOVAL

Pull the lever rear and pull up the seat at the rear.

Remove the seat.



Lever

Seat

#### INSTALLATION

To install the seat, align the tabs on the seat with the grommets on the frame and press the seat down until it locks.

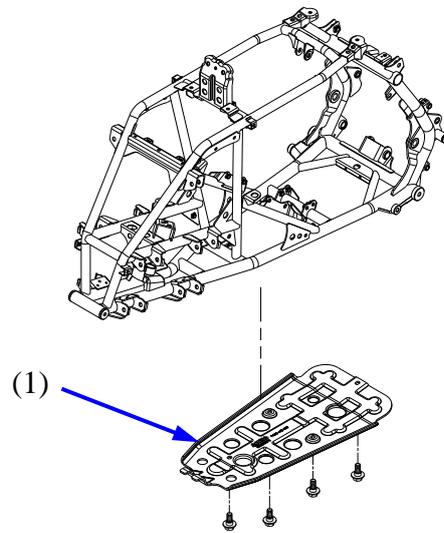


## 2.FRAME COVERS/EXHAUST MUFFLER

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### RIGHT/LEFT FOOTBOARD REMOVAL/INSTALLATION

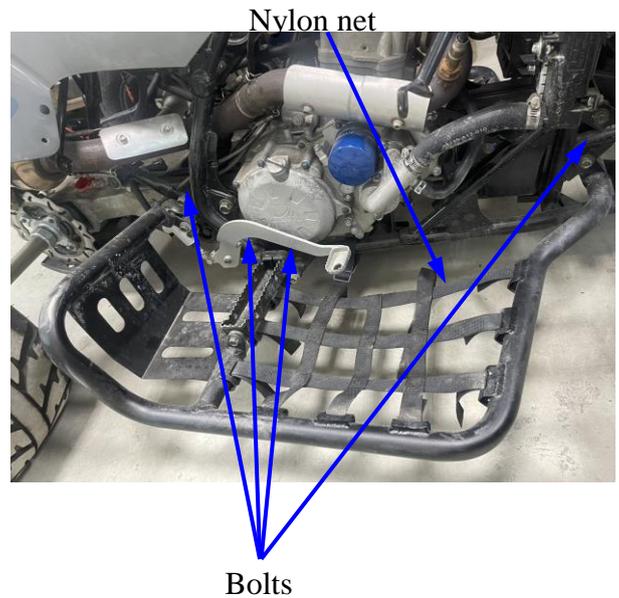
Remove the engine under cover (1).



Remove 3 mounting bolts and nylon net.

\* During removal, do not pull the joint claws forcedly to avoid damage.

Installation is in the reverse order of removal.

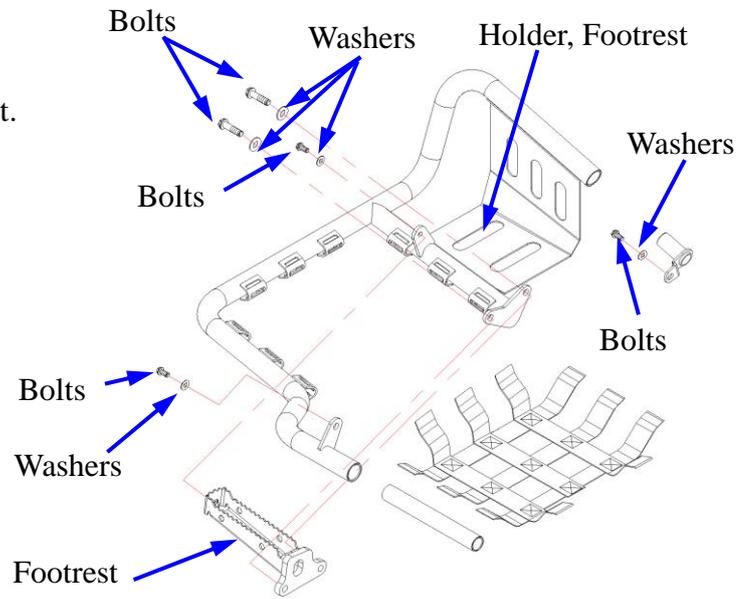


## 2.FRAME COVERS/EXHAUST MUFFLER

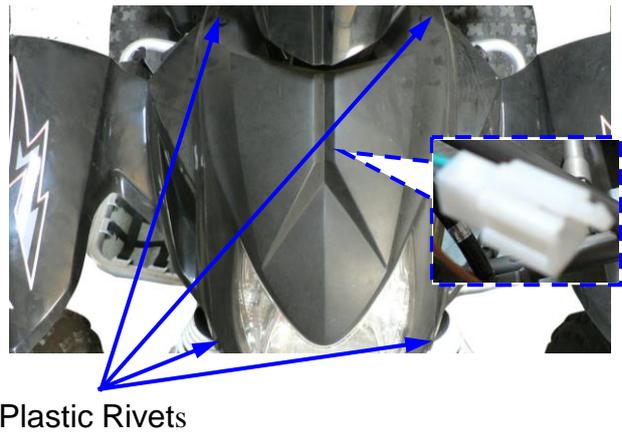
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Remove 2 Bolts and 2 Washers.  
Remove the right (left) Holder, Footrest.

Remove 3 Bolts and 3 Washers.  
Remove the right (left) Footrest



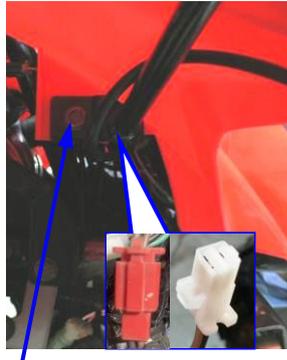
Remove the 4 plastic rivets and 2 headlight connector.



## 2.FRAME COVERS/EXHAUST MUFFLER

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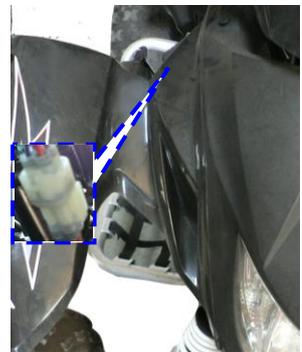
Remove the bolts from the support bracket, and remove the right & left signal light connector, main switch connector.



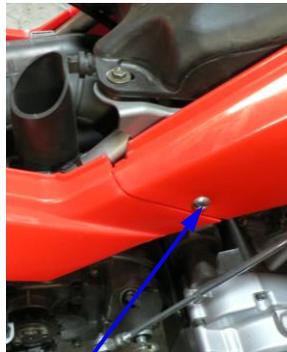
Bolt



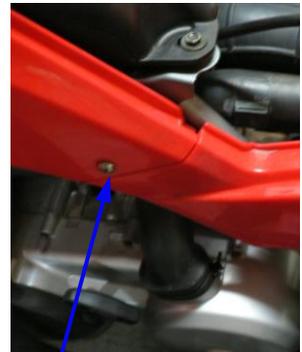
Bolt



Remove the screws from the 2 side fenders.



Screw



Screw

Remove the 2 bolts.



Bolts

## 2.FRAME COVERS/EXHAUST MUFFLER

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Remove the plastic rivet from the rear fender.



Plastic Rivet



Plastic Rivet

Remove the 2 bolts from support under rear fender and right and left signal light, tail light connector.



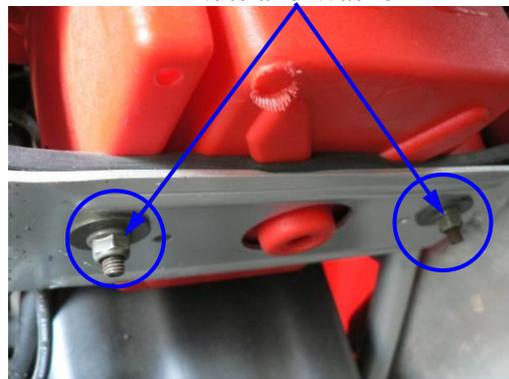
Bolt



Bolt

Remove the 2 nuts and washer.  
Remove the fixing bracket.

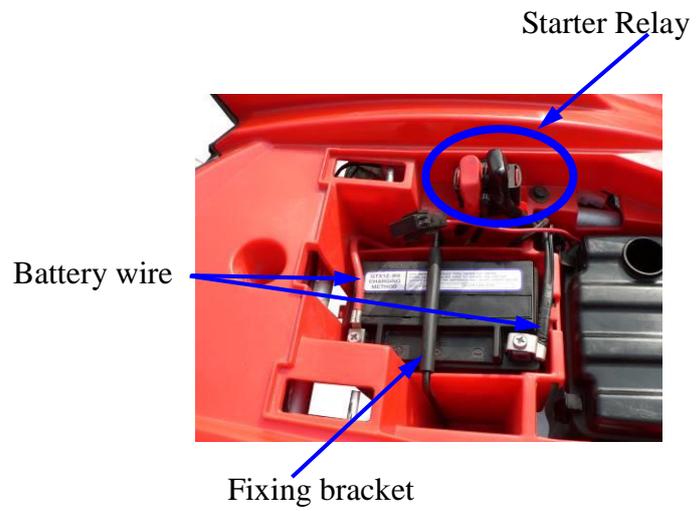
Nuts and Washer



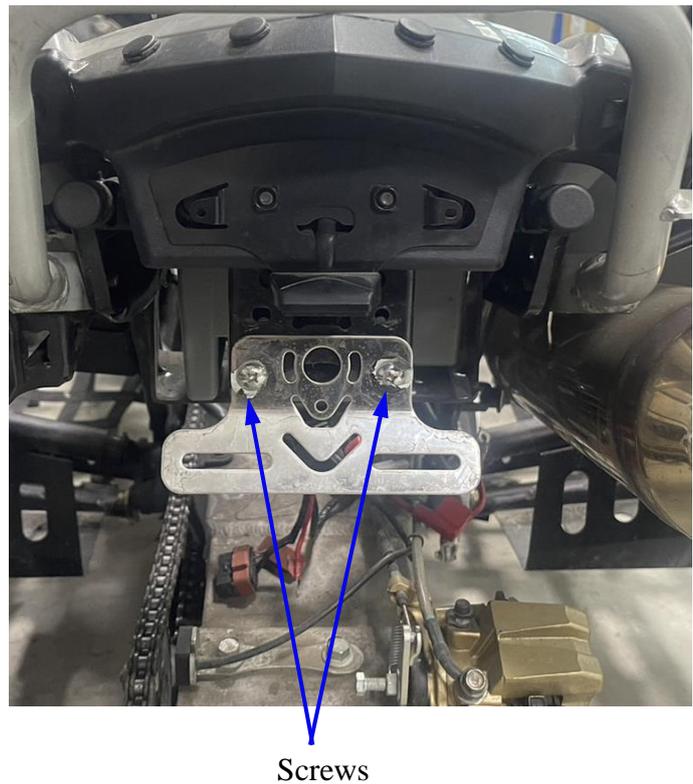
## 2.FRAME COVERS/EXHAUST MUFFLER

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Remove the battery wire.  
Remove the battery.



Remove the 2 screws from rear cover fender.



## 2.FRAME COVERS/EXHAUST MUFFLER

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### EXHAUST MUFFLER

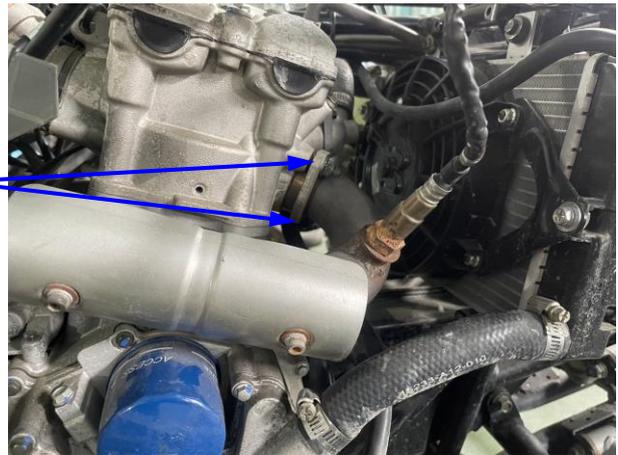
#### REMOVAL/INSTALLATION

Remove the exhaust pipe joint

Exhaust muffler lock nut:

2 kgf-m (20 Nm, 14.4 lbf-ft)

nuts



Remove the muffler mounting bolt, spring and exhaust muffler.

Bolt



Springs

Inspect the gasket.

If the exhaust gas leaks the gasket should be replaced.

Bolt



Installation is in the reverse order of removal.

#### Torque

Exhaust muffler lock bolt:

4.5 kgf-m (45 Nm, 32 lbf-ft)

Springs



\* Be sure to install a new exhaust gasket.

# 3.INSPECTION/ADJUSTMENT

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## INSPECTION/ADJUSTMENT

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# 3.INSPECTION/ADJUSTMENT

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## SERVICE INFORMATION

### GENERAL

<b>WARNING</b>
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- |  |
|--|
| <ul style="list-style-type: none"><li>● Before running the engine, make sure that the working area is well-ventilated.</li><li>● Never run the engine in a close area.</li><li>● The exhaust contains poisonous carbon monoxide gas which may cause death to people.</li><li>● Gasoline is extremely flammable and is explosive under some conditions.</li><li>● The working area must be well-ventilated and do not smoke or allow flames or sparks near the working area or fuel storage area.</li></ul> |
|--|

### SPECIFICATIONS

#### ENGINE

Throttle grip free play: 3~5 mm (0.12~0.20 in)

Spark plug gap : 0.7~0.8 mm (0.028~0.032 in)

Spark plug (Standard) : CR8E

Valve clearance : IN: 0.10~0.15 mm (0.004~0.006in)

EX: 0.15~0.20 mm (0.006~0.008in)

Idle speed : 1800± 100rpm

Engine oil capacity:

Full capacity: 2.8 liter

Oil change : 2.6 liter

Oil and filter change : 2.7 liter

Cylinder compression : 16± 2 kg/cm<sup>2</sup> at 500rpm

Ignition timing : 6° B.T.D.C. at 1500rpm

#### TIRE PRESSURE

	1 Rider
Front	0.32 kgf/cm <sup>2</sup> (35 Kpa, 5 psi)
Rear	0.32 kgf/cm <sup>2</sup> (35 Kpa, 5 psi)

#### TIRE SIZE:

Front : 21\*7-10

Rear : 20\*11-9 or 20\*11-10

#### TORQUE VALUES

Front wheel nut 4.5 kgf-m (45 Nm, 32 lbf-ft)

Rear wheel nut 4.5 Kgf-m (45 Nm, 32 lbf-ft)

# 3.INSPECTION/ADJUSTMENT

## ■ MAINTENANCE SCHEDULE

This chapter includes all information necessary to perform recommended inspections and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to vehicles already in service as well as new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

ITEM	CHECK OR MAINTENANCE JOB	WHICHEVER COMES FIRST	INITIAL		EVERY		
			mi	200	600	600	1200
			km	300	1000	1000	2000
			MONTH	1	3	3	6
Engine oil	● Replace (Warm engine before draining)			○	○	○	○
Engine oil filter cartridge	● Replace			○	○	○	○
★ Clutch	● Check operation/Adjust if necessary.			○			○
Spark plug	● Check condition. ● Adjust gap and clean. ● Replace if necessary.			○	○	○	○
Coolant	● Check coolant leakage. ● Replace if necessary. ● Replace coolant			○	○	○	○
				Every 24 months.			
Battery	● Check specific gravity. ● Check breather hose for proper operation. ● Correct if necessary.			○	○	○	○
Spark arrester	● Clean				○	○	○
Air filter element (for engine and *V-belt compartment)	● Clean. ● Replace if necessary.			Every 20~40 hours (150~300km, 100~200 mi) (More often in wet or dusty areas.)			
★ Carburetor	● Check idle speed/starter operation.and adjust if necessary			○	○	○	○
★ Cylinder head cover breather system	● Check breather hose for cracks or damage. ● Replace if necessary.				○	○	○
★ Exhaust system	● Check leakage. ● Retighten if necessary. ● Replace gasket if necessary.					○	○
Fuel line	● Check fuel hose for cracks or damage, and replace if necessary.					○	○
★ V-belt	● Check operation. ● Replace if damage or excessive wear.			○	○	○	○
★ Valves	● Check valve clearance. ● Adjust if necessary.			○	○	○	○
Brake	● Check operation and correct. ● Check fluid level and ATV for fluid leakage.. ● Replace brake pads.			○	○	○	○
				Whenever worn to the limit			
★ Brake hose	● Check for cracks or other damage. ● Replace if necessary. ● Replace				○	○	○
				Every 4 years.			
Wheels	● Check balance/damage/ runout. ● Replace if necessary.			○	○	○	○
★ Wheel bearings	● Check bearing assembly for looseness/damage. ● Replace if damaged.			○	○	○	○
★ Tire	● Check tread depth and for damage,and replace if necessary. ● Check air pressure and balance,and correct if necessary.			○	○	○	○

# 3.INSPECTION/ADJUSTMENT

ITEM	CHECK OR MAINTENANCE JOB	WHICHEVER COMES FIRST	INITIAL		EVERY		
			mi	200	600	600	1200
			km	300	1000	1000	2000
			MONTH	1	3	3	6
Knuckle pivots and shafts Steering shaft	● Lubricate with lithium-soap-based grease.				○	○	
★ Axle boots	● Check for cracks or other damage. ● Replace brake pad if necessary.		○	○	○	○	
Moving parts and cables	● Lubricate				○	○	
Drive select lever safety system cable	● Check operation and adjust or replace if necessary.				○	○	
★ Throttle lever housing and cable	● Check operation and correct if necessary. ● Check throttle cable free play and adjust or replace if necessary. ● Lubricate throttle lever housing and cable.		○	○	○	○	
Steering system	● Check operation. ● Replace if damaged. ● Check toe-in. ● Adjust if necessary.		○	○	○	○	
★ Drive shaft universal joint	● Lubricate with lithium-soap-based grease.			○	○	○	
Upper and lower arm pivots	● Lubricate with lithium-soap-based grease.			○	○	○	
Chassis fasteners	● Make sure that all nuts, bolts, and screws are properly tightened.		○	○	○	○	
★ Shock absorber assemblies	● Check operation and correct if necessary. ● Check for oil leakage and replace if necessary.			○	○	○	
★ Stabilizer bushes	● Check for cracks or other damage. ● Replace brake pad if necessary.			○	○	○	
★ Fittings and Fasteners	● Check all chassis fittings and fasteners. ● Correct if necessary.		○	○	○	○	
Front and rear brake switches	● Check operation and correct if necessary.		○	○	○	○	
Lights and switches	● Check operation and correct if necessary. ● Adjust headlight beams.		○	○	○	○	

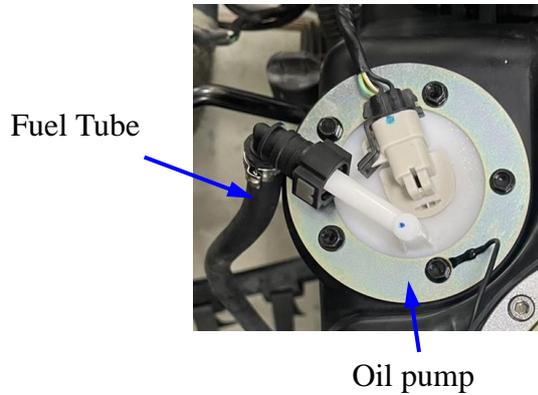
- In the interest of safety, we recommend with an asterisk these items should be serviced only by an authorized Access Motor dealer.
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake service
  - \* Regularly check and, if necessary, correct the brake fluid level.
  - \* Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
  - \* Replace the brake hoses every four years and if cracked or damaged.

# 3.INSPECTION/ADJUSTMENT

## FUEL LINE

Check the fuel tubes and replace any parts, which show signs of deterioration, damage or leakage.

\* Do not smoke or allow flames or sparks  
In your working area.



## THROTTLE OPERATION

Check the throttle to swing for smooth movement.

Measure the throttle to swing free play.

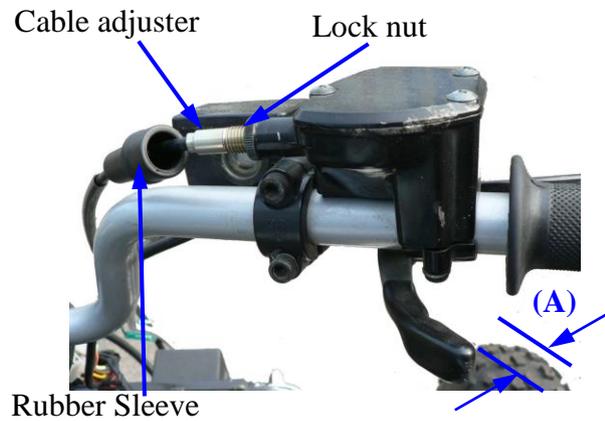
**Free Play (A):** 3~5 mm (0.12~0.20 in)

To adjust throttle free play:

Slide the rubber sleeve back to expose the Throttle cable adjuster.

Loosen the lock nut, then turn the adjuster To obtain the correct free play. (3~5 mm or 0.12~0.20 in)

Tighten the lock nut and reinstall sleeve.



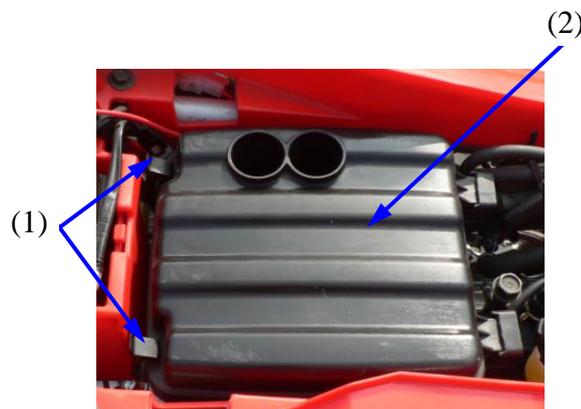
## AIR CLEANER

### AIR CLEANER REPLACEMENT

Remove the seat. (See page 2-3)

Unlatch the four retainer clips (1) and

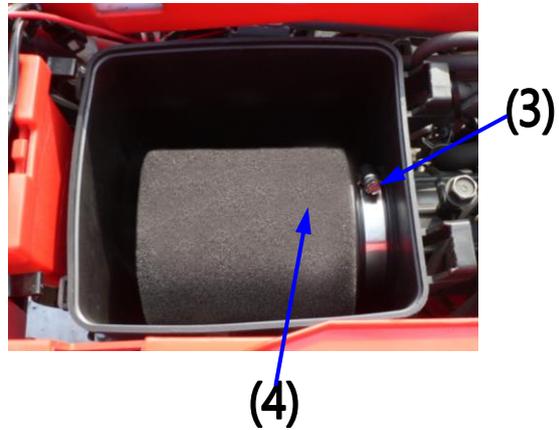
Remove the air cleaner cover (2).



# 3.INSPECTION/ADJUSTMENT

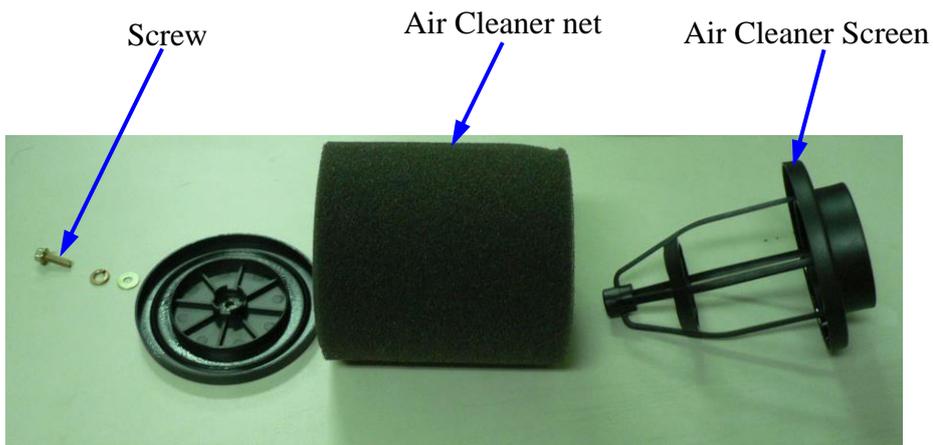
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Unscrew (3) screw and remove the air cleaner assembly (4) from the air cleaner box.



Remove the screw.  
Remove the air cleaner and air cleaner screen from the air cleaner body.  
Remove the air cleaner net from the air cleaner.

Reassemble by reversing the disassembly sequence.



# 3.INSPECTION/ADJUSTMENT

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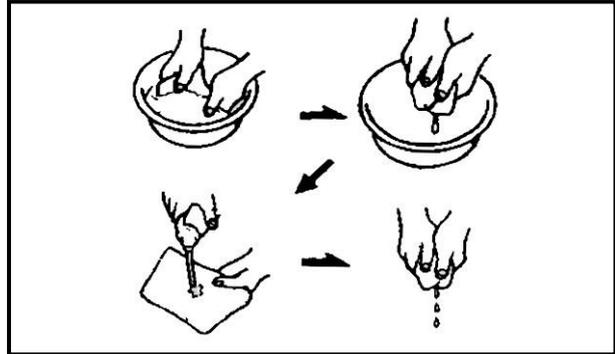
## CLEAN AIR FILTER ELEMENT

Wash the element gently, but thoroughly in solvent.

\*

Use parts cleaning solvent only.  
Never use gasoline or low flash point solvents.  
which may lead to a fire or explosion.

Squeeze the excess solvent out of the element and let dry.



\*

Do not twist or wring out the foam element.  
This could damage the foam material.

More frequent replacement is required when riding in unusually dusty or rainy areas.

## AIR CLEANER BOX DRAIN

Remove the drain tube (under air cleaner case) by removing the clip.

Drain the deposits.

Reinstall the drain tube, securing it with the clip.

Air Cleaner Box



Drain Tube

Clip

# 3.INSPECTION/ADJUSTMENT

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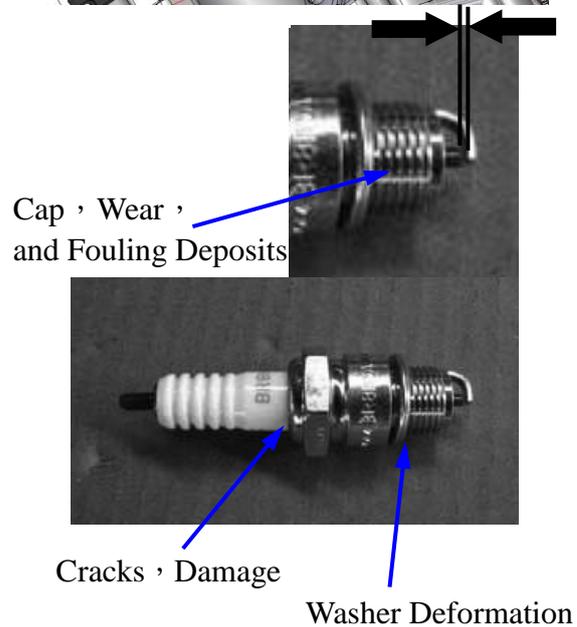
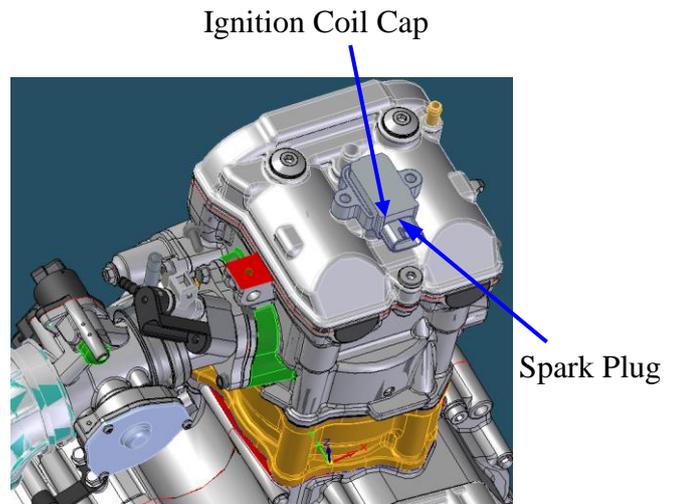
## SPARK PLUG

Remove ignition coil cap and spark plug.  
Check the spark plug for wear and fouling deposits.  
Clean any fouling deposits with a spark plug cleaner or a wire brush.

**Specified Spark Plug: CR8E**

Measure the spark plug gap.  
**Spark Plug Gap:** 0.7~0.8 mm  
(0.028~0.032 in)

\* When installing first screw in the spark plug by hand, and then tighten it with a spark plug wrench.



# 3.INSPECTION/ADJUSTMENT

## VALVE CLEARANCE

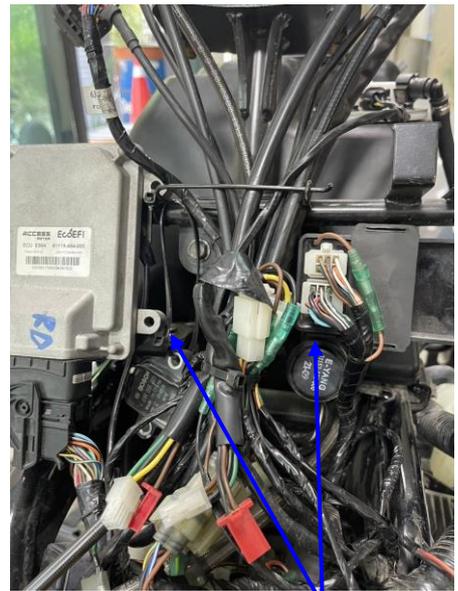
\* Inspect and adjust valve clearance while the engine is cold (below 35°C).  
The piston must be at top dead center (TDC) on the compression stroke in order to check or adjust the valve clearance.

Remove the seat.  
Remove the fender, front.  
Remove the cover fender, front.  
(See chapter 7)

Remove the four bolts,  
then remove the fuel tank.



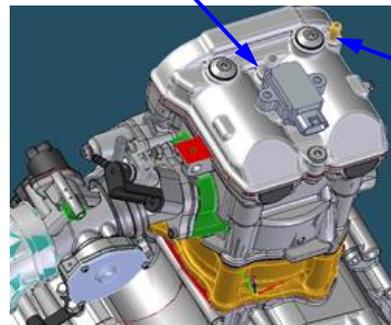
Bolts



Pressure release hose

Bolts

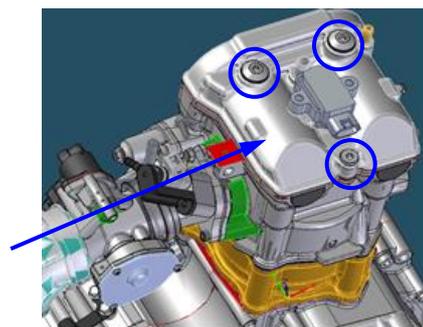
Remove the spark plug.  
Disconnect the pressure release hose  
and breather hose.



breather hose

Remove the screw and cylinder head cover.  
The valve clearance specification is different  
for both intake and exhaust valves.  
Valve clearance adjustment must be checked  
and adjusted:

cylinder head cover

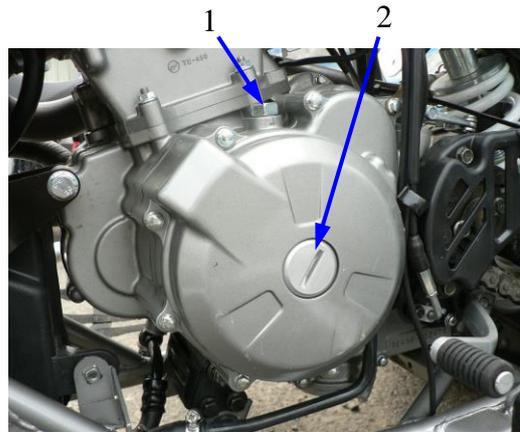


# 3.INSPECTION/ADJUSTMENT

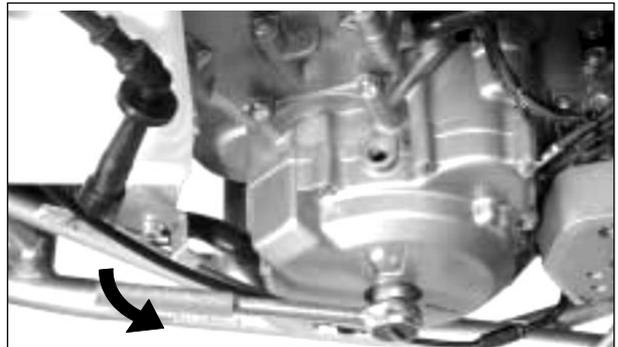
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At the time of periodic inspection  
when the valve mechanism is serviced,  
and when the camshafts are removed for servicing.

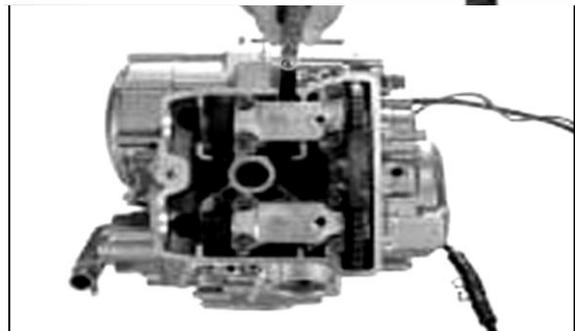
Remove the valve timing inspection plug 1.  
Remove the magneto cover cap 2.



Rotate the magneto rotor counter-clockwise  
with a socket wrench to set the piston at  
TDC on the compression stroke.  
(rotate the rotor until the “T” line on the  
magneto rotor is aligned with the triangle  
mark on the crankcase.)



To inspect the valve clearance, insert a  
thickness gauge between the tappet and camshaft.



Valve clearance	Standard (when cold)
IN.	0.10~0.15mm(0.004~0.006 in)
EX.	0.15~0.20mm(0.006~0.008 in)

### 3.INSPECTION/ADJUSTMENT

---

If the clearance is out of specification, first remove the cam chain tension adjuster, camshaft housing, camshaft.

To install the tappet shim at original position, record the shim NO. and clearance to present by “A”, “B”, “C”, “D” mark on the cylinder head.

Select the tappet that agree with tappet clearance (vertical line) and shim NO. (horizontal line) as refer to the tappet shim selection chart. (Refer to page 9-38&9-39)

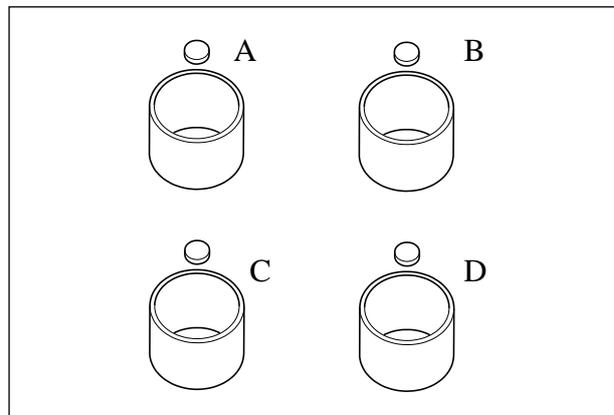
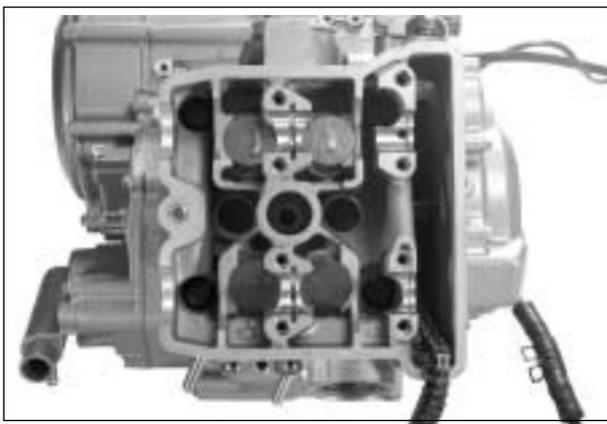
Adjust valve timing; install the camshaft housing and the tension adjuster.

After the crankshaft rotate about 10 times, measure the valve clearance.

If the clearance be not correct, adjust the standard clearance as the same manner above.

If case of valve adjustment which is not the tappet shim selection chart, please follow instructions of example in the below.

For example, the intake clearance is 0.4 and the shim is 270 (2.70 mm), select 295 (2.95 mm) of the shim which 270 (2.70 mm) of the shim add up standard 0.15 as the intake standard clearance 0.1~0.2mm



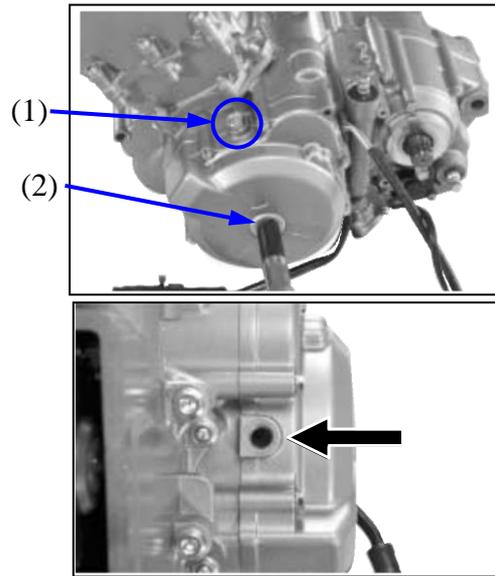
# 3.INSPECTION/ADJUSTMENT

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## IGNITION TIMING

\* Before removing the camshaft housing, the piston must be at TDC of the compression stroke.

Remove the valve timing inspection plug. (1).  
Remove the magneto cover cap (2) using the tool.  
Turn the magneto rotor until the “T” line on the magneto rotor is aligned with the triangle mark on the crankcase.



# 3.INSPECTION/ADJUSTMENT

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## CYLINDER COMPRESSION

Warm up the engine before compression test.

Remove the spark plug.

Insert a compression gauge.

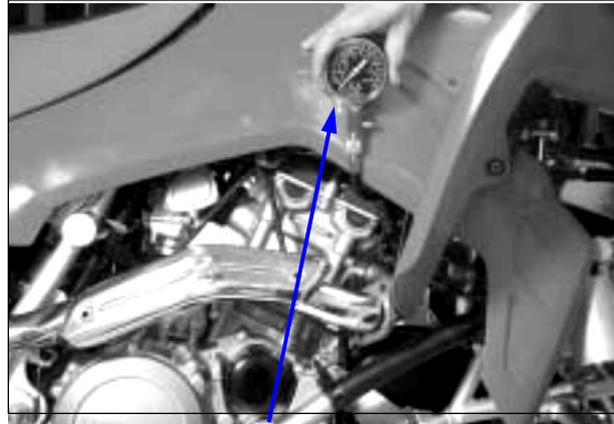
Open the throttle valve fully and push the starter button to test the compression.

**Compression:** 16 kg/cm<sup>2</sup>

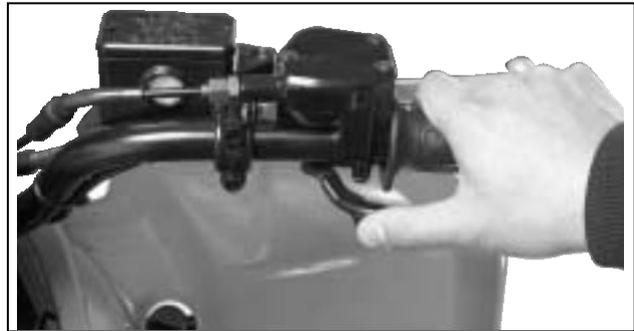
If the compression is low, check for the Following:

- Leaky valves
- Valve clearance too small
- Worn piston rings
- Worn piston/cylinder

If the compression is high, it indicates that carbon deposits have accumulated on the combustion chamber and the piston head.



Compression Gauge



## OIL PRESSURE

Check the engine oil pressure periodically.

This will give a good indication of the condition of the moving parts.

**Oil pressure : 1.0~3.0 kg/cm<sup>2</sup> (at 60°c , 3000rpm)**

If the oil pressure is lower or higher than the specification, the following causes maybe considered.

### Low oil pressure :

- Clogged oil filter
- Oil leakage from the oil passage
- Damaged O-ring
- Defective oil pump
- Combination of above items

### High oil pressure :

- Engine oil viscosity is too high
- Clogged oil passage
- Combination of above items

# 3.INSPECTION/ADJUSTMENT

---

## Oil pressure test procedure

Remove the oil check plug and install the adapter of oil pressure gauge at removed position.  
Connect an engine tachometer.

Warm up the engine as follows :

**Summer** : 10 min. at 2000rpm.

**Winter** : 20 min. at 2000rpm.

After warming up the engine, increase the engine speed to 3000rpm. (with the engine tachometer), and read the oil pressure gauge.



## ENGINE OIL AND OIL FILTER

The oil should be changed while the engine is warm.  
oil filter replacement at the above intervals, should be done together with the engine oil change.

### Engine oil replacement

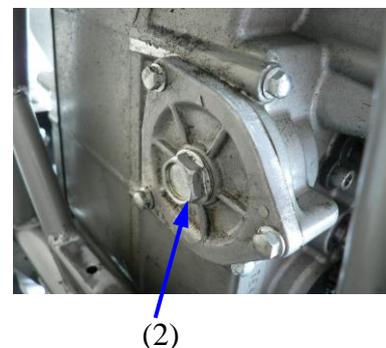
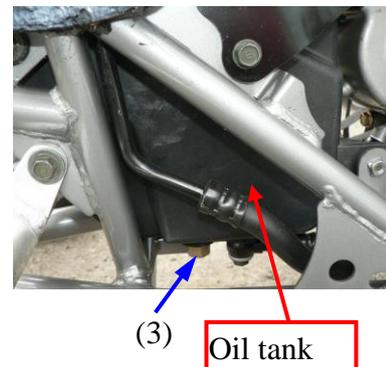
Place an oil pan under the drain plug(2) on the crankcase and drain plug(3) on the oil tank.  
Then drain out the engine oil by removing the engine oil drain plug(2) ,(3) and engine oil level gauge(4) and outer cover oil filler cap(5).

Reinstall the drain plug(2) ,(3) and gasket.  
Tighten the engine oil drain plug(2) and(3) to the specified torque, and then pour the new oil through the oil filler hole of oil tank and filler hole of outer cover.

When performing an oil change (without oil filter replacement ), the engine will hold about 1.6 liter of oil, oil tank will hold about 1.0 liter.

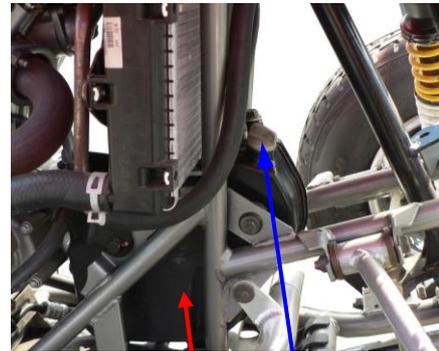
Use an engine oil that meets the API service classifications of over SL and that has a viscosity rating of SAE 20W/50.

Engine oil drain plug : 2.10 kgf-m(21 Nm).... (2)  
2.50 kgf-m(25 Nm) .... (3)



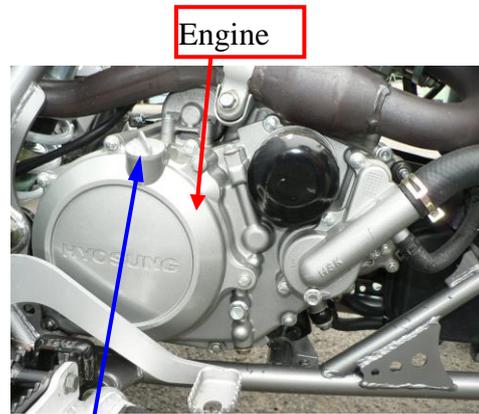
# 3.INSPECTION/ADJUSTMENT

Install the oil level gauge(4).  
Install the outer cover oil filler cap(5).  
Start the engine and allow it to run for a few minutes at idling speed.  
Turn off the engine and wait about three minutes, and the check the oil level on the dipstick(6).  
(Remove the oil level gauge(4). Wipe the oil from the oil level gauge using a clean rag.  
Reinsert the oil level gauge until the threads touch filler neck, but do not screw the oil level gauge in.

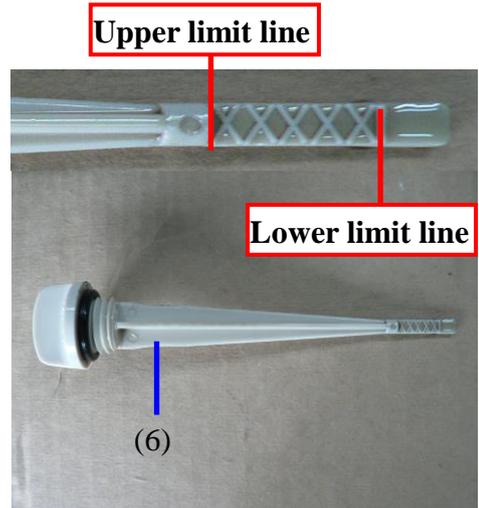
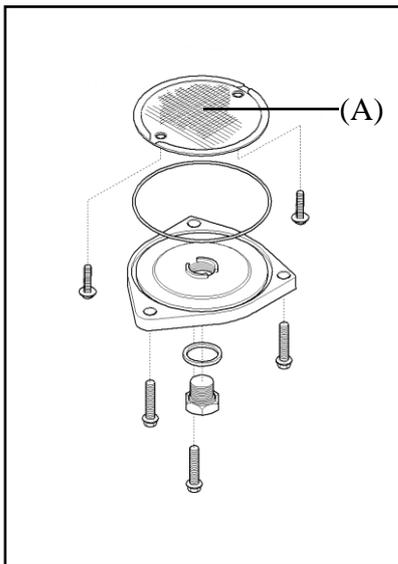


Oil tank (4)

If the level is below upper limit line, add oil to that level.  
The vehicle must be in a level position for accurate measurement.



Engine (5)



Upper limit line

Lower limit line

(6)

\* Necessarily, confirm and clean the oil strainer (A) when replace the engine oil (specially, when first replacement).

# 3.INSPECTION/ADJUSTMENT

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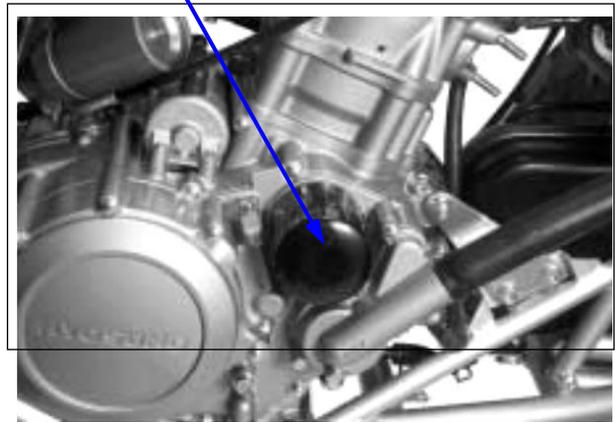
## OIL FILTER REPLACEMENT

Drain the engine oil as described in the engine oil replacement procedure.  
Replace the oil filter (1) with a new one.  
Add new engine oil and check the oil level as described in the engine oil replacement procedure.

Necessary amount of engine oil	
Oil change	2,600cc
Oil and filter change	2,700cc
Engine overhaul	2,800cc
Engine oil type	SAE 20W/50 API OVER SL



(1)

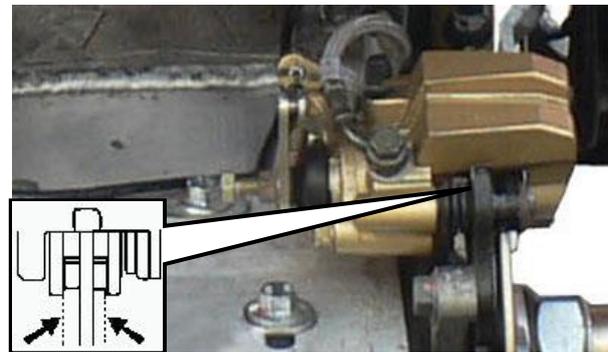


# 3.INSPECTION/ADJUSTMENT

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## BRAKE PADS INSPECTION

A wear indicator is provided on each brake. The indicators allows checking of brake pads wear. Check the position of the indicator. If the indicator reaches the wear limit line, to replace the pads.



# 3.INSPECTION/ADJUSTMENT

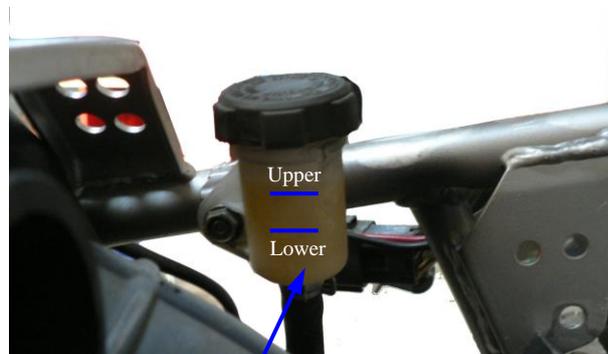
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## BRAKE FLUID INSPECTION

Check if the fluid level is below the lower level mark through the inspection window.



Inspection Window (R Brake Lever)



Inspection Window (Rear Brake Pedal)

# 3.INSPECTION/ADJUSTMENT

---

## STEERING SYSTEM

### INSPECTION

Place the machine on a level place.  
Check the steering column bushings  
Move the handlebar up and down, and/or  
back and forth.  
Replace the steering column bushings  
if excessive play.



Check the tie-rod ends  
Turn the handlebar to the left and/or right  
until it stops completely, then slightly move  
the handlebar from left to right.  
Replace the tie-rod ends if tie-rod end has  
any vertical play.



Tie-rod Ends

Raise the front end of the machine so that  
there is no weight on the front wheels.  
Check ball joints and/or wheel bearings.  
Move the wheels laterly back and froth.  
Replace the front arms and/or wheel  
bearings if excessive free play.



# 3.INSPECTION/ADJUSTMENT

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## TOE-IN ADJUSTMENT

Place the machine on a level place.

Measure the toe-in.

Adjust if out of specification.

Toe-in measurement steps:

Mark both front tread centers.

Raise the front end of the machine so that there is no weight on the front ahead.

Measure the width A between the marks.

Rotate the front tires 180 degrees until the marks come exactly opposite.

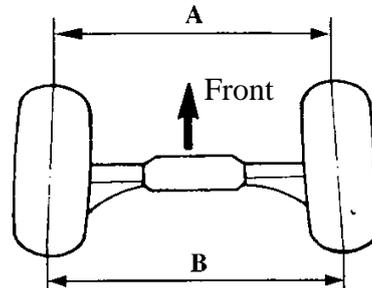
Measure the width B between the marks.

Calculate the toe-in using the formula given below.

Toe-in = B – A

Toe-in : 0~10 mm

If the toe-in is incorrect, adjust the toe-in.



Adjust the toe-in step:

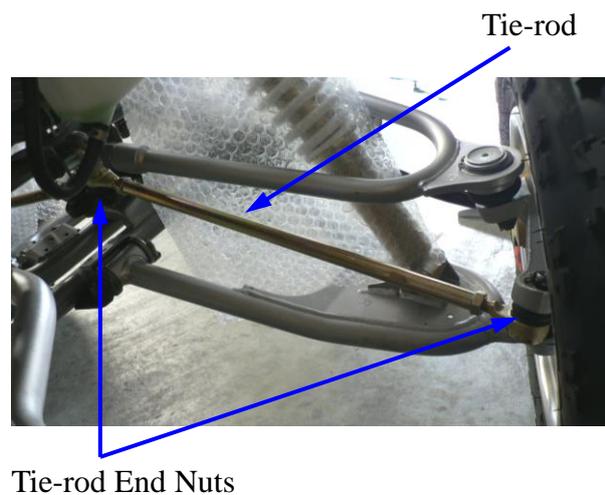
Mark both tie-rods ends.

This reference point will be needed during adjustment.

Loosen the lock nuts (tie-rod end) of both tie-rods

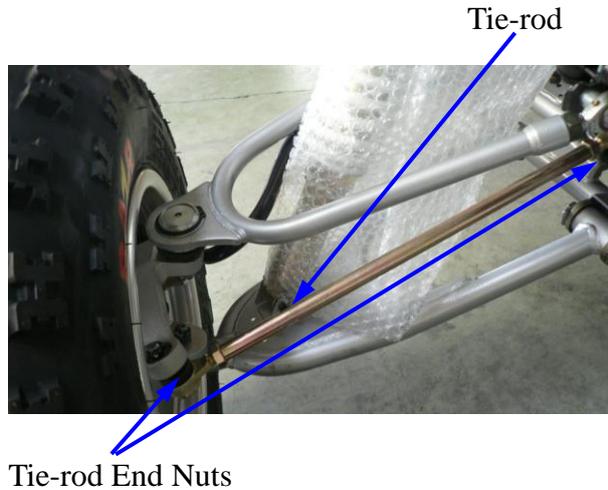
The same number of turns should be given to both tie-rods right and left until the specified toe-in is obtained, so that the lengths of the rods will be kept the same. Tighten the rod end locknuts of both Tie-rods.

**Torque:** 3.0 kgf-m (30 Nm, 22 lbf-ft)



# 3.INSPECTION/ADJUSTMENT

- \* Be sure that both tie-rod are turned the same amount. If not, the machine will drift right or left even though the handlebar is positioned straight which may lead to mishandling and accident.
- \* After setting the toe-in to specification, run the machine slowly for some distance with hands placed lightly on the handlebar responds correctly. If not, turn either the right or left tie-rod within toe-in specification.



## WHEELS/TIRES

Check the tires for cuts, imbedded nails or other damages.  
Check the tire pressure.

- \* Tire pressure should be checked when tires are cold.

## TIRE PRESSURE

	1 Rider
Front	0.32 kgf/cm <sup>2</sup> (35 kpa, 5 psi)
Rear	0.32 kgf/cm <sup>2</sup> (35 kpa, 5psi)



## TIRE SIZE

**Front :** 21\*7-10

**Rear :** 20\*11-9 or 20\*11-10

Check the front axle nut for looseness.

Front Axle Nuts



# 3.INSPECTION/ADJUSTMENT

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Check the rear axle nut for looseness.  
If the axle nuts are loose, tighten them to the Specified torque.

**Torque:**

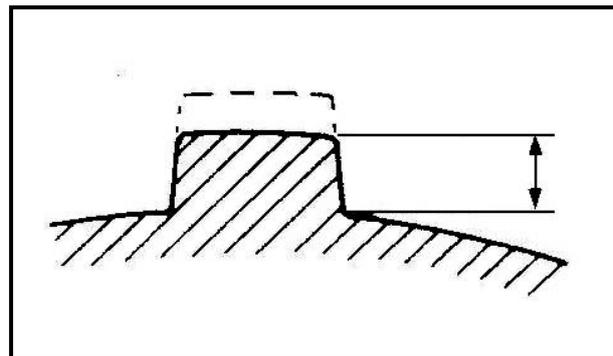
**Front** : 7.0 kgf-m (70 Nm, 50 lbf-ft)

**Rear** :10.0 kgf-m (100 Nm, 72 lbf-ft)



Rear Axle Nut

Inspect the tire surfaces.  
Replace if wear or damage.  
**Tire wear limit:** 3 mm (0.12 in)



\* It is dangerous to ride with a worn out tire.  
When a tire wear is out of specification, replace the tire immediately.

## WHEEL INSPECTION

Inspect the wheel.  
Replace if damage.  
Always balance the wheel when a tire or wheel has been changed or replaced.

\*

- Never attempt even small repairs to the wheel.
- Ride conservatively after installing a tire to allow it to seat itself properly on the rim.

# 3.INSPECTION/ADJUSTMENT

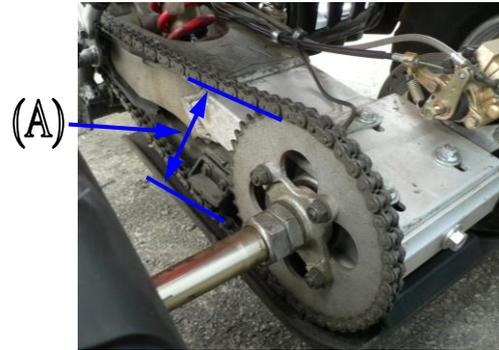
## DRIVE CHAIN SLACK

### ADJUSTMENT

Before checking and/or adjusting, rotate the rear wheels several revolutions and check slack at several points to find the tightest point.

Check and/or adjust the chain slack with the rear wheels in this “tightest” position.

\* Too little of chain slack will overload the engine and other vital parts keep the slack within the specified limits.



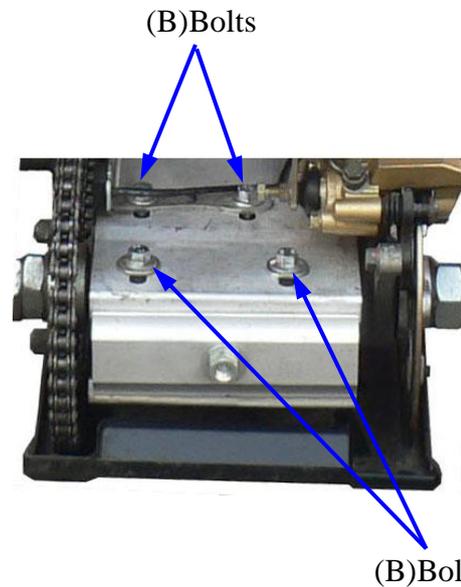
Place the machine on a level place.

\* Wheels should be on the ground without the rider on it.

Check drive chain slack.  
Adjust if out of specification.

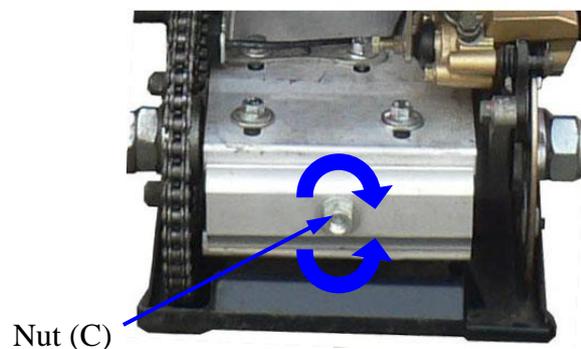
**Drive chain slack (A):**  
**30~40 mm (1.2~1.6 in)**

Adjust drive chain slack:  
Loosen the bolts(B).



Adjust the nut (C) to proper tightness.  
Fastening the bolt(B).

**Torque:**  
**bolts(B) :7.0kgf-m (70 Nm, 50 lbf-ft)**



# 3.INSPECTION/ADJUSTMENT

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## CABLE INSPECTION AND LUBRICATION

- \* Damaged cable sheath may cause corrosion and interfere with the cable movement.  
An unsafe condition may result so replace such cable as soon as possible.

Inspect the cable sheath.  
Replace if damage.  
Check the cable operation.  
Lubricate or replace if unsmooth operation.

- \* Be careful not to drop foreign matters into the crankcases.

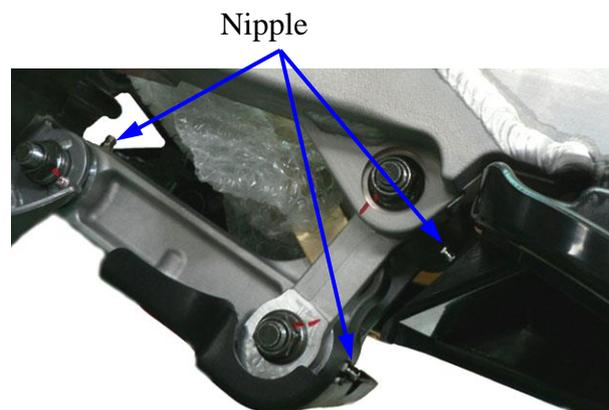
## LEVER LUBRICATION

Lubrication the pivoting parts of each lever.

## REAR SUSPENSION LUBRICATION

Inject grease into the nipples using a grease gun until slight over flow is observed from the thrust covers.

- \* Wipe off the excess grease.



# 3.INSPECTION/ADJUSTMENT

## COOLING SYSTEM

### COOLANT LEVEL INSPECTION

Place the machine on the level ground.  
Check the coolant level in the coolant Reservoir when the engine is cold as the Coolant level will vary with engine temperature.

The coolant level should be between the maximum and minimum marks.

If the level is low, remove the coolant reservoir cap, and then add coolant or distilled water to raise it to the specified level.

Recommended Coolant: SIGMA Coolant  
(Standard Concentration 30%)

- \* The coolant level does not change no matter the engine is warm or cold. Fill to the maximum mark.

### COOLANT REPLACEMENT

- \* Perform this operation when the engine is cold.

Remove the radiator cap.  
Remove the drain bolt to drain the coolant.  
Drain the coolant in the reserve tank.  
Reinstall the drain bolt.

- \* The coolant freezing point should be 5°C lower than the temperature of the riding area.

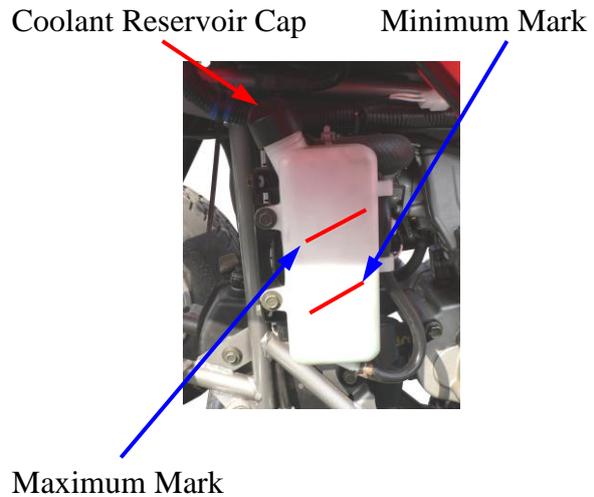
Coolant capacity:  
1000 cc

Reserve tank capacity:  
400 cc

Start the engine and check if there are no bubbles in the coolant and the coolant level is stable. reinstall the radiator cap.

If there are bubbles in the coolant, bleed air from the system.

Fill the reserve tank with the recommended Coolant up to the maximum mark.



# 3.INSPECTION/ADJUSTMENT

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## CLUTCH ADJUSTMENT

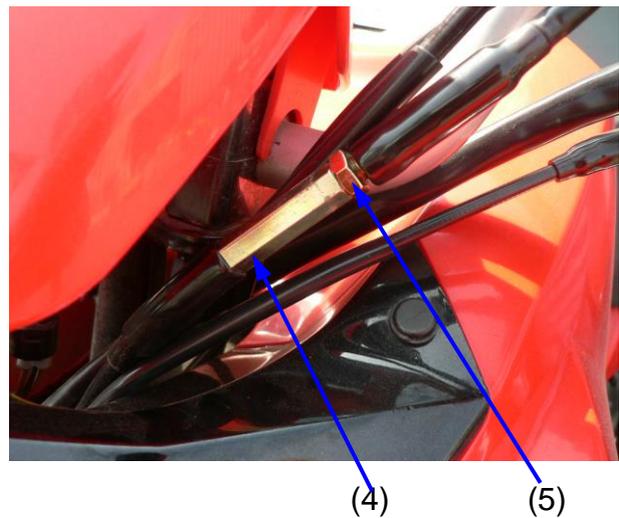
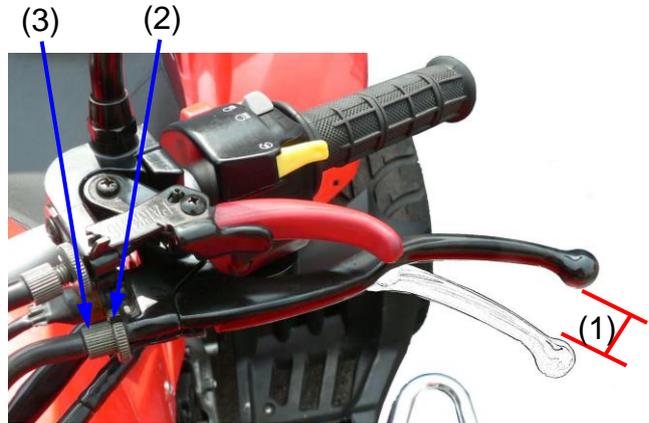
At each maintenance interval, adjust the clutch cable play by means of clutch cable adjuster.

The cable play should be **10~15 mm (0.4~0.6 in)** as measured at the clutch lever holder before the clutch begins to disengage.

If you find the play of the clutch incorrect, adjust it in the following way :

1. A basis adjustment be allowed by the clutch lever adjuster (3).
2. Loosen the clutch lever adjuster lock nut (2) and turn the clutch lever adjuster (3) in or out to provide the specified play.
3. After adjustment, tighten the lock nut (2).
4. If can't adjust by the adjuster (3), Loosen the clutch cable adjuster lock nut (6).
5. Turn the clutch cable adjuster (5) in or out to provide the specified play.
6. After adjustment, tighten the clutch cable adjuster lock nut (6).
7. The clutch cable should be lubricated with a light weight oil whenever it is adjusted.

- (1). The clutch lever play
- (2). The clutch lever adjuster lock nut
- (3). The clutch lever adjuster
- (4). The clutch cable adjuster
- (5). The clutch cable adjuster lock nut





# 3.INSPECTION/ADJUSTMENT

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## Front & Rear suspension

### Spring PRE-LOAD adjustment

This adjustment can be performed by changing the adjuster ring position.

To ensure riding comfort, the travel of rear shock absorber is adjustable.

#### How to adjust it :

1. Using a wrench to loosen the retaining nut and adjust the absorber travel.
2. Turning counterclockwise the retaining nut is to increase the travel, and turning clockwise is to reduce the travel.
3. Tighten the retaining nut again after a proper travel is obtained.

Front



Rear

\*

Unequal front suspension adjustment can cause poor handling and loss of stability. Be sure to adjust the compression and tension damping force on right and left front shock absorbers to the same setting.

# 4.LUBRICATION SYSTEM

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## LUBRICATION SYSTEM

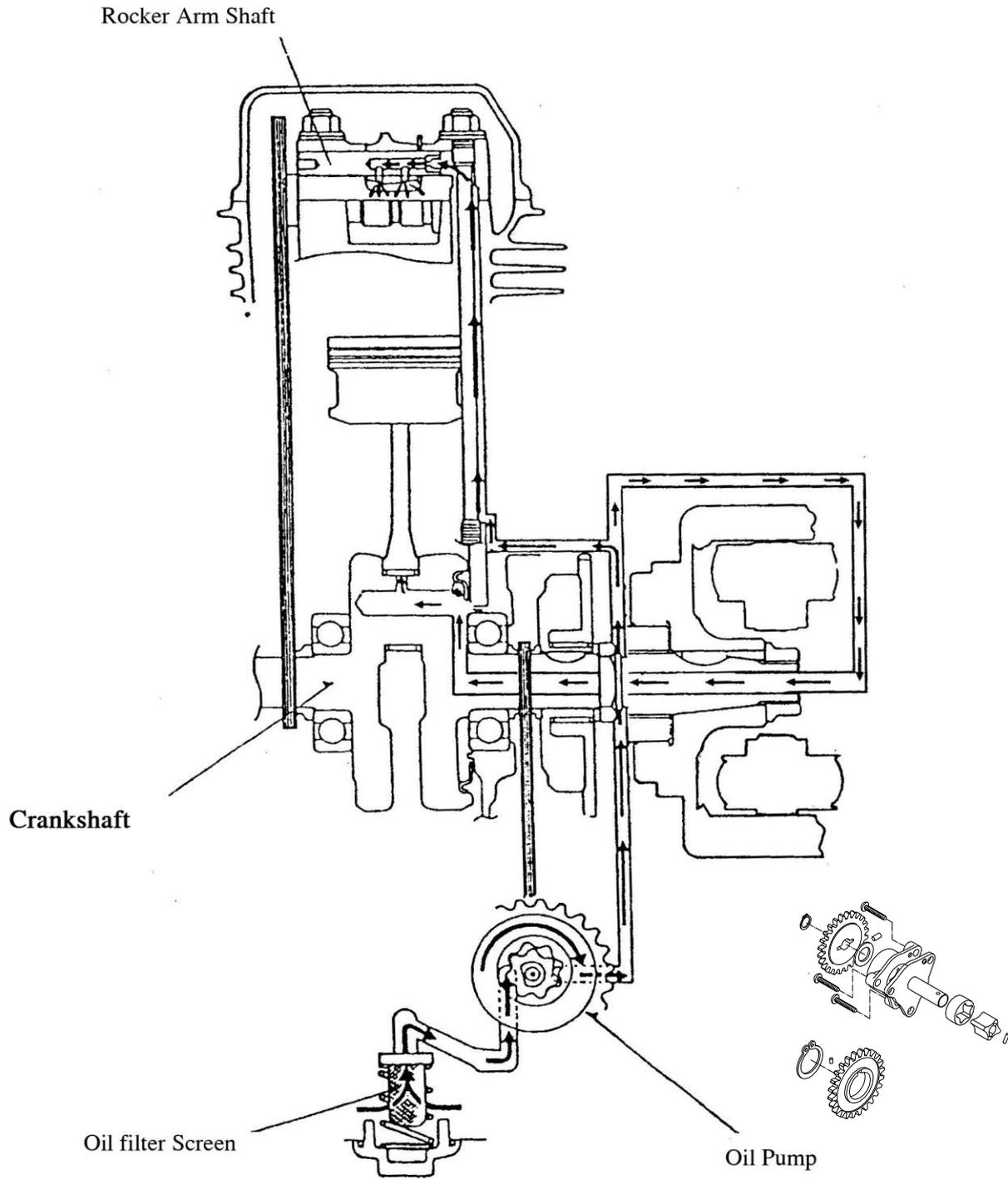
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SERVICE INFORMATION .....	4-2
TROUBLESHOOTING .....	4-2
ENGINE OIL/OIL FILTER .....	4-3
OIL PUMP.....	4-3

# 4.LUBRICATION SYSTEM

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## LUBRICATION SYSTEM



# 4.LUBRICATION SYSTEM

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## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- Use care when removing and installing the oil pump not to allow dust and foreign matters to enter the engine and oil line.
- Do not attempt to disassemble the oil pump.
- The oil pump must be replaced as a set when it reaches its service limit.
- After the oil pump is installed, check each part for oil leaks.

### SPECIFICATIONS

Item	Standard	Note
Oil pressure	1.0~3.0 kgf/cm <sup>2</sup> (at 60°C, 3,000 rpm)	-----
Oil pump reduction ratio	1.3 (45/34)	-----

### TROUBLESHOOTING

#### Oil level too low

- Natural oil consumption
- Oil leaks
- Worn or poorly installed piston rings
- Worn valve guide or seal

#### Poor lubrication pressure

- Oil level too low
- Clogged oil filter or oil passages
- Not use the specified oil

### SPECIAL TOOLS

Clutch sleeve hub holder      71600-E12-000

# 4.LUBRICATION SYSTEM

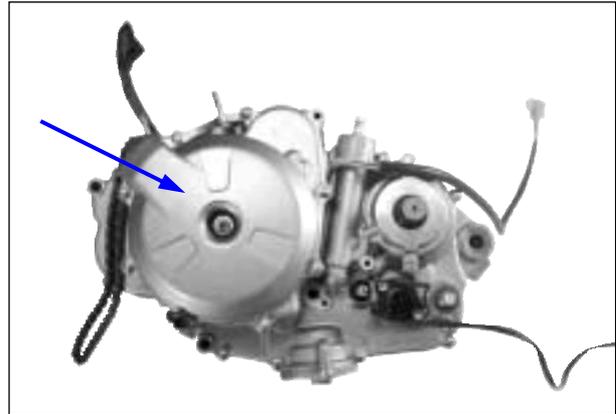
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## ENGINE OIL/OIL FILTER OIL LEVEL AND OIL CHANGE

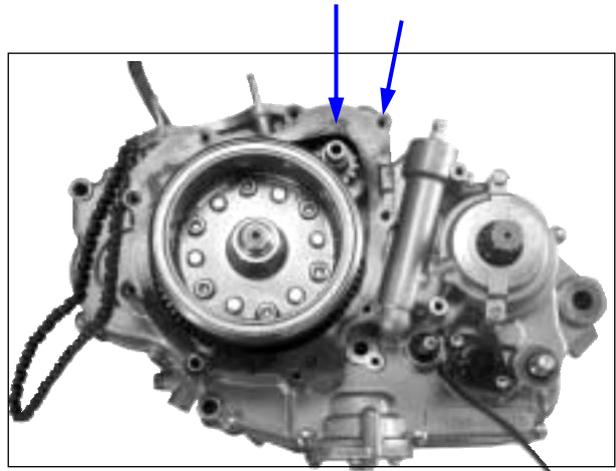
Refer to the “ENGINE OIL” section in the chapter 3 to check the oil level and replacement and oil filter cleaning.

## OIL PUMP REMOVAL

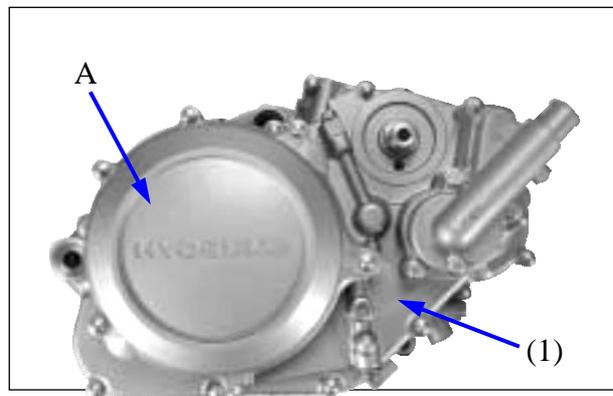
Remove the magneto cover.



Remove the dowel pins and gasket.



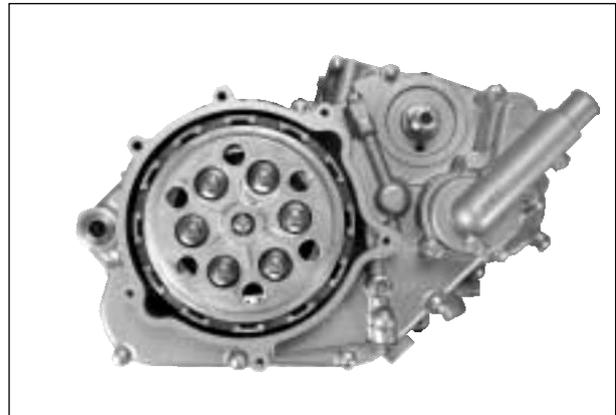
Remove the clutch cover (1).



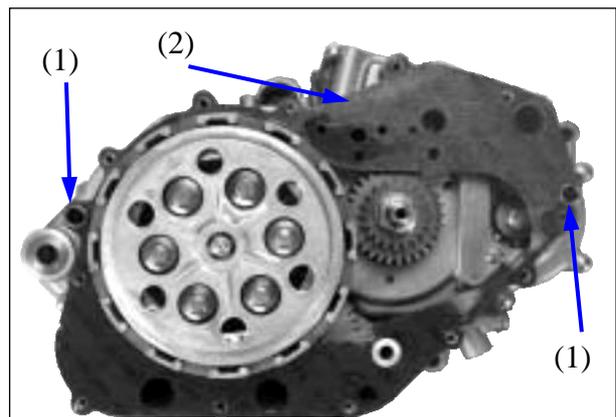
# 4.LUBRICATION SYSTEM

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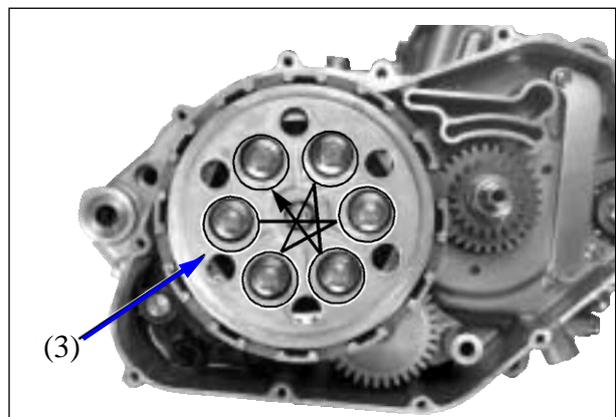
\* When remove or inspect the clutch drive and driven plate, remove only the clutch pressure cover A.



Remove the dowel pins (1) and gasket (2).



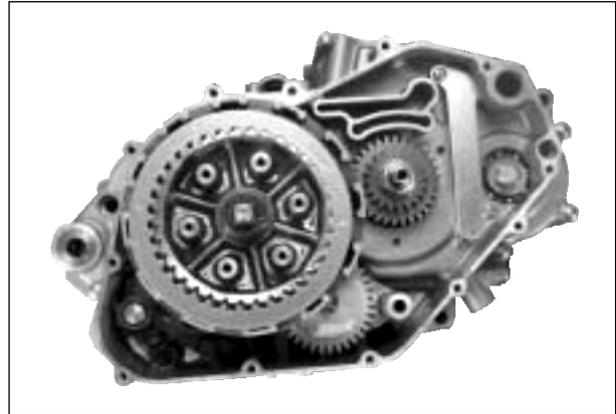
Loosen the clutch spring mounting bolts working in diagonal stages.  
Remove the bolts and spring.  
Remove the clutch pressure disk (3).



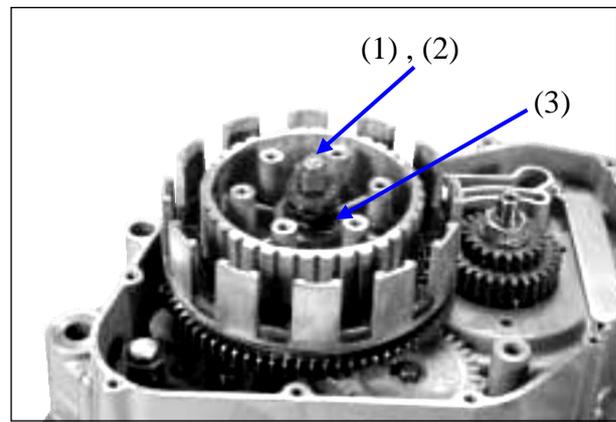
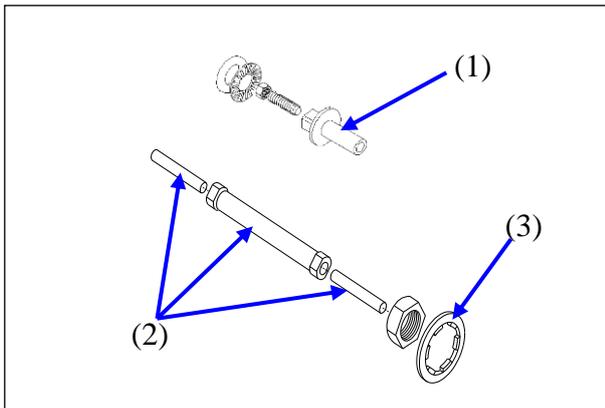
## 4.LUBRICATION SYSTEM

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Remove the clutch drive plates No. 1 and driven plates.  
Remove the spring washer and spring washer seat.  
Remove the clutch drive plate No. 2.



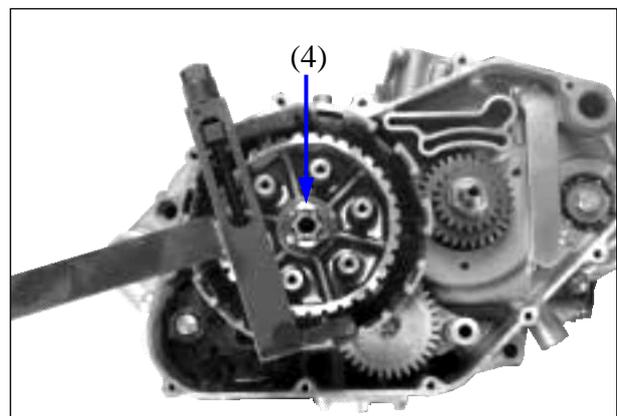
Remove the clutch push piece (1) and push rod (2).  
Flatten the clutch sleeve hub washer (3).



Hold the clutch sleeve hub using the special tool, and then remove the clutch sleeve hub nut (4).

Special Tool:

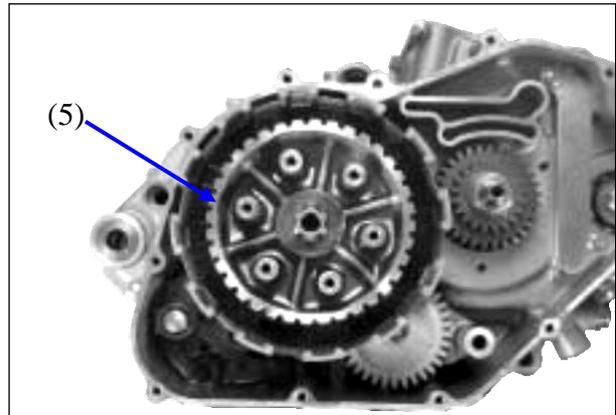
Clutch sleeve hub holder : 71600-E12-000



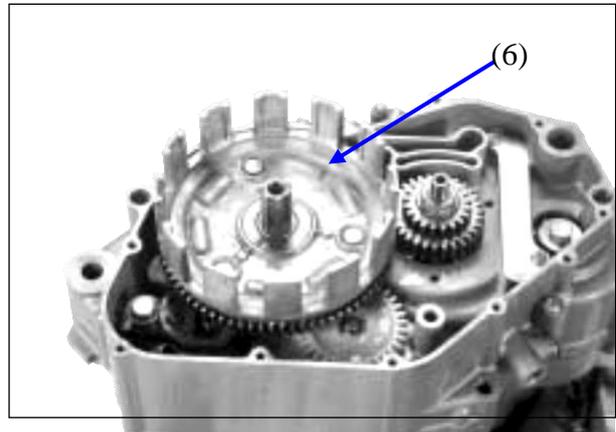
# 4.LUBRICATION SYSTEM

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Remove the clutch sleeve hub (5).



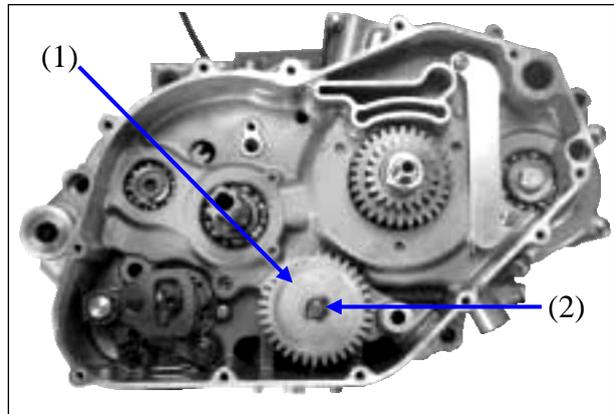
Remove the primary driven gear assembly (6) and washer.



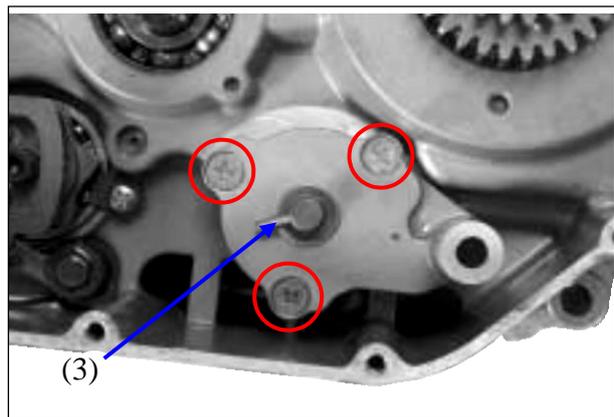
# 4.LUBRICATION SYSTEM

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Remove the oil pump driven gear (1)  
by removing the circlip (2).



Remove the oil pin (3) and oil pump assembly.



# 4.LUBRICATION SYSTEM

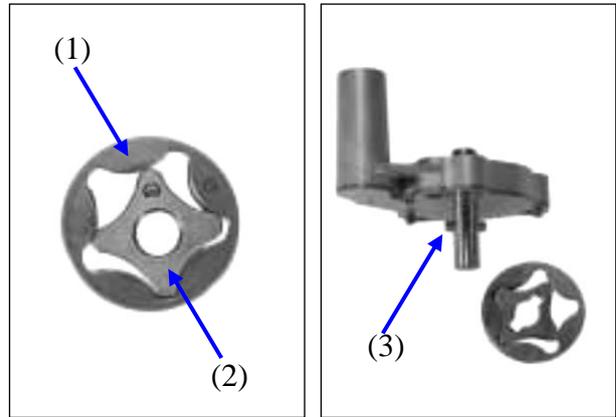
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## INSPECTION

Remove the outer rotor (1), inner rotor (2) and pin (3).

Inspect the outer rotor (1) and inner rotor (2) for any scratches or other damage.

If any damages are found, replace them with new ones.

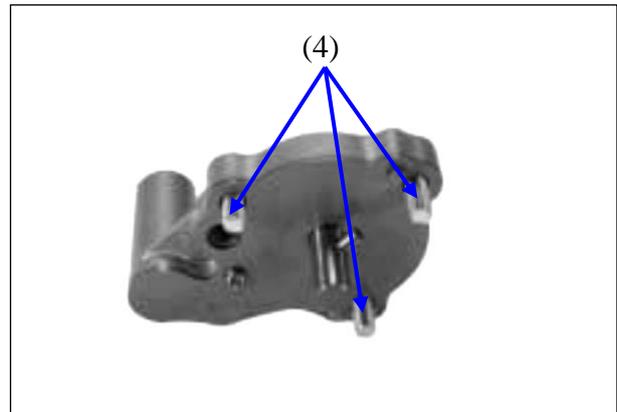


\*

The oil pump case securing screw (4) is applied with thread lock.

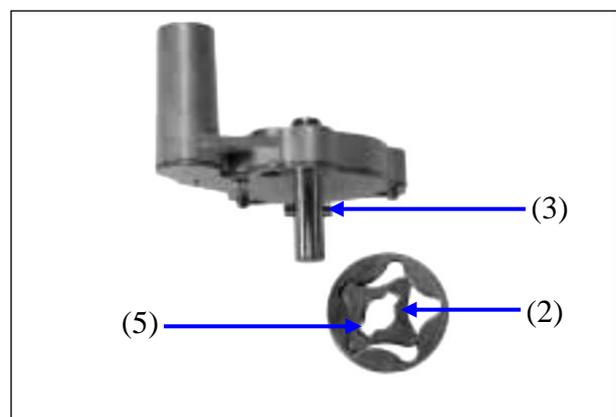
If an attempt is made to overhaul the oil pump assembly, the screw may be damaged.

Only the oil pump unit is available as a replacement.



Apply engine oil to the sliding surfaces of the oil pump inner rotor, outer rotor and shaft.

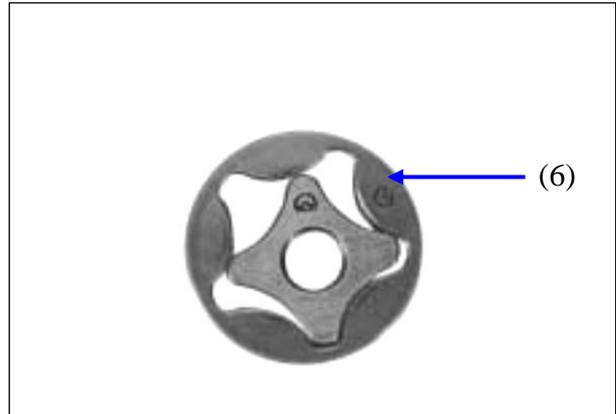
When installing the inner rotor (2), align the pin (3) with the groove (5).



## 4.LUBRICATION SYSTEM

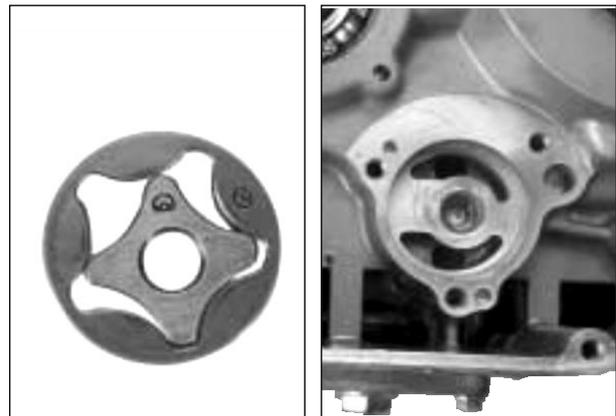
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When installing the outer rotor, face the punched mark (6) on the outer rotor to the outside.



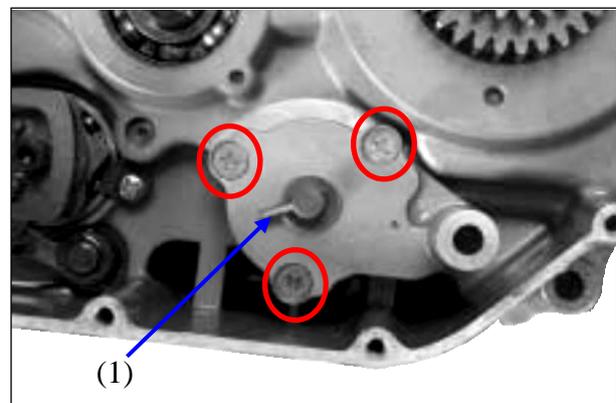
### INSTALLATION

Before mounting the oil pump, apply engine oil to the sliding surface of the oil pump case, outer rotor, inner rotor, and crankcase.



Apply a small quantity of thread lock to the oil pump mounting screws, and then tighten them securely.

When installing the oil pump driven gear, align the pin (1) with the groove.



# 5. FUEL SYSTEM

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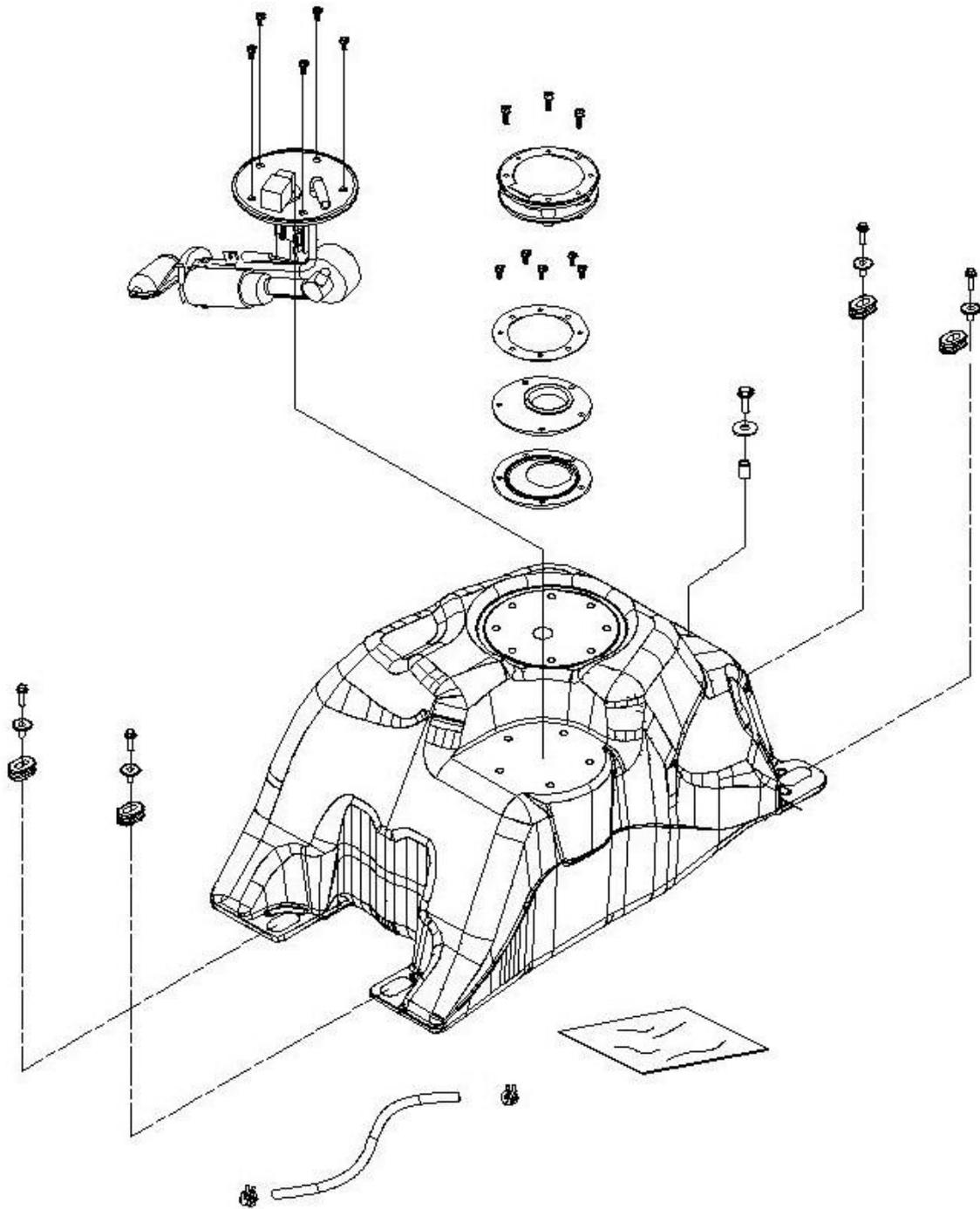
## FUEL SYSTEM

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# 5. FUEL SYSTEM

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# 5. FUEL SYSTEM

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## SERVICE INFORMATION

### GENERAL INSTRUCTIONS



Gasoline is very dangerous. When working with gasoline, keep sparks and flames away from the working area.

Gasoline is extremely flammable and is explosive under certain conditions. Be sure to work in a well-ventilated area.

- Do not bend or twist control cables. Damaged control cables will not operate smoothly.
- When disassembling fuel system parts, note the locations of O-rings. Replace them with new ones during reassembly.
- Before float chamber disassembly, loosen the drain screw to drain residual gasoline into a clean container.
- After the throttle is removed, plug the intake manifold side with a clean shop towel to prevent foreign matters from entering.
- When cleaning the throttle air and fuel jets, the O-rings must be removed first to avoid damage. Then, clean with compressed air.
- When the ATV is not used for over one month, drain the residual gasoline from the float.

# 5. FUEL SYSTEM

## FUEL TANK

### REMOVAL



#### Warning

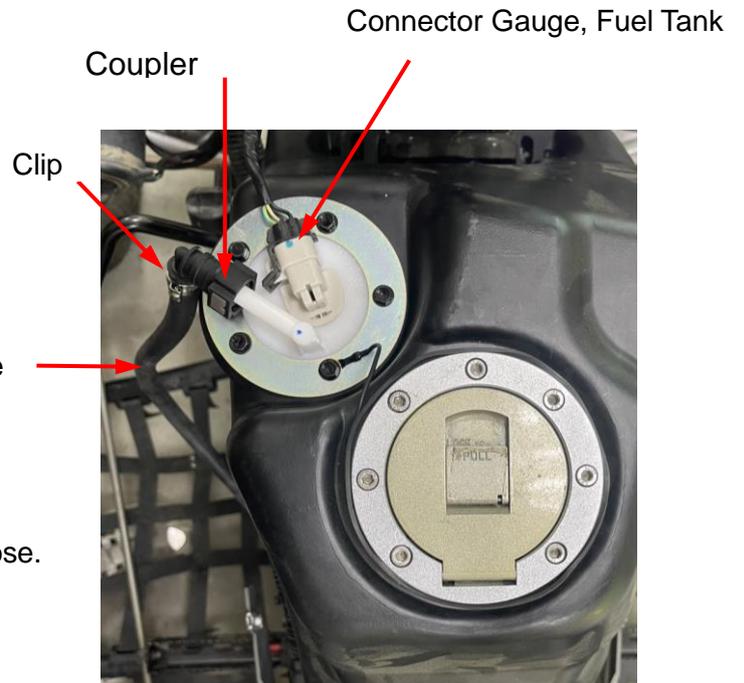
- Keep sparks and flames away from the work area.
- Wipe off any spilled gasoline.

Remove the seat (See page 2-3), and front fender.

Disconnect the “Coupler” and “Connector Gauge, Fuel Tank”. Replace the fuel hose with new ones if they are damaged or deteriorated. Use the clip pliers tool. Disconnect the clip and then remove the fuel hose.

Special Tool:

Fuel hose clip pliers tool: 71516-A26-000



Disconnect

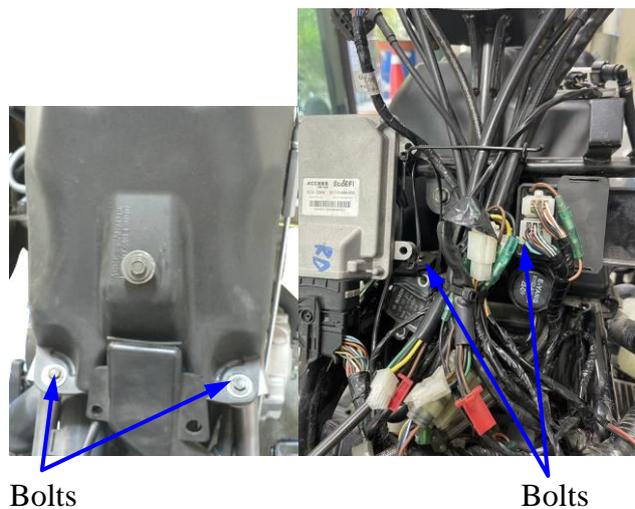


Connect

Remove the four bolts , then remove the fuel tank.

### INSTALLATION

Reverse the “FUEL TANK REMOVAL” procedures.



Bolts

Bolts

# 5. FUEL SYSTEM

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## FUEL PUMP

### REMOVAL

- \* • Keep sparks and flames away from the work area.
- Drain gasoline into a clean container.

### REMOVAL

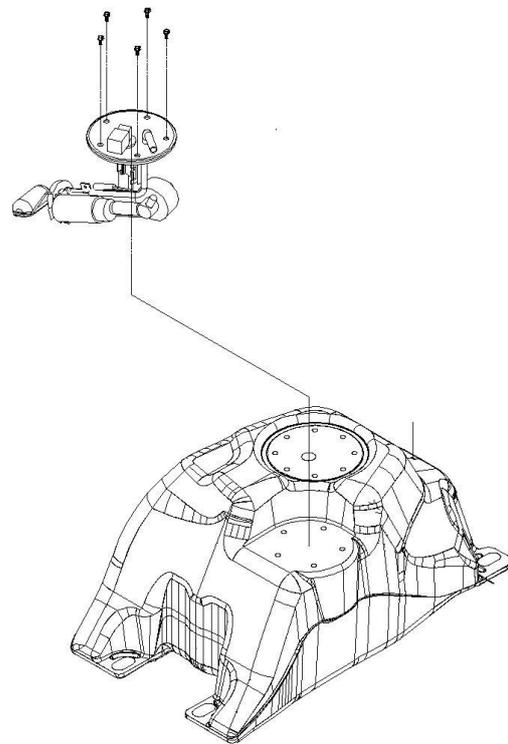
Turning the 5 bolts on the fuel pump counterclockwise open and remove it.

Remove the fuel pump oil seal.

Remove the fuel pump assembly.

Replace the fuel pump oil seal with new ones if they are damaged or deteriorated.

Replace the fuel pump assembly if they are cracks or damaged.



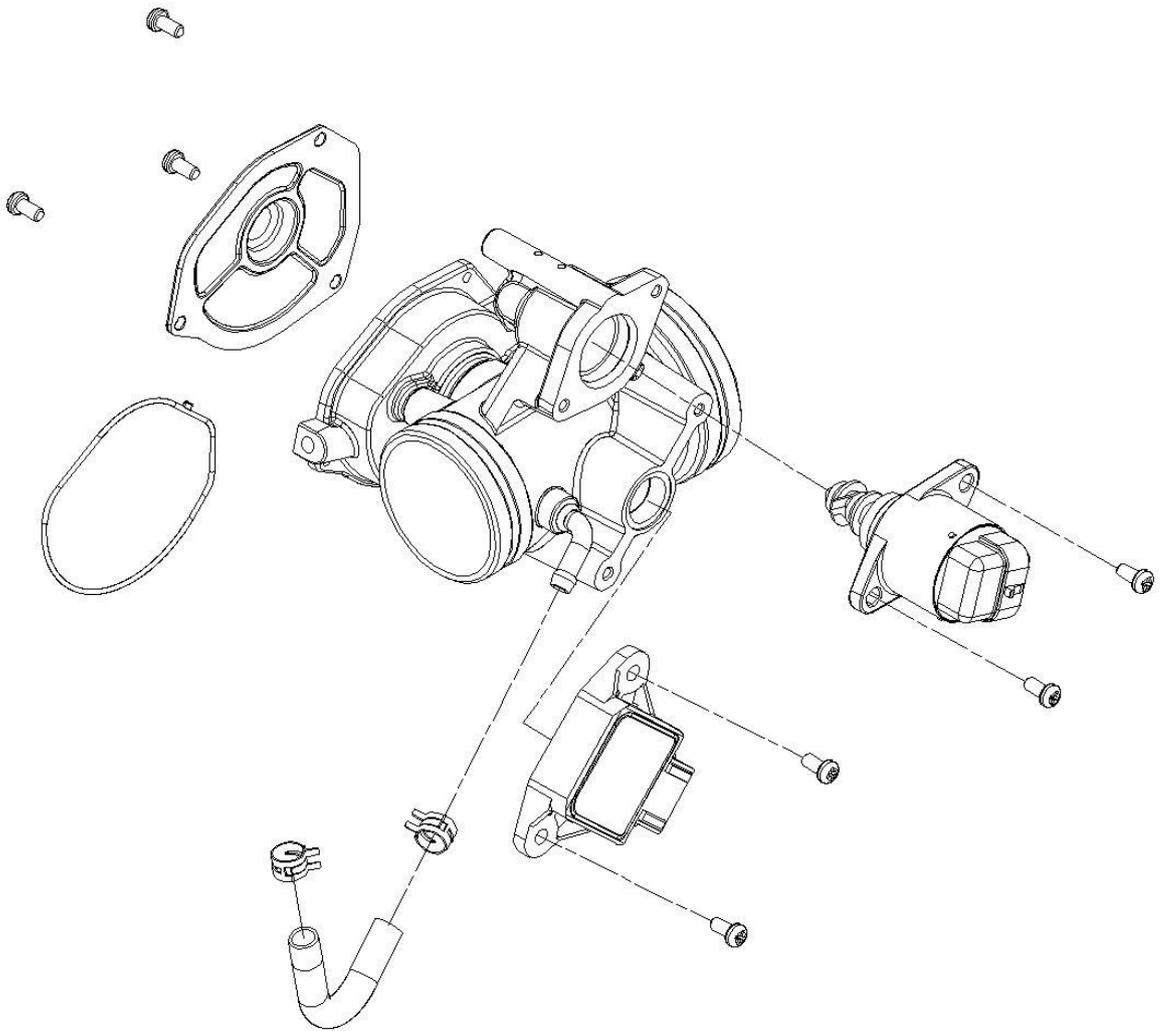
Installation is in the reverse order of removal.

Tighten the fuel pump clockwise.

# 5.

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## THROTTLE VALVE CONSTRUCTION

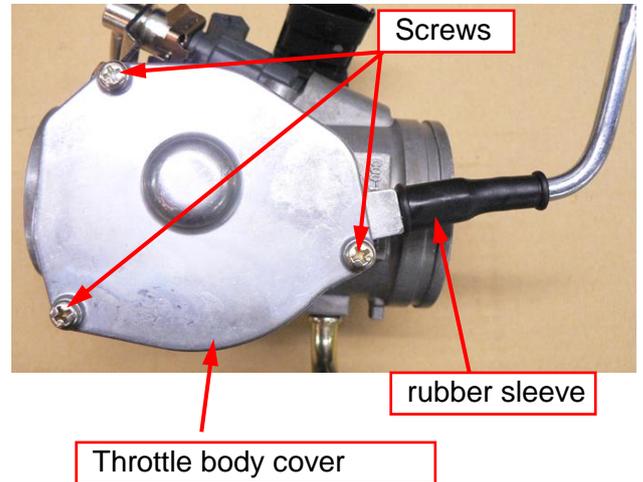


# 5. FUEL SYSTEM

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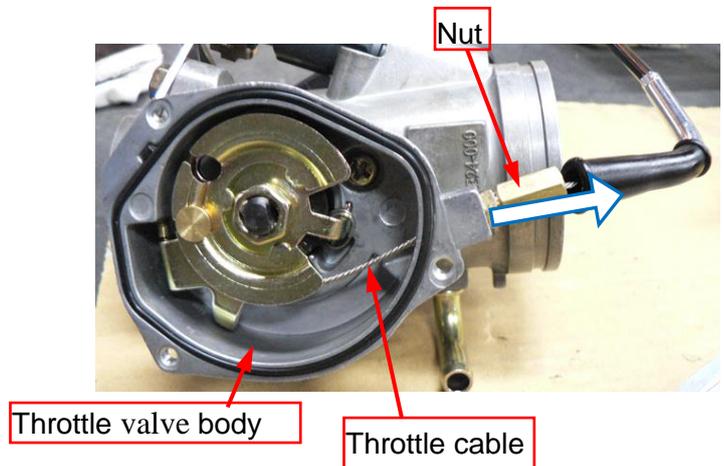
## THROTTLE CABLE DISASSEMBLY

Remove the screws.  
Remove the throttle body cover.  
Slide the rubber sleeve back to expose the nut.  
Loosen the nut and then remove the throttle cable.



## ASSEMBLY

Reverse the "DISASSEMBLY" procedures.  
Install the throttle cable into the throttle  
valve body.



# 5. FUEL SYSTEM

## Component Structures and Features of Control System of Gasoline Engine

### Intake Absolute Air Pressure/Temperature Sensor DS-S3TF

(1) Illustration Diagram and Pin

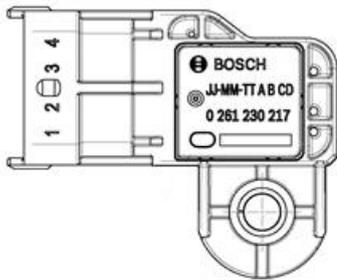


Figure2-1 Intake Absolute Air Pressure /Temperature Sensor

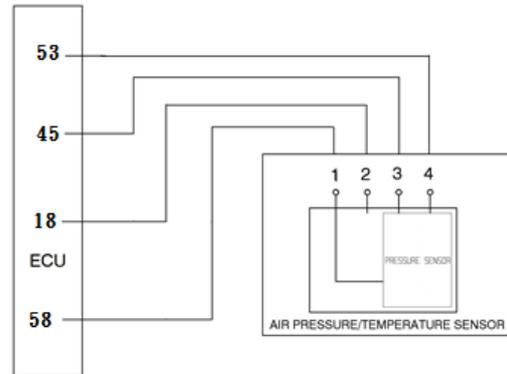


Figure2-2 Circuit of Intake Absolute Air Pressure/Temperature Sensor

Pin: No.1 connects to ground; No.2 connects to NTC; No.3 connects to 5V; No.4 outputs pressure signal.

(2) Usage

When connected to air channel, the pressure/temperature sensor can monitor and detect absolute pressure(kPa) and temperature(°C) of intake manifold to provide engine relevant loading data. Detectable pressure ranges from 10~115kPa.

(3) Limitation

Condition	Value			Unit
	Lowest	Standard	Largest	
Withstand Power/Voltage			16	V
Withstand Pressure			500	kPa
Withstand Storing Temperature	-40		+130	°C

(4) Specification

Condition	Value			Unit
	Lowest	Standard	Largest	
Pressure Range	10		115	kPa
Operating Temperature	-40		125	°C
Operating Voltage	4.75	5.0	5.25	V
Current at $U_S=5.0V$	6.0	9.0	12.5	mA
Load Current at Output Circuit	-0.1		0.5	mA

# 5. FUEL SYSTEM

## Throttle Pos DKG

(1) Illustration Diagram and Pin



Figure 2-3 Throttle Pos

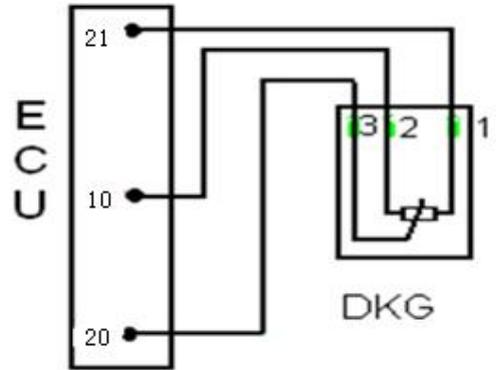


Figure 2-4 Circuit of Throttle Pos

Pin:

When viewing from one side of sensor toward throttle along throttle shaft, For the design turning up throttle counterclockwise: No.1 connects to ground; No.2 connects to 5V Power; For the design turning up throttle clockwise: No.1 connects to 5V Power; No.2 connects to ground; and No.3 outputs signals.

(2) Usage

The sensor provides throttle angle data to ECU. In accordance with the data provided, ECU obtain information on engine load condition, operation condition (such as starting, idle speed, partial load, full load and etc) and acceleration/deceleration info.

(3) Fault Diagnosis

When throttle rotating angle is greater or less than its reliable upper/lower limits, failure signal of throttle pos will be activated.

(4) Limitation

Condition	Value	Unit
Machine revolve angle between two extreme ends	$\geq 95$	degree
Allowable electrical angle between two extreme ends	86	degree
Allowable current on sliding contact arm	$\leq 18$	$\mu\text{A}$
Storing Temperature	-40~+130	$^{\circ}\text{C}$

## 5. FUEL SYSTEM

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### (5) Specification

Condition	Value			Unit
	Lowest	Standard	Largest	
Total Resistance (Pin 1-2)	1.6	2.0	2.4	k $\Omega$
Protective Resistance of Sliding Contact Arm (Sliding Contact Arm at zero position, pin 2-3)	710		1380	$\Omega$
Operating Temperature	-40		130	$^{\circ}\text{C}$
Power Voltage		5		V
Voltage Ratio at right extreme end	0.04		0.093	
Voltage Ratio at left extreme end	0.873		0.960	
UP/US increasing rate proportional to throttle angle		0.00927		1/degree
Weight	22	25	28	g

# 5. FUEL SYSTEM

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## Oxygen sensor

(1) Illustration Diagram and Pin

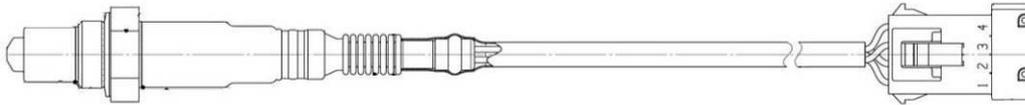


Figure 2-7 Oxygen Sensor

There are four pins of each electric connector

No1.connects to anode of heating power (white color)

No2.connects to cathode of heating power (white color)

No3.connects to signal cathode (gray color)

No4.connects to signal anode (black color)

(2)Fault Diagnosis

ECU monitors various sensors, actuators, power amplifier circuit and detection circuit.

Once any of the following condition occurs, failure signal of lambda sensor will be activated :

(Refer to "Failure Condition Record")

- incredible lambda sensor signal
- incredible storage battery voltage
- incredible intake absolute pressure signal
- incredible coolant temperature signal of engine
- failure of injector

Once lambda sensor failure signal is activated, fuel quantities closed-loop control shuts down and adopts fuel quantities with basic injection time stored in ECU.



## 5. FUEL SYSTEM

### (3) Limitation

Condition		Value			Unit
		Lowest	Standard	Largest	
Storing Temperature		-40		+100	°C
Operating temperature	Ceramic Pipe End	200		850	°C
	Hexagon Housing			≤570	°C
	Metal buckle ring and connecting cable			≤250	°C
	Connecting plug			≤120	°C
maximum permissible temperature when heating elements are connected (up to 10 minutes each, a total of up to 40 hours)	Exhaust air at ceramic pipe end			930	°C
	Hexagon Housing			630	°C
	Metal buckle ring and connecting cable			280	°C
Permissible Rate of temperature change at ceramic pipe end				≤100	K/s
Permissible temperature of ceramic elements when there is condensed water on the side of exhaust pipe				≤350	°C
Continuous DC current under 350°C				10	μA
maximum continuous AC current at exhaust temperature at $\geq 350^{\circ}\text{C}$ 、 $f \geq 1\text{Hz}$				±20	μA
Permissible fuel additive		lead-free fuel, or allow the lead amounted to 0.15g/L			
Fuel consumption and fuel burned		Value and Data should be confirmed by the clients through proper testing. Guidline value: $\leq 0.7\text{L}/1000\text{km}$			

### (4) Specification

Condition	NEW		After test for 500 hours	
Exhaust temperature	350°C	850°C	350°C	850°C
sensor element voltage (mV) at $\lambda=0.97$ (CO=1%)	840±70	710±70	840±80	710±70
sensor element voltage (mV) $\lambda=1.10$	20±50	55±30	20±50	40±40
Internal resistance of sensor element(kΩ)	≤1.0	≤0.1	≤1.5	≤0.3
Response Time (ms) (600mV to 300mV)	≤150	≤150	≤300	≤200
Response Time (ms) (300mV to 600mV)	≤150	≤150	≤300	≤200

## 5. FUEL SYSTEM

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### (5) Sensor Electrical Data

Condition		Value	Unit
Insulation resistance between sensor heating element and sensor connector	Room temperature; disconnection of heating element	$\geq 30$	M $\Omega$
	Exhaust Temperature 350°C	$\geq 10$	M $\Omega$
	Exhaust Temperature 850°C	$\geq 100$	k $\Omega$
Power voltage at plug	Rated voltage	12	V
	Continuous working voltage	12~14	V
	Working voltage that can last 1% of its total life(Exhaust Temperature $\leq 850^{\circ}\text{C}$ )	15	V
	Working voltage that can last 75 seconds (Exhaust Temperature $\leq 350^{\circ}\text{C}$ )	24	V
	Test Voltage	13	V
Heating power with working voltage at 13V, at heat balance (Exhaust Temperature 350°C, exhaust flow rate approximately 0.7 m/s)		12	W
Heating current with working voltage at 13V, environment temperature -40°C (Exhaust Temperature 350°C, exhaust flow rate approximately 0.7 m/s)		5	A
Fuse of heating circuit		8	A

### (6) Life Span

Life span of lambda sensor is associated with lead content of fuel; as shown below.

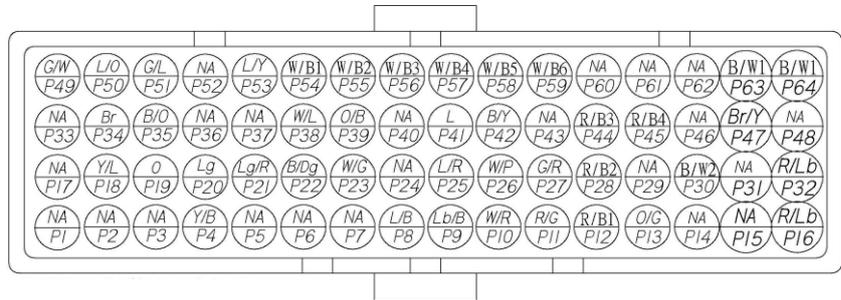
lead content of fuel (g/L)	Life span (km)
$\leq 0.6$	30000
$\leq 0.4$	50000
$\leq 0.15$	80000
$\leq 0.005$ (lead-free fuel)	160000

# 5. FUEL SYSTEM

## Electric Control Unit ECU



(1) ECU Pin Definition



ECU Pin	Stepper	ISA-TEV+canister purge (TEV)
1	GND(sensor signal)	GND(sensor signal)
2	EMPTY	EMPTY
3	EMPTY	EMPTY
4	N gear signal input	N gear signal input
5	EMPTY	EMPTY
6	EMPTY	EMPTY
7	GND(sensor signal)	GND(sensor signal)
8	Fuel pump relay	Fuel pump relay
9	Lambda sensor heater	Lambda sensor heater
10	Idle engine speed step motor	Idle engine speed step motor
11	Idle engine speed step motor	Idle engine speed step motor
12	5V power	5V power
13	Injector	Injector
14	GND(sensor signal)	GND(sensor signal)
15	EMPTY	EMPTY
16	12V power input	12V power input
17	GND(sensor signal)	GND(sensor signal)
18	intake air temp.(IAT)	intake air temp.(IAT)
19	coolant temp.(ECT)	coolant temp.(ECT)
20	D gear signal input	D gear signal input
21	L gear signal input	L gear signal input
22	R gear signal input	R gear signal input
23	Radiator Fan relay	Radiator Fan relay
24	engine speed signal output	engine speed signal output r
25	cancel speed limit	cancel speed limit
26	Idle engine speed step motor	Idle engine speed step motor
27	Idle engine speed step motor	Idle engine speed step motor
28	5V power	5V power

# 5. FUEL SYSTEM

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ECU Pin	Stepper	ISA-TEV+canister purge (TEV)
29	EMPTY	EMPTY
30	GND(battery )	GND(battery)
31	EMPTY	EMPTY
32	12V power input	12V power input
33	EMPTY	EMPTY
34	Main switch(KEY ON)	Main switch(KEY ON)
35	Lambda sensor input	Lambda sensor input
36	EMPTY	EMPTY
37	EMPTY	EMPTY
38	TPS signal	TPS signal
39	Dumping switch signal	Dumping switch signal
40	EMPTY	EMPTY
41	CAN signal(HI)	CAN signal(HI)
42	CAN signal(LO)	CAN signal(LO)
43	GND(sensor signal)	GND(sensor signal)
44	5V power input	5V power input
45	5V power input	5V power input
46	EMPTY	EMPTY
47	Ignition signal	Ignition signal
48	EMPTY	EMPTY
49	Generator signal(HI)	Generator signal(HI)
50	Generator signal(LO)	Generator signal(LO)
51	EMPTY	EMPTY
52	EMPTY	EMPTY
53	Intake air pressure(MAP)	Intake air pressure(MAP)
54	GND(sensor signal)	GND(sensor signal)
55	GND(sensor signal)	GND(sensor signal)
56	GND(sensor signal)	GND(sensor signal)
57	GND(sensor signal)	GND(sensor signal)
58	GND(sensor signal)	GND(sensor signal)
59	GND(sensor signal)	GND(sensor signal)
60	GND(sensor signal)	GND(sensor signal)
61	GND(sensor signal)	GND(sensor signal)
62	EMPTY	EMPTY
63	GND(battery )	GND(battery)
64	GND(battery )	GND(battery)

# 5. FUEL SYSTEM

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## (2) Functions

- Receiving signals of engine speed sensor
- Receiving engine loading signals
- Receiving motorcycle switch signals
- Controlling injection
- Controlling ignition
- Controlling idle speed
- Provide power supply for sensor: 5V/100mA
- EEPROM: 2K bits or above
- Output of engine speed signal (TN signal)
- Input of speed signal
- KWP2000 Protocol
- Fault Diagnosis of drive level and sensor

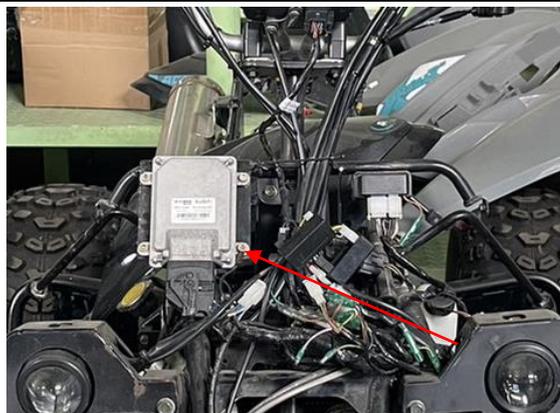
## (3) Fault Diagnosis

Pin 26 of ECU connects to K line for fault diagnosis.

The K line helps to retrieve data of failure records, or manually input some commands such as deleting failure recordation or self-learning etc.

## (4) Limitations

Condition		Value			Unit
		Lowest	Standard	Largest	
Voltage of storage battery	Normal Operation	9.0	14.0±0.1	16.0	V
	Limited Function	6.0~9.0		16.0~18.0	V
Permissible limits and time of over-voltage of storage battery	26.0V	Partial functions remains for fault diagnosis		5	Min.
Operating temperature		-40		+70	°C
Storage Temperature		-40		+90	°C



# 5. FUEL SYSTEM

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## Electric Fuel Pump EKP13.5 Type (EKPT)

### (1) Illustration Diagram and Pin

Pin: there are two pins of electric fuel pump that connect to fuel pump relay.

Two fuel pump case besides the pins are engraved “+” and “-” signs to indicate to be connected to anode and cathode.

1. Fuel pump end cap 2. Engine 3. Fuel channel 4. Impeller pump

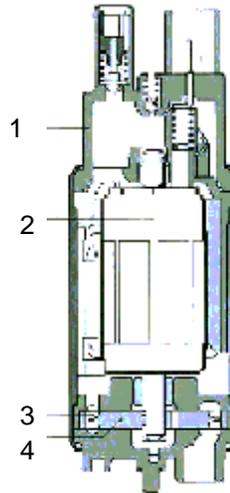


Figure 2-8 Cross-sectional view of electric fuel pump

### (2) Usage

With a certain pressure and flow (various in each system) to transport fuel from the tank to engine.

### (3) Limitations

Condition	Value			Unit
	Lowest	Standard	Largest	
Working Voltage	8		14	V(DC)
Environment Temperature ( For Storage and Transportation )	-40		+80	°C
Permissible Fuel Temperature	-30		+70	°C

### (4) Specification

Under certain supply pressure, flow of electric fuel pump is in direct proportion to voltage. Every auto factory adopts different fuel pump.

# 5. FUEL SYSTEM

## Electromagnetic Fuel Injector

### (1) Illustration Diagram and Pin

Pins: there are two pins for every injector; the one marked with “+” on the side of case connects to Pin no. 87 of output end of fuel pump relay; the other one connects to ECU.



Injector Element EV-Module

### (2) Usage

In accordance with ECU instruction, injector will inject fuels in specified time to provide fuel to the engine.

### (3) Limitations

Condition		Value			Unit
		Lowest	Standard	Largest	
Storage Temperature (original package)		-40		+70	°C
Permissible temperature of injector inside automobile (when not working)				+140	°C
Operating temperature of Injector	Continuous	-40		+110	°C
	Short Time after Heat Start (Approximately 3 minutes)			+130	°C
Permissible Fuel Temperature at intake of Injector	Continuous			+70	°C
	Short Time after Heat Start (Approximately 3 minutes)			+100	°C
Temperature of fuel flowrate within deviation less than 5% comparing to 20°C		-40		+45	°C
Permissible leaking around O-ring area at temperature -35 to -40°C		Allow to be humid, but cannot drip.			
Permissible Acceleration				400	m/s <sup>2</sup>
Voltage Supply		6		16	V
Insulation Resistance		1			MΩ
Permissible Leading Current				0.75	mA
Withstand Internal Fuel Pressure				1100	KPa
Withstand Torque				6	Nm
Withstand Pulling Force				600	N

# 5. FUEL SYSTEM

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## (4) Specification

Condition	Value			Unit
	Lowest	Standard	Largest	
Working Pressure (Pressure Difference)		300		kPa

## (5) Limitations (Injector Element EV-Module)

Condition	Value			Unit
	Lowest	Standard	Largest	
Operating Temperature	-40		+120	°C
Maximum Operating Temperature at for 15 Minutes			+130	°C
Maximum Permissible Peak of Acceleration			300	m/s <sup>2</sup>

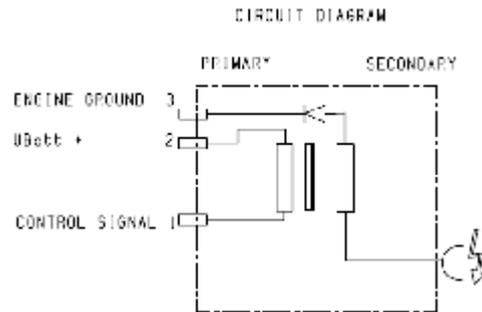
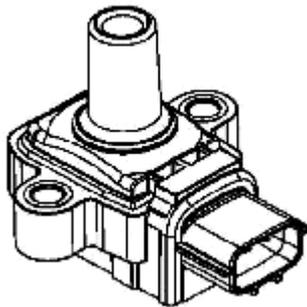
Refer to characteristic parameter of relief valve for system pressure.  
Refer to characteristic parameter of injector for fuel requirement.  
No fuel leaking is required for seal under operating pressure.  
Diameter of fuel rubber pipe is  $\Phi 7.5 \pm 0.3$ .



# 5. FUEL SYSTEM

## Ignition Coil ZSK-1x1

(1) Illustration Diagram and Pin



Pins:

There are three pins on the low voltage end of ignition coil ZSK-1X1; as indicated in the circuit, pin1 connects to ECU control signal; pin2 connects to “+” of storage battery; and pin3 connects to the ground.

High voltage end of ignition coil ZSK-1X1 connects to high voltage cable.

(2) Usage

Ignition coil ZSK-1X1 transforms low voltage of primary winding into high voltage of secondary winding. Spark plug discharges to produce spark and ignite fuel air mixture in fuel tank.

(3) Limitations

Condition	Value			Unit
	Lowest	Standard	Largest	
Permissible Temperature at Test Point	-40		+120	°C

(4) Specification

Condition		Value			Unit
		Lowest	Standard	Largest	
Rated Voltage			14		V
Operating Voltage		6		16.5	V
Resistance (20~25°C)	Primary Winding	0.74	0.76	0.78	Ω
	Secondary Winding	10.1	10.6	11.1	kΩ
Primary Current			7		A

# 5. FUEL SYSTEM

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## Idle Speed Step motor



(1) Illustration Diagram and Pin

There are four pins of idle speed step motor connecting to ECU pin10、11、26、27.

(2) Usage

Used to control bypass air flow.

Idle speed step motor is controlled by ECU in accordance with engine loading, and electrical duration and frequency (duty-cycle) of electrical pulse.

(3) Specification

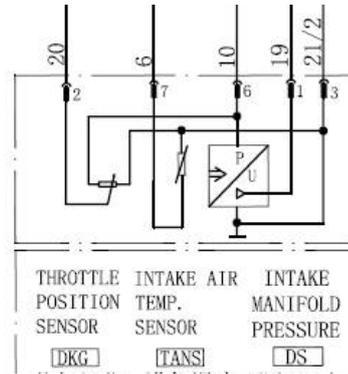
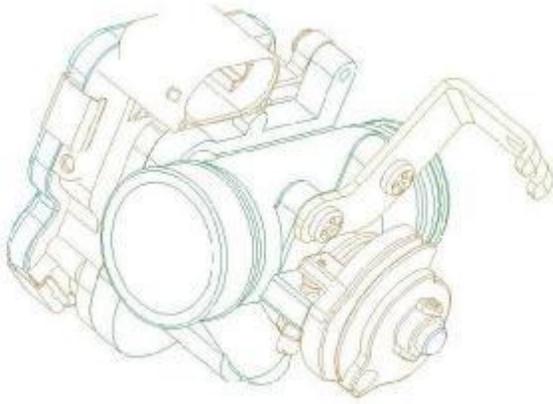
Condition	TEV-2			Unit
	Value			
	Lowest	Standard	Largest	
Rated Voltage	7.5	12	14	V
+20°C Resistance		53		Ω
Current under rated voltage		0.45		A
inductance(at 25°C/1KHz)			30	mH

# 5. FUEL SYSTEM

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## Small Engine Compact Module IMSE

- (1) IMSE comprises of the following components: mechanical throttle body, intake air temperature sensor, intake pressure sensor, throttle pos and stepping motor (optional).



(2) Usage

IMSE provides information regarding throttle body position, intake air temperature and pressure to ECU.

In accordance with provided info, ECU obtain data on air entering the engine through throttle body.

# 5. FUEL SYSTEM

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## EMS System Maintenance

### (1) General Maintenance Information

- Only digital millimeter allowed to be used for inspection on EMS.
- For maintenance, please use genuine parts otherwise normal operation of EMS will not be guaranteed.
- Only lead-free fuel should be used during maintenance.
- Please follow guidelines for maintenance process.
- It is prohibited to disassemble component parts of EMS.
- Carefully handle electric elements (such as ECU, sensors) during maintenance; not to drop them on the grounds.
- Establish environmental friendly awareness and process waste produced during maintenance effectively.

### (2) Notes on Maintenance Process.

- Do not arbitrarily remove or disassemble any component or its connector from installation position to prevent accidental damage or impacts on normal operation of EMS due to objects such as water or oil entering.
- When connecting/disconnecting connectors, be sure ignition switch is turned off.
- Otherwise electric component may be damaged.
- For any maintenance process that may raises operating temperature, the temperature of ECU units must be always under 80°C.
- Supply pressure of EMS is higher (around 300kPa).
- All fuel pipes can bear high pressure.
- Even engine not running, fuel pressure is maintained high in fuel channel.
- So be caution not to remove fuel pipe easily during maintenance.
- At times when it is necessary to performance maintenance on fuel system, it is required to release pressure before removal of fuel pipe.
- Procedure for releasing pressure as following: remove fuel pump relay and then initiate engine for idle speed until engine shuts down automatically.
- Fuel pipe removal and replacement of fuel filter should be conducted in well ventilated area and by professional maintenance personnels.
- When removing electric fuel pump from fuel tank, be sure power off fuel pump to avoid sparks.

## 5. FUEL SYSTEM

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- Operation test of fuel pump is not allowed at dry state or in water, otherwise service life of fuel pump will be reduced.
- Moreover, anode/cathode connectors of fuel pump cannot be connected reversely.
- When inspecting ignition system, spark test is conducted only when necessary, and inspection time must be as short as possible.
- At time of inspection, throttle valve should be closed to prevent unburned fuel to enter exhaust pipe and damage three-way catalytic converter.
- Idle speed regulation is monitored by EMS completely so manual adjustment is not required. Screws of throttle body is adjusted and fixed at manufacturer's factory, it is not allowed to change position manually.
- Positive/Negative poles of storage battery should be connected correctly.
- The system adopts negative ground.
- When the engine is running, removal of storage battery cable is not allowed.
- Before welding in the care, positive/negative cables of storage battery and electric control units must be removed.
- Do not pierce the surface of wire to examine input/output signals of component parts.

### (3) List of Repair Tools



Tool Name:

EMS (Engine Management System) Diagnostic Device

Function:

Read/clea trouble code of EMS, inspect data processing, test of operation of components and so on.

## 5. FUEL SYSTEM

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Tool Name:

EMS (Engine Management System) Adaptor

Function:

Inspect electrical signal of every pin of ECU, check on circuits and so on.



Tool Name:

Ignition Timing Light

Function:

Check ignition timing and so on.



Tool Name:

Digital Multimeter

Function:

Check characteristic parameters such as voltage, current, and resistance in EMS.

## 5. FUEL SYSTEM

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Tool Name:

Vacuums Gauge

Function:

Check pressure condition inside intake manifold.



Tool Name:

Cylinder Pressure Gauge

Function:

Check pressure condition in each cylinder.



Tool Name:

Fuel Pressure Gauge

Function:

Check pressure condition of fuel system, determine working condition of fuel pump and fuel pressure regulator in fuel system.

## 5. FUEL SYSTEM

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Tool Name:

Exhaust Analyzer

Function:

Check on exhaust condition of automobile to help on determining fault diagnosis of EMS.



Tool Name:

Injector Cleaning Analyzer

Function:

Analyze cleaning process of injector.

## 5. FUEL SYSTEM

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### Error code ( P CODE ) list

No.	P code	Description (UAES)
1	P0030	O2 Sensor Heater Contr. Circ/Open
2	P0031	O2 Sensor Heater Contr. Circ. Low
3	P0032	O2 Sensor Heater Contr. Circ. High
4	P0107	Manifold Abs. Pressure or Bar. Pressure Low Input
5	P0108	Manifold Abs. Pressure or Bar. Pressure High Input
6	P0112	Intake Air Temp. Circ. Low Input
7	P0113	Intake Air Temp. Circ. High Input
8	P0117	Engine Coolant Temp. Circ. Low Input
9	P0118	Engine Coolant Temp. Circ. High Input
10	P0122	Throttle Pos. Sensor Circ. Low Input
11	P0123	Throttle Pos. Sensor Circ. High Input
12	P0130	O2 Sensor Circ. Malfunction
13	P0131	O2 Sensor Circ. Low Voltage
14	P0132	O2 Sensor Circ. High Voltage
15	P0134	O2 Sensor Circ. No Activity Detected
16	P0201	Cylinder 1- Injector Circuit
17	P0261	Cylinder 1- Injector Circuit Low
18	P0262	Cylinder 1- Injector Circuit High
19	P0321	Engine Speed Reference Mark
20	P0322	Eng. Speed Inp. Circ. No Signal
21	P0508	ISA control Circuit Low
22	P0509	ISA control Circuit High
23	P0511	ISA control Circuit/Open
24	P0560	System Voltage Malfunction
25	P0562	System Voltage Low Voltage
26	P0563	System Voltage High Voltage
27	P0650	Malfunction Indicator Lamp Control Circ.
28	P1099	Malfunction Dump Sensor Control Circ.

# 5. FUEL SYSTEM

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## **MSE3.0 system processes diagnostic flow based on error code**

Description:

1. Please make sure it is a fixed error in order to proceed following service or it would cause misdiagnosis.
2. The millimeter mentioned is digital millimeter; it is prohibited to inspect circuit of EFI system with VOM.
3. While in service of vehicle with security device, please pay attention to ECU programming after ECU is changed.
4. If description of error code is low voltage of circuit, it means that the circuit could be short to GND or open; if description of error code is high voltage of circuit, it means that circuit could be short to power; if description of error code is circuit, it means there is possible cut or multiple circuit error.

Diagnosis assist:

1. If error code cannot be deleted, it is fixed error; if error happens in occasion, please check whether the connector is loose.
2. Inspection is done with procedures mentioned, no abnormal status is found.
3. Do not neglect influences from service condition of vehicle, cylinder pressure, mechanical timing during diagnosis.
4. Change ECU and perform test.
5. If error code can be deleted at this time, then it is ECU that has error, if error code cannot be deleted, change back to original ECU, repeat the procedure and inspect again.

The following is meaning of error code used in current MSE3.0 system, corresponding diagnostic strategy, possible cause and trouble shooting, the information is reference for vehicle service.

## 5. FUEL SYSTEM

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### Error code: P0030 : O2 Sensor Heater Contr. Circ/Open

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"><li>1) Open between circuit of ECU pin and no.2 pin of air conduct sensor.</li><li>2) Open between no.1 pin of lambda sensor and circuit of main relay.</li><li>3) Open between no.1 and no.2 pin of lambda sensor.</li></ol>	<p>Service notification:</p> <p>Inspect following item</p> <ol style="list-style-type: none"><li>1) Measure circuit resistance between ECU insertion pin and no.2 pin of lambda sensor.</li><li>2) Measure circuit resistance between main relay and no.1 pin of lambda sensor.</li><li>3) Measure resistance between no.1 and no.2 pin of lambda sensor.</li></ol>
---	---

### Error code: P0031 : O2 Sensor Heater Contr. Circ. Low

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"><li>1) Circuit connected to ECU pin is short to GND.</li></ol>	<p>Service notification:</p> <p>Inspect following items</p> <ol style="list-style-type: none"><li>1) Measure resistance of ECU pin to GND.</li></ol>
--	--

### Error code: P0032 : O2 Sensor Heater Contr. Circ. High

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"><li>1) Short between circuit connected to ECU pin and no.1 pin of lambda sensor.</li><li>2) Short between circuit connected to ECU pin and other power circuit.</li></ol>	<p>Service notification:</p> <p>Inspect following item</p> <ol style="list-style-type: none"><li>1) Measure ECU voltage.</li><li>2) Measure resistance between ECU pin and no.1 pin circuit of lambda sensor.</li></ol>
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### Error code: P0107 : Manifold Abs. Pressure or Bar. Pressure Low Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"><li>1) ECU detects ground short of signal circuit of sensor.</li></ol>	<p>Service notification:</p> <p>Inspect following item</p> <ol style="list-style-type: none"><li>1) Resistance between ECU pin and GND.</li></ol>
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### Error code: P0108 : Manifold Abs. Pressure or Bar. Pressure High Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"><li>1) ECU detects power short of signal circuit of sensor.</li></ol>	<p>Service notification:</p> <p>Inspect following item</p> <ol style="list-style-type: none"><li>1) Voltage of ECU pin.</li></ol>
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## 5. FUEL SYSTEM

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### Error code: P0112 : Intake Air Temp. Circ. Low Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) GND short of sensor signal circuit that is connected to ECU pin.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure the resistance between sensor signal circuit of ECU pin and GND.</p>
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### Error code: P0113 : Intake Air Temp. Circ. High Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Power short of sensor signal circuit that is connected to ECU pin.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure the voltage of signal circuit of sensor signal of ECU pin.</p>
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### Error code: P0117 : Engine Coolant Temp. Circ. Low Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) GND short of circuit that is connected to ECU pin.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure resistance between ECU pin and GND.</p>
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### Error code: P0118 : Engine Coolant Temp. Circ. High Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Short between circuit connected to ECU pin and other power circuit.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure voltage that connects to ECU pin.</p>
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### Error code: P0122 : Throttle Pos. Sensor Circ. Low Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) ECU pin GND short.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure resistance between ECU pin and GND.</p>
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## 5. FUEL SYSTEM

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Error code: P0123 : Throttle Pos. Sensor Circ. High Input

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Short between circuit connected to ECU pin and other power circuit.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure voltage connected to ECU.</p>
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Error code: P0130: O2 Sensor Circ. Malfunction

Fail cause: System determines fail of lambda sensor signal if it has following status. Lambda sensor signal circuit couples with heating circuit.

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Check if lambda sensor insertion is correct.</p> <p>2) Check is lambda sensor signal circuit couples with heating circuit.</p>	<p>Service notification:</p>
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Error code: P0131 : O2 Sensor Circ. Low Voltage

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Signal circuit connected to ECU pin is short to GND.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure resistance between ECU pin and GND.</p>
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Error code: P0132 : O2 Sensor Circ. High Voltage

Fail cause : When engine starts, ECU detects the circuit voltage of lambda sensor, if signal voltage is higher than 1.5 volt; it determines signal circuit of lambda sensor is short to power.

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Signal circuit connected ECU pin is short to no.1 pin of lambda sensor.</p> <p>2) Signal circuit connected ECU pin is short to other power circuit.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure resistance between signal circuit connected ECU pin and no.1 pin of lambda sensor.</p> <p>2) Measure voltage of signal circuit connected to ECU pin.</p>
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## 5. FUEL SYSTEM

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Error code: P0134 : O2 Sensor Circ. No Activity Detected

Fail cause : When engine starts, ECU detects circuit voltage of lambda sensor, if signal voltage changes between 0.4~0.6 volt, system determines it is a failure of open circuit of lambda sensor.

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"> <li>1) Circuit open of lambda sensor connected to ECU pin.</li> <li>2) Bad contact of lambda sensor insertion component (oxidized pin).</li> </ol>	<p>Service notification:</p> <p>Inspect following item</p> <ol style="list-style-type: none"> <li>1) Measure resistance between ECU insertion component and no.4 pin of lambda sensor.</li> </ol>
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Error code: P0201 : Cylinder 1- Injector Circuit

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"> <li>1) Whether injector coil is open.</li> <li>2) Connection between pin of injector insertion and ECU pin.</li> <li>3) Connection between pin of injector insertion and main relay.</li> </ol>	<p>Service notification:</p> <p>Inspect following item</p>
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Error code: P0261 : Cylinder 1- Injector Circuit Low

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"> <li>1) GND short of driving circuit connected to ECU pin.</li> </ol>	<p>Service notification:</p> <p>Inspect following item</p> <ol style="list-style-type: none"> <li>1) Measure GND resistance that is connected to ECU pin circuit.</li> </ol>
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Error code: P0262 : Cylinder 1- Injector Circuit High

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"> <li>1) Circuit connected to ECU pin is short to other power.</li> </ol>	<p>Service notification:</p> <p>Inspect following item</p> <ol style="list-style-type: none"> <li>1) Measure voltage of circuit connected to ECU pin.</li> </ol>
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## 5. FUEL SYSTEM

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Error code: P0321 : Engine Speed Reference Mark

Fail cause : System uses speed test system of 36-2, 36-2 sensing tooth coil is installed on flywheel, while flywheel moves ( engine speed is synchronized with crankshaft ) it creates magnetic change in sensor and generate AC power, the frequency depends on engine speed. ECU signaling circuit transforms input sine wave to square wave; when ECU finds moving down distance of square wave is bigger than the gap between two teeth, then reference position is found. System defines that the specific position the reference tooth gap physically corners ponds to one cylinder should be software referencing signal (BM) in second low point of referencing tooth gap, and the distance from software referencing signal to crankshaft corner value should fix to 100°CA. So with one circle of crankshaft the system receives a software referencing signal, according to the software referencing signal system synchronization with crankshaft to ensure control of correct injection, intake air and ignition timer.

If following condition happens, it is consider failure of software referencing signal of crankshaft(BM) :

1. BMs detected are frequently occurred earlier or delayed from expected point;
2. Speed signal detectable but BM not detectable;
3. Frequent loss of BM;

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"> <li>1) Intermittent short or open of line connection.</li> <li>2) Installation position bias of crankshaft signaling wheel.</li> <li>3) Installing position bias of engine speed sensor.</li> </ol>	<p>Service notification:</p> <p>Inspect following item</p>
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Error code: P0322 : Eng.Speed Inp.Circ. No Signal

Fail cause : When engine is started, ECU monitors sensor signal of speed engine and other signals at the same time. It is determined as loss of sensor signal of engine speed through analysis.

<p>Service notification:</p> <p>Error may be caused by following problems</p> <ol style="list-style-type: none"> <li>1) Circuit of speed engine sensor connected to ECU is open.</li> <li>2) Circuit of speed engine sensor connected to ECU is short.</li> <li>3) Sensor coil of speed sensor is open.</li> </ol>	<p>Service notification:</p> <p>Inspect following item</p>
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## 5. FUEL SYSTEM

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Error code : P0508 GND short of stepper driving pin

Error code : P0509 Power short of stepper driving pin

Error code : P0511 Open of stepper driving pin

Fail cause: After engine starts, circuit control module of ECU monitors driving circuit voltage of idle speed stepper, when GND short/power short/open happens to one of the four circuits, system determines it is a fail of stepper circuit.

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) GND short/power short/open of any stepper driving circuit connected to ECU.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure resistance or voltage between stepper driving circuit connected to ECU and GND.</p>
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Error code : P0560 Signal fail of system battery voltage

Error code : P0562 Low system battery voltage

Error code : P0563 High system battery voltage

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Damaged power generator cannot generate power or electricity leakage of battery.</p> <p>2) Circuit open of power generator.</p> <p>3) Damaged power generator regulator that cannot control power generation and causes high generating voltage.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Examine power generation of power generator. (Examine voltage of power generator after start).</p>
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Error code: P0650 Driving circuit failure of MIL indicator

<p>Service notification:</p> <p>Error may be caused by following problems</p> <p>1) Open/GND short/Power short of MIL indicator driving circuit connected to ECU.</p> <p>2) Open circuit between MIL and main relay.</p> <p>3) Burnt MIL indicator.</p>	<p>Service notification:</p> <p>Inspect following item</p> <p>1) Measure resistance or voltage of MIL indicator driving circuit connected to ECU.</p>
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# 5. FUEL SYSTEM

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## **MSE3.0 System Diagnostic Flow Based on Failure Condition**

Initial examination has to be done before starting procedure of diagnostic based on failure condition of engine.

- 1 · Make sure failure indicator of engine is OK.
- 2 · Inspecting with diagnostic instrument to make sure no failure record.
- 3 · Confirm the existence of failure phenomenon and confirm the conditions of failure cause.

Then proceed inspection of appearance :

- (1) Check if there is leakage of fuel pipe.
- (2) Check if vacuum pipe is broken, twisted or connected correctly.
- (3) Check if intake air pipe leaks, chocked, pressed or damaged.
- (4) Check if high voltage coil of ignition system is broken, aged, and correctness of ignition sequence.
- (5) Check if GND contact of cord group is clean.
- (6) Check if there is loose or bad contact of each sensor and connector.

Important notification:

If the phenomenon's aforementioned exist, proceed service prefigure phenomenon otherwise it will influence diagnostic and repair work afterward.

Diagnostic assistance:

- (1) Confirm no record of engine failure.
- (2) Confirm existence of failure phenomenon.
- (3) Examine per above procedure and no abnormal condition is found.
- (4) Do not neglect vehicle service status, cylinder pressure, mechanical timer, fuel status during examination procedure that might affect system.
- (5) Change ECU and precede test.

If failure can be deleted that it is an ECU failure, if failure still exists then change back to original ECU and repeat procedure, run examination again.

- When starting, engine does not run or run slowly.
- When starting, engines runs but cannot start successfully.
- Hard to start when engine is hot.
- Hard to start when engine is cool.
- Normal engine speed, hard to start anytime.
- Proper start but idle speed is not stable anytime.
- Proper start but idle speed is not stable during warm up.
- Proper start but idle speed is not stable after warm up.
- Proper start but the idle speed is not stable or engine stop with partials load (Headlight is on).
- Proper start but idle speed is too high.
- Engine speed cannot go higher or engine stop during acceleration.
- Slow reaction during acceleration.
- Powerless during acceleration, bad capability.

# 5. FUEL SYSTEM

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## On Failure Condition

(1) Engine does not run or run slowly when starting

Normal failure part:

1. Battery; 2. Power generator; 3. Coil or ignition switch; 4. Engine mechanical part

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Examine the voltage between two poles with millimeter, and whether it is 8-12V when engine starts.	Yes	Next step
		No	Change battery
2	Keep ignition switch in start position, check if there is 8V on positive pole of engine with millimeter.	Yes	Next step
		No	Repair or change coil
3	Disembark engine, check working status of engine if there is short or jam due to bad grease.	Yes	Repair or change start engine
		No	Next step
4	If failure only happens in winter, check whether the engine oil is not correct that cause big abrasion of start engine.	Yes	Change proper lubricant
		No	Next step
5	Check if inner mechanical resistance of start engine is too big that causes engine not run or run slowly.	Yes	Change inner resistance of engine
		No	Repeat previous step

(2) While starting, engine runs but cannot start successfully.

General failure part :

1. No fuel in tank ; 2. Fuel pump ; 3. Engine speed sensor ; 4. Ignition coil ; 5. Mechanical part of engine.

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Connect to fuel pressure gauge (Switch on ignition in the front of fuel pipe), repeat it if necessary or start engine and check whether fuel pressure is around 300kPa.	Yes	Next step
		No	Examine fuel supply system
2	Connect to diagnostic instrument of electrical injector, observe "engine speed", start engine and see if there is output of engine speed signal.	Yes	Next step
		No	Examine line of engine speed sensor

## 5. FUEL SYSTEM

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3	Plug off ignition high voltage coil, connect it to spark and leave spark 5mm away from engine, start engine and see if there is blue and white sparking.	Yes	Next step
		No	Examine ignition system
4	Examine pressure of engine cylinder and see whether the pressure is enough for engine cylinder	Yes	Solve engine mechanic failure
		No	Next step
5	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(3) Hard to start when engine is hot

General failure part :

1.Fuel contains water ; 2.Fuel pump ; 3.Coolant sensor ; 4. Ignition coil

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Connect to fuel pressure gauge (Connect point is front end of fuel pipe of injector), start engine and check whether fuel pressure is around 300kPa.	Yes	Next step
		No	Examine fuel supply system
2	Plug off ignition high voltage coil, connect it to spark and leave spark 5mm away from engine, start engine and see if there is blue and white sparking.	Yes	Next step
		No	Examine ignition system
3	Take off connector of coolant sensor, start engine and see whether engine can start successfully. (Or connect a 300 $\Omega$ resistant to connector of coolant sensor to replace coolant sensor, then observe whether engine can start successfully.)	Yes	Examine line or change sensor
		No	Next step
4	Examine fuel status and see if the failure happens after filling fuel.	Yes	Change fuel
		No	Next step

## 5. FUEL SYSTEM

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5	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(4) Hard to start when engine is cool

General failure part :

1. Fuel contains water; 2. Fuel pump; 3. Coolant sensor; 4. Injector ; 5. Ignition coil; 6. Throttle and idle speed air channel; 7. Mechanical part of engine.

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Connect to fuel pressure gauge (Connect point is front end of fuel pipe of injector), start engine and check whether fuel pressure is around 300kPa.	Yes	Next step
		No	Examine fuel supply system
2	Plug off ignition high voltage coil, connect it to spark and leave spark 5mm away from engine, start engine and see if there is blue and white sparking.	Yes	Next step
		No	Examine ignition system
3	Take off connector of coolant sensor, start engine and see whether engine can start successfully. (Or connect a 2500 $\Omega$ resistant to connector of coolant sensor to replace coolant sensor, then observe whether engine can start successfully.)	Yes	Examine line or change sensor
		No	Next step
4	Pull accelerator slightly and see if engine can start easily.	Yes	Clean throttle and idle speed air channel
		No	Next step
5	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage.	Yes	Change failure part
		No	Next step
6	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step

## 5. FUEL SYSTEM

---

7	Examine the pressure of engine cylinder and see if engine cylinder does not have enough pressure.	Yes	Solve mechanical failure of engine.
		No	Next step
8	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(5) Normal engine speed, hard to start anytime

General failure part :

- 1.Fuel contains water; 2.Fuel pump; 3.Engine coolant sensor; 4.Injector; 5.Ignition coil;  
6.Throttle and idle speed air channel; 7.Intake air channel; 8.Ignition timer; 9.Spark;  
10.Mechanical part of engine

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if air filter is jammed or leakage in Intake air channel.	Yes	Examine intake air system
		No	Next step
2	Connect to fuel pressure gauge (Connect point is front end of fuel pipe of injector), start engine and check whether fuel pressure is around 300kPa.	Yes	Next step
		No	Examine fuel supply system
3	Plug off ignition high voltage coil, connect it to spark and leave spark 5mm away from engine, start engine and see if there is blue and white sparking.	Yes	Next step
		No	Examine ignition system
4	Check the cylinder spark and see if the model number and gap match requirement.	Yes	Next step
		No	Adjust or change
5	Take off connector of engine coolant sensor, start engine and see if engine can start successfully.	Yes	Examine line or change sensor
		No	Next step
6	Pull accelerator slightly and see if engine can start easily.	Yes	Clean throttle and idle speed air channel
		No	Next step

## 5. FUEL SYSTEM

---

7	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage.	Yes	Change failure
		No	Next step
8	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step
9	Examine the pressure of engine cylinder and see if engine cylinder does not have enough pressure.	Yes	Solve mechanical failure of engine.
		No	Next step
10	Check whether the mechanical ignition timer of engine meet requirement.	Yes	Next step
		No	Examine ignition timer
11	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(6) Proper start but idle speed is not stable anytime

General failure part :

1. Fuel contains water; 2. Fuel pump; 3. Spark; 4. Throttle and idle speed air channel; 5. Intake air channel; 6. Ignition timer; 7. Spark; 8. Mechanical part of engine

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if air filter is jammed or leakage in Intake air channel.	Yes	Examine intake air system
		No	Next step
2	Check the cylinder spark and see if the model number and gap match requirement.	Yes	Next step
		No	Adjust or change
3	Check if there is carbon accumulated in throttle and idle speed air channel	Yes	Clean
		No	Next step
4	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage.	Yes	Change failure
		No	Next step
5	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step

## 5. FUEL SYSTEM

---

6	Examine the pressure of engine cylinder and see if engine cylinder does not have enough pressure.	Yes	Solve mechanical failure of engine.
		No	Next step
7	Check whether the mechanical ignition timer of engine meet requirement.	Yes	Next step
		No	Examine ignition timer
8	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(7) Proper start but idle speed is not stable during warm up

General failure part :

1. Fuel contains water; 2.Engine coolant sensor; 3.Spark; 4. Throttle and idle speed air channel;
- 5.Intake air channel; 6.Mechanical part of engine

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if air filter is jammed or leakage in Intake air channel.	Yes	Examine intake air system
		No	Next step
2	Check the cylinder spark and see if the model number and gap match requirement.	Yes	Next step
		No	Adjust or change
3	Check if there is carbon accumulated in throttle and idle speed air channel.	Yes	Clean relevant accessories
		No	Next step
4	Take off connector of engine coolant sensor and see if idle speed of engine is not stable during warm up	Yes	Examine line or change sensor
		No	Next step
5	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage.	Yes	Change failure
		No	Next step
6	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step
7	Examine the pressure of engine cylinder and see if engine cylinder does not have enough pressure.	Yes	Solve mechanical failure of engine.
		No	Next step

## 5. FUEL SYSTEM

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8	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(8) Proper start but idle speed is not stable after warm up

General failure part :

1. Fuel contains water; 2.Engine coolant sensor; 3.Spark; 4. Throttle and idle speed air channel;
5. Intake air channel; 6. Mechanical part of engine

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if air filter is jammed or leakage in Intake air channel.	Yes	Examine intake air system
		No	Next step
2	Check the cylinder spark and see if the model number and gap match requirement.	Yes	Next step
		No	Adjust or change
3	Check if there is carbon accumulated in throttle and idle speed air channel.	Yes	Clean relevant accessories
		No	Next step
4	Take off connector of engine coolant sensor and see if idle speed of engine is not stable during warm up	Yes	Examine line or change sensor
		No	Next step
5	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage.	Yes	Change failure
		No	Next step
6	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step
7	Examine the pressure of engine cylinder and see if engine cylinder does not have enough pressure.	Yes	Solve mechanical failure of engine.
		No	Next step
8	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

## 5. FUEL SYSTEM

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(9) Proper start but the idle speed are not stable or engine stop with partials load (Headlight is on)

1. Injector

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if there is carbon accumulated in throttle and idle speed air channel.	Yes	Clean relevant accessories
		No	Next step
2	Observe if the working load of output power increases when engine start, utilize instrument of electrical injection system to observe ignition, injection and intake air volume.	Yes	To step 4
		No	Next step
		No	Examine air condition system
3	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage.	Yes	Change failure
		No	Next step
4	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(10) Proper start but idle speed is too high

General failure part :

1. Throttle and idle speed air channel; 2. Vacuum valve; 3. Engine coolant sensor; 4. Ignition timer

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Examine if accelerator string is stucked or too tight.	Yes	Adjust
		No	Next step
2	Check if there is leakage in intake air system and vacuum air pipe connected.	Yes	Examine intake air system
		No	Next step
3	Check if there is carbon accumulated in throttle and idle speed air channel.	Yes	Clean relevant accessories
		No	Next step
4	Take off connector of engine coolant sensor and see if idle speed of engine is not stable during warm up.	Yes	Examine line or change sensor
		No	Next step

## 5. FUEL SYSTEM

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5	Examine whether mechanical ignition timer meets requirement.	Yes	Next step
		No	Examine ignition timer
6	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(11) Engine speed cannot go higher or engine stop during acceleration

General failure part :

1. Fuel contains water; 2. Intake air pressure sensor and throttle position sensor; 3. Spark;
4. Throttle and idle speed air channel; 5. Intake air channel; 6. Injector; 7. Ignition timer; 8. Exhaust

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if air filter is jammed.	Yes	Examine intake air system
		No	Next step
2	Connect to fuel pressure gauge (Connect point is front end of fuel pipe of injector), start engine and check whether fuel pressure is around 300kPa.	Yes	Next step
		No	Examine fuel supply system
3	Check the cylinder spark and see if the model number and gap match requirement.	Yes	Next step
		No	Adjust or change
4	Check if there is carbon accumulated in throttle and idle speed air channel.	Yes	Clean relevant accessories
		No	Next step
5	Examine intake air pressure sensor, throttle position sensor and the circuit line.	Yes	Next step
		No	Examine circuit line or change sensor
6	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage	Yes	Change failure part
		No	Next step
7	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step
8	Check if ignition sequence if engine and whether ignition timer meets requirement	Yes	Next step
		No	Examine ignition timer

## 5. FUEL SYSTEM

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9	Check if condition of exhaust is good	Yes	Next step
		No	Repair or change exhaust
10	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(12) Slow reaction during acceleration

General failure part :

1. Fuel contains water; 2. Intake air pressure sensor and throttle position sensor; 3. Spark; 4.

Throttle and idle speed air channel; 5. Intake air channel; 6. Injector; 7. Ignition timer; 8. Exhaust

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if air filter is jammed.	Yes	Examine intake air system
		No	Next step
2	Connect to fuel pressure gauge (Connect point is front end of fuel pipe of injector), start engine and check whether fuel pressure is around 300kPa.	Yes	Next step
		No	Examine fuel supply system
3	Check the cylinder spark and see if the model number and gap match requirement.	Yes	Next step
		No	Adjust or change
4	Check if there is carbon accumulated in throttle and idle speed air channel.	Yes	Clean relevant accessories
		No	Next step
5	Examine intake air pressure sensor, throttle position sensor and the circuit line.	Yes	Next step
		No	Examine circuit line or change sensor
6	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage	Yes	Change failure part
		No	Next step
7	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step
8	Check if ignition sequence if engine and whether ignition timer meets requirement	Yes	Next step
		No	Examine ignition timer

## 5. FUEL SYSTEM

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9	Check if condition of exhaust is good	Yes	Next step
		No	Repair or change exhaust
10	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

(13) Powerless during acceleration, bad capability

General failure part :

1. Fuel contains water;
2. Intake air pressure sensor and throttle position sensor;
3. Spark;
4. Throttle and idle speed air channel;
5. Intake air channel;
6. Injector;
7. Ignition timer;
8. Exhaust;
9. Pulse coil

General diagnostic flow :

No.	Operation procedure	Result	Next procedure
1	Check if there is clutch slip, low tire pressure, poor braking system or wrong tire size.	Yes	Repair
		No	Next step
2	Check if air filter is jammed.	Yes	Examine intake air system
		No	Next step
3	Connect to fuel pressure gauge (Connect point is front end of fuel pipe of injector), start engine and check whether fuel pressure is around 300kPa.	Yes	Next step
		No	Examine fuel supply system
4	Plug off ignition high voltage coil, connect it to spark and leave spark 5mm away from engine, start engine and see if there is blue and white sparking.	Yes	Next step
		No	Examine ignition system
5	Check the cylinder spark and see if the model number and gap match requirement.	Yes	Next step
		No	Adjust or change
6	Check if there is carbon accumulated in throttle and idle speed air channel.	Yes	Clean relevant accessories
		No	Next step
7	Examine intake air pressure sensor, throttle position sensor and the circuit line.	Yes	Next step
		No	Examine circuit line or change sensor

## 5. FUEL SYSTEM

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8	Remove injector, use cleaning analysis instrument to inspect whether injector is jammed or leakage	Yes	Change failure part
		No	Next step
9	Examine fuel status and see if failure happens after filling fuel.	Yes	Change fuel
		No	Next step
10	Check if ignition sequence if engine and whether ignition timer meets requirement	Yes	Next step
		No	Examine ignition timer
11	Check if condition of exhaust is good	Yes	Next step
		No	Repair or change exhaust
12	Connect to switch of electrical injection system, switch ignition on, check whether 5#, 10#, 23# power supply pin are normal; check whether pin solder contact of 2# and 21# are normal.	Yes	Diagnostic assistance
		No	Examine corresponding line

# 5. FUEL SYSTEM

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## How to read ECU Error Code

1. When the error code indicator is on, push “adjust” button 3 times.



Adjust

2. To the screen “dte”. (The 2 block shows the quantity of error code occurred)



3. In this dte screen push “adjust” for 3 seconds to enter next screen as below picture.



Here shows the quantity of error code occurred.

If the error code quantity is bigger than 2, Need to check the different error code, push “adjust” to change the screen for each error code.

With the error code, you can check with the Error code number list to diagnose the defected points with this ATV.

## 5. FUEL SYSTEM

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4. When finish it. Push "djust" for 3 seconds to back to the front screen.



5. Push "adjust" again to back to the first screen.



## 5. FUEL SYSTEM

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### **Instruction for Error Code indicator on**

1. No malfunction, water temperature is lower than 105°C. The error code indicator will not be on.
2. Key on, but the ATV is not starting, there is some parts out of order diagnosed by ECU, the error code indicator will be on all the time.
3. During riding, there is some parts out of order judged by ECU, the error code signal will be lighted all the time.
4. When water temperature is over 105°C, the error code indicator is on, but no error code number shown on it. If keeping riding this ATV, ECU would make the horsepower lower itself to protect the engine and remind the user to alert the water temperature is over heat.
5. When this ATV has a historical record for the error code: when key on, no start the engine, the error code indicator will be on for 4 seconds and then disappear. (This historical record means it was happened before, then repaired, but error codes were not eliminated.)
6. If the error code historical record is not being eliminated, after the engine runs and stops for 20 times. Then ECU can eliminate the historical code automatically.

# 6. ENGINE REMOVAL

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## ENGINE REMOVAL

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SERVICE INFORMATION .....	6-1
ENGINE REMOVAL .....	6-2

# 6. ENGINE REMOVAL

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## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- A floor jack or other adjustable support is required to support and maneuver the engine.  
Be careful not to damage the machine body, cables and wires during engine removal.
- Use shop towels to protect the machine body during engine removal.

# 6. ENGINE REMOVAL

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## ENGINE REMOVAL

Drain engine coolant and remove the radiator.  
(Refer to chapter 10).

Remove the engine under cover (1).

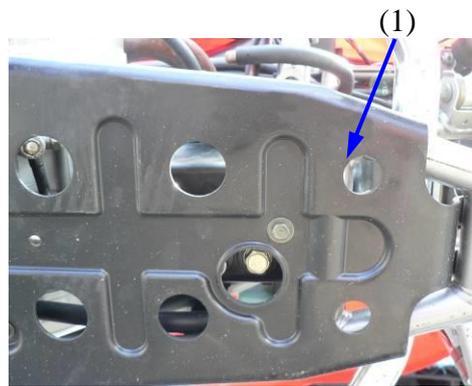
Drain engine oil. (Refer to page 3-11).

Remove the seat. (Refer to page 2-3)

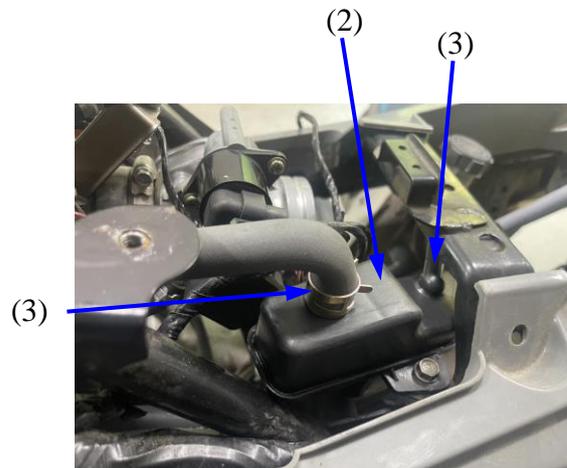
Remove the headlight connector. (Refer to page 2-5)

Remove the 2 side fenders. (Refer to page 2-6)

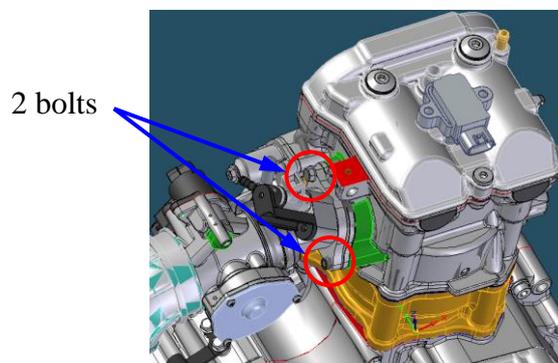
Remove the fuel tank. (Refer to page 5-3)



Disconnect the the oil return tank (2) with hose (3).



Remove the throttle valve and throttle cable by 2 bolts.



# 6. ENGINE REMOVAL

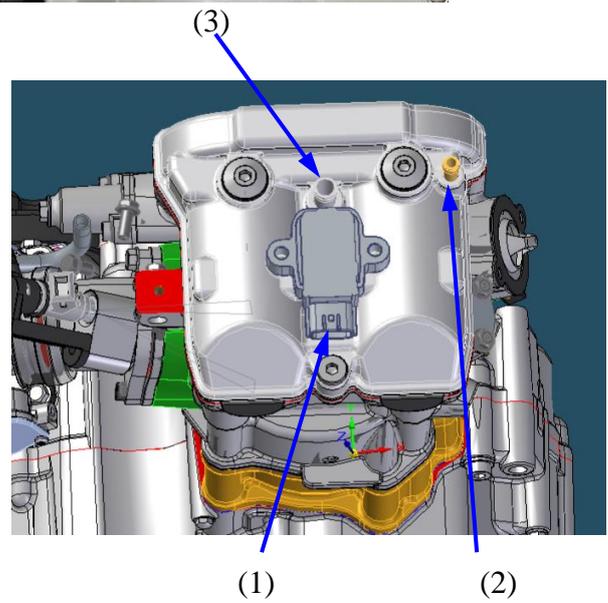
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Disconnect the battery (-) lead wire.

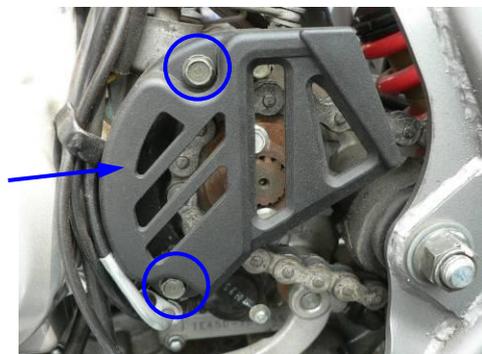
Battery(-)lead wire



Disconnect the spark plug cap (1), oil tank overflow hose (2) and breather hose (3).



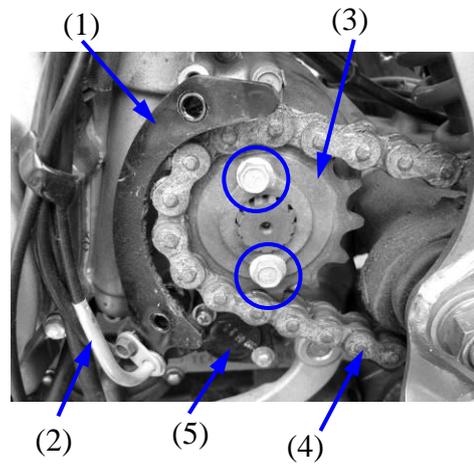
Remove the engine sprocket cover.



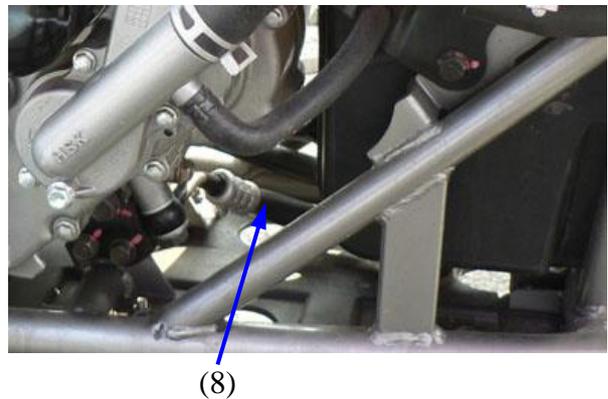
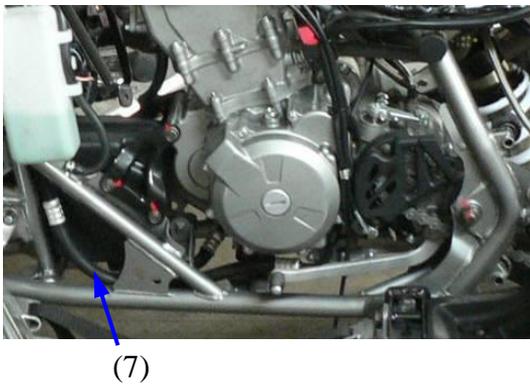
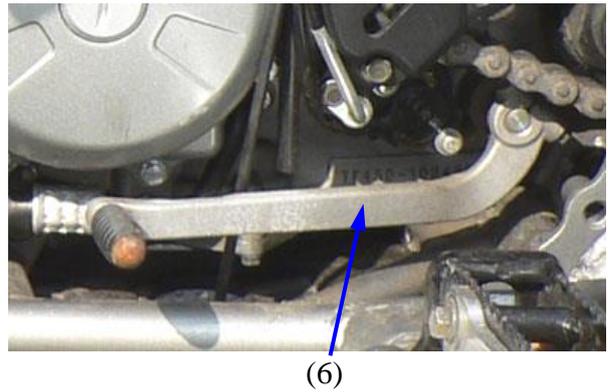
## 6. ENGINE REMOVAL

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- Remove the reverse gear cable bracket (1).
- Disconnect the reverse gear cable (2).
- Remove the engine sprocket (3) with drive chain (4).
- Remove the gear position switch (5).



- Remove the gearshift lever (6).
- Remove the engine oil outlet hose (7) and inlet hose (8).



## 6. ENGINE REMOVAL

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Remove the engine coolant inlet hose. (1)



Remove the engine coolant outlet hose (2).



(2)

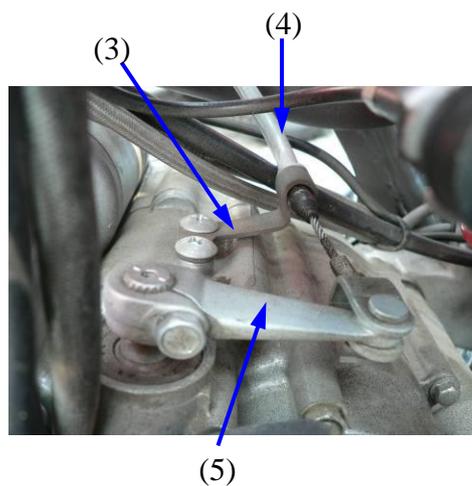
## 6. ENGINE REMOVAL

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Disconnect the starter motor lead wire (1) and ground wire (2).



Remove the clutch cable bracket (3).  
Disconnect the clutch cable (4) end out of the clutch lever.  
Disconnect the clutch cable (4) end out of the clutch release arm.  
Remove the clutch release arm (5).



## 6. ENGINE REMOVAL

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Disconnect the magneto lead wire couplers (1) and gear position switch lead wire coupler (2).



Remove the exhaust pipe (3).  
(Refer to page 2-8)



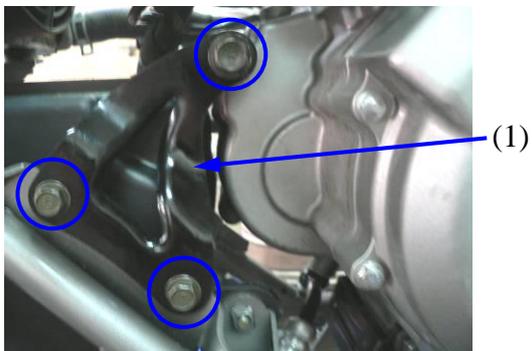
## 6. ENGINE REMOVAL

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Remove the engine mounting bolts and nuts.

Remove the engine mounting brackets (1).

Remove the engine from the left side.



# 7.CYLINDER HEAD/VALVES

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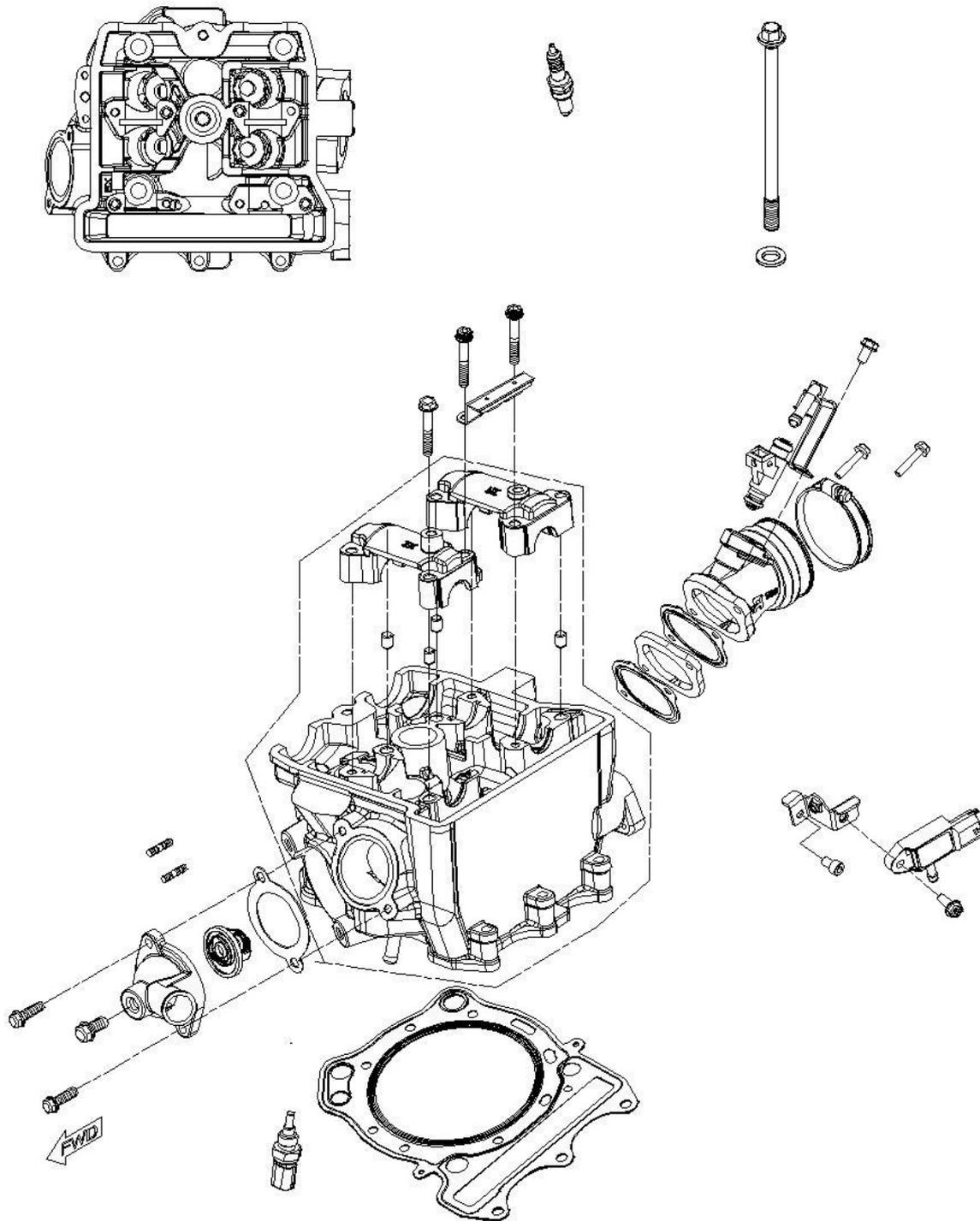
## CYLINDER HEAD/VALVES

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SERVICE INFORMATION-----	7-2
TROUBLESHOOTING -----	7-3
CYLINDER HEAD COVER-----	7-4
CYLINDER HEAD-----	7-8
CAMSHAFT-----	7-11

# 7. CYLINDER HEAD/VALVES

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# 7.CYLINDER HEAD/VALVES

## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- When assembling, apply engine oil to the valve guide movable parts, valve arm and camshaft sliding surfaces for initial lubrication.
- The camshaft is lubricated by engine oil through the cylinder head engine oil passages. Clean and unclog oil passages before assembling the cylinder head.
- After removal, mark and arrange the removed parts in order. When assembling, install, them in the reverse order of removal.

### SPECIFICATIONS

Unit mm ( in )

Item		Standard	Service Limit
Valve clearance ( cold )	IN	0.1~0.15 ( 0.004~0.006 )	—
	EX	0.15~0.2 ( 0.006~0.008 )	—
Valve diam	IN	36.0 (1.42)	—
	EX	29.0 (1.14)	—
Valve guide to valve stem clearance	IN	0.010~0.037 (0.0004~0.0015)	—
	EX	0.030~0.057 (0.0012~0.0022)	—
Valve stem deflection	IN&EX	—	0.35 (0.014)
Valve guide I.D.	IN&EX	5.000~5.012 (0.1969~0.1973)	—
Valve stem O.D.	IN	4.975~4.990 (0.1959~0.1965)	—
	EX	4.955~4.970 (0.1951~0.1957)	—
Valve stem runout	IN&EX	—	0.05 (0.002)
Valve head thickness	IN&EX	—	0.50 (0.02)
Valve seat width		1.25~1.65 (0.049~0.065)	
Valve seat angle	IN&EX	45°	
Valve head radial runout	IN&EX	—	0.35 (0.014)
Cylinder head compression pressure		16 kgf/cm <sup>2</sup> (at 500 rpm)	
Cylinder head warp		—	0.05
Camshaft cam height	IN	39.98~40.02(1.574~1.576 )	39.88
	EX	39.98~40.02(1.574~1.576 )	39.88
Camshaft journal oil clearance (IN & EX)			0.15 0.006 in
Camshaft runout		—	0.10(0.004 in)
Camshaft O.D.	IN&EX	21.959~21.980 (0.8645~0.8654)	
Camshaft housing I.D.	IN&EX	22.012~22.025 (0.8666~0.8671)	
Cam chain pin (arrow 3)		15 th pin	
Valve spring free length	IN		36.9(1.45 in)
	EX		39.6(1.57 in)
Valve spring tension	IN	6.5~7.1kgf ( 14.3~15.7 lbs ) at length 32.0mm(1.26 in)	—
	EX	12~14kgf ( 26.5~30.9 lbs ) at length 35.5mm(1.40 in)	—

# 7.CYLINDER HEAD/VALVES

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## TORQUE VALUES

Cylinder head cover bolt	1.4kgf-m ( 14Nm )	
Camshaft housing bolts	1.2kgf-m ( 12Nm )	Apply engine oil to threads
Cylinder head bolt	4.7 kgf-m (47 Nm)	
Cylinder head base bolt	1.0 kgf-m (10 Nm)	
Cam chain tension adjuster bolt	2.0kgf-m (20Nm)	
Cam chain tension adjuster mounting bolt	1.0kgf-m (10Nm)	
Thermostat cover bolt	1.0kgf-m (10Nm)	

## SPECIAL TOOLS

Valve spring compressor	71605-E12-000
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## TROUBLESHOOTING

- The poor cylinder head operation can be diagnosed by a compression test or by tracing engine top-end noises.

Refer to the chapter 1 (page 1-24)

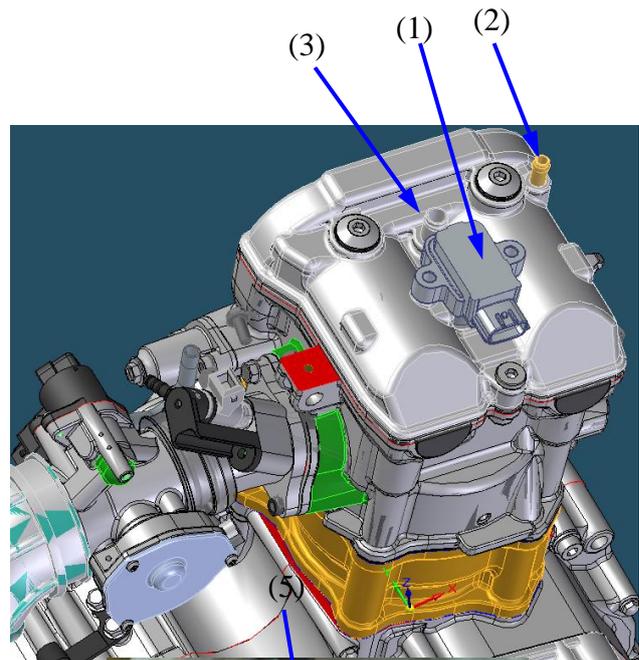
# 7.CYLINDER HEAD/VALVES

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## CYLINDER HEAD COVER REMOVAL

Remove the fuel tank. (Refer to page 5-4)

Disconnect the spark plug cap (1), oil tank overflow hose (2) and breather hose (3).



## REMOVAL

Remove the spark plug (5).

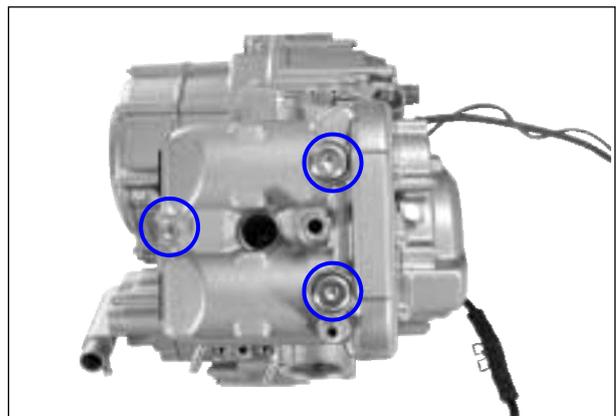
## INSTALLATION

Please defer to the opposite order to install.



## REMOVAL

Remove the cylinder head cover bolts in diagonal stages, and then remove the cylinder head cover.



# 7.CYLINDER HEAD/VALVES

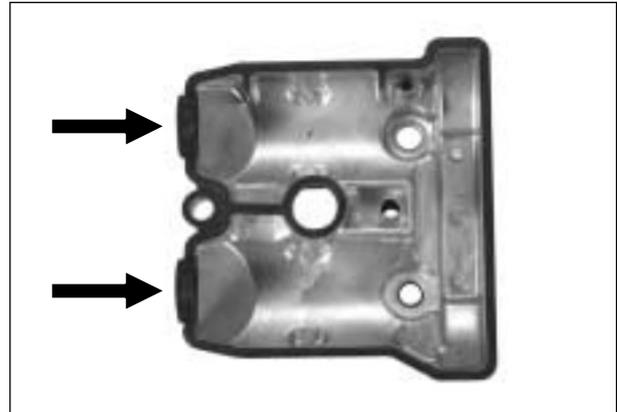
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## INSTALLATION

Thoroughly wipe off oil from the fitting surfaces of the cylinder head and cover.

Apply BOND to the end caps of the cylinder head cover gasket as shown.

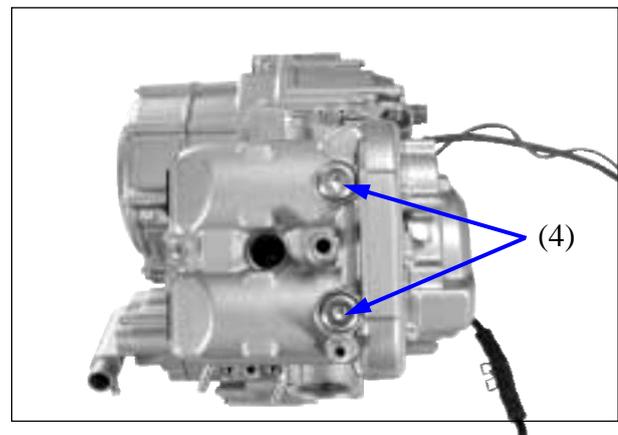
 BOND



Apply engine oil to both sides of the washer (4)  
Lightly tighten the cylinder head cover bolts in diagonal stages, and then tighten them to the specified torque.

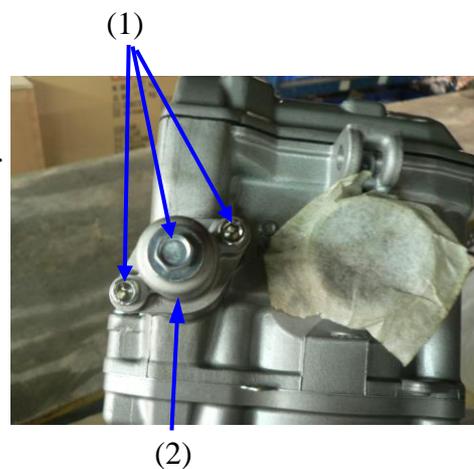
**Torque:** 1.4 kgf-m ( 14Nm )

\* Use a new washer (4).



## CAMCHAIN TENSION ADJUSTER REMOVAL

Remove the cam chain tension adjuster bolt and 2bolts(1).  
Remove the cam chain tension adjuster (2).



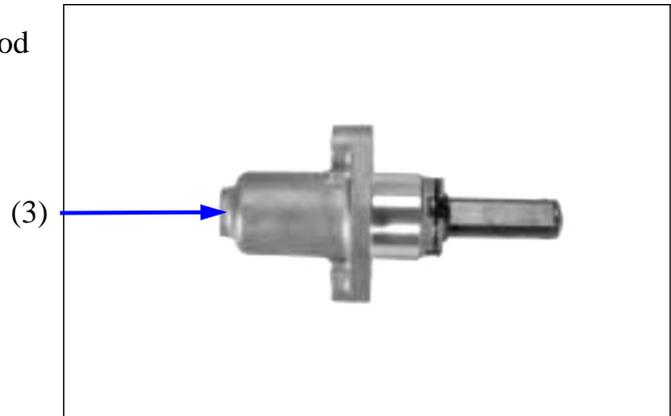
# 7.CYLINDER HEAD/VALVES

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## INSTALLATION

Apply engine oil to the push rod.

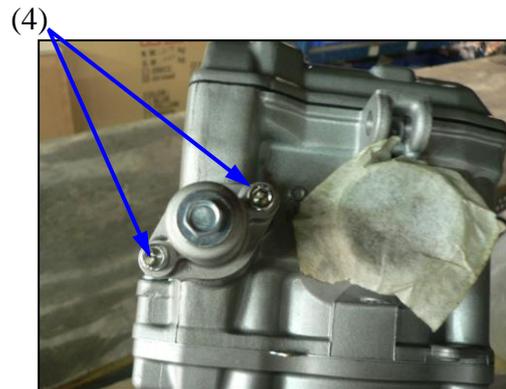
Unlock the ratchet mechanism and push the push rod (3) all the way.



Install the new gasket and cam chain tension adjuster to the cylinder.

Tighten the cam chain tension adjuster mounting bolts (4) to the specified torque.

**Torque:**1 kgf-m ( 10Nm )



Tighten the cam chain tension adjuster bolts (5) to the specified torque.

**Torque:**2 kgf-m ( 20Nm )



# 7.CYLINDER HEAD/VALVES

---

Remove the thermostat cover by 2 bolt.

**Torque:** 1kgf-m (10 Nm)



Remove the thermostat.



# 7.CYLINDER HEAD/VALVES

---

## CYLINDER HEAD REMOVAL

Remove the CYLINDER HEAD COVER. (Refer to page 7-4)

Remove the CAM CHAIN TENSION ADJUSTER. (Refer to page 7-5)

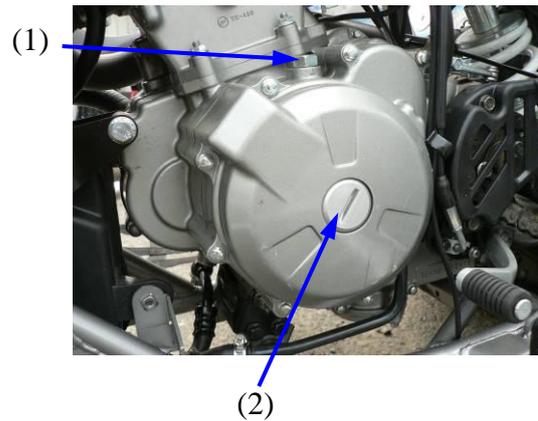
Remove the thermostat cover, 2 nd pipe and thermostat. (Refer to page 7-7)

Remove the throttle. (Refer to the “throttle remove” section in the chapter 5)

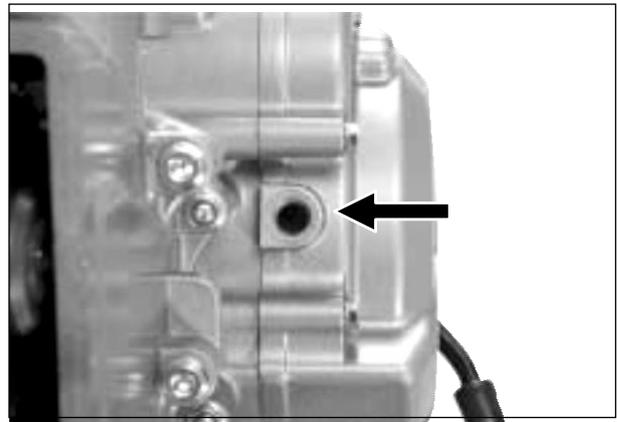
Remove the exhaust muffler. (Refer to the “exhaust muffler remove” section in the chapter 2)

Remove the valve timing inspection plug (1).

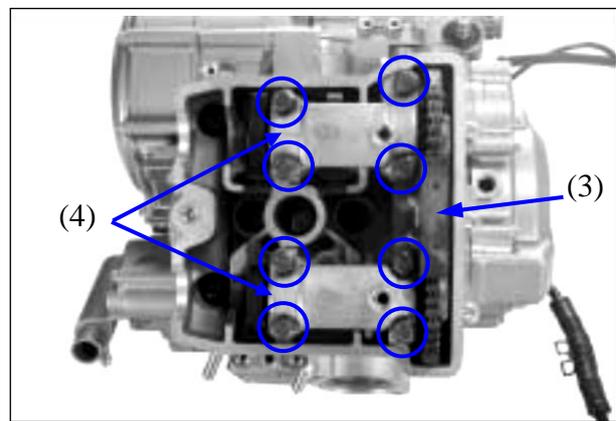
Remove the magneto cover cap (2).



Turn the magneto rotor until the “T” line on the magneto rotor is aligned with the triangle mark on the crankcase.



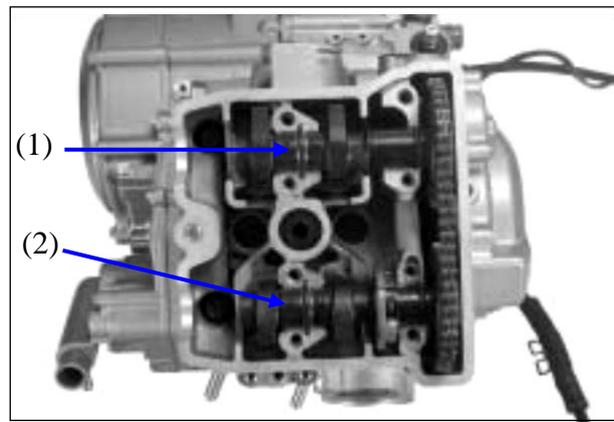
Remove the cam chain guide (3) and camshaft housing (4).



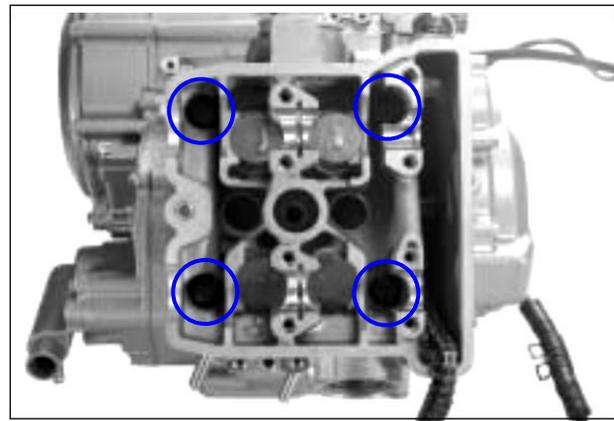
## 7.CYLINDER HEAD/VALVES

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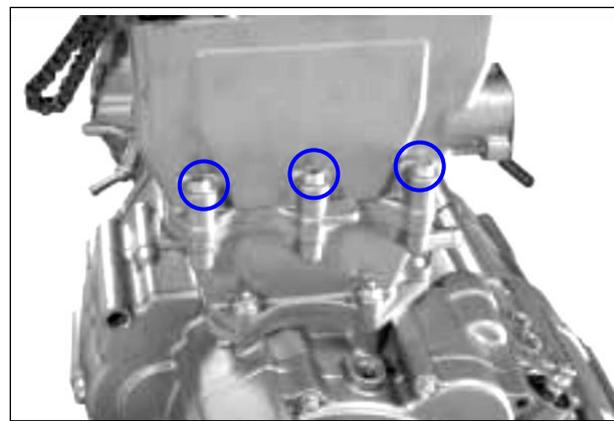
Remove the dowel pin, intake camshaft (1) and exhaust camshaft (2).



Remove the four cylinder head bolts in diagonal stages.



Remove the cylinder head base bolts, and then remove the cylinder head.



\* If the cylinder head dose not com off easily, lightly tap it using a plastic hammer.

# 7.CYLINDER HEAD/VALVES

## INSPECTION

### CAMSHAFT JOURNAL WEAR

Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.

Use the plastigauge to read the clearance at the widest portion, which is specified as follows:

Camshaft journal oil clearance (IN & EX)	Service limit
	0.15mm (0.006 in)

If the camshaft journal oil clearance exceeds the service limit, measure the inside diameter of the camshaft housing and outside diameter of the camshaft journal. Replace the camshaft or the cylinder head and camshaft housing depending upon which one exceeds the specification.

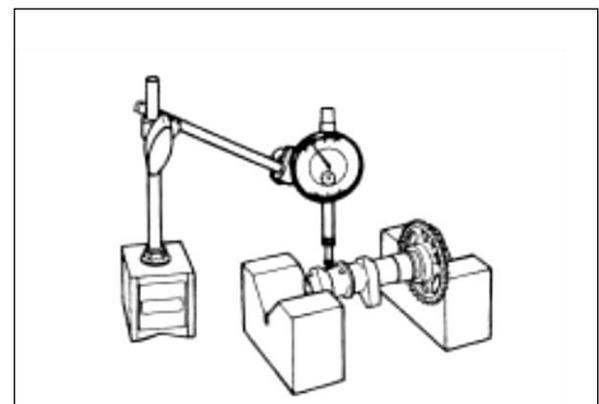
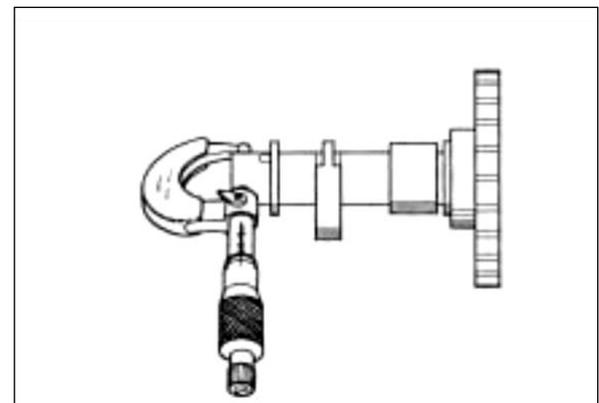
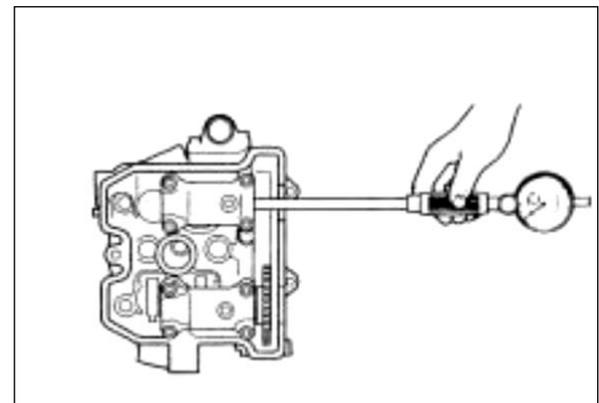
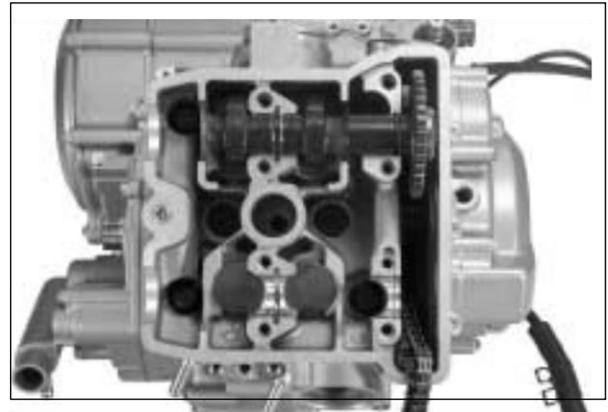
camshaft housing I.D	Standard
IN.	22.012~22.025 mm
EX.	(0.8666~0.8671 in)

camshaft O.D	Standard
IN.	21.959~21.980 mm
EX.	(0.8645~0.8654 in)

### CAMSHAFT RUNOUT

Support the valve using a V-blocks and measure the camshaft runout using the dial guage. If the runout exceeds the service limit, replace the camshaft with a new one.

Camshaft runout	Service limit
	0.10mm (0.004 in)

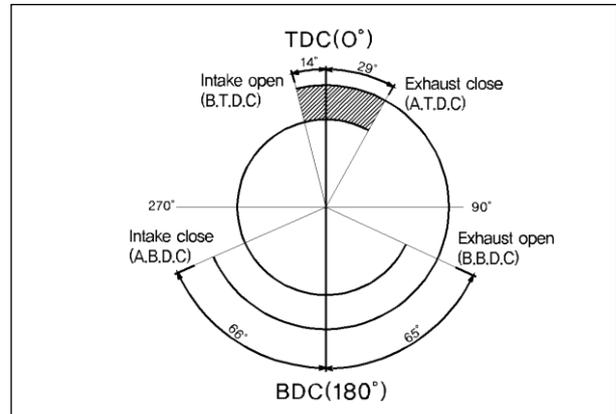


# 7.CYLINDER HEAD/VALVES

## CAMSHAFT

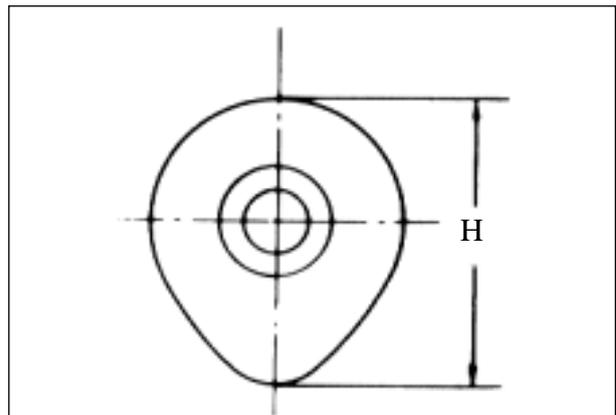
The camshaft should be checked for runout and also for wear of cams and journals if the engine has been noted to produce abnormal noise or vibration or a lack of output power.

Any of these abnormality could be caused by a worn camshaft.



## CAMSHAFT WEAR

Worn-down cams are often the cause of mistimed valve operation resulting in reduced output power. The limit of cam wear is specified for both intake and exhaust cams in terms of cam height H, which is to be measured with a micrometer. Replace camshafts if found it worn-down to the limit.



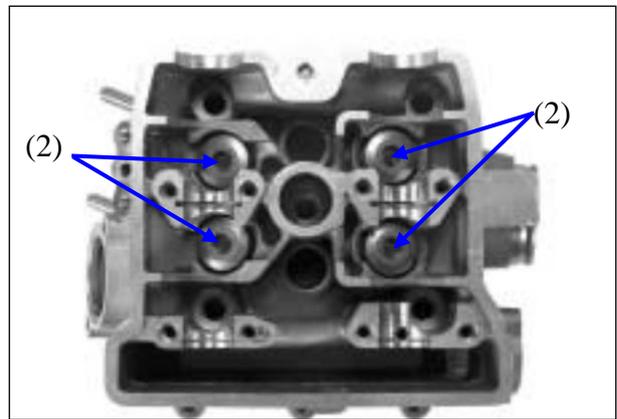
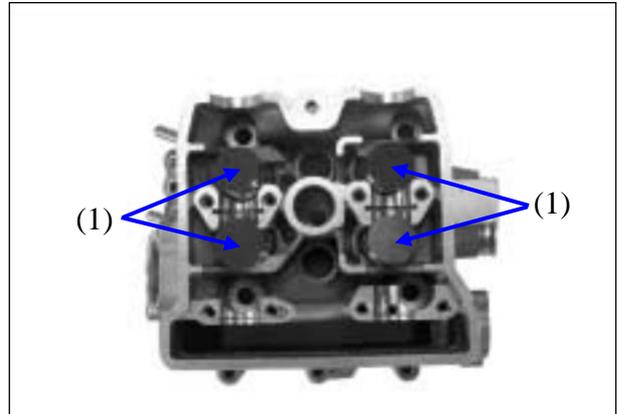
Cam height H	Service limit
Intake cam	39.88 mm (1.570 in)
Exhaust cam	39.88 mm (1.570 in)

# 7.CYLINDER HEAD/VALVES

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## CYLINDER HEAD DISASSEMBLY

Remove the tappets (1) and shims (2)  
by hand or by using a magnet.



Compress the valve springs, and then remove the  
valve cotters from the valve stem using the  
valve springs compressor.

Special Tool:

**Valve springs compressor : 71605-E12-000**

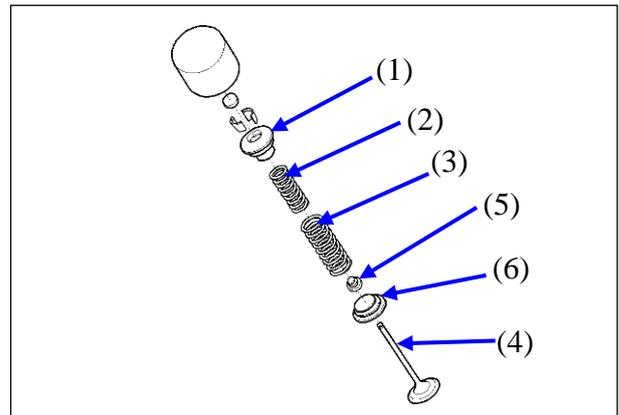
**Valve springs compressor attachment**



# 7.CYLINDER HEAD/VALVES

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Remove the valve spring retainer (1), inner valve spring (2) and outer valve spring (3).  
Remove the valve (4) from the other side.  
Remove the oil seal (5) with long-nose pliers.  
Remove the valve spring seat (6).



## CYLINDER HEAD INSPECTION

Check the spark plug hole and valve areas for cracks.

Check the cylinder head for warp age with a straight edge and feeler gauge.

**Service Limit:** 0.05 mm repair or replace if over.



## VALVE GUIDE INSPECTION

### VALVE FACE WEAR

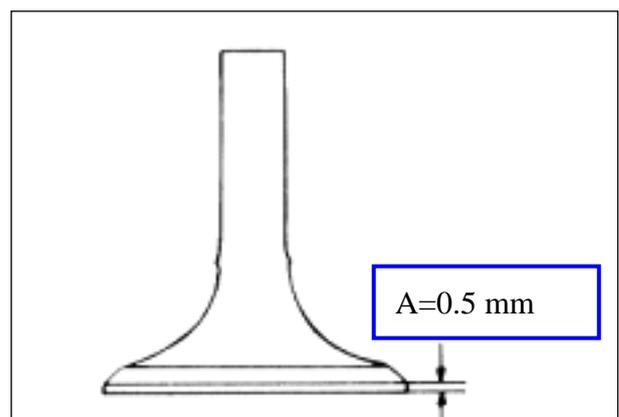
Visually inspect each valve face for wear or damage.

If any abnormal wear is found, replace the respective valve with a new one.

The thickness of the valve face decreases as the face wears.

Measure the valve head thickness "A".

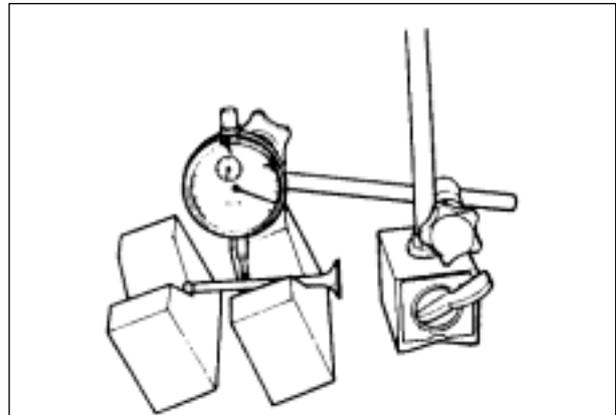
If the valve head thickness is not within the specified value, replace the valve with a new one.



# 7.CYLINDER HEAD/VALVES

## VALVE STEM RUNOUT

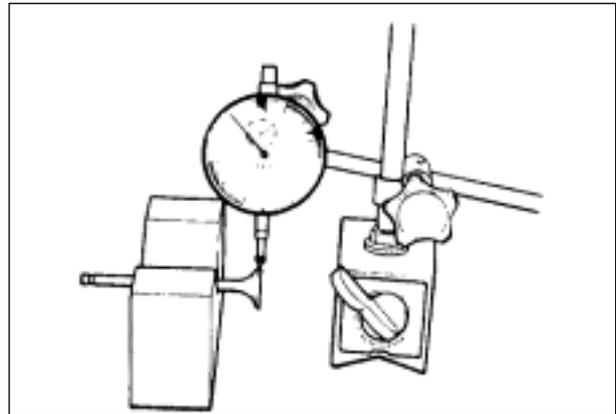
Check the valve stem for abnormal wear or bend. Support the valve using a V-block and measure the valve stem runout using the dial gauge, as shown. If the service limit is exceeded or abnormal condition exists, replace the valve with a new one.



Valve stem runout	Service limit
	0.05mm (0.002 in)

## VALVE HEAD RADIAL RUNOUT

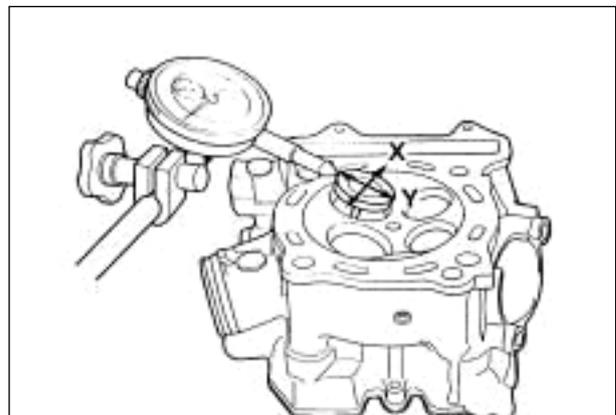
Support the valve using a V-block and measure the valve head radial runout using the dial gauge, as shown. If the runout exceeds the service limit, replace the valve with a new one.



Valve head radial runout	Service limit
	0.35mm (0.014 in)

## VALVE STEM DEFLECTION

Life the valve about 10 mm (0.39 in) from the valve seat. Measure the valve stem deflection in two directions, "X" and "Y", perpendicular to each other. Position the dial gauge as show. If the deflection exceeds the service limit, determine whether the valve or the guide should be replaced with a new one.



Valve stem deflection	Service limit
IN.	0.35mm (0.014 in)
EX.	0.35mm (0.014 in)

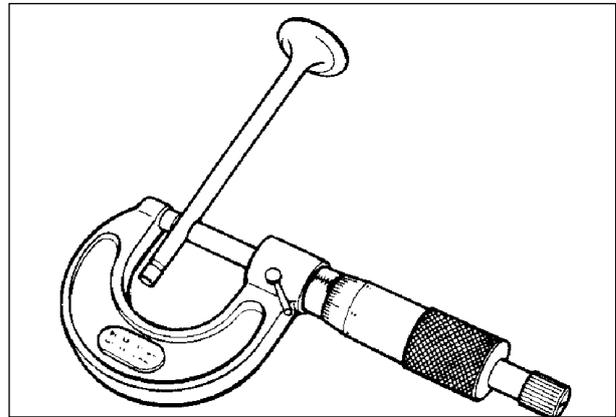
# 7.CYLINDER HEAD/VALVES

## VALVE STEM DIAMETER

Measure the valve stem outside diameter using the micrometer.

If the diameter measured exceeds the standard, replace the valve.

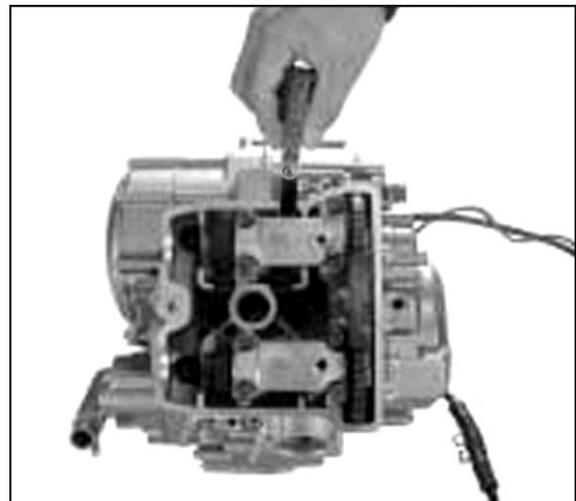
Valve stem diameter	Standard
IN.	4.975~4.990 mm (0.1959~0.1965 in)
EX.	4.955~4.970 mm (0.1951~0.1957 in)



## TAPPET & SHIM WEAR

When measuring the valve clearance, the clearance should be within the standard range.

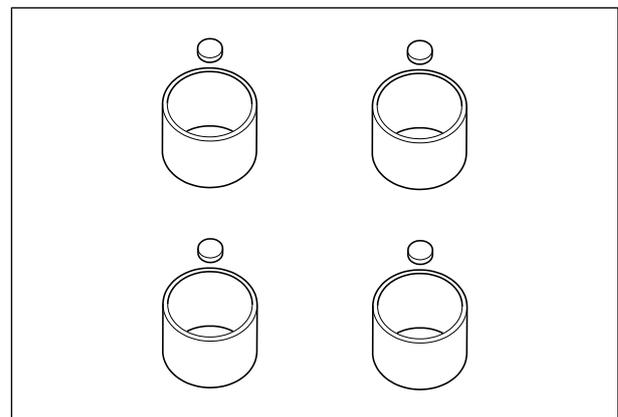
Valve clearance	Standard(when cold)
Intake valve	0.1~0.2 mm (0.004~0.008 in)
Exhaust valve	0.2~0.3 mm (0.008~0.012 in)



Inspect the tappet for wear and scratch.

If modification or scratch is present, replace the tappet.

When you checked the valve clearance, if the valve clearance is wide please replace the present shim into thick one, if the valve clearance is narrow please replace the present shim into thin shim. (refer to page 9-38&9-39)



## SHIM KIND

There are 49 kinds of shim which thickness is increased by each 0.025 mm from 2.30 mm to 3.50 mm.

# 7.CYLINDER HEAD/VALVES

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## VALVE SPRING INSPECTION

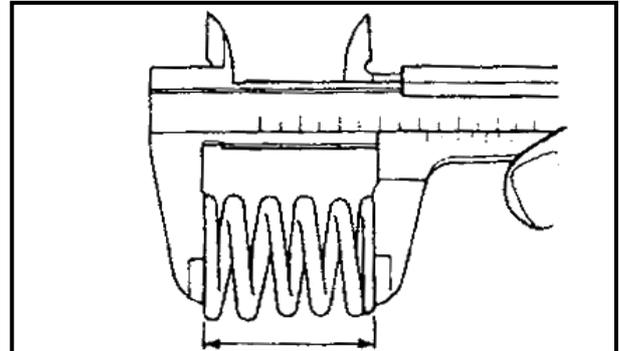
The force of the coil spring keeps the valve seat tight.

A weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.

Check the valve spring for proper strength by measuring their free length and also by the force required to compress them.

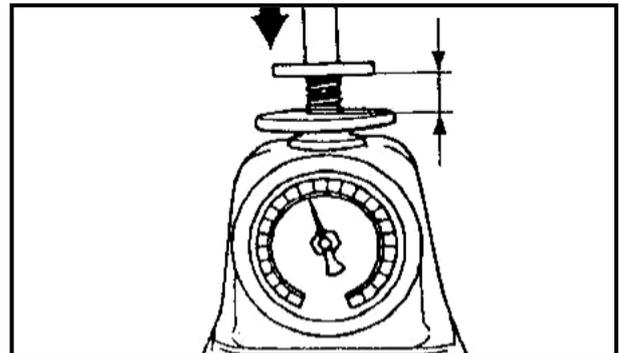
If the spring length is less than the service limit or if the force required to compress the valve spring is not within specification.

Replace both the inner and outer spring as a set.



Valve spring free length	Service limit
Inner	36.9 mm(1.45 in)
Outer	39.9 mm(1.57 in)

Valve spring tension	Standard
Inner	6.5~7.1 kgf (14.3~15.7 lbs) at length 32.0 mm(1.26in)
Outer	12.0~14.0 kgf (26.5~30.9 lbs) at length 35.5 mm(1.40in)



# 7.CYLINDER HEAD/VALVES

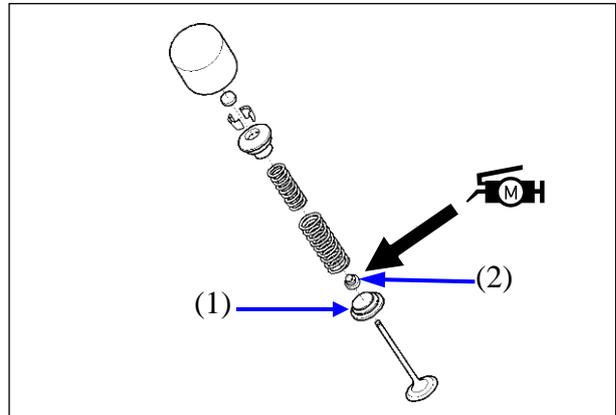
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## REASSEMBLY

Install each valve spring seat (1).

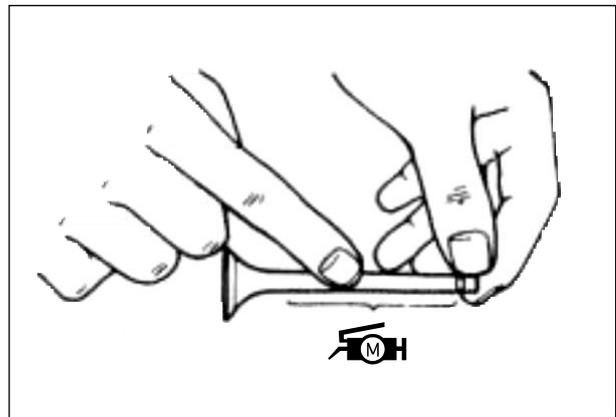
Apply MOLY PASTE to each oil seal (2) and press fit them into position.

\* Be sure to install new oil seal.

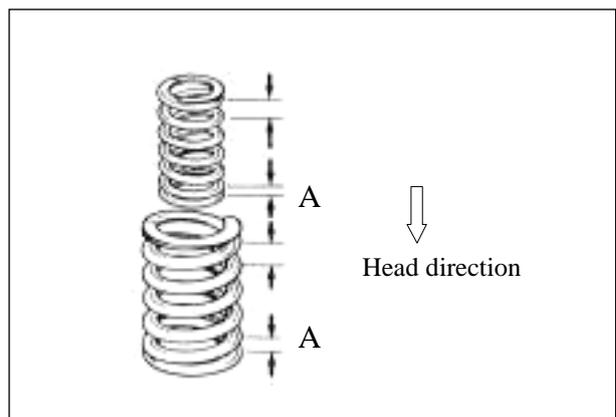


Apply MOLY PASTE to the valve as shown, and then insert them into the valve guides.

\* When inserting each valve into the valve guides, make sure not to damage the lip of the oil seal.



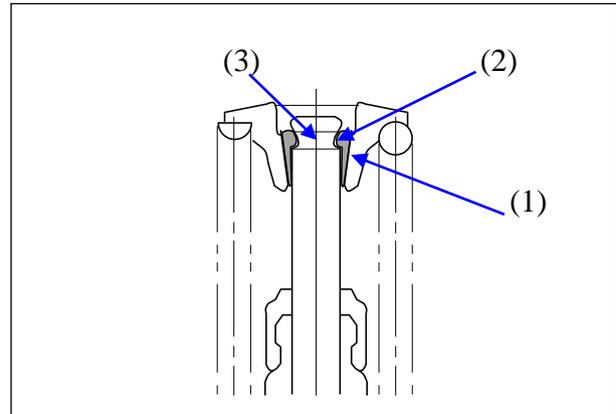
install the valve spring with the smaller pitch "A" facing the cylinder head.



# 7.CYLINDER HEAD/VALVES

---

Install the valve spring retainer by pressing down the spring using the valve spring compressor. Fit the cotter halves to the stem end and release the lifter to allow the cotter (1) to wedge between the retainer and the valve stem. Make sure that the rounded lip (2) of the cotter fits snugly into the groove (3) in the stem end.

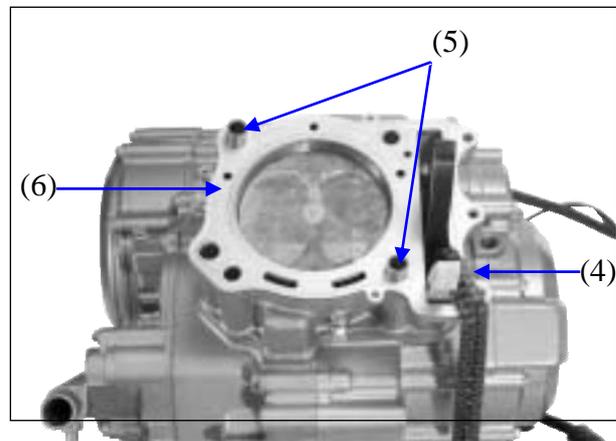


Special Tool:

Valve Spring Compressor 71605-E12-000  
Valve springs compressor attachment

## CYLINDER HEAD INSTALLATION

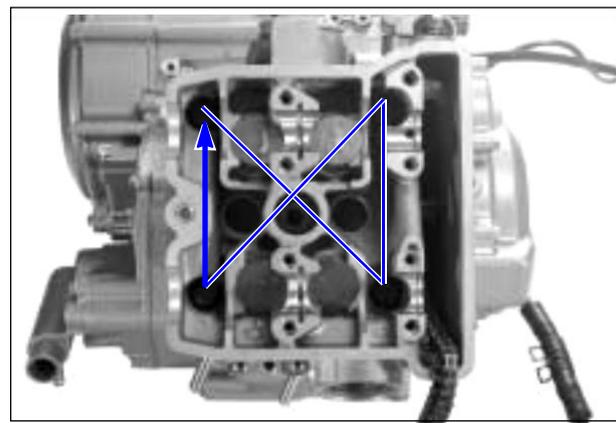
Install the cam chain guide (4).  
Install the dowel pins (5) and new gasket (6).



Reverse the “CYLINDER HEAD REMOVAL” procedures.

Tighten the cylinder head bolts diagonally to the specified torque.

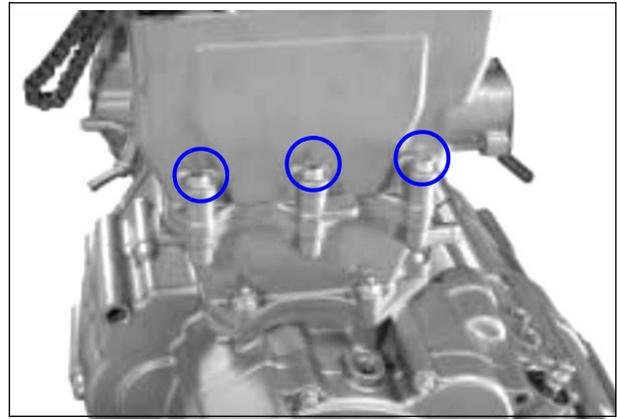
Torque :  
Cylinder head bolt : 4.7 kgf-m (47 Nm)



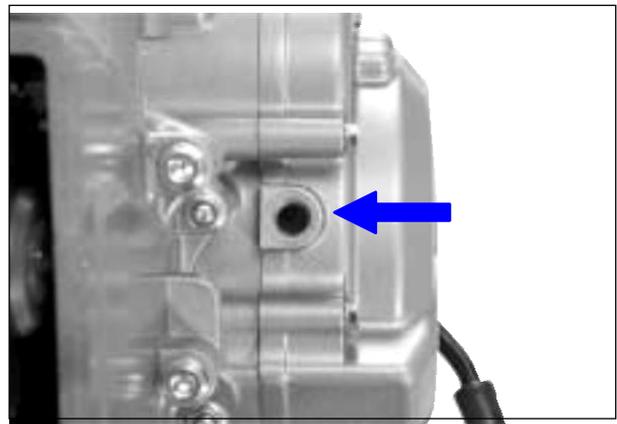
## 7.CYLINDER HEAD/VALVES

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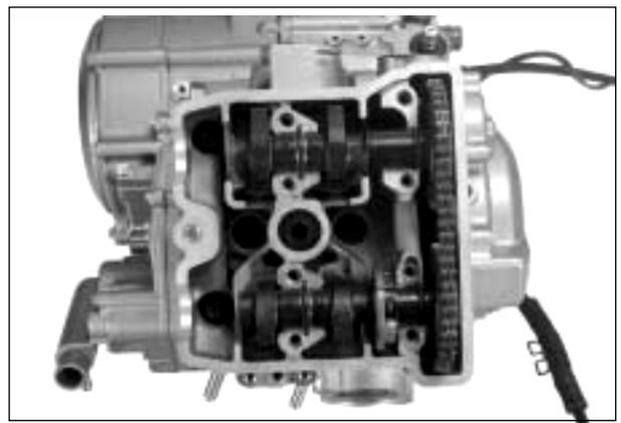
Torque :  
Cylinder head base bolt : 1 kgf-m (10 Nm)



Turn the magneto rotor until the “T” line on the magneto rotor is aligned with the triangle mark on the crankcase.



Place each camshaft into the correct position.



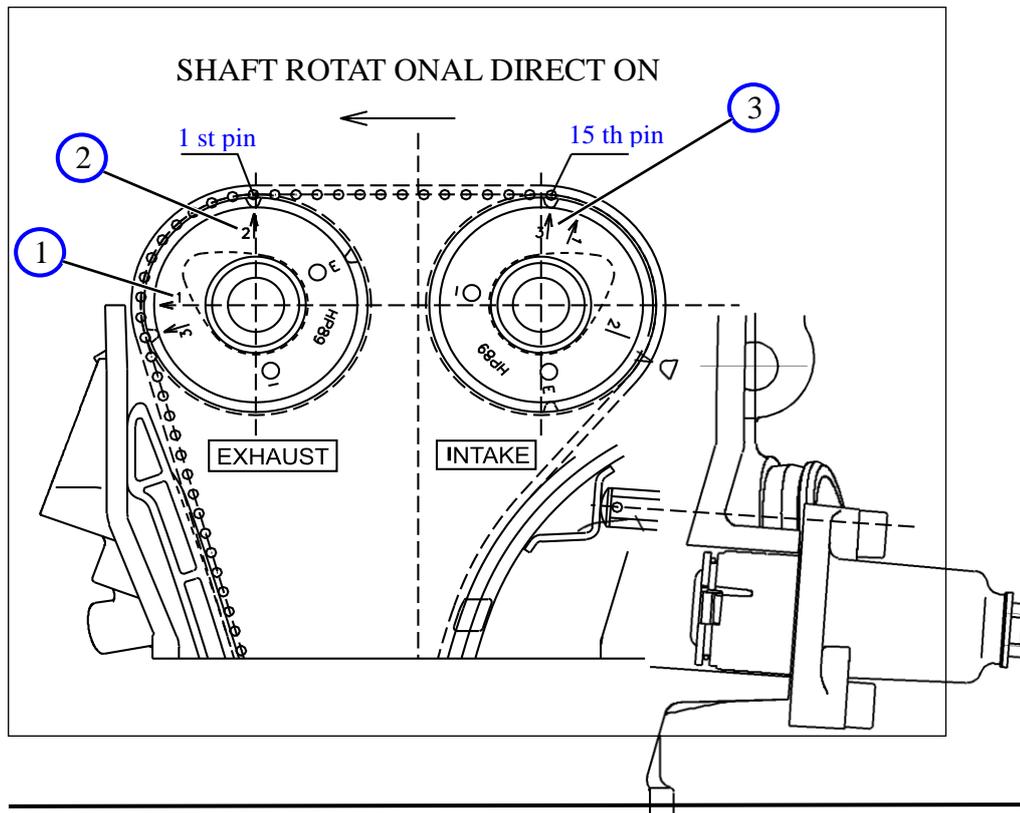
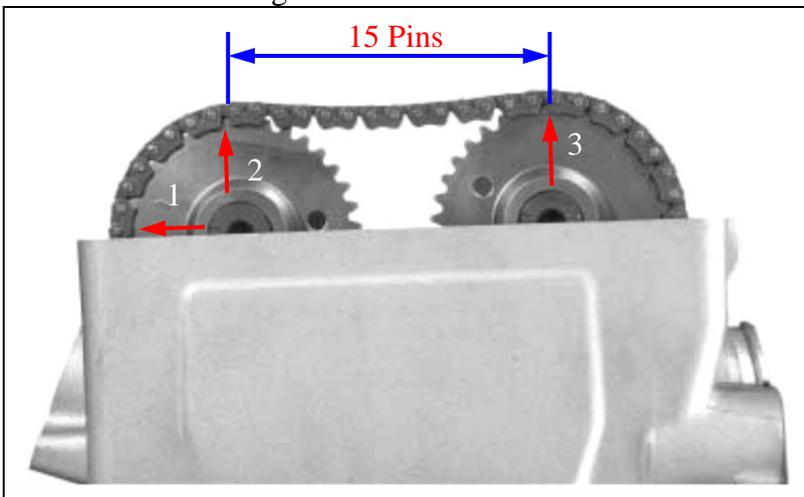
# 7. CYLINDER HEAD/VALVES

With the “T” line on the magneto rotor is aligned with the triangle mark on the crankcase, hold the camshaft steady and lightly pull up the cam chain to remove any slack between the cam chain sprocket and exhaust camshaft sprocket.

The exhaust camshaft sprocket has an arrow marked “ 1 ❶ ”. Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head. Engage the cam chain with the exhaust camshaft sprocket.

The other arrow marked “ 2 ❷ ” should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked “ 2 ❷ ”, count out 15 roller pins (from the exhaust camshaft side going towards the intake camshaft side).

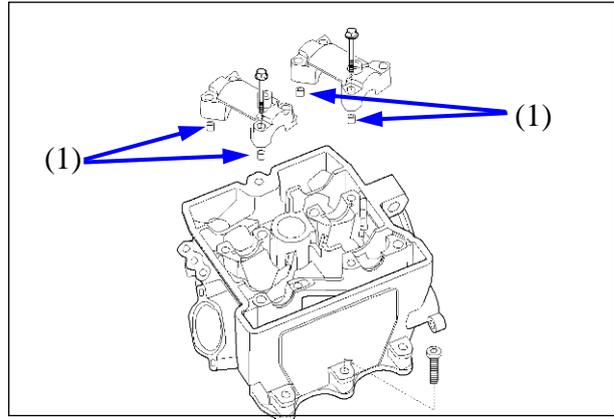
Engage the 15 th roller pin on the cam chain with the arrow marked “ 3 ❸ ” on the intake sprocket. Refer to the following illustrations.



## 7.CYLINDER HEAD/VALVES

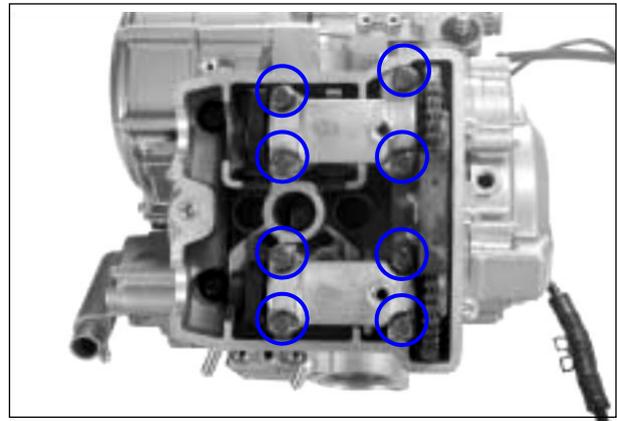
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Install the dowel pins (1).  
Place each camshaft housing and cam chain guide  
into the correct position.



Tighten the camshaft housing bolts to the specified  
torque.

Torque : 1 kgf-m (10 Nm)



### INSTALLATION

Installation the 2 nd pipe. (Refer to page 7-7)

Installation the thermostat & thermostat cover. (Refer to page 7-7)

Installation the cam chain tension adjuster. (Refer to page 7-6)

Installation the cylinder head cover. (Refer to page 7-5)

# 8.CYLINDER/PISTON

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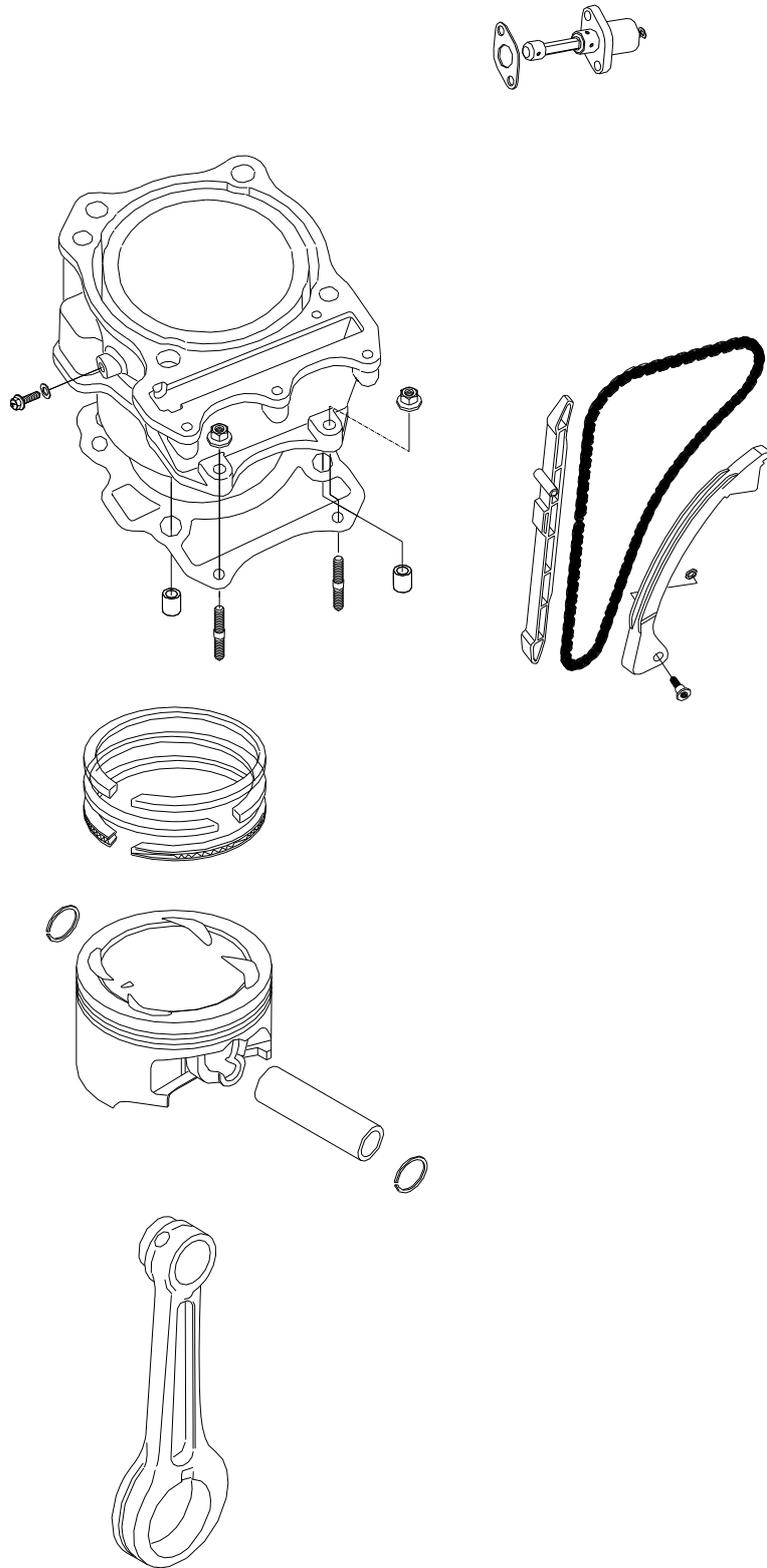
## CYLINDER/PISTON

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SERVICE INFORMATION .....	8-2
TROUBLESHOOTING .....	8-2
SPECIFICATION .....	8-3
CYLINDER/PISTON .....	8-5

# 8.CYLINDER/PISTON

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# 8.CYLINDER/PISTON

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## **SERVICE INFORMATION**

### **GENERAL INSTRUCTIONS**

- After disassembly, clean the removed parts and dry them with compressed air before inspection.

### **TROUBLESHOOTING**

- When hard starting or poor performance at low speed occurs, check the crankcase breather for white smoke.
- If white smoke is found, it means that the piston rings are worn, stuck or broken.

Refer to the chapter 1 (page 1-24)

# 8.CYLINDER/PISTON

## SPECIFICATIONS

Item		Standard(mm)	Service Limit (mm)	
Cylinder	I.D.	96.000~96.015	96.075	
	War page	—	0.05	
	Cylindricity	—	0.05	
	True roundness	—	0.05	
Piston, Piston ring	Piston ring free end gap	1 st	Approx 11	
		2 nd	Approx 10	
	Piston ring end gap (assembly condition)	1 st	0.25~0.40	0.5
		2 nd	0.40~0.55	0.7
	Piston ring groove clearance	1 st		0.150
		2 nd		0.150
	Piston ring groove width	1 st	1.21~1.23	
		2 nd	1.01~1.03	
		Oil	2.01~2.03	
	Piston ring thickness	1 st	1.170~1.190	
		2 nd	0.970~0.990	
	Piston O.D.		95.945~95.960	95.88
	Piston O.D. measuring position		18 mm from bottom of skirt	—
	Piston-to-cylinder clearance		0.050~0.060	0.120
Piston pin hole I.D.		19.002~19.008	19.030	
Piston pin O.D		18.992~18.995	18.980	
Conrod deflection		-----	3.0	
Conrod big end side clearance		0.10~0.65	1.0	
Conrod small end I.D. bore		19.006~19.014	19.040	

# 8.CYLINDER/PISTON

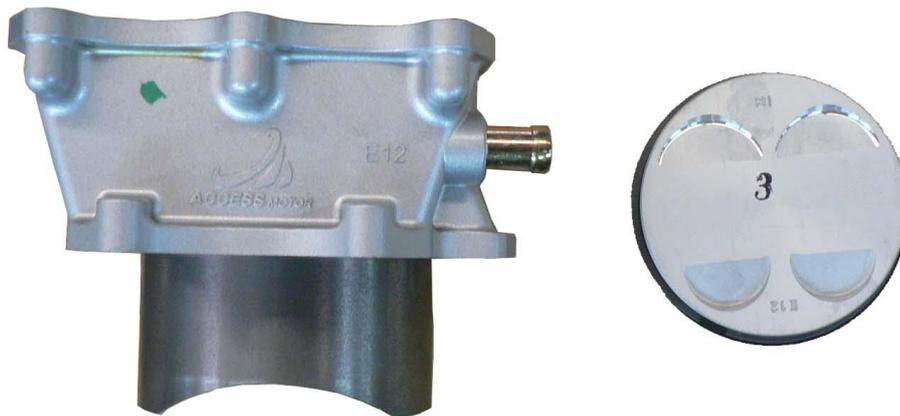
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Cylinder base nut orque : 1.0kgf-m (10Nm)

Item		Standard	Service Limit
Cylinder	Compression pressure(at 500rpm)	16kg/cm <sup>2</sup>	14kg/cm <sup>2</sup>

## Cylinder and piston size match

Piston	1	2	3	4
	$\phi 96 -0.030$ $\sim -0.035$	$\phi 96 -0.036$ $\sim -0.040$	$\phi 96 -0.041$ $\sim -0.045$	$\phi 96 -0.046$ $\sim -0.050$
Cylinder	A (BLUE)		B (GREEN)	
	$\phi 96 +0.006 \sim +0.010$		$\phi 96 +0 \sim +0.005$	



# 8.CYLINDER/PISTON

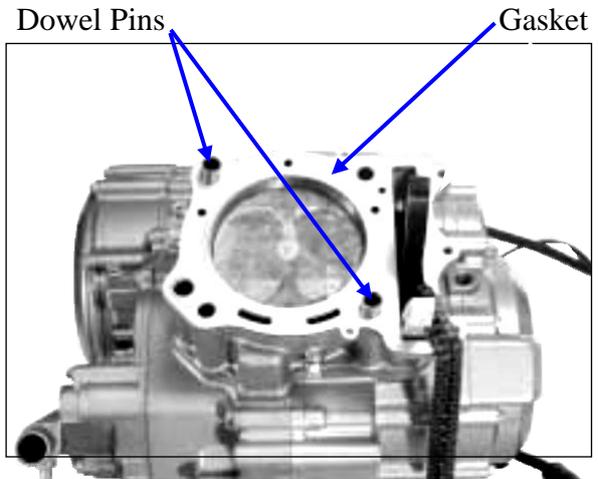
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## CYLINDER/PISTON

### REMOVAL

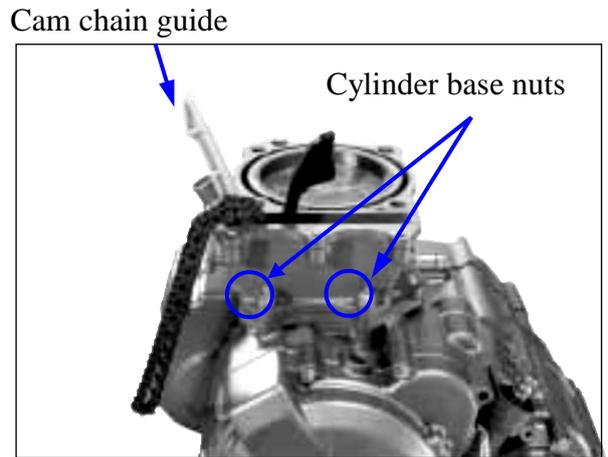
Remove the cylinder head.  
(Refer to the chapter 7)

Remove the two dowel pins and cylinder head gasket.



Remove the cam chain guide.  
Remove the cylinder base nuts.  
Remove the cylinder.

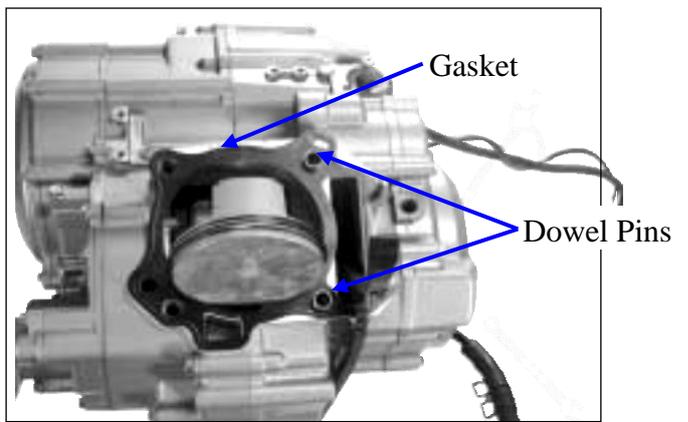
Cylinder base nuts  
Torque : 1.0gf-m (10Nm)



Remove the cylinder gasket and dowel pins.  
Clean any gasket material from the cylinder surface.

\*

Be careful not to drop foreign matters into the crankcase.  
If the cylinder does not come off easily, lightly tap it using a plastic hammer.



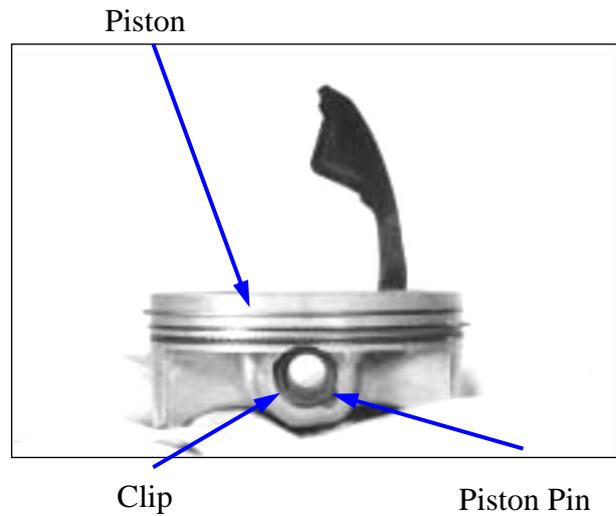
## 8.CYLINDER/PISTON

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Remove the piston pin clip.

- \* Place a clean rag over the cylinder base to prevent the piston pin clip from dropping into the crankcase.

Press the piston pin out of the piston and remove the piston.



### INSPECTION

Inspect the piston, piston pin and piston rings.

Remove the piston rings.

- \* Take care not to damage or break the piston rings during removal.

Clean carbon deposits from the piston ring grooves.



Inspect the piston will for wear/scratches/damage.

If any defects are found, replace the piston with a new one.

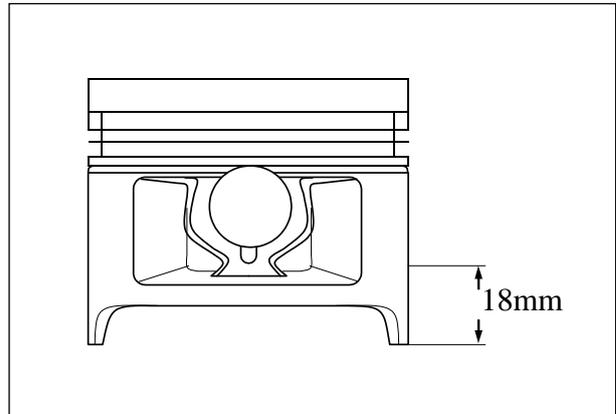
## 8.CYLINDER/PISTON

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### PISTON DIAMETER INSPECTION

Measure the outside diameter of piston in the direction perpendicular to the piston pin axis at the height from the skirt as shown in the illustration using a micrometer.

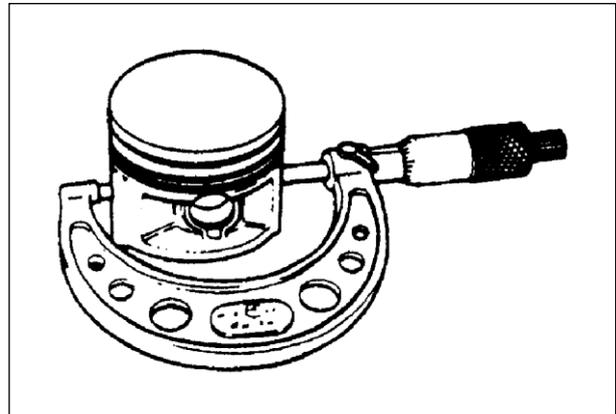
If the measurement is found less than the service limit, replace the piston.



### PISTON-TO-CYLINDER CLEARANCE

To determine the piston-to-cylinder clearance, calculate the difference between the cylinder bore and outside diameter of the piston.

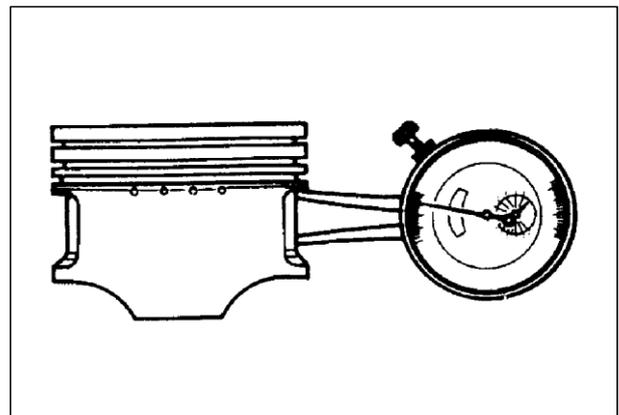
**Service Limit** : 0.120mm



### PISTON PIN HOLE BORE

Using a dial calipers, measure the piston pin hole bore both the vertical and horizontal directions. If the measurement exceeds the service limit, replace the piston with a new one.

**Service Limit** : 19.030mm



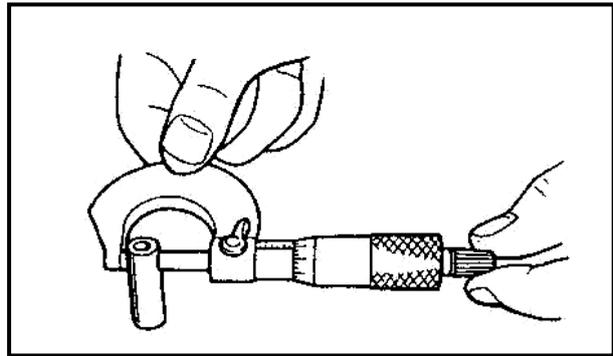
# 8.CYLINDER/PISTON

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## PISTON PIN DIAMETER INSPECTION

Measure the piston pin O.D.

**Service Limits**(replace if below):  
18.980 mm



## PISTON RING FREE END GAP INSPECTION

Before installing piston rings, measure the free end gap of each ring using vernier calipers. If the gap is less than the service limit, replace the ring.

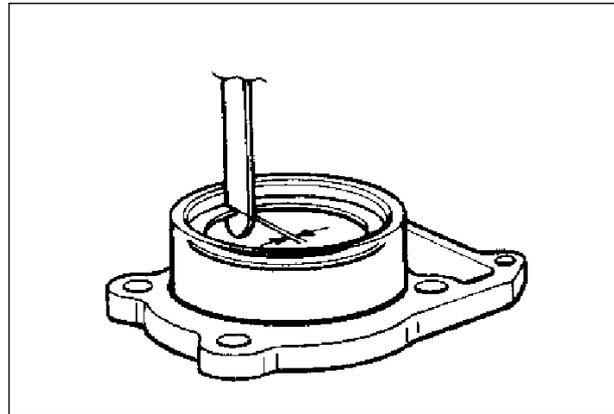


## PISTON RING END GAP INSPECTION (Assembly condition)

Insert the piston ring squarely into the cylinder using the piston head.

Measure the end gap with a thickness gauge.

If the gap exceeds the service limit, replace the piston ring with a new one.



**Service Limits :** 1st...0.5mm  
2nd...0.7mm

## 8.CYLINDER/PISTON

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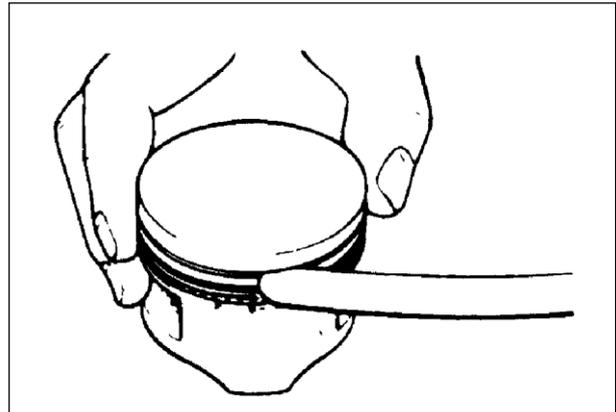
### PISTON RING-TO-GROOVE CLEARANCE INSPECTION

Remove carbon deposit both from the piston ring and its groove.

Fit the piston ring into the groove.

With the ring compressed and lifted up, measure the clearance on the bottom side of the ring using a thickness gauge.

If any clearance reading exceeds the service limit, replace both the piston and piston rings.



Groove clearance service limit :

1 st & 2 nd...0.150mm

Groove width standard :

1 st...1.21~1.23mm

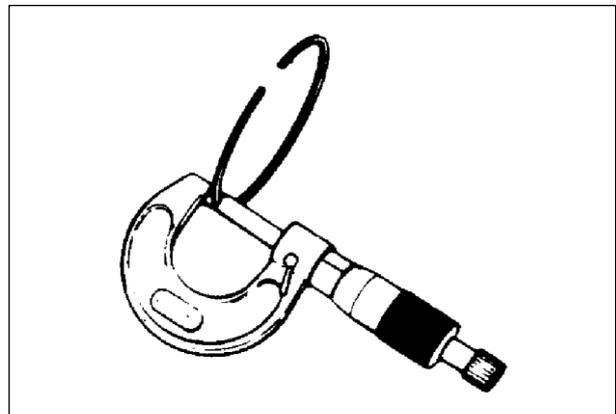
2 nd...1.01~1.03mm

Oil...2.01~2.03mm

Piston ring thickness standard :

1 st...1.170~1.190mm

2 nd...0.970~0.990mm

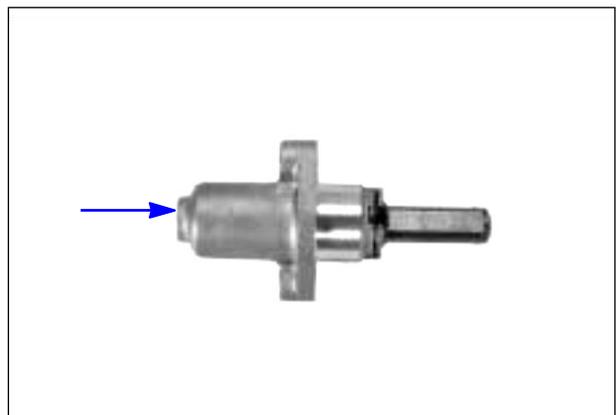


### CAM CHAIN TENSION ADJUSTER AND TENSIONER

#### CAM CHAIN TENSION ADJUSTER

Check that push rod slides smoothly with the lock shaft handle clockwise.

If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



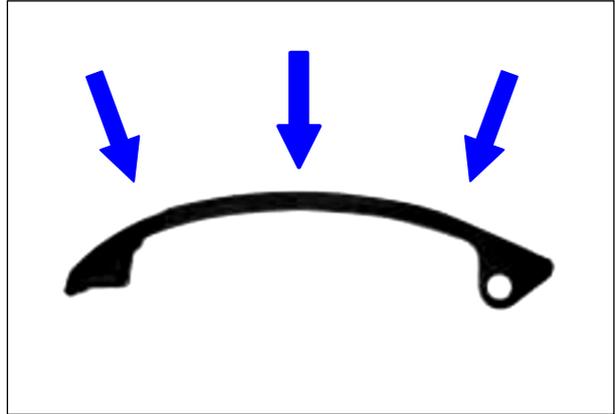
# 8.CYLINDER/PISTON

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## CAM CHAIN TENSIONER

Check the contacting surface of the cam chain tensioner.

If it is worn or damaged, replace it with a new one.



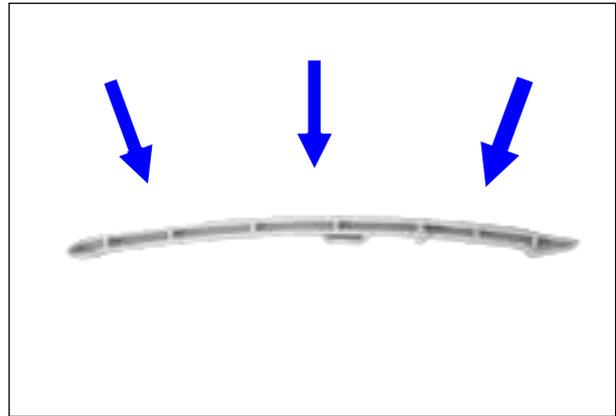
## CAM CHAIN AND CAM CHAIN GUIDE

Check the cam chain for wear, damage and kinked or binding links.

If any defects are found, replace it with a new one.

Check the cam chain guide for wear and damage.

If it is found to be damaged, replace it with a new one.

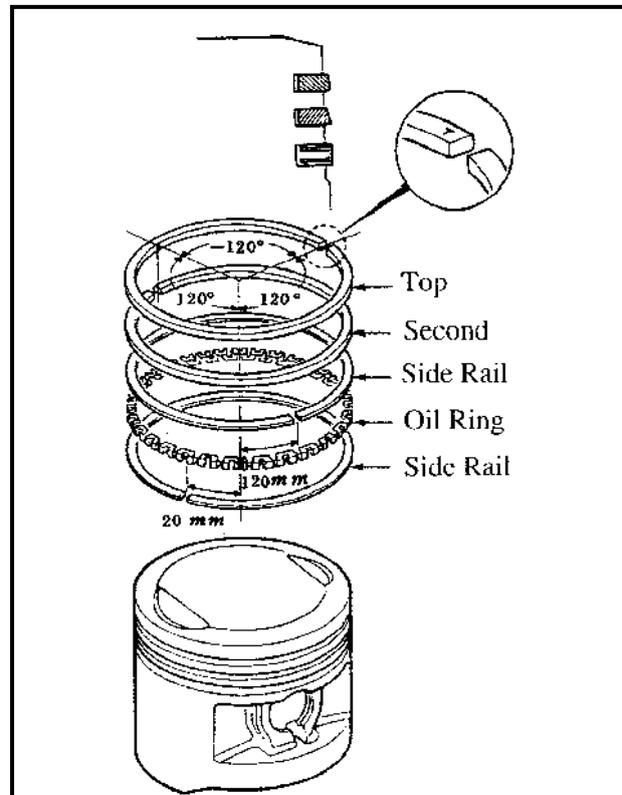


# 8.CYLINDER/PISTON

## PISTON RING INSTALLATION

Install the piston rings onto the piston.  
Apply engine oil to each piston ring.

- \* Be careful not to damage or break the piston and piston rings.
- All rings should be installed with the markings facing up.
- After installing the rings, they should rotate freely without sticking.

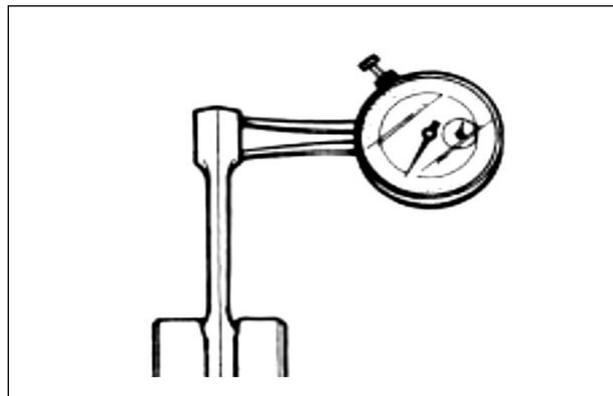


## CONROD SMALL END INSIDE DIAMETER INSPECTION

Measure the connecting rod small end I.D.

**Service Limit** (replace if over):

19.040 mm



## 8.CYLINDER/PISTON

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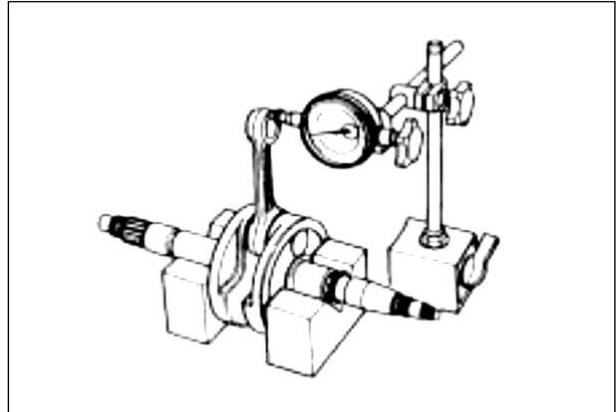
### CONROD DEFLECTION INSPECTION

Wear on the big end of the conrod can be estimated by checking the movement of the small end of the rod.

Turn the conrod and see if it moves smoothly without play and noise.

This method can also be used to check the extent of wear on the conrod big end.

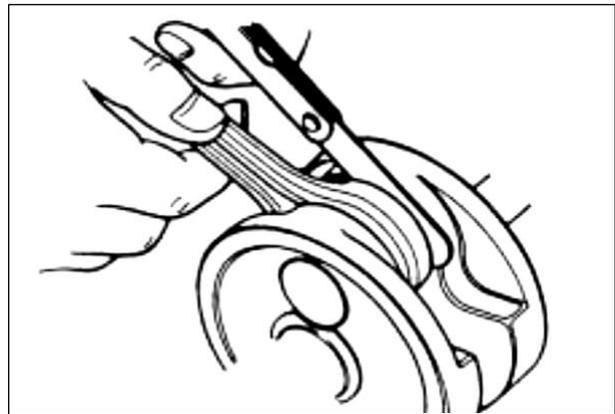
**Service Limit** (replace if over):  
3.0 mm



### CONROD BIG END SIDE CLEARANCE INSPECTION

Push the big end of the conrod to one side and measure the side clearance using a thickness gauge.

If the clearance exceeds the service limit, replace the crankshaft assembly with a new one or bring the deflection and the side clearance within the service limit by replacing the worn parts (conrod, big end bearing, crankshaft, crank pin, etc.) with new ones.



**Standard : 0.10~0.65mm**

**Service limit : 1.0mm**

# 8.CYLINDER/PISTON

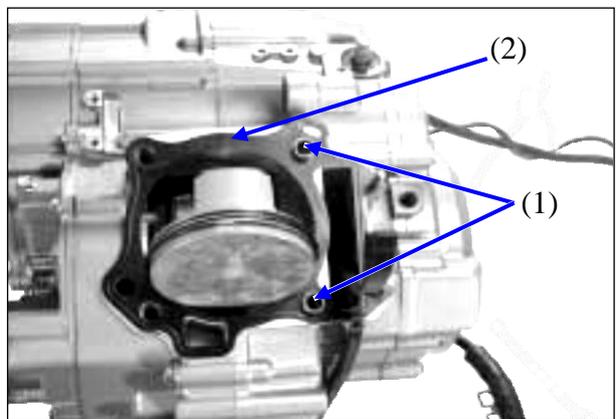
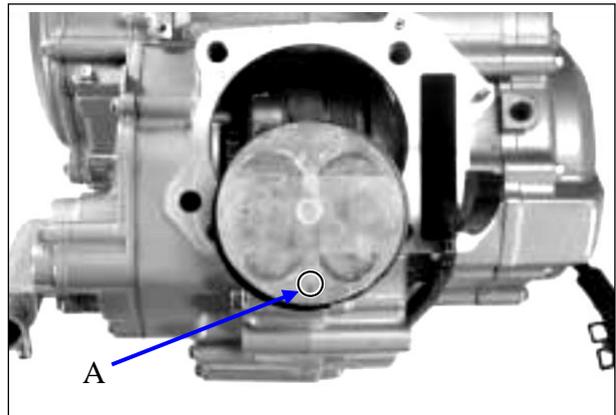
## PISTON INSTALLATION

Remove any gasket material from the crankcase surface.

- \* Be careful not to drop foreign matters into the crankcases.

Install the piston, piston pin and a new piston pin clip.

- \*
  - Install the piston with the punch mark "A" on the piston head facing toward the exhaust side.
  - Place a clean shop towel in the crankcase to keep the piston pin clip from falling into the crankcase.



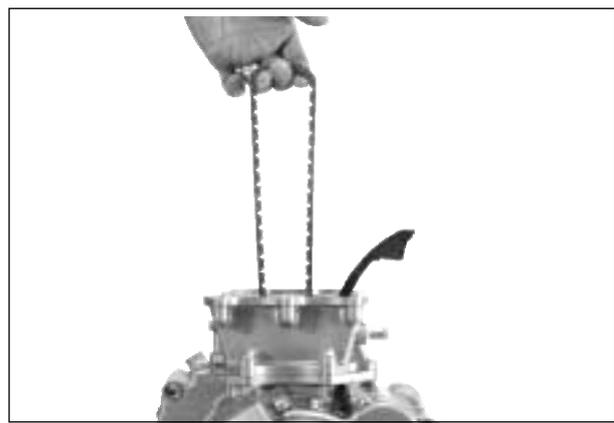
## CYLINDER INSTALLATION

Install the dowel pins (1) and a new cylinder gasket (2) on the crankcase.

Coat the cylinder bore, piston and piston rings with clean engine oil.

Carefully lower the cylinder over the piston by compressing the piston rings.

- \*
  - Apply proper clean engine oil around cylinder wall.
  - Be careful not to damage or break the piston rings.
  - Stagger the ring end gaps at 120° to the piston pin.



## **9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER**

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### **CRANK SHAFT/BLANCER DRIVE GEAR CLUTCH/TRANSMISSION CRANK CASE/CLUTCH COVER**

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SERVICE INFORMATION .....	9-1
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TAPPET SHIM SELECTION CHART .....	9-38

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

### SERVICE INFORMATION

#### SPECIFICATIONS

Unit:mm

Item	Standard		Service Limit
Width between webs	71.0±0.1		-----
Clutch drive plate thickness	No.1	2.92~3.08	2.62
	No.2	3.42~3.58	3.12
Clutch drive plate claw width	No.1	15.9~16.0	15.1
	No.2	15.9~16.0	15.1
Clutch drive plate distortion	-----		0.1
Clutch cable play	10~15		-----
Clutch spring free length	-----		51.6
Shift fork to groove clearance	0.10~0.30		0.50
Shift fork groove width	(No.1/No.2/No.3) 4.85~5.00		-----
Shift fork thickness	(No.1/No.2/No.3) 5.3~5.4		-----
Conrod big end width	24.95~25.00		-----
Crank web to web width	71±1		-----
Crank shaft runout	-----		0.05
Primary reduction ratio	2.500 (75/30)		-----
Secondary reduction ratio	3.143 (44/14)		-----
Gear ratio	1 st	2.538	-----
	2 nd	1.684	-----
	3 rd	1.261	-----
	4 th	1.040	-----
	5 th	0.885	-----
	Reverse	2.231	-----
Drive chain	Type	RK 520EXW	-----
	Links	102	-----
	20-pitch length	317.5	319.4
Drive chain slack	30~40		-----
Reverse cable play	1~2		-----

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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### TORQUE VALUES

Item	TORQUE
Starter clutch bolts	2.3~2.8kgf-m ( 23~28 Nm )
Crankcase bolt	1.1kgf-m ( 11Nm )
Gear position switch bolt	0.65kgf-m (6.5 Nm)
Cam chain tensioner mounting bolt	1.0kgf-m (10Nm)
Magneto rotor nut	12kgf-m (120Nm)
Primary drive gear nut	14kgf-m (140Nm)
Gearshift cam stopper	3.2kgf-m (32Nm)
Clutch sleeve hub nut	9kgf-m (90Nm)

### SPECIAL TOOLS

Clutch sleeve hub holder	71600-E12-000
Conrod holder	71612-E12-000
Rotor remover	71615-E12-000
Crankcase separator	71607-E03-000
Crankcase installer	71613-E12-000

### TROUBLESHOOTING

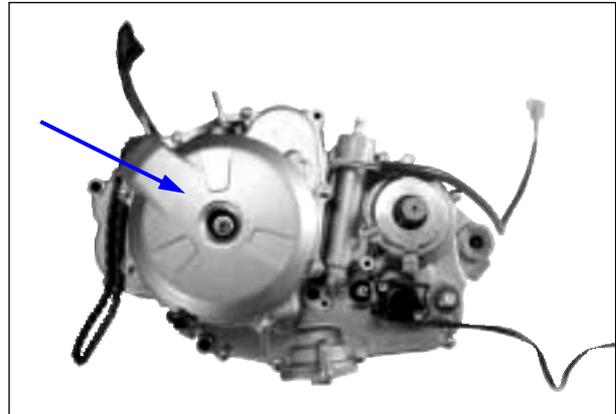
Refer to the chapter 1 (page 1-24)

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

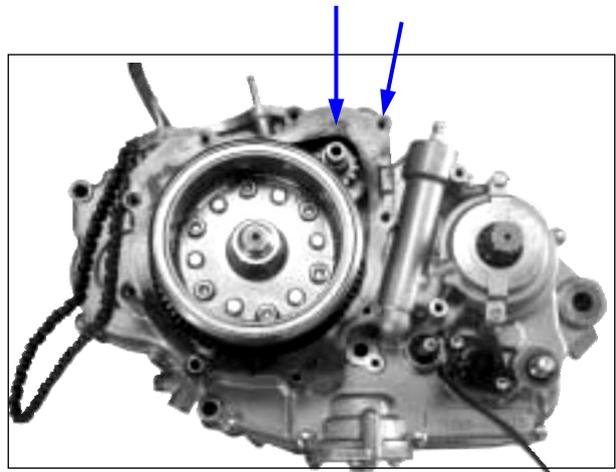
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### REMOVAL

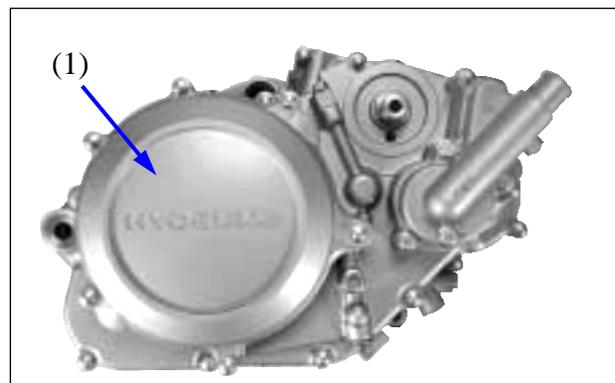
Remove the magneto cover.



Remove the dowel pins and gasket.



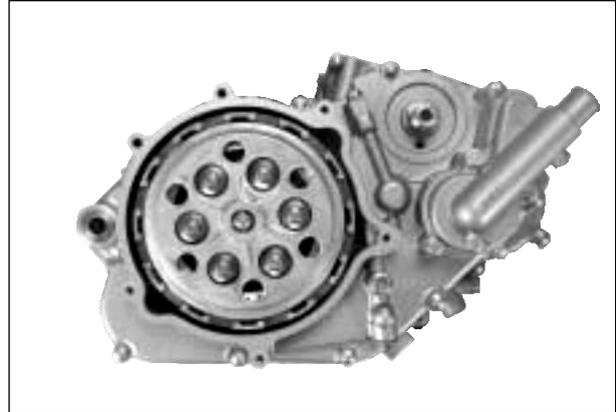
Remove the clutch cover (1).



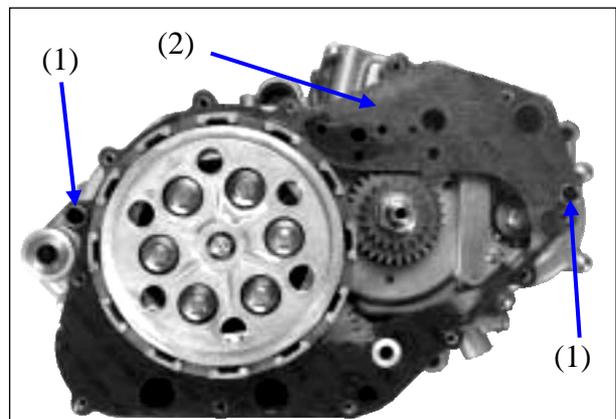
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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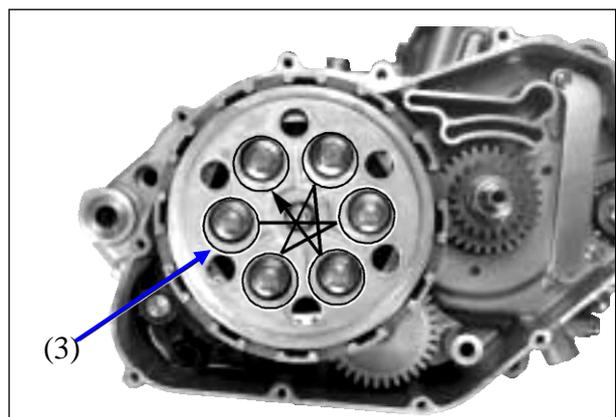
\* When remove or inspect the clutch drive and driven plate, remove only the clutch pressure cover A.



Remove the dowel pins (1) and gasket (2).



Loosen the clutch spring mounting bolts working in diagonal stages.  
Remove the bolts and spring.  
Remove the clutch pressure disk (3).

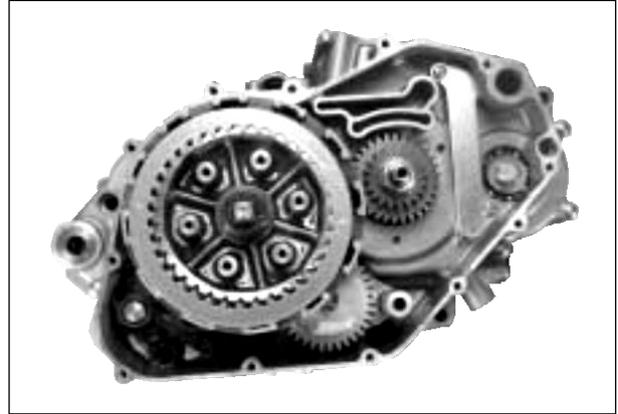


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/TRANSMISSION/CRANKCASE/CLUTCH COVER

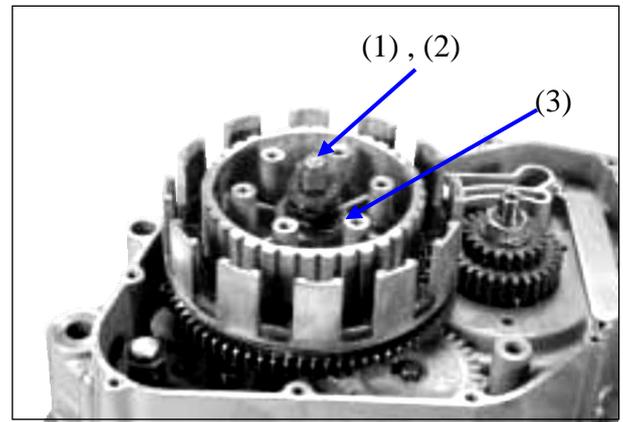
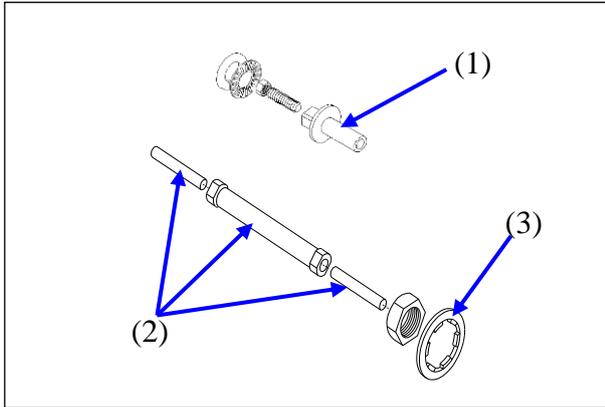
Remove the clutch drive plates No. 1 and driven plates.

Remove the spring washer and spring washer seat.

Remove the clutch drive plate No. 2.



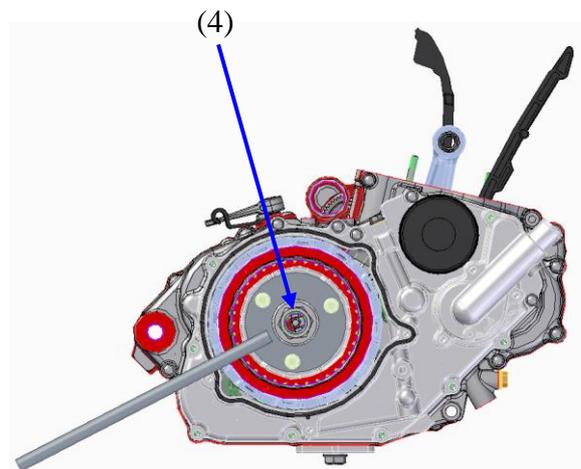
Remove the clutch push piece (1) and push rod (2).  
Flatten the clutch sleeve hub washer (3).



Hold the clutch sleeve hub using the special tool, and then remove the clutch sleeve hub nut (4).

Special Tool:

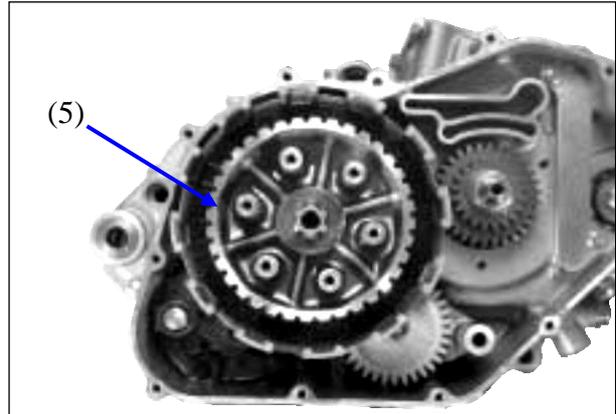
Clutch sleeve hub holder : 71600-E12-000



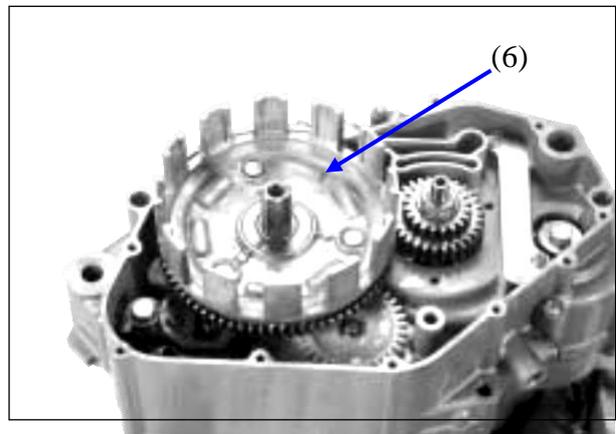
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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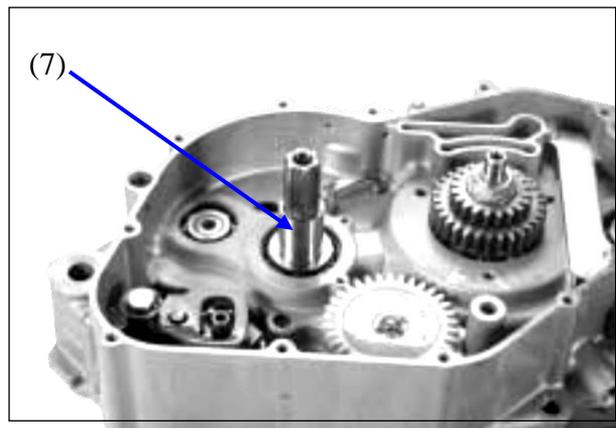
Remove the clutch sleeve hub (5).



Remove the primary driven gear assembly (6)  
and washer.



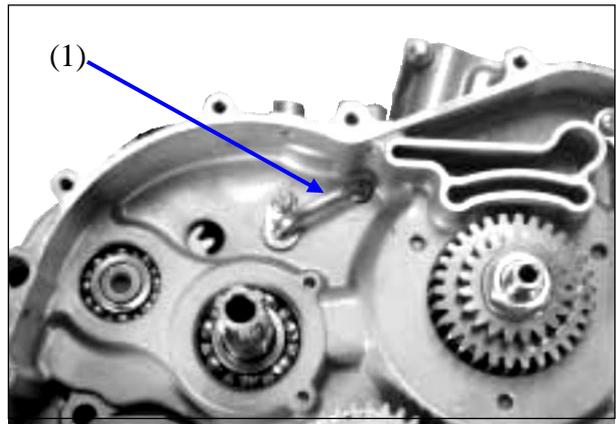
Remove the collar (7).



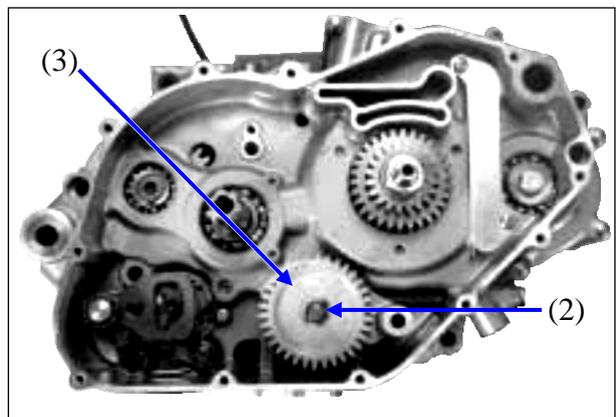
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/TRANSMISSION/CRANKCASE/CLUTCH COVER

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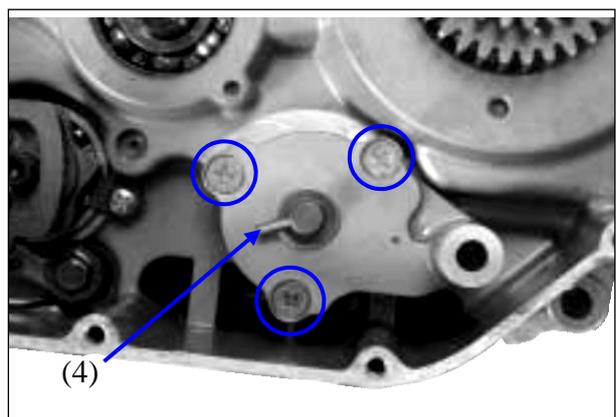
Remove the oil pipe (1).



Remove the oil pump driven gear (3) by removing the circlip (2).



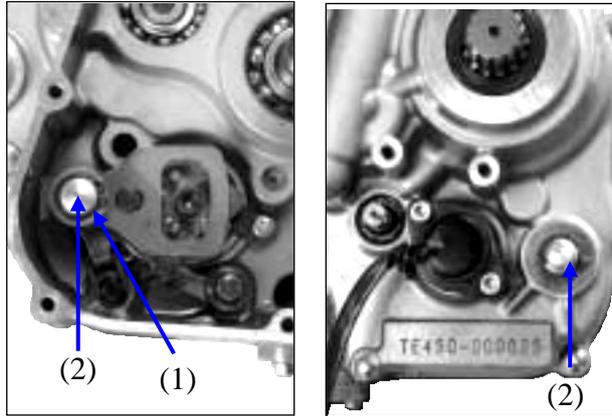
Remove the oil pin (4) and oil pump assembly.



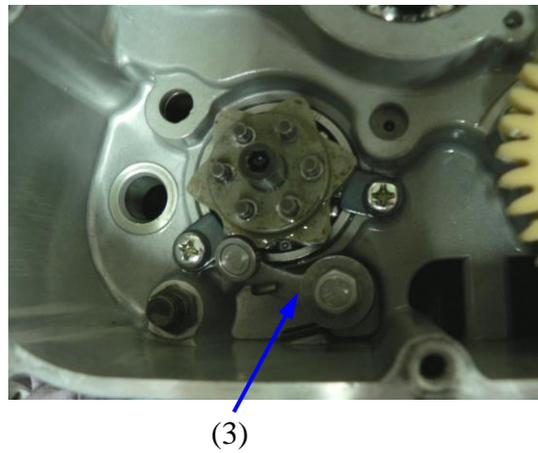
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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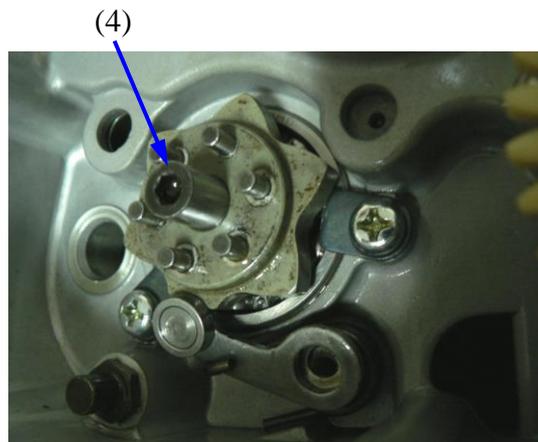
Remove the gearshift shaft (2) by removing the circlip (1).



Remove the gearshift cam stopper (3).



Loosen the gearshift cam plate bolt (4).  
Remove the gearshift cam plate.

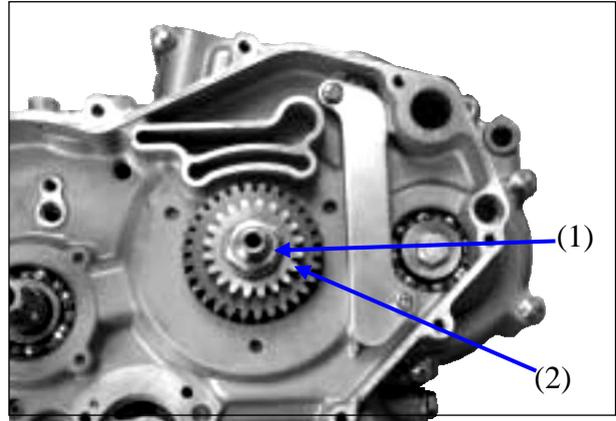


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/TRANSMISSION/CRANKCASE/CLUTCH COVER

With the crankshaft held immovable using the special tool, remove the primary drive gear nut (1), washer and water pump drive gear (2).

Special Tool:

Conrod holder : 71612-E12-000

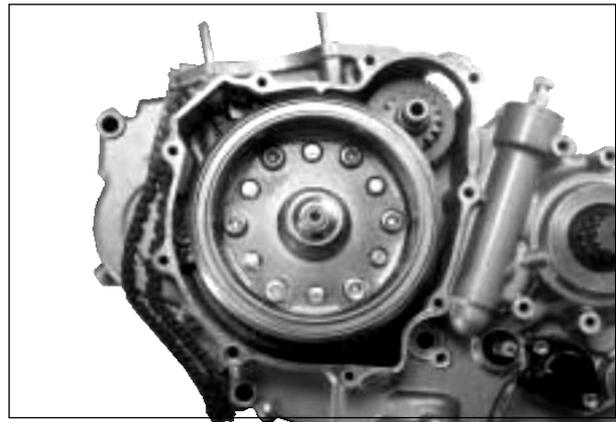


\* The primary drive gear nut has left-hand threads. If turning it counter-clockwise, it may cause damage. Pay attention at the primary drive gear nut with a washer, and water pump drive gear.

With the magneto rotor hold immovable using the special tool, loosen the rotor nut.

Special Tool:

Conrod holder : 71612-E12-000

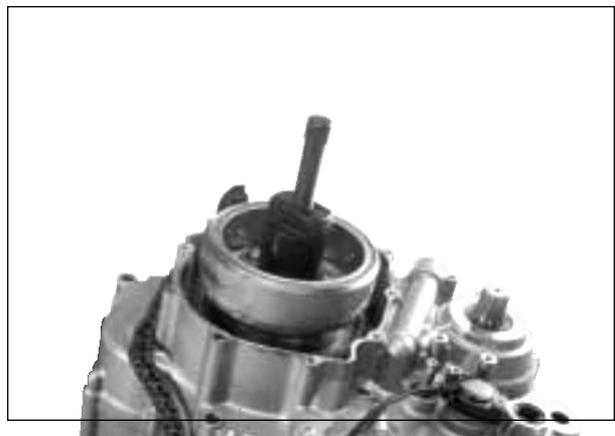


remove the magneto rotor using the special tool.

Special Tool:

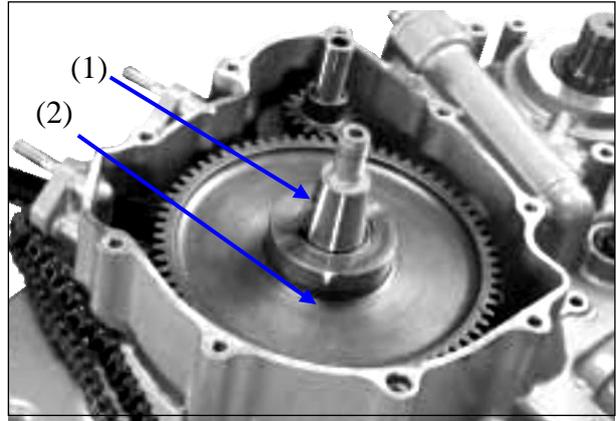
Rotor remover : 71604-E12-000

\* Do not hit the magneto rotor with a hammer, otherwise the rotor may be damaged.

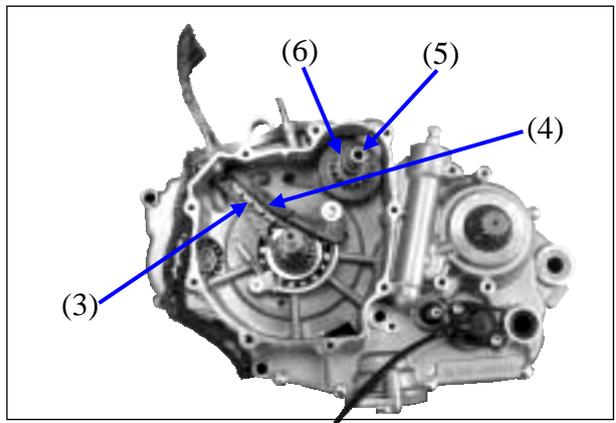


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/TRANSMISSION/CRANKCASE/CLUTCH COVER

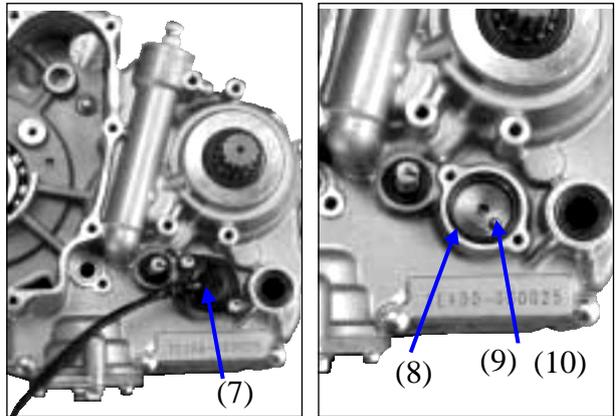
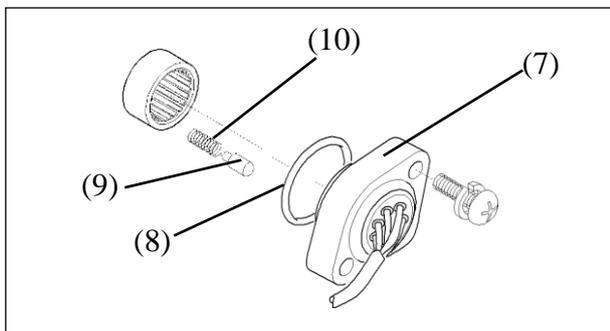
Remove the magneto rotor key (1).  
Remove the starter driven gear (2).



Remove the cam chain (3) and cam chain tensioner (4).  
Remove the starter idle shaft (5) and starter idle gear (6).



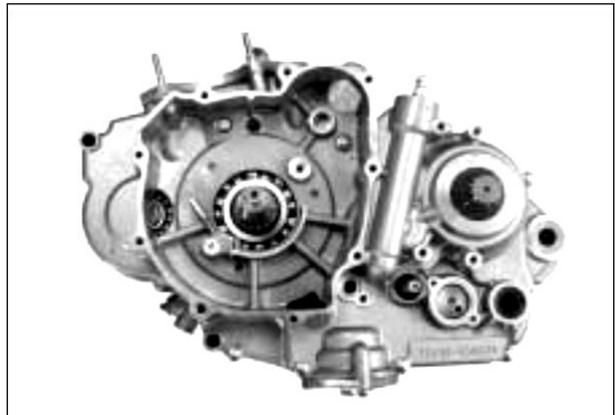
Remove the gear position switch (7).  
Remove the O-ring (8), switch contact (9) and spring (10).



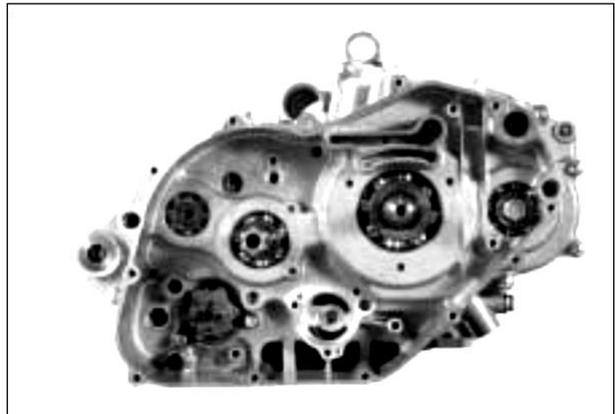
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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Remove the left crankcase securing bolts.



Remove the right crankcase securing bolts.



Separate the crankcase using the special tool.

Special Tool:

Crankcase separator : 71607-E03-000

\*

Fit the crankcase separator, so that the tool arms parallel the side of the crankcase.

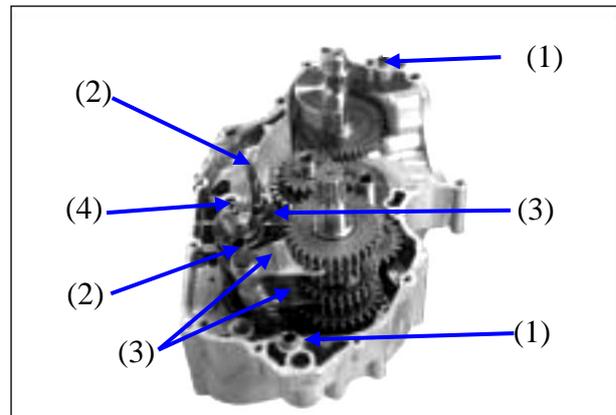


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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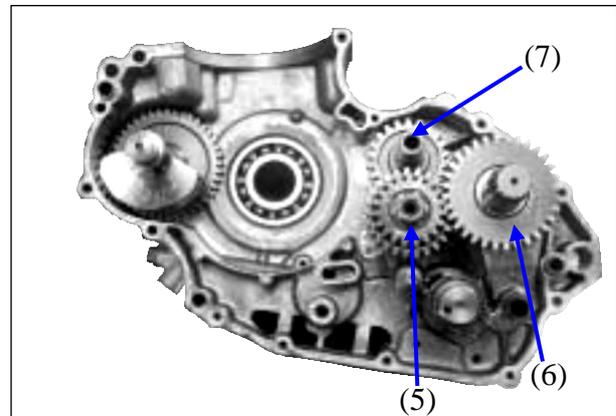
Remove the dowel pins (1).

Remove the gearshift fork shafts (2),  
gearshift forks (3) and gearshift cam (4).

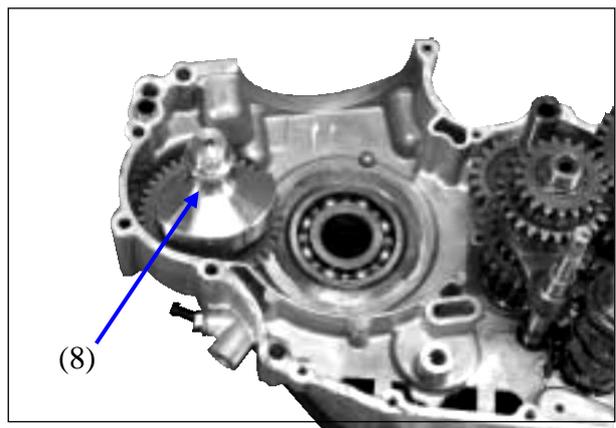


Remove the countershaft assembly (5) and  
driveshaft assembly (6).

Remove the reverse idle gear with its shaft (7).



Remove the crank balancer (8).



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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Remove the crankshaft from the crankcase using the special tool.

Special Tool:

Crankcase separator : 71607-E03-000



### INSPECTION & SERVICE

#### CRANKSHAFT

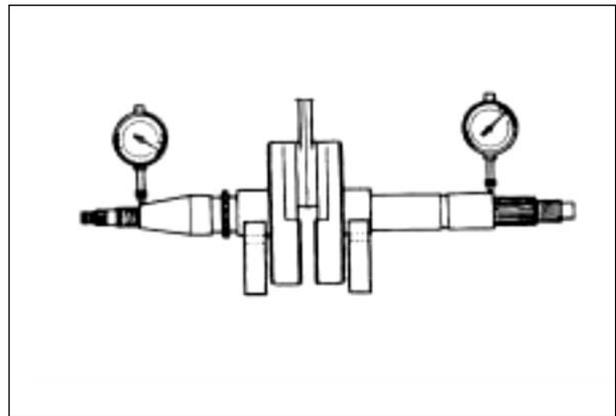
##### CRANKSHAFT RUNOUT INSPECTION

With the right and left crank journals supported using a V-block, turn the crankshaft slowly.

At this time, measure the crankshaft end runout using a dial gauge.

If the runout exceeds the service limit, replace the crankshaft with a new one.

Service limit : 0.05mm

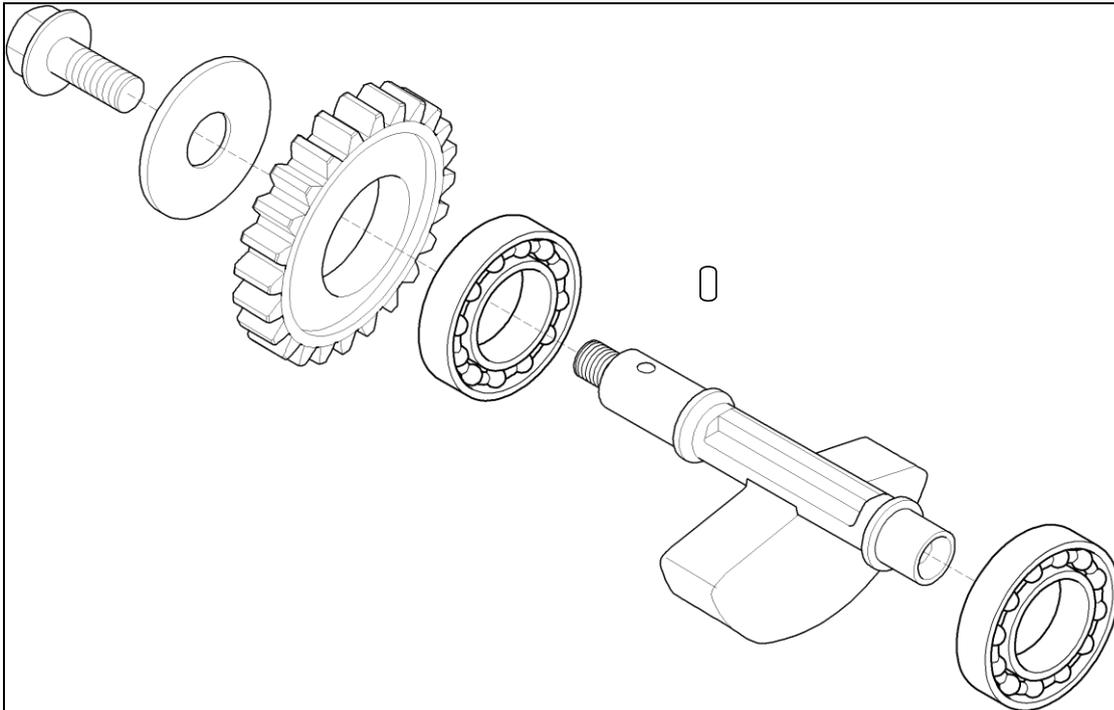


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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### CRANK BALANCER AND BALANCER DRIVE GEAR DISASSEMBLY

Disassemble the crank balancer and balancer drive gear as show in the illustration.



### REASSEMBLY

Reassemble the crank balancer and balancer drive gear in the reverse order of disassembly.

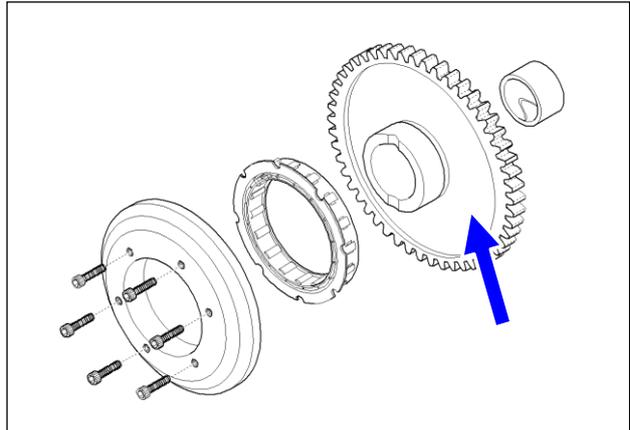
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/TRANSMISSION/CRANKCASE/CLUTCH COVER

### STARTER CLUTCH

Install the starter driven gear onto the starter clutch and turn the starter driven gear by hand (the gear turns in only one direction).

The starter driven gear should turn smoothly. If excessive resistance is felt while turning the starter driven gear, inspect the starter clutch. Also, inspect the surface of the starter driven gear which contacts the starter clutch, for wear or damage.

If any wear or damage is found, replace the defective parts.



### DISASSEMBLY

With the magneto rotor held immovable, remove the starter clutch bolts.



### REASSEMBLY

Apply a small quantity of thread lock to the starter clutch bolts and tighten them to the specified torque with the magneto rotor held immovable.

Torque : 2.3~2.8 kgf-m (23~28 Nm)



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

### CLUTCH

#### CLUTCH DRIVE PLATES

Measure the thickness and claw width of the clutch plates using a vernier calipers. If a clutch drive plate is not within the service limit, replace the clutch plates as a set.

Thickness standard :

NO.1 → 2.92~3.08 mm(0.115~0.121 in)

NO.2 → 3.42~3.58 mm(0.135~0.141 in)

Thickness service limit :

NO.1 → 2.62 mm(0.103 in)

NO.2 → 3.12 mm(0.123 in)

Claw width standard :

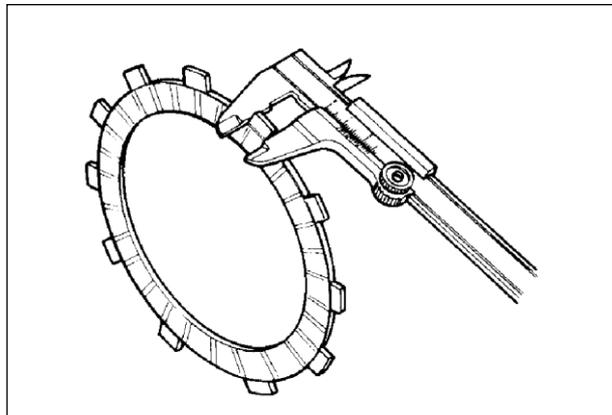
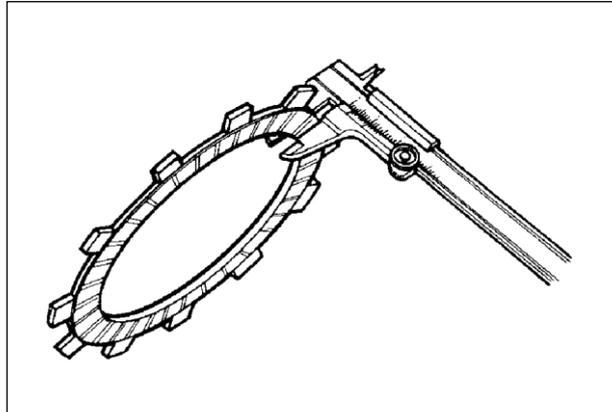
NO.1 → 15.9~16.0 mm(0.626~0.630 in)

NO.2 → 15.9~16.0 mm(0.626~0.630 in)

Claw width service limit :

NO.1 → 15.1 mm(0.595 in)

NO.2 → 15.1 mm(0.595 in)

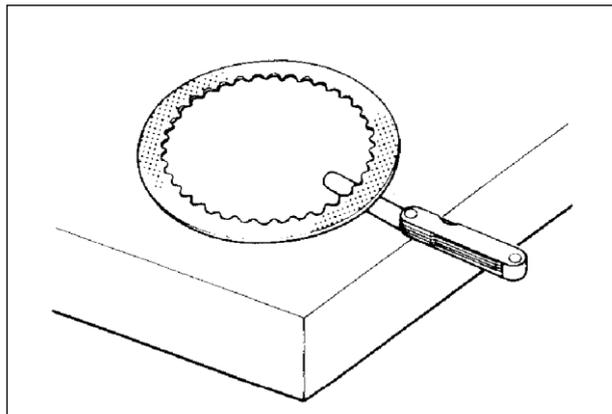


#### CLUTCH DRIVEN PLATES

Measure each clutch driven plate for distortion using the thickness gauge. If the clutch driven plate is not within the service limit, replace the clutch plates as a set.

Distortion service limit :

0.1 mm (0.004 in)



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

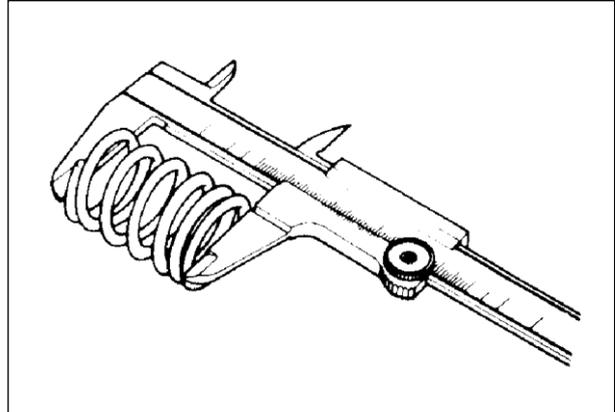
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### CLUTCH SPRING FREE LENGTH

Measure the free length of each clutch a vernier calipers.

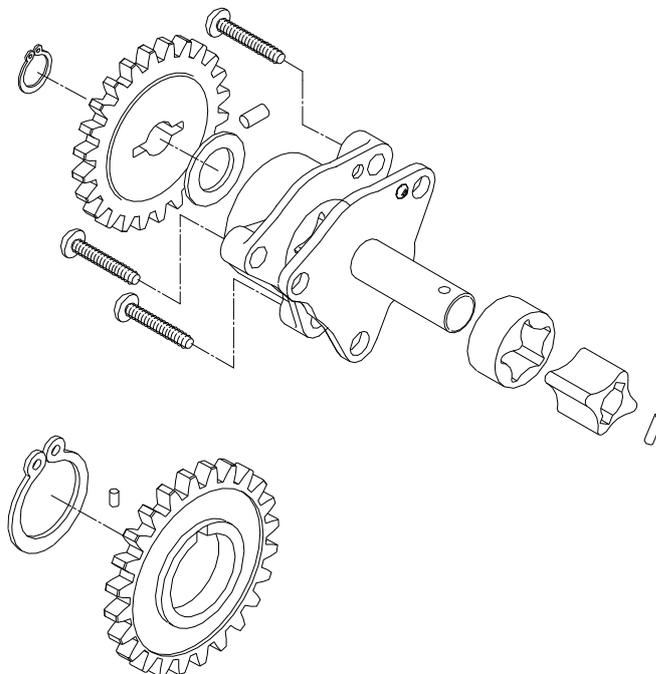
If any spring is not within the service limit,  
replace all of the spring with new ones.

Service limit : 51.6 mm(2.032 in)



### OIL PUMP

Remove the oil pump.(Refer to the chapter 4)



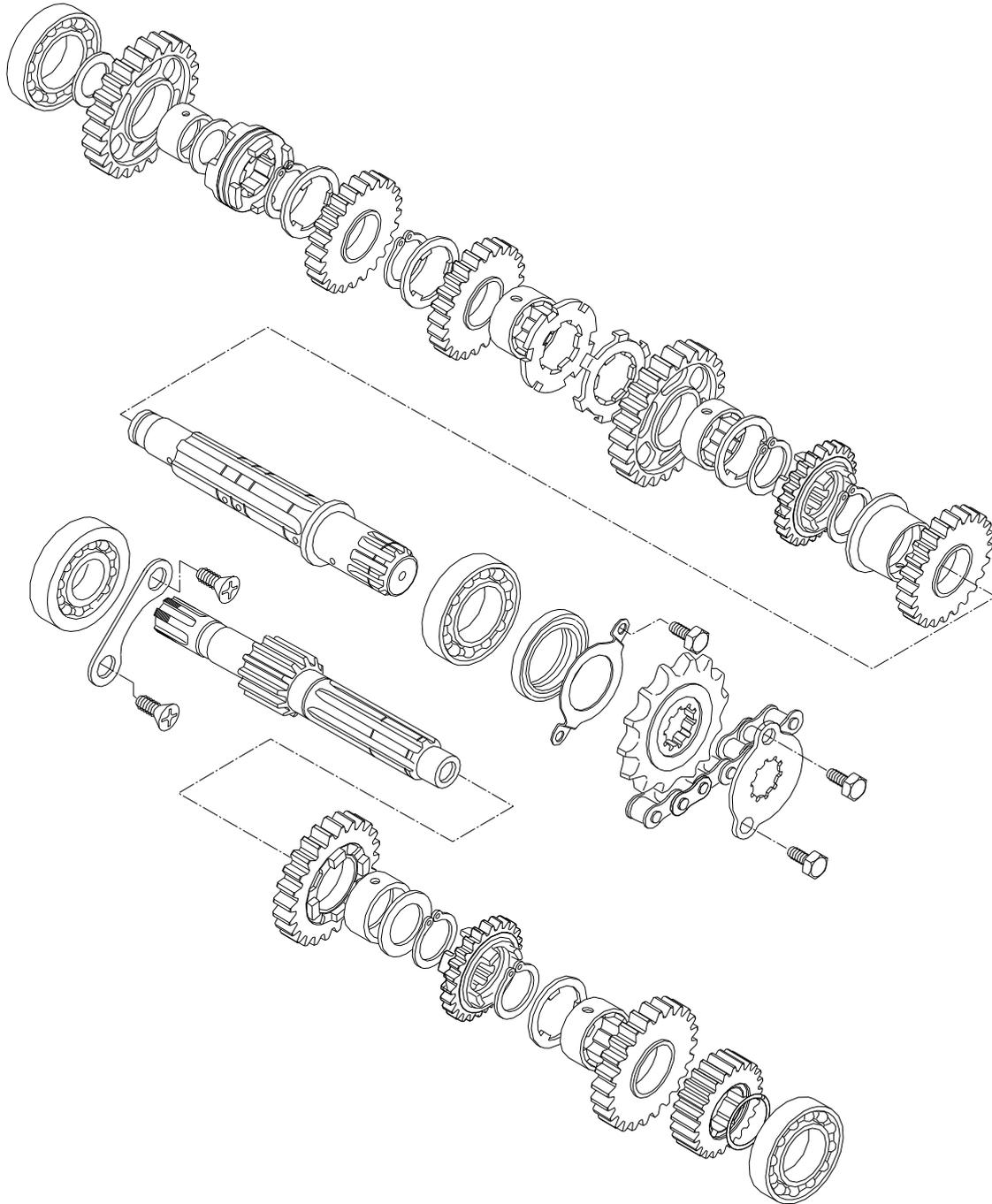
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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### TRANSMISSION

### DISASSEMBLY

Disassemble the transmission gears as show.



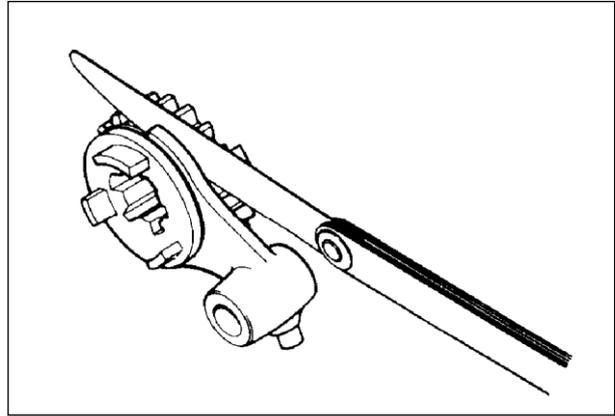
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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### INSPECTION

#### GEAR-SHIFTING FORK

Using a thickness gauge, check the clearance between the groove of its gear and shifting fork. The clearance for each of the three shifting forks plays an important role in the smoothness and positiveness of shifting action. If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.



#### Shift fork to groove clearance

standard : 0.10~0.30 mm(0.004~0.012 in)

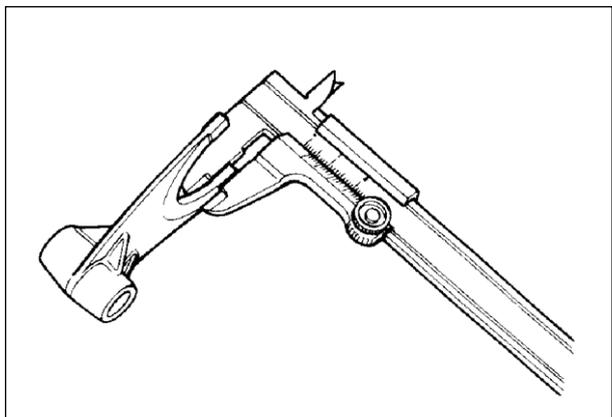
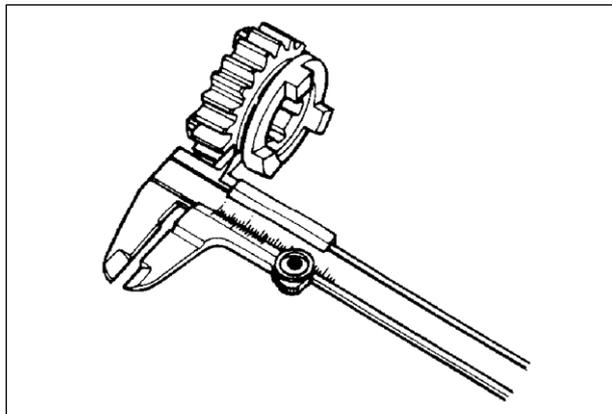
service limit : 0.50 mm(0.020 in)

#### Shift fork groove width (NO.1 NO.2 NO.3)

standard : 4.85~5.00 mm(0.191~0.197 in)

#### Shift fork thickness (NO.1 NO.2 NO.3)

standard : 5.3~5.4 mm(0.209~0.213 in)



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

### REASSEMBLY

Reassemble the transmission in the reverse order of disassembly.

Pay attention to following points :

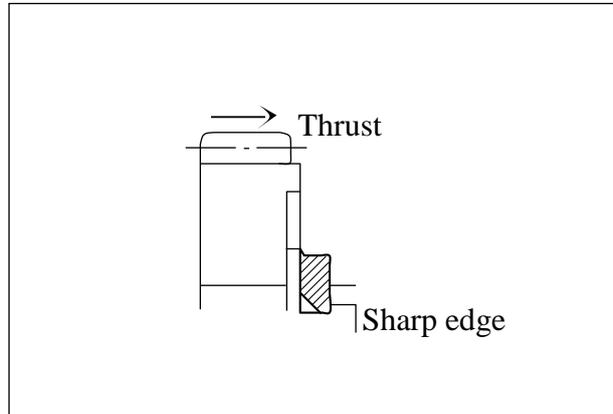
\*

Before installing the gears, coat lightly engine oil to the inner surface of each gear and bushing.

Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and new circlip must be installed.

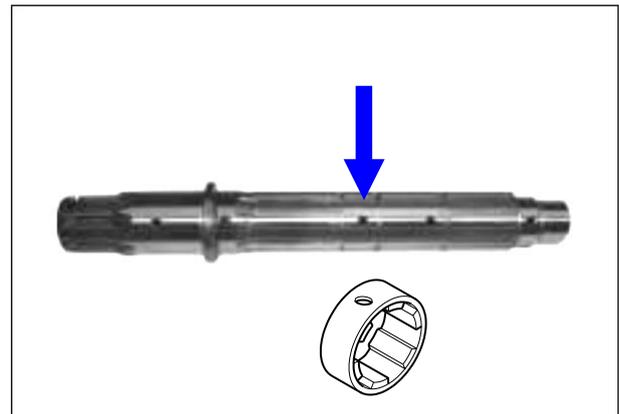
When installing a new circlip, care must be taken not to expand the end gap larger than required to slip the circlip over the shaft.

After installing a circlip, always ensure that it is completely seated in its groove and securely fitted.

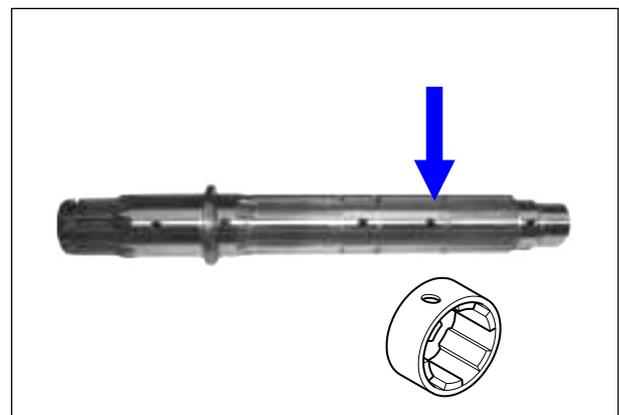


When installing a new circlip, pay attention to the direction of the circlip.

Fit it to the side where the thrust is as shown in figure.



When installing the third drive gear bushing, align the its oil hole with the driveshaft oil hole.

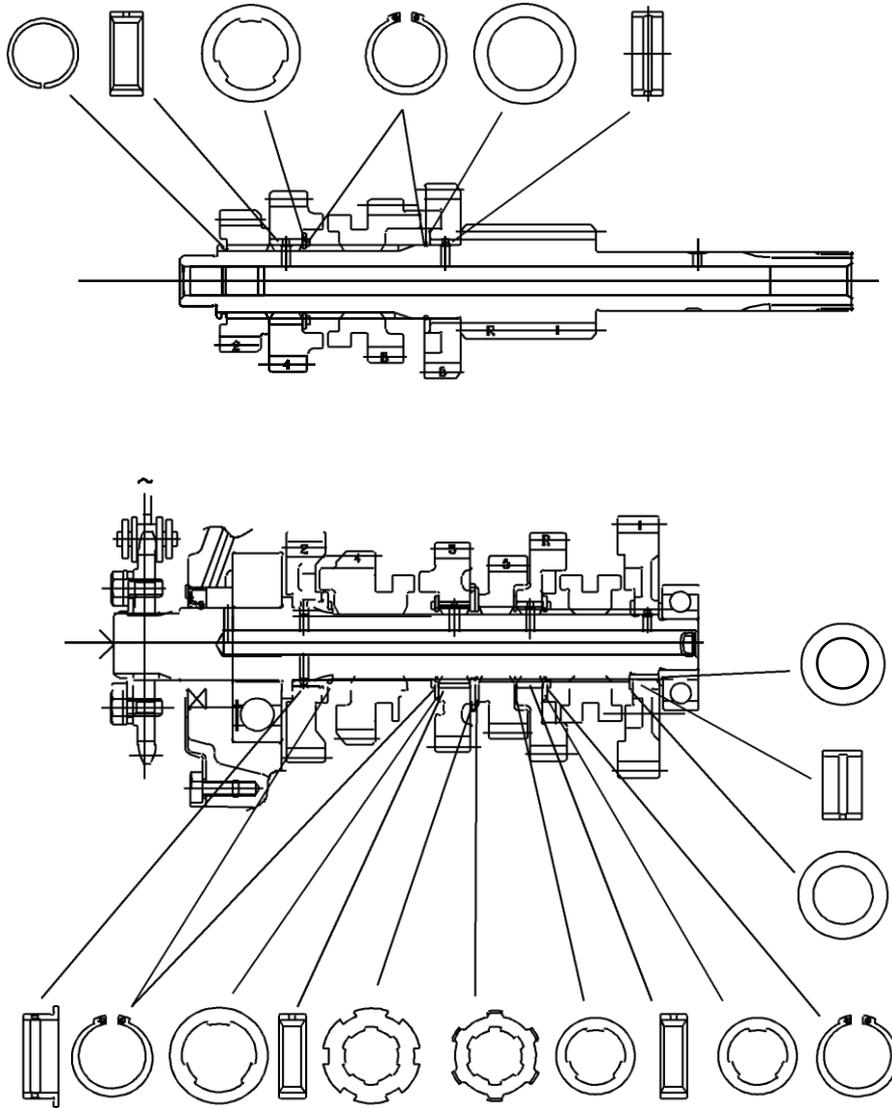


When installing the reverse driven gear bushing, align the its oil hole with the driveshaft oil hole.

# 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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## TRANSMISSION GEARS AND RELATED PARTS



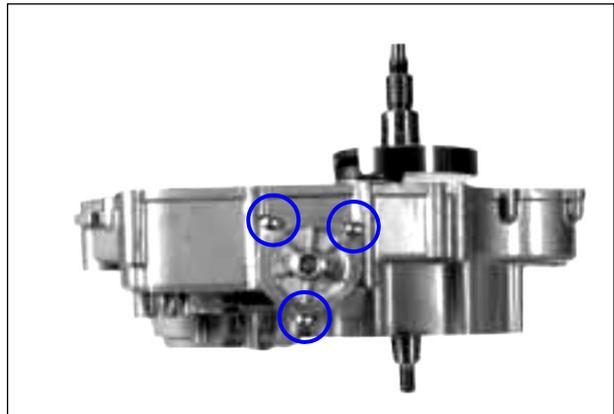
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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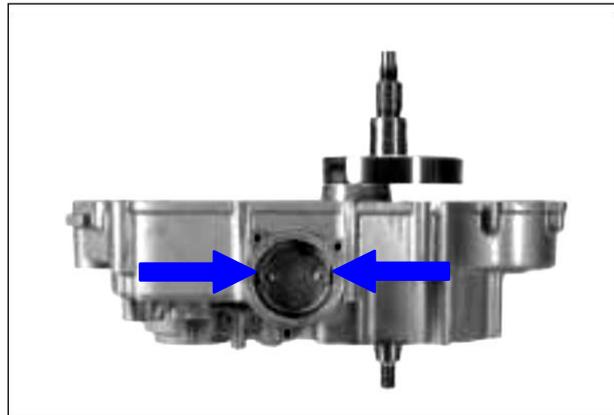
### CRANKCASE

#### OIL STRAINER CAP

Remove the oil strainer cap.



Remove the oil strainer screw.



Clean the oil strainer using compressed air.

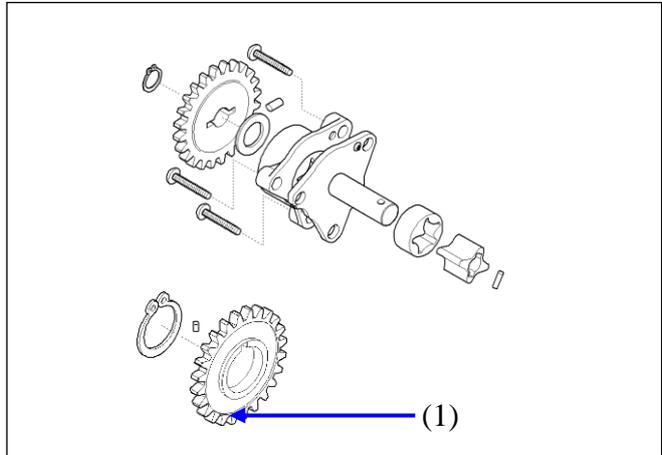


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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### OIL PUMP DRIVE GEAR

Remove the oil pump drive gear (1).

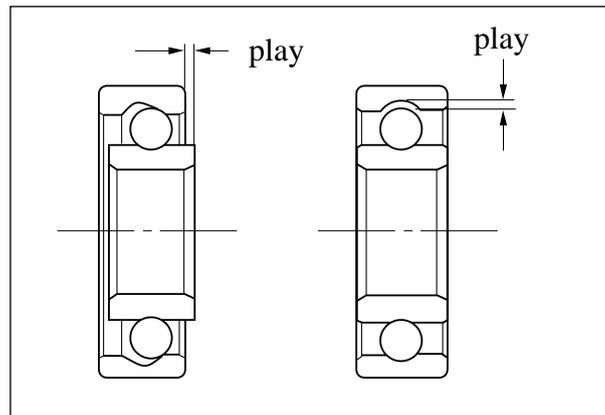


### BEARING INSPECTION

Wash the bearing with a cleaning solvent and lubricate it with motor oil before inspection.

Rotate the inner race and check to see that it turns smoothly.

If it does not turn quietly and smoothly, or if there are signs of any abnormalities, the bearing is defective and must be replaced with a new one as follows.



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

### OIL SEAL INSPECTION

Damage to the lip of the oil seal result in leakage of the engine oil.

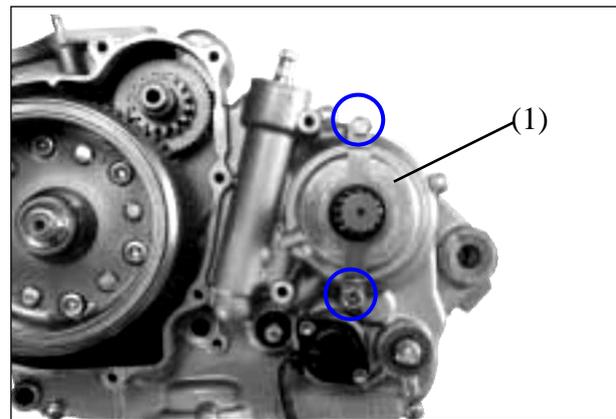
Inspect the oil seal for wear or damage.

If any damage are found, replace the oil seal with a new one.

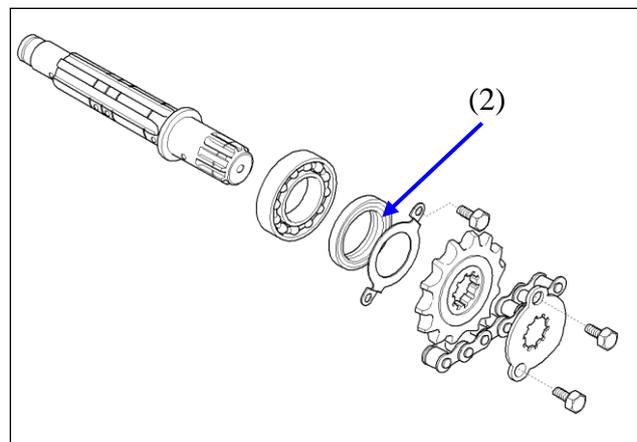


### OIL SEAL REMOVAL

Remove the oil seal retainer (1).



Remove the oil seal (2).



\* Replace the removed oil seals with new ones.

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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### OIL SEAL INSTALLATION

Install the oil seals into the crankcase.

Pay attention to the following points :

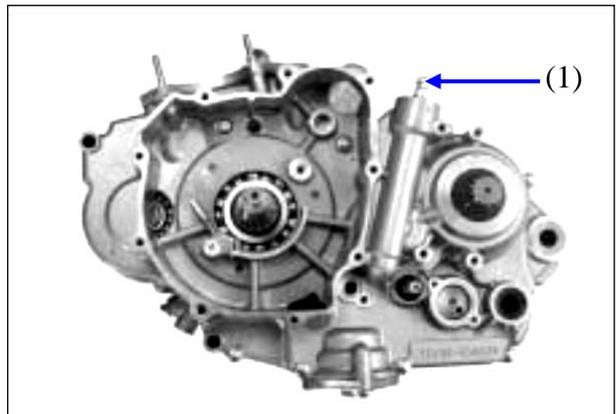
Apply super grease to the lip of the oil seals.

Install the new oil seals.

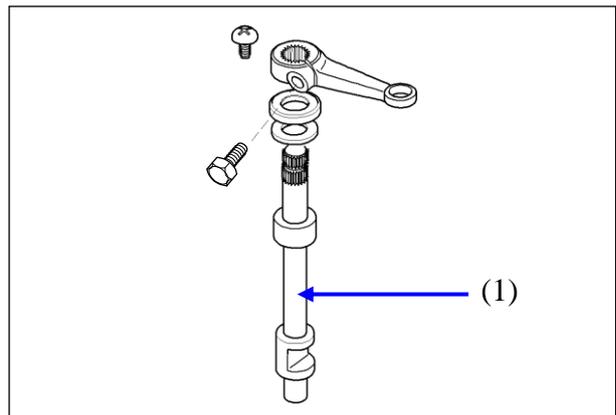


### CLUTCH RELEASE CAMSHAFT

remove the clutch release camshaft (1).



Install the clutch release camshaft correctly.



### CLUTCH COVER

#### OIL FILTER

Refer to page 3-14

#### WATER PUMP

Refer to page 10-11

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

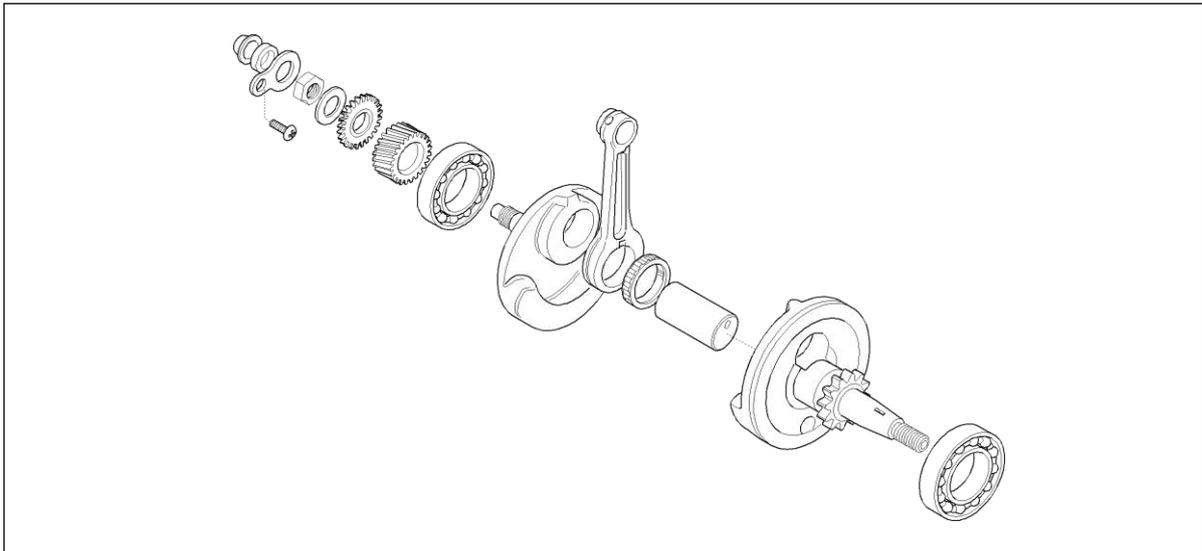
### REASSEMBLY

Reassemble the engine in the reverse order of disassembly.

Pay special attention to the following points :

- \* Apply engine oil to each running and sliding part before reassembling the engine.

### CRANKSHAFT



Determine the width between the webs referring to the figure when rebuilding the crankshaft.  
When mounting the crankshaft in the crankcase, it is necessary to pull its left end into the crankcase by using the special tools.

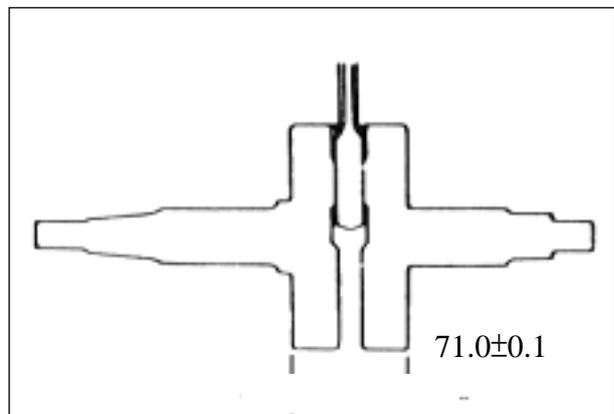
Width between web standard :

$71.0 \pm 0.1$  mm ( $2.795 \pm 0.004$  in)

Special TOOL:

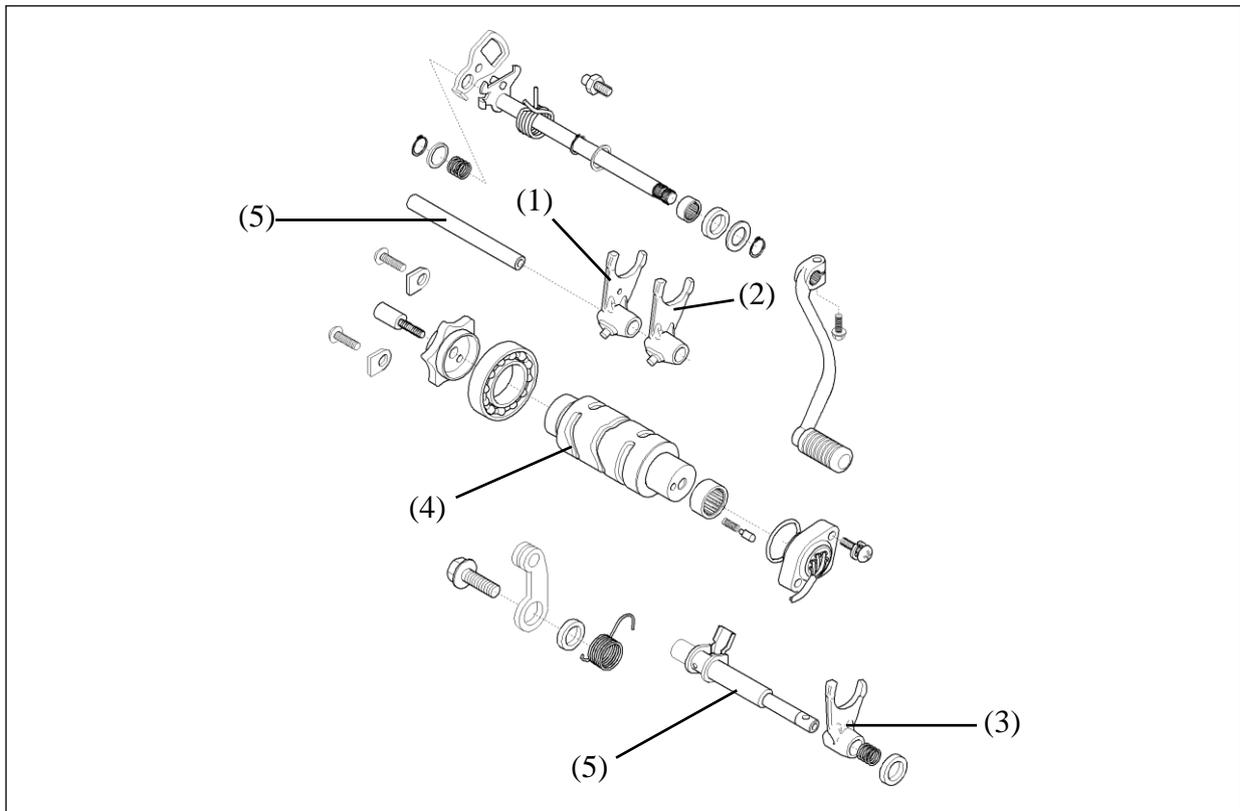
Crankshaft installer : 71613-E12-000

- \* Never fit the crankshaft into the crankcase by striking it with a plastic hammer. Always use the special tool, otherwise the accuracy of the crankshaft alignment will be affected.



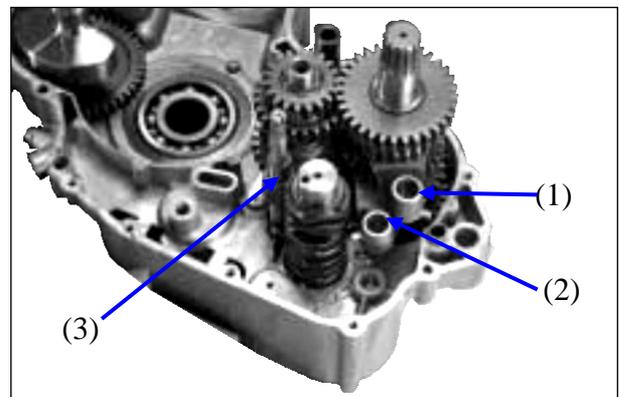
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

### GEARSHIFT CAM, FORK AND REVERSE LOCK SHAFT

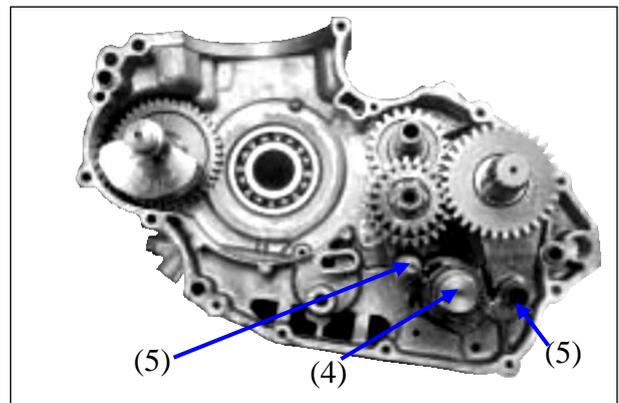


Install the gearshift forks into the gearshifting grooves in the correct position and direction.

- (1) Gearshift fork No.1
- (2) Gearshift fork No.2
- (3) Gearshift fork No.3



Install the gearshift cam (4).  
Install the gearshift fork shaft (5).



\* After the gearshift fork shaft and gearshift forks have been fitted, make sure that the gears engage normally.  
Set the transmission gears to the neutral position.

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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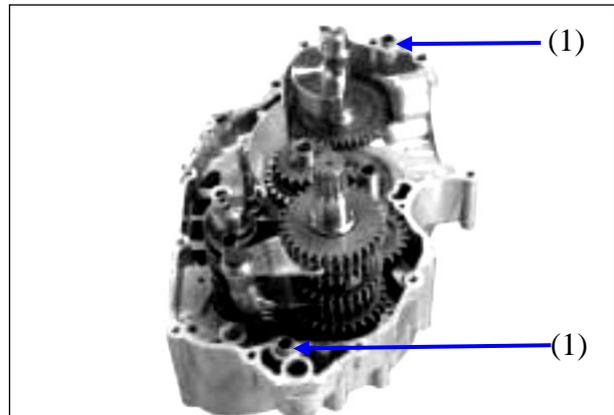
### CRANKCASE

Thoroughly remove the sealant material and oil stains on the mating surface of the right and left crankcases.

Install the dowel pins (1) to the crankcase.

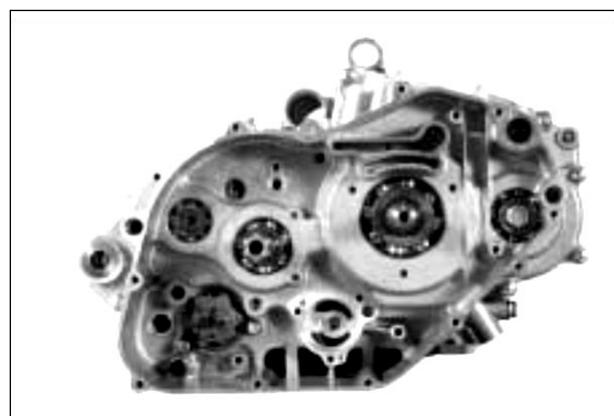
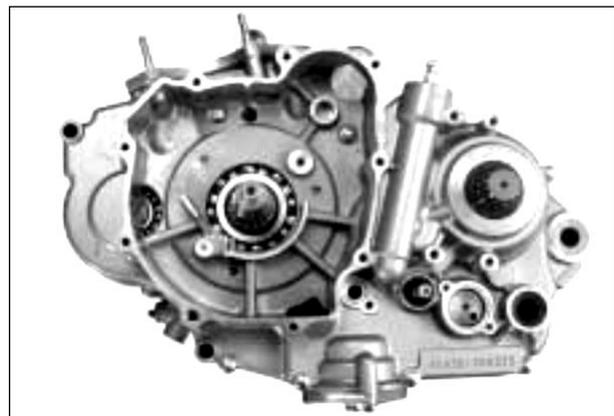
Apply engine oil to the conrod big end and to the transmission gears.

Apply BOND "1215" to the mating surface of the crankcase.



Tighten the crankcase bolts to the specified torque.

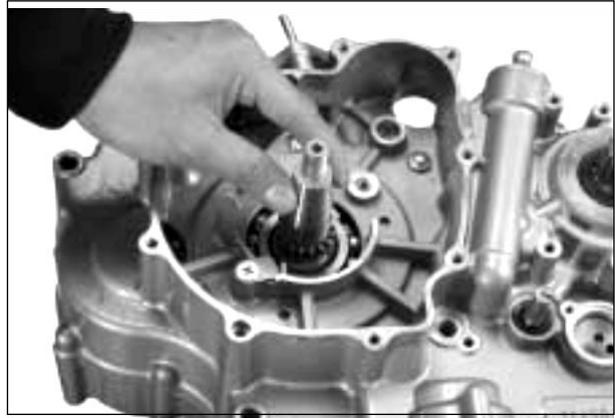
Torque : 1.1 kgf-m (11 Nm)



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/TRANSMISSION/CRANKCASE/CLUTCH COVER

After the crankcase bolts have been tightened, check if the crankshaft, countershaft, and driveshaft rotate smoothly.

If a large resistance is felt to rotation, try to free the shafts by tapping them with a plastic hammer.

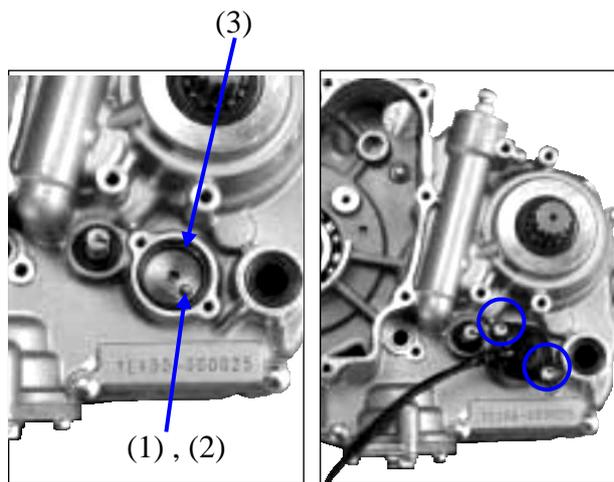


### GEAR POSITION SWITCH

Install the spring (1), contacts (2) and new O-ring (3).

Install the gear position switch and tighten the bolts to the specified torque.

Torque : 0.65 kgf-m (6.5 Nm)



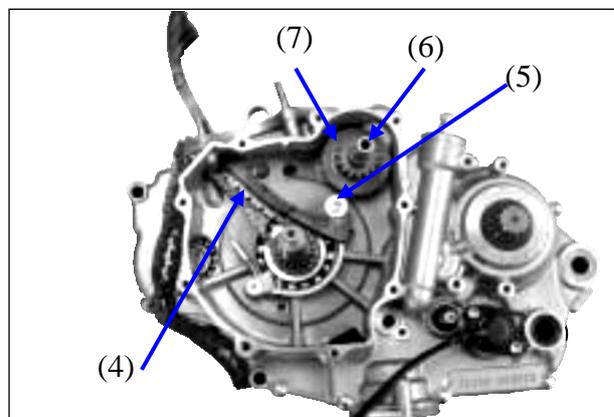
### CAM CHAIN

Install the cam chain (4) onto the sprocket.

Tighten the cam chain tensioner mounting bolt (5) to the specified torque.

Install the starter idle shaft (6) and starter idle gear (7).

Torque : 1.0 kgf-m (10 Nm)

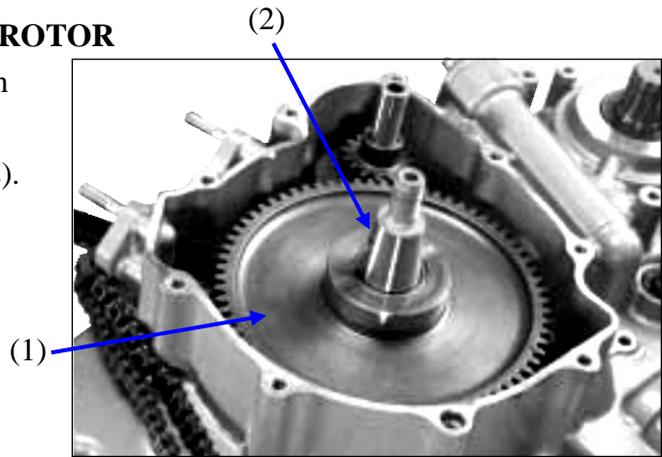


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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### STARTER CLUTCH AND MAGNETO ROTOR

Remove the grease from the tapered portion of the crankshaft and the magneto to rotor. Install the starter driven gear (1) and key (2).



Tighten the magneto rotor nut to the specified torque using the special tool.

Torque : 12 kgf-m (120 Nm)



Special Tool:

Conrod holder : 71612-E12-000

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/TRANSMISSION/CRANKCASE/CLUTCH COVER

### PRIMARY DRIVE GEAR AND WATER PUMP DRIVE GEAR

Install the primary drive gear to the crankshaft (1).

Install the water pump drive gear (2).

Apply engine oil to the thread and inside surface of the nut.

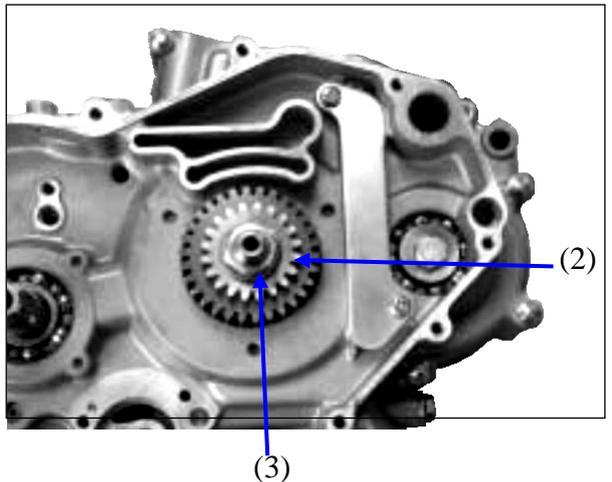
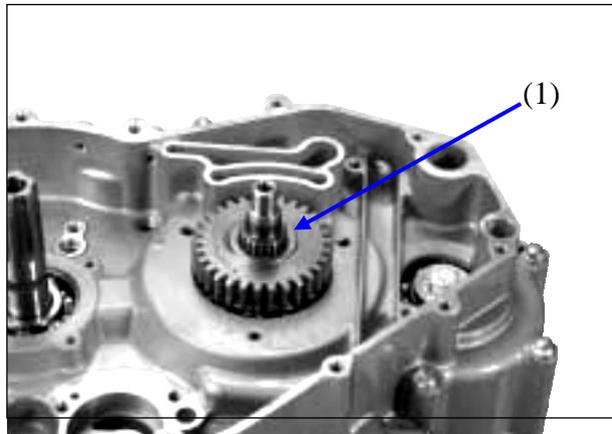
With the crankshaft held immovable using the special tool, and then tighten the primary drive gear nut (3) to the specified torque.

\* This nut has left-hand thread.  
Apply engine oil to the primary drive gear nut.

Nut Torque : 14 kgf-m (140 Nm)

Special Tool:

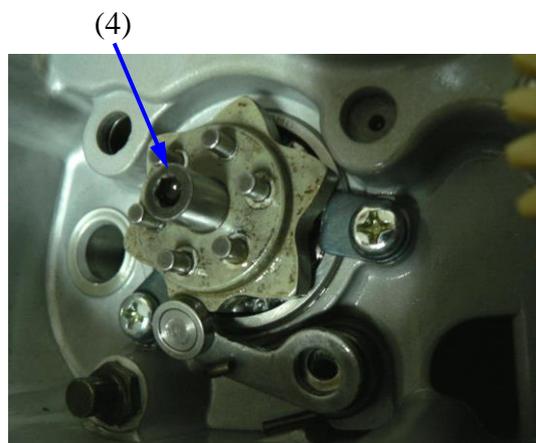
Conrod holder : 71612-E12-000



### GEARSHIFT CAM STOPPER

Apply a small quantity thread lock "1324" to the gearshift cam plate bolt (4).

Install the gearshift cam plate and gearshift cam plate bolt (4).



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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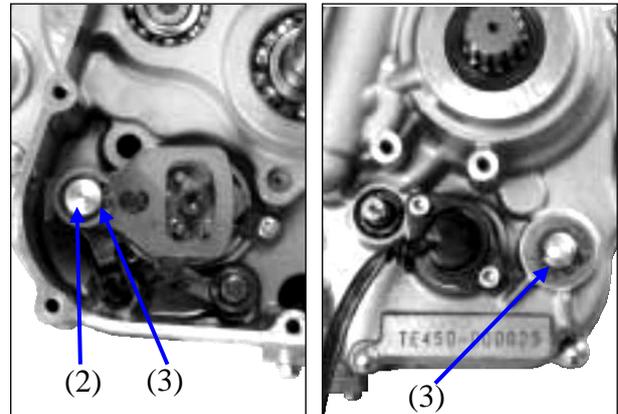
Install the gearshift cam stopper (1) to the specified torque.

Torque : 3.2 kgf-m (32 Nm)



(1)

Install the gearshift shaft (2).  
Install the circlip (3).



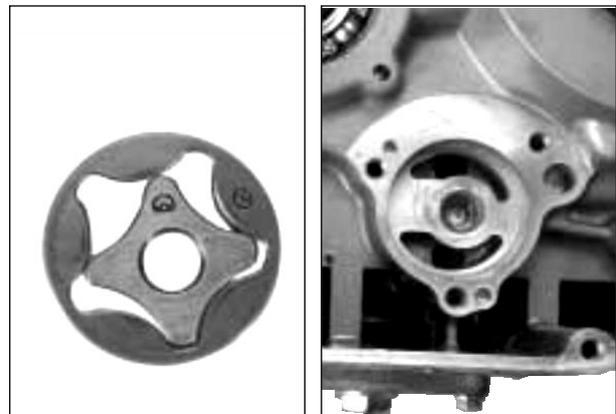
(2)

(3)

(3)

### OIL PUMP

Before mounting the oil pump, apply engine oil to the sliding surface of the oil pump case, outer rotor, inner rotor, and crankcase.

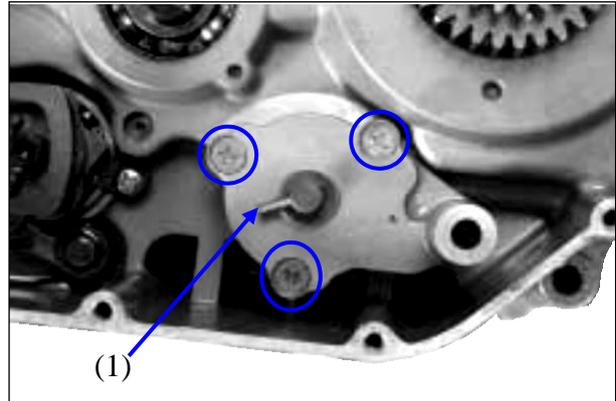


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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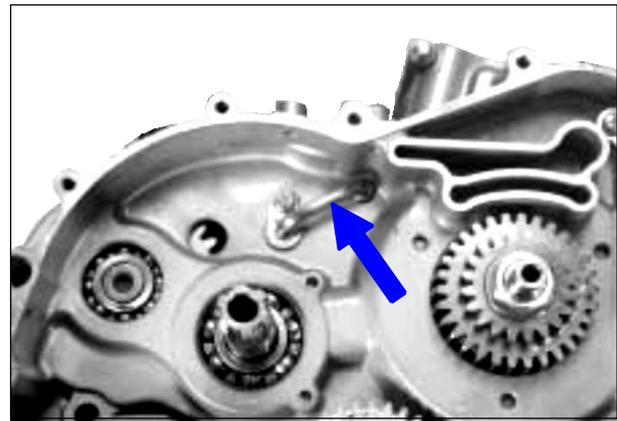
Apply a small quantity of thread lock to the oil pump mounting screws, and then tighten them securely.

When installing the oil pump driven gear, align the pin (1) with the groove.



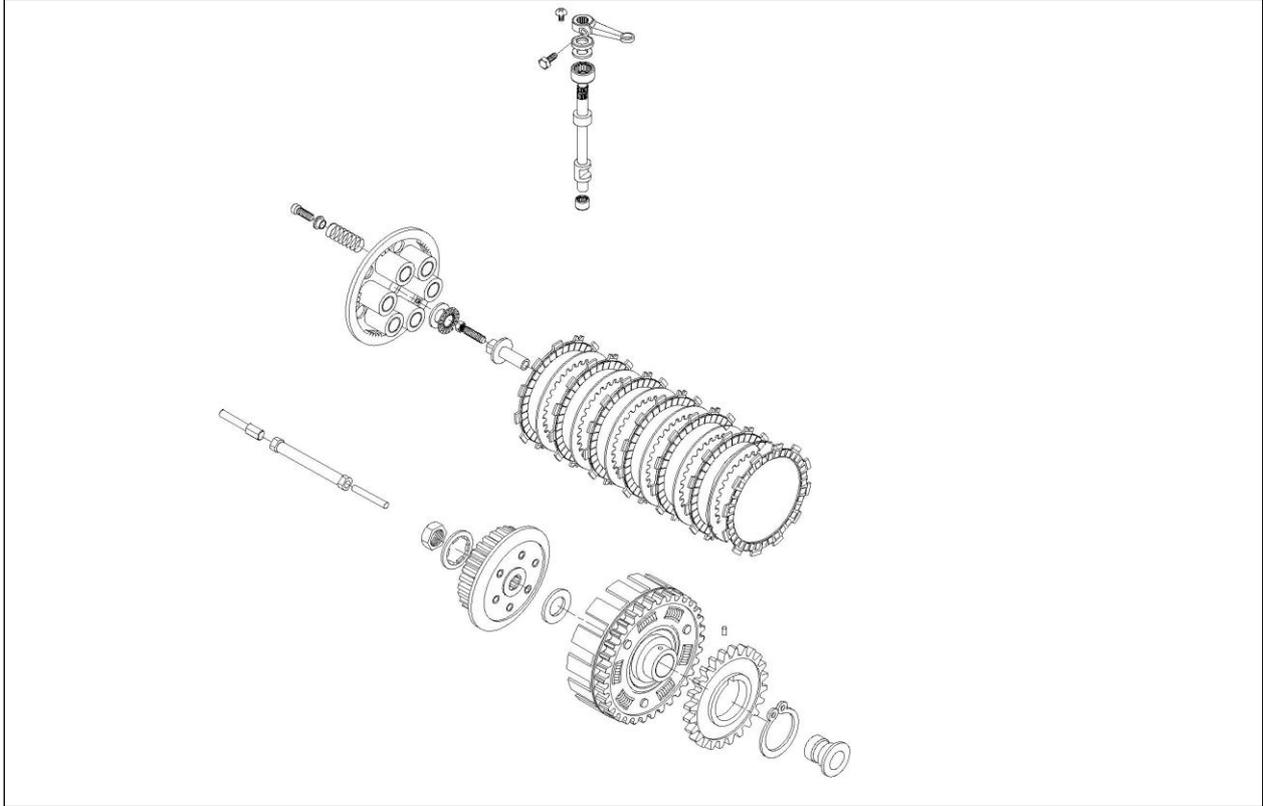
### OIL PIPE

Apply engine oil to the O-rings.  
Tighten the oil pipe bolt securely.

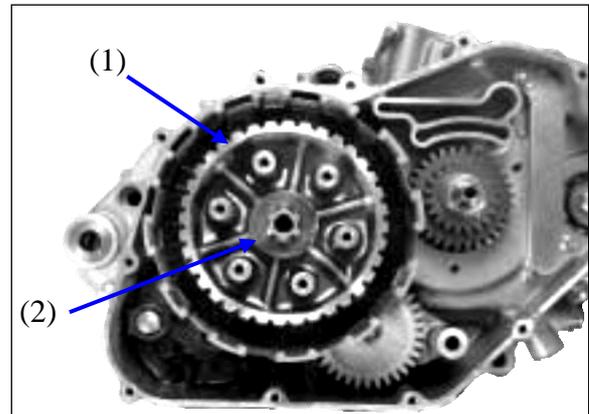


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

### CLUTCH



Install the clutch sleeve hub (1), lock washer (2).

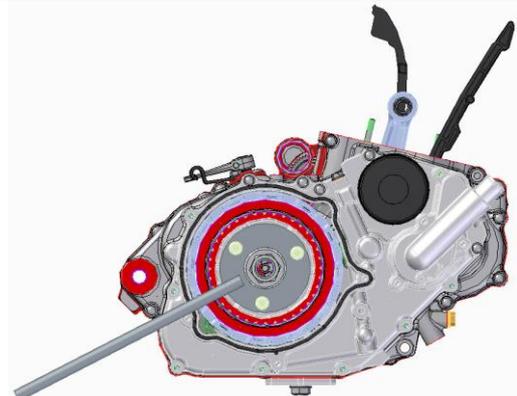


Hold the clutch sleeve hub using the special tool, and then tighten the clutch sleeve hub nut to the specified torque.

Torque : 9.0 kgf-m (90 Nm)

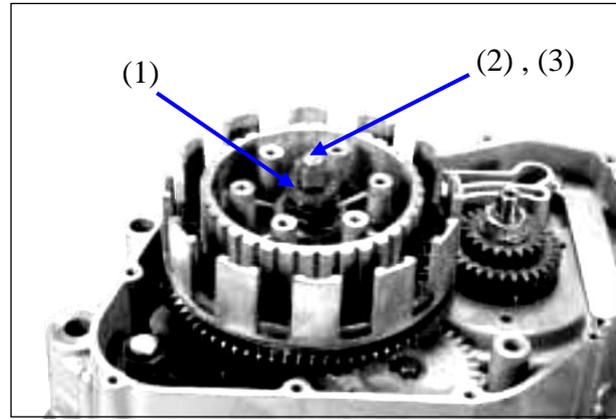
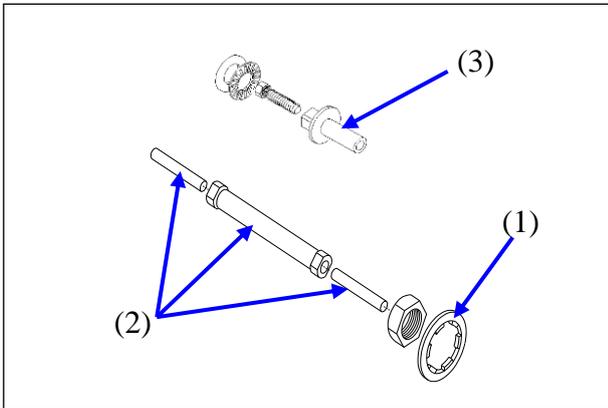
Special Tool:

Clutch sleeve hub holder : 71600-E12-000

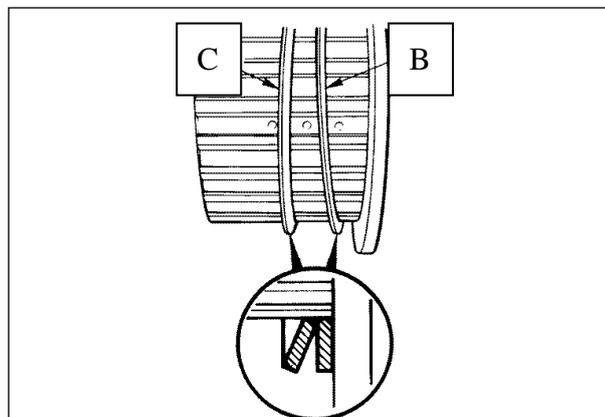
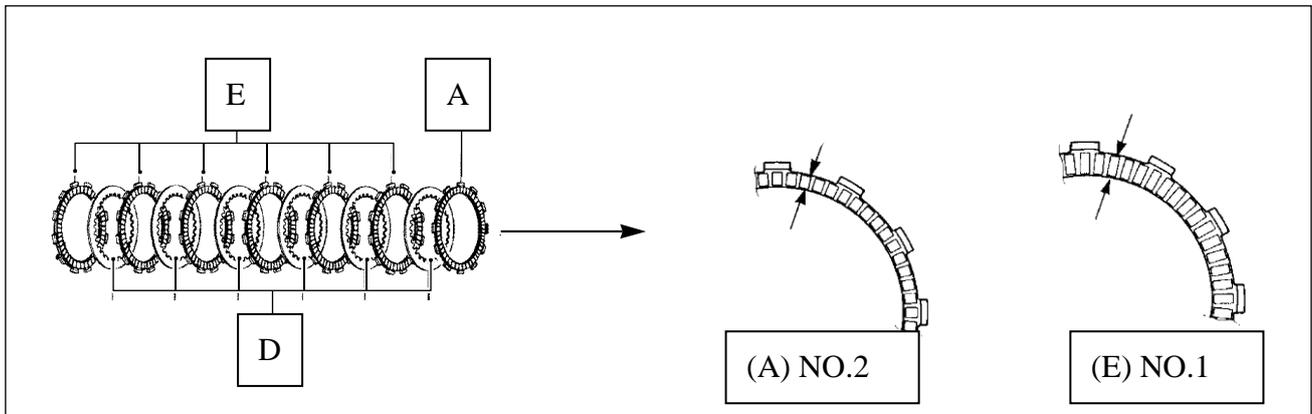


## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

Bend the tongue of the washer (1) securely.  
Install the push rod (2), clutch push piece (3).



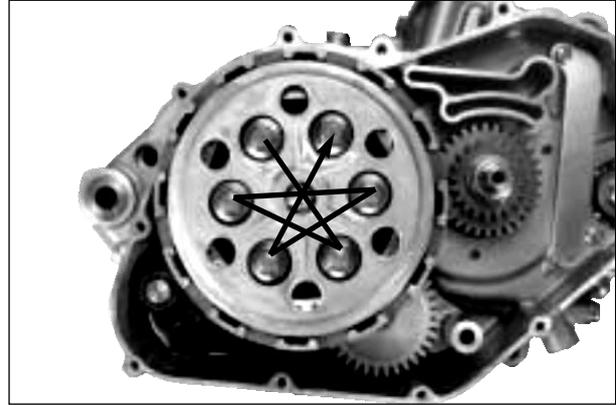
Install the clutch drive plate NO.2 (A).  
Install the spring washer seat (B) and spring washer (C) onto the clutch sleeve hub correctly.  
Install the clutch drive plates (D) and drive plates NO.1 (E) one by one into the clutch sleeve hub in the prescribed order.



## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

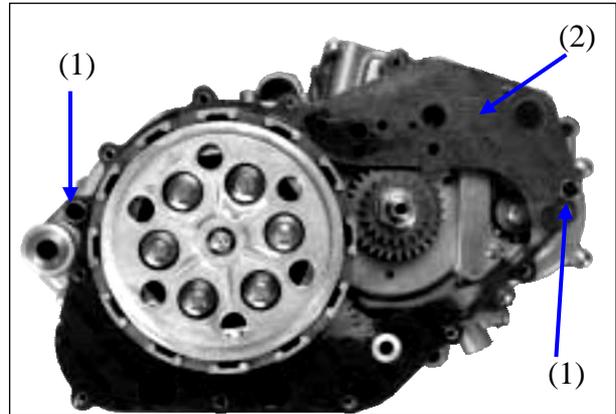
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Tighten the clutch spring set bolts securely in diagonal stages.

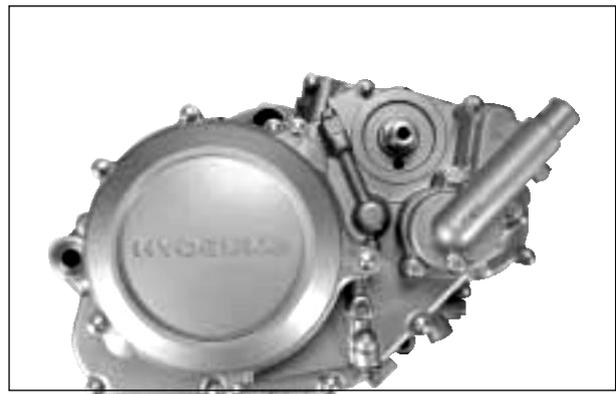


Install the dowel pins (1) and new gasket (2).

\* Use a new gasket to prevent oil leakage.



Tighten the clutch cover bolts securely.



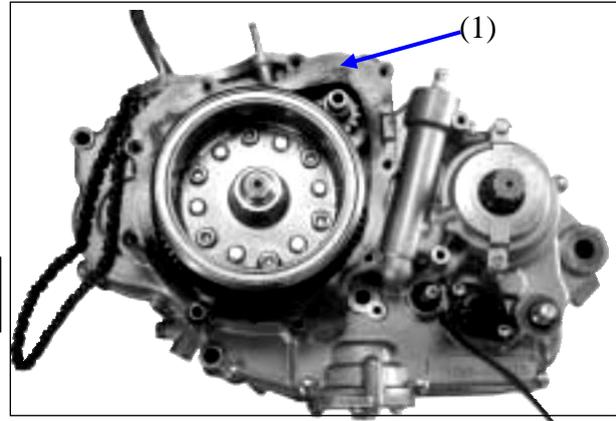
## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

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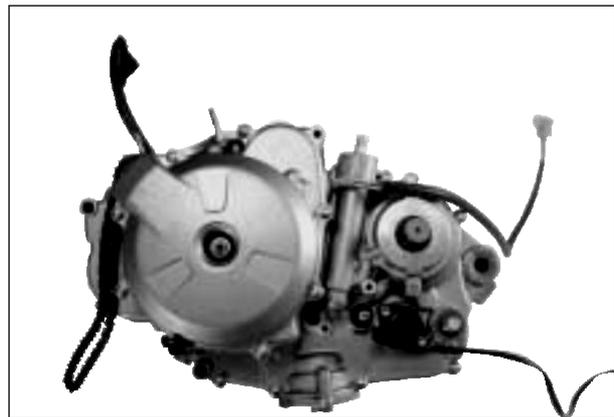
### MAGENTO ROTOR COVER

Install the dowel pins and new gasket (1).

\* Use a new gasket to prevent oil leakage.



Tighten the magneto rotor cover bolts securely.





## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

**TAPPET SHIM SELECTION CHART (IN.)**

SHIM NO.		230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	
MEASURING	SHIM THICKNESS	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
TAPPET	AT PRESENT																										
CLEARANCE (mm)	(mm)																										
	0.00~0.04			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	
	0.05~0.09		2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	
	0.10~0.20	<b>Specified clearance--Adjustment unnecessary</b>																									
	0.21~0.25	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
	0.26~0.30	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
	0.31~0.35	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
	0.36~0.40	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
	0.41~0.45	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
	0.46~0.50	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
	0.51~0.55	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
	0.56~0.60	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
	0.61~0.65	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
	0.66~0.70	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
	0.71~0.75	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
	0.76~0.80	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
	0.81~0.85	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50															
	0.86~0.90	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50																
	0.91~0.95	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50																	
	0.96~1.00	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50																		
	1.01~1.05	3.20	3.25	3.30	3.35	3.40	3.45	3.50																			
	1.06~1.10	3.25	3.30	3.35	3.40	3.45	3.50																				
	1.11~1.15	3.30	3.35	3.40	3.45	3.50																					

**HOW TO USE THE CHART**

1. Measure the tappet clearance . (When cold)
2. Measure the shim thickness at present .
3. Look for meeting space in that horizontal line for thickness and vertical line for clearance .

(EXAMPLE)

When the tappet clearance is 0.38mm and the shim thickness at present is 2.70mm , the shim thickness should be used 2.95mm .

## 9. CRANK SHAFT/BLANCER DRIVE GEAR/CLUTCH/ TRANSMISSION/CRANKCASE/CLUTCH COVER

TAPPET SHIM SELECTION CHART (EX.)																											
MEASURING TAPPET CLEARANCE (mm)	SHIM NO.	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	
	SHIM THICKNESS AT PRESENT (mm)	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
0.10~0.14				2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	
0.15~0.19			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	
0.20~0.30		<b>Specified clearance</b>																									
0.31~0.35		2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
0.36~0.40		2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
0.41~0.45		2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
0.46~0.50		2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
0.51~0.55		2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
0.56~0.60		2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
0.61~0.65		2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
0.66~0.70		2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
0.71~0.75		2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
0.76~0.80		2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
0.81~0.85		2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
0.86~0.90		2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
0.91~0.95		3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50															
0.96~1.00		3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50																
1.01~1.05		3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50																	
1.06~1.10		3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50																		
1.11~1.15		3.20	3.25	3.30	3.35	3.40	3.45	3.50																			
1.16~1.20		3.25	3.30	3.35	3.40	3.45	3.50																				
1.21~1.25		3.30	3.35	3.40	3.45	3.50																					

### HOW TO USE THE CHART

1. Measure the tappet clearance . (When cold)
2. Measure the shim thickness at present .
3. Look for meeting space in that horizontal line for thickness and vertical line for clearance .

### (EXAMPLE)

When the tappet clearance is 0.48mm and the shim thickness at present is 2.70mm , the shim thickness should be used 2.95mm .

# 10.COOLING SYSTEM

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## COOLING SYSTEM

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SERVICE INFORMATION -----	10-1
TROUBLESHOOTING -----	10-1
SPECIFICATIONS -----	10-2
COOLING SYSTEM TESTING -----	10-3
ENGINE COOLANT/COOLING CIRCUIT -----	10-4
RADIATOR -----	10-5
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WATER PUMP-----	10-11
OIL TANK AND HOSE -----	10-16
THERMOSTAT -----	10-19

# 10.COOLING SYSTEM

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## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- The cooling system service can be done with the engine installed in the frame.
- The engine must be cool before servicing the cooling system.
- When the coolant temperature is over 100°C, never remove the radiator cap to release the pressure because the boiling coolant may cause danger.
- Avoid spilling coolant on painted surfaces because the coolant will corrode the painted surfaces.
- Wash off any spilled coolant with fresh water as soon as possible.
- After servicing the system, check for leaks with a cooling system tester.

### TORQUE VALUES

Thermostat case bolt torque : 1.0 kgf-m (10 Nm)

Engine oil inlet hose union bolt torque : 2.3 kgf-m (23 Nm)

Radiator mounting bolt torque : 0.8~1.2 kgf-m (8~12 Nm)

### TROUBLESHOOTING

**Temperature gauge pointer does not register the correct coolant temperature.**

- Faulty temperature gauge or thermo sensor
- Faulty thermostat

#### Radiator (cooling system)

Complaint	Symptom and possible causes	Remedy
Engine overheats	<ol style="list-style-type: none"><li>1. Not enough engine coolant.</li><li>2. Radiator core clogged with dirt or scale.</li><li>3. Faulty cooling fan.</li><li>4. Defective cooling fan thermo-switch.</li><li>5. Clogged water passage.</li><li>6. Air trapped in the cooling circuit.</li><li>7. Defective water pump.</li><li>8. Use of incorrect engine coolant.</li><li>9. Defective thermostat.</li></ol>	<p>Add coolant</p> <p>Clean</p> <p>Repair or replace</p> <p>Replace</p> <p>Clean</p> <p>Bleed out air</p> <p>Replace</p> <p>Replace</p> <p>Replace</p>
Engine overcools	<ol style="list-style-type: none"><li>1. Defective cooling fan thermo-switch.</li><li>2. Extractive thermostat.</li><li>3. Defective thermostat.</li></ol>	<p>Replace</p> <p>Put on the radiator cover</p> <p>Replace</p>

# 10.COOLING SYSTEM

## SPECIFICATIONS

Radiator cap relief pressure	0.75~1.05 kgf/cm <sup>2</sup> (75~105 kPa,10.65~14.91 psi)		
	Standard		Limit
Thermostat valve Lift	Over 8mm/90°C		
Thermostat valve operating temperature	Valve opening	76°C	
	Valve closing	71°C	
Water temperature switch operating temperature	OFF→ON	Approx.105°C	
	ON→OFF	Approx.95°C	
Cooling fan thermo-switch operating temperature	OFF→ON	Approx.85°C	
	ON→OFF	Approx.75°C	
Coolant capacity	Total system 1400±20 cc	Radiator:1000±20 cc Reserve tank:400±20 cc	

### Cautions for Using Coolant:

- Don't mix coolant concentrate of different brands.
- Don't drink the coolant which is poisonous.
- The freezing point of coolant mixture shall be 5°C lower than the freezing point of the riding area.

# 10.COOLING SYSTEM

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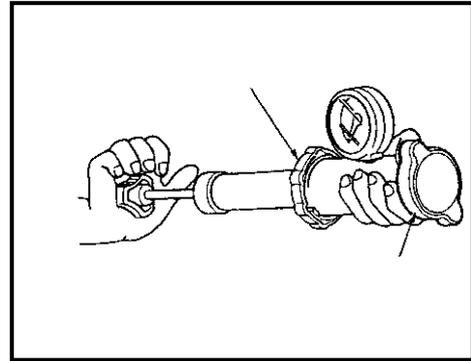
## COOLING SYSTEM TESTING

### RADIATOR CAP INSPECTION

Install the radiator cap onto the radiator tester and apply specified pressure to it .

It must hold specified pressure for at least six seconds.

- \* Apply water to the cap sealing surface before testing.



### Radiator Cap Relief Pressure:

0.75~1.05 kgf/cm<sup>2</sup>

(75~105 kpa, 10.65~14.91 psi)

Install the radiator tester onto the radiator and apply specified pressure to it.

It must hold specified pressure for at least six seconds.

Check the water hoses and connectors for leaks.

- \* The test pressure should not exceed 1.05 kg/ cm<sup>2</sup> (105kpa, 14.91 psi).Excessive pressure can damage the radiator and its hose connectors.

# 10.COOLING SYSTEM

## ENGINE COOLANT

At the time of manufacture, the cooling system is filled with 1:1 mixture of distilled water and ethylene glycol anti-freeze.

This 1:1 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above  $-31^{\circ}\text{C}$  ( $-24^{\circ}\text{F}$ ).

\*

You can be injured by scalding fluid or steam if you open the radiator cap when the engine is hot. After the engine cools, wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow pressure to escape and then turn the cap all the way off.

The engine must be cool before servicing the cooling system.

Coolant is harmful.

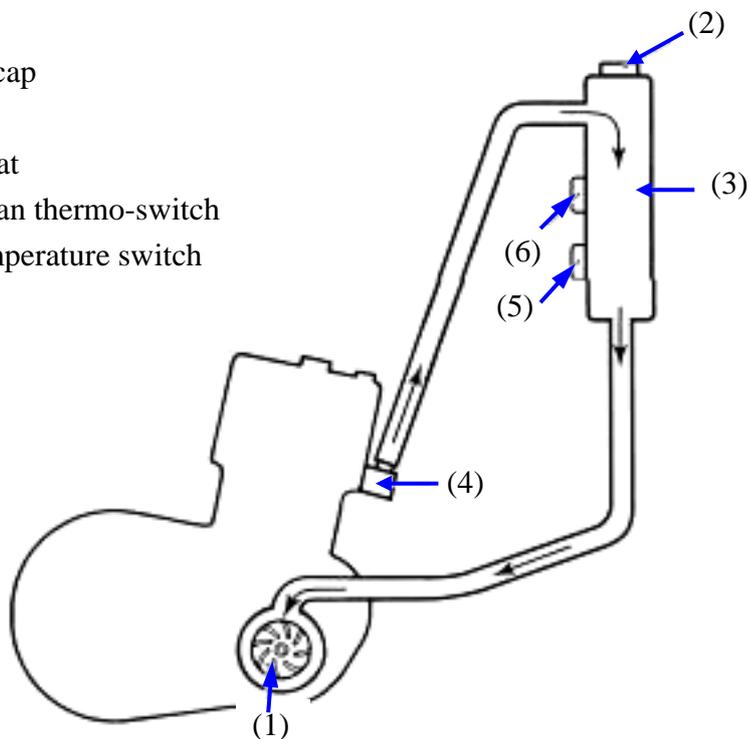
If it comes in contact with skin or eyes, flush with water.

If swallowed accidentally, induce vomiting and call physician immediately.

Keep it away from children.

## COOLING CIRCUIT

- (1) Impeller
- (2) Radiator cap
- (3) Radiator
- (4) Thermostat
- (5) Cooling fan thermo-switch
- (6) Water temperature switch



# 10.COOLING SYSTEM

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## RADIATOR

### RADIATOR INSPECTION

Inspect the radiator soldered joints and seams for leaks.  
Blow dirt out from between core fins with compressed air.  
If insects, etc., are clogging the radiator, wash them off.  
Carefully straighten any bent fins.



Radiator  
Radiator Cap

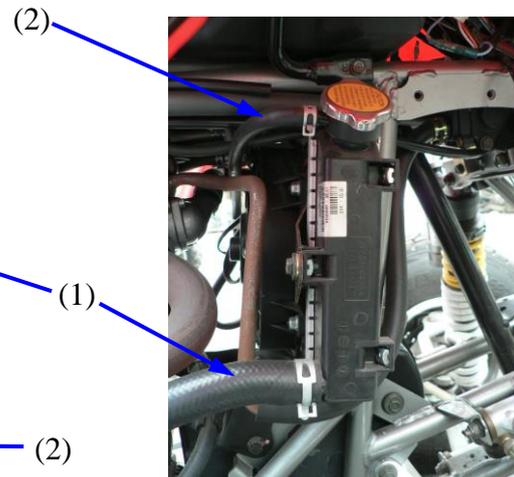
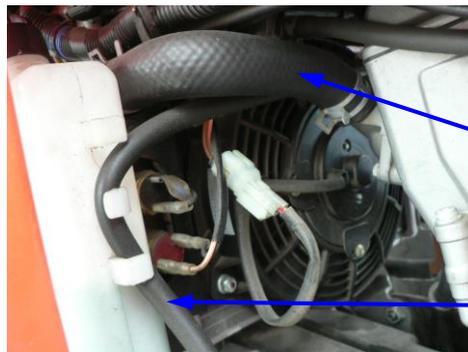
### RADIATOR REMOVAL

Remove the radiator cap.  
Remove the drain bolt and drain the coolant from the system.



Coolant Drain Bolt

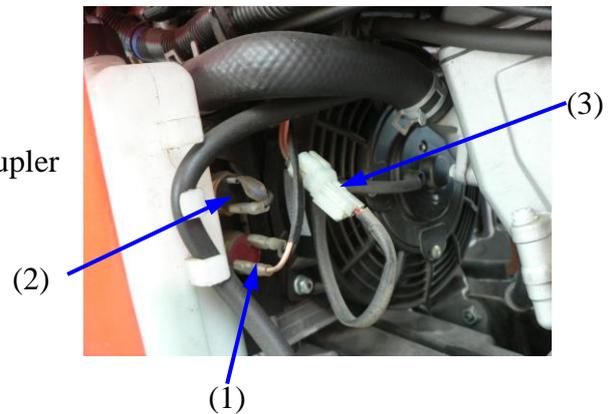
Disconnect the radiator hose (1).  
Disconnect the Aux. Liquid Bottle hose (2).



# 10.COOLING SYSTEM

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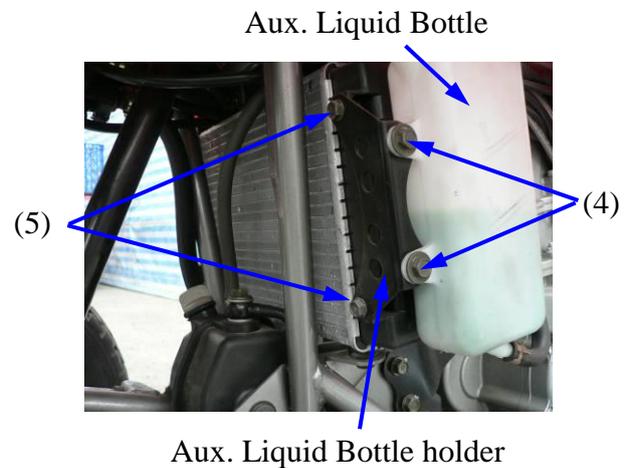
Disconnect the cooling fan thermo-switch lead wire coupler (1).  
Disconnect the water temperature switch lead wire coupler (2).  
Disconnect the cooling fan motor lead wire coupler (3).



## Aux. Liquid Bottle

### REMOVAL/REMOUNTING

Remove the bolts (4).  
Remove the Aux. Liquid Bottle.  
Remove the bolts (5).  
Remove the Aux. Liquid Bottle holder.



## INSPECTION OF WATER HOSE

Any water hose found in a cracked condition or flattened or water leaked must be replaced.  
Any leakage from the connecting section should be corrected by proper tightening.

# 10.COOLING SYSTEM

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Remove the two bolts on the radiator.  
Raise the radiator from frame.

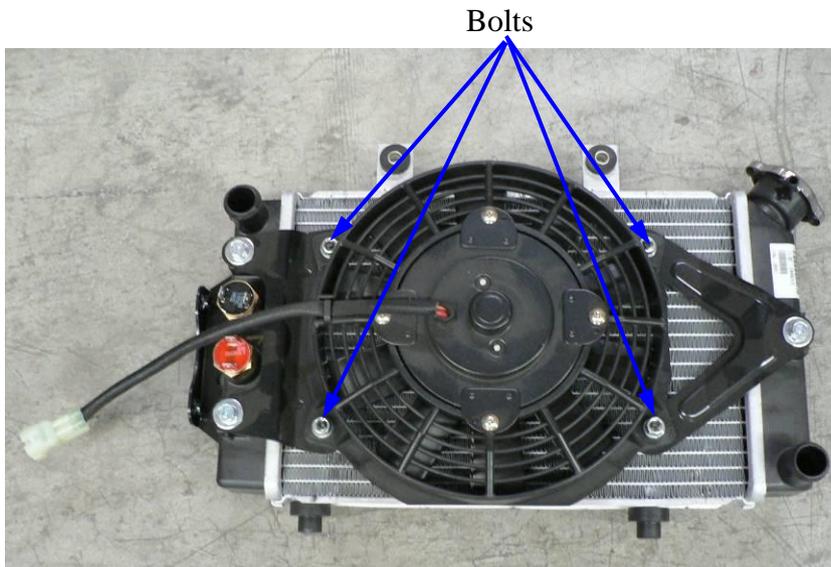
Torque : 0.8~1.2 kgf-m (8~12 Nm)



Bolts

## RADIATOR DISASSEMBLY

Remove the four bolts and then remove the fan shroud from the radiator.  
Check fan motor by battery.



# 10.COOLING SYSTEM

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## CHECK THERMOSTATIC SWITCH

### COOLING FAN THERMO-SWITCH

When coolant temperature lower then 75°C the thermostatic switch “OFF”.  
When coolant temperature over 85°C the thermostatic switch “ON”.

Cooling fan thermo-switch



### WATER TEMPERATURE SWITCH

When coolant temperature lower then 95°C the thermostatic switch “OFF”.  
When coolant temperature over 105°C the thermostatic switch “ON”.

Water temperature switch



## RADIATOR ASSEMBLY

Install the fan shroud on the radiator with the three bolts.

## RADIATOR INSTALLATION

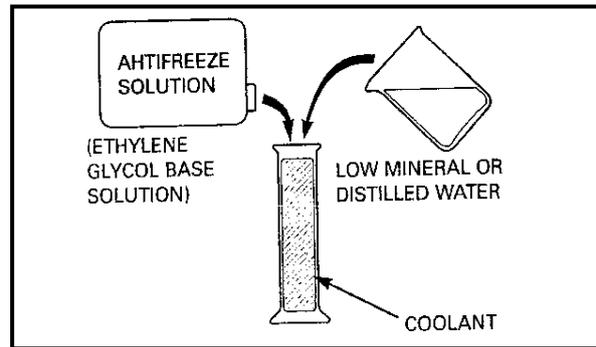
Reverse the “RADIATOR REMOVAL” procedures.

# 10.COOLING SYSTEM

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## COOLANT REPLACEMENT PREPARATION

- The effectiveness of coolant decreases with the accumulation of rust or if there is a change in the mixing proportion during usage.  
Therefore, for best performance change the coolant regularly as specified in the maintenance schedule.
- Mix only distilled, low mineral water with the antifreeze.



### Recommended mixture:

1:1 ( Distilled water and antifreeze )

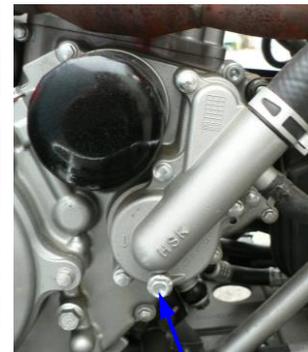
## REPLACEMENT/AIR BLEEDING

- \* When filling the system or reserve tank with coolant (checking the coolant level), place the vehicle in a vertical position on a flat, level surface.

Remove the radiator cap.

Remove the drain bolt and drain the coolant from the system.

Radiator Cap



Coolant Drain Bolt

# 10.COOLING SYSTEM

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Remove the reserve tank cap and drain the coolant from the reserve tank.

Remove the drain bolt with the new sealing washer securely.

Place the vehicle on a flat, level surface.

Fill the reserve tank to the upper level line.

Coolant Reservoir Cap

Minimum Mark



Maximum Mark

*Fill the system with the recommended coolant through the filler opening up to the filler neck.*

Filler Neck



Bleed air from the system as follow:

1. Start the engine and let it idle for 2-3minutes.
2. Snap the throttle three to four times to bleed air from the system.
3. Stop the engine and add coolant to the proper level if necessary. Reinstall the radiator cap.
4. Check the level of coolant in the reserve tank and fill to the upper level if it is low.

# 10.COOLING SYSTEM

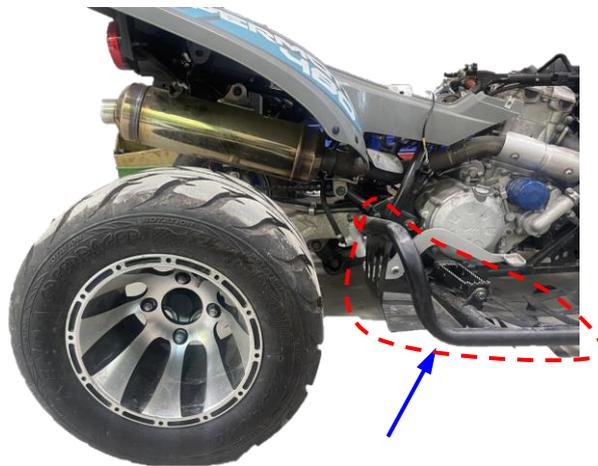
## WATER PUMP

### REMOVAL AND DISASSEMBLY

- Drain engine coolant.
- Drain engine oil.
- Disconnect the water hoses.



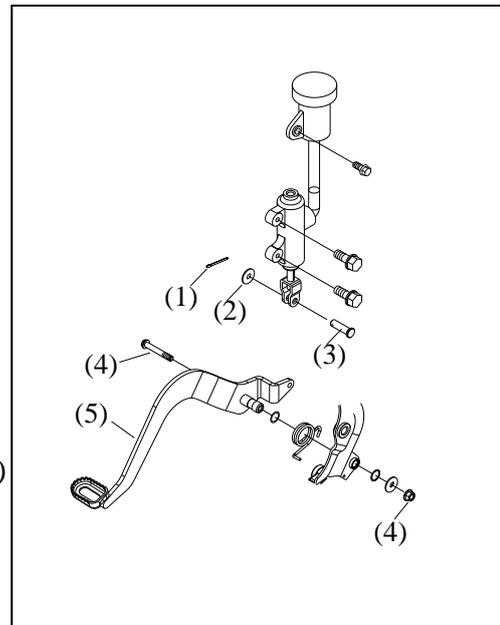
Remove the right footrest.  
(Refer to page 2-4).



- Remove the cotter pin (1).
- Remove the pin (3) and washer (2).
- Remove the bolt and nut (4).
- Remove the swing arm, footbrake (5).



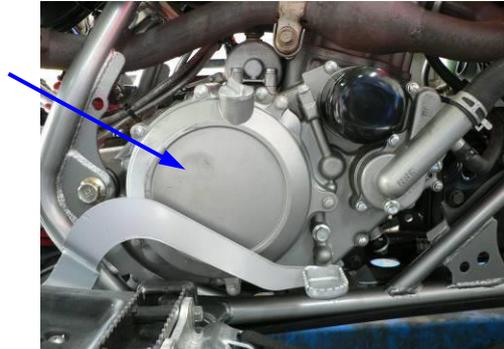
(1),(2),(3)



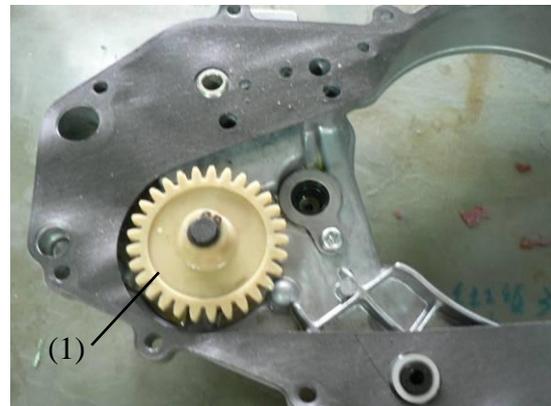
# 10.COOLING SYSTEM

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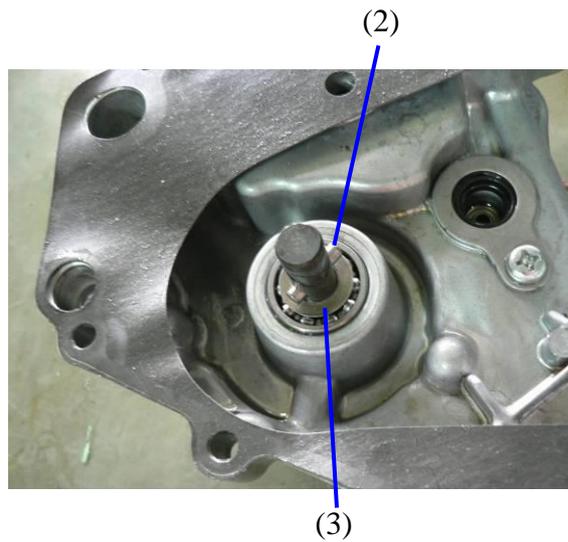
Remove the clutch cover.



Remove the circlip and water pump driven gear (1).



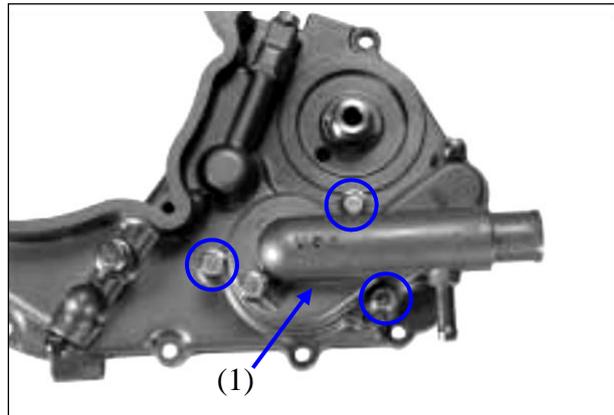
Remove the pin (2) and washer (3).



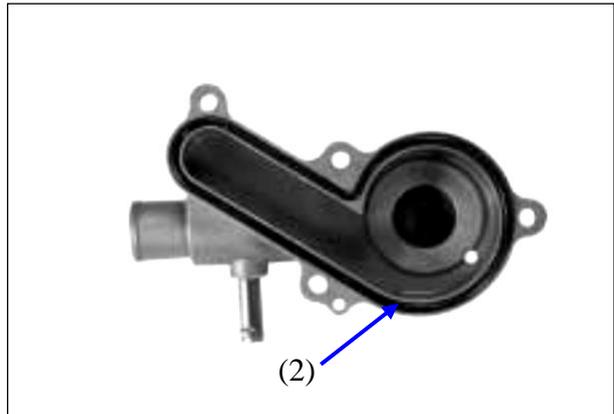
# 10.COOLING SYSTEM

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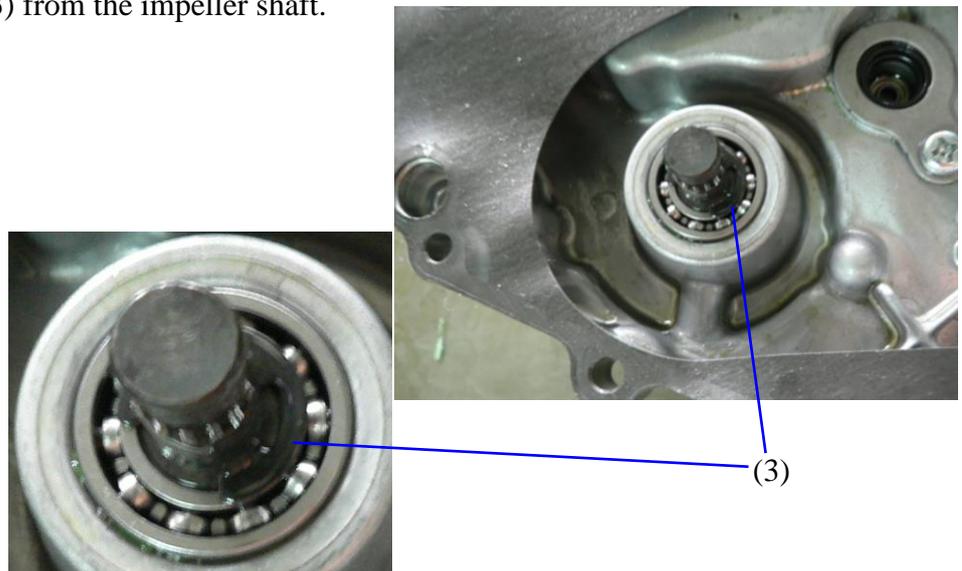
Remove the water pump case (1) from the clutch cover.



Remove the O-ring (2).



Remove the E-ring (3) from the impeller shaft.



# 10.COOLING SYSTEM

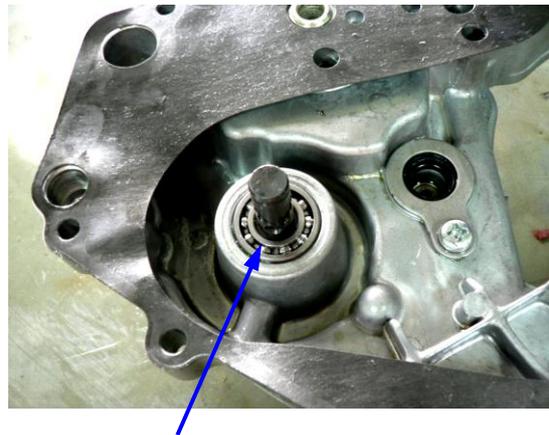
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Remove the impeller (1) from the other side.



(1)

Remove the bearing.

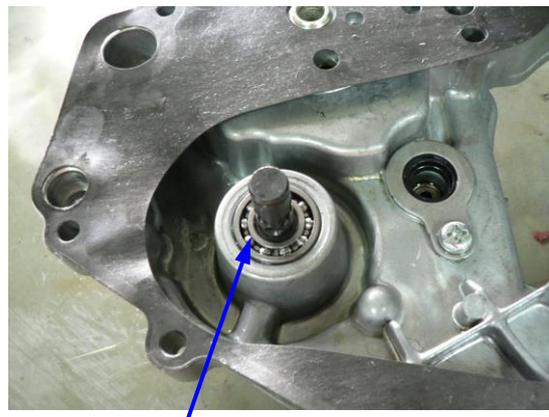


## INSPECTION BEARING

Inspect the play of the bearing by hand while it is in the water pump case.

Rotate the inner race by hand to inspect abnormal noise and smooth rotation.

Replace the bearing if there is anything unusual.



# 10.COOLING SYSTEM

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## BEARING CASE

Visually inspect the bearing case for damage.  
Replace the water pump body if necessary.



## IMPELLER

Visually inspect the impeller and its shaft  
for damage.



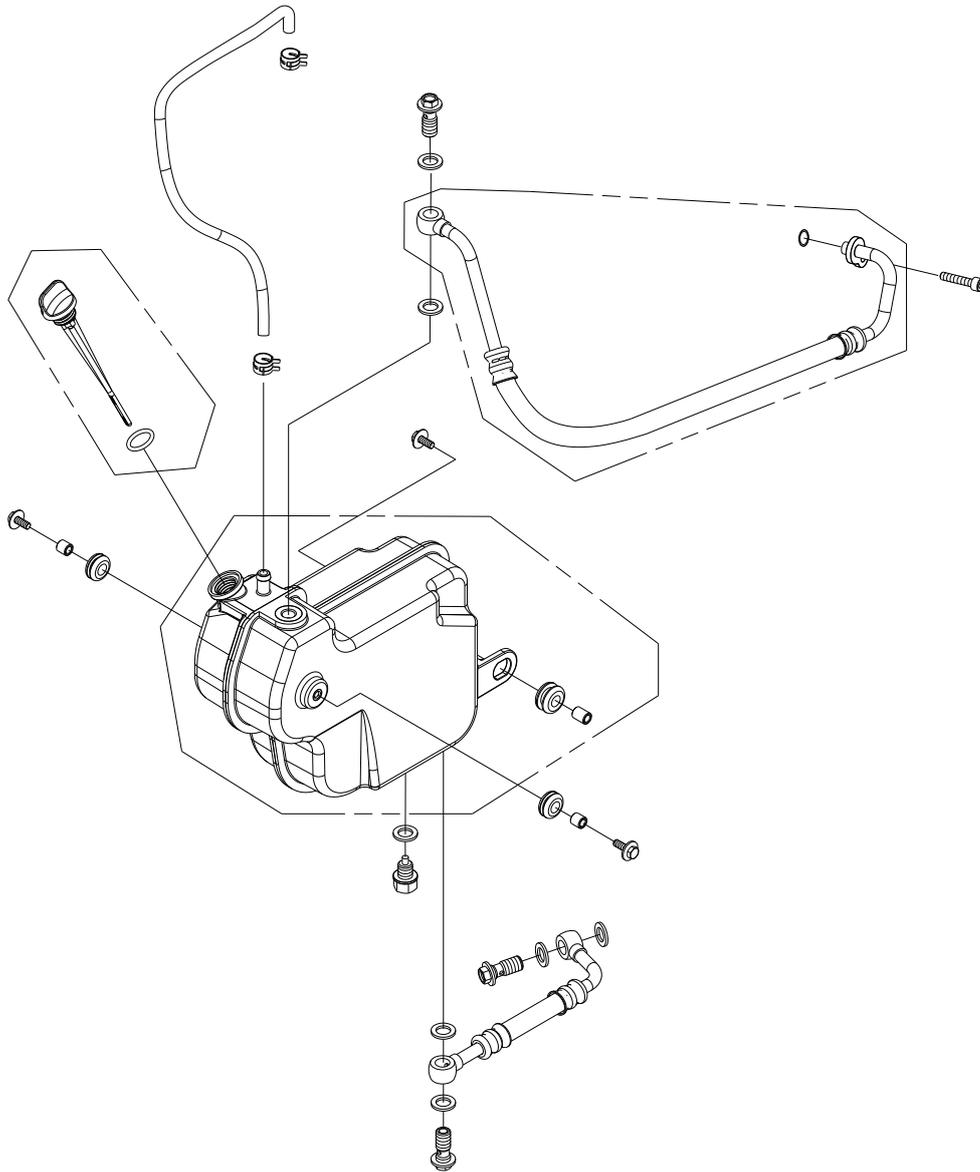
## REASSEMBLY AND INSTALLATION

Install the water pump in the reverse order of removal.

# 10.COOLING SYSTEM

---

## OIL TANK AND HOSES CONSTRUCTION



# 10.COOLING SYSTEM

---

## REMOVAL

Drain engine coolant. (Refer to page 10-5).

Remove the radiator. (Refer to page 10-6~10-8).

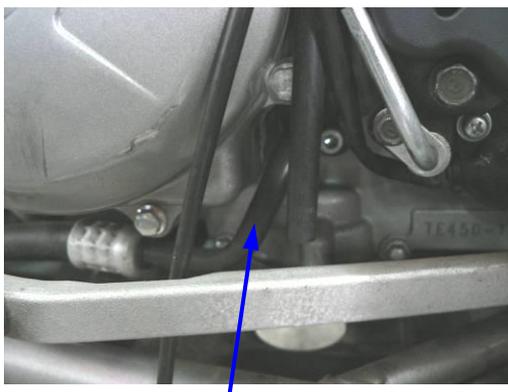
Drain engine oil. (Refer to page 3-12).

Remove the engine under cover (1).  
(Refer to page 2-4)



(1)

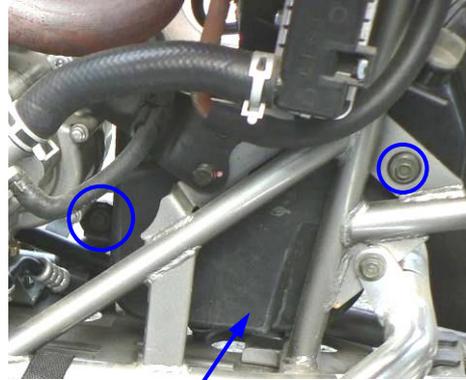
Remove the oil hoses.



# 10.COOLING SYSTEM

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Remove the oil tank.



Oil tank

## REMOUNTING

Remount the oil tank and hoses in the reverse order of removal.

\* Use the new O-ring to prevent engine coolant leakage.

Engine oil inlet hose union bolt torque : 2.3 kgf-m (23 Nm)



# 10.COOLING SYSTEM

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## THERMOSTAT

### THERMOSTAT REMOVAL

Disconnect the radiator hose.

(Refer to page 10-5)

Drain engine coolant.

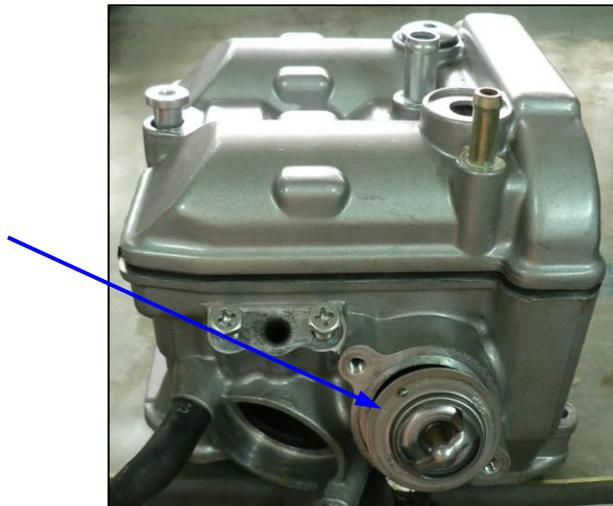
(Refer to page 10-5)

Place a rag under the thermostat case.

Remove the thermostat case cap by 2 bolt.



Remove the thermostat.



Thermostat case bolt torque :

1.0 kgf-m (10 Nm)

# 10.COOLING SYSTEM

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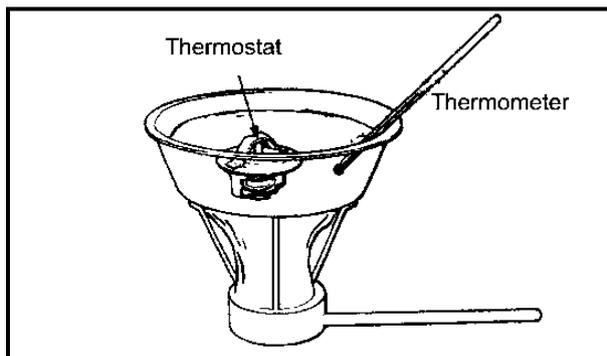
## THERMOSTAT INSPECTION

Suspend the thermostat in a pan of water over a burner and gradually raise the water temperature to check its operation.

### Technical Data

Thermostat valve operation temperature	Standard
Valve opening	76°C (169°F)
Valve closing	71°C (160°F)

Thermostat valve lift	Standard
	Over 8.0mm at 90°C (Over 0.32in at 194°F)



- \* Do not let the thermostat touch the pan as it will give a false reading.
- \* Replace the thermostat if the valve stays open at room temperature.
- \* Test the thermostat after it is opened for about 5 minutes and holds the temperature at 70°C.

## THERMOSTAT INSTALLATION

The installation sequence is the reverse of removal.

Fill the cooling system with the specified coolant. (⇒10-10)

# 11.BRAKE SYSTEM

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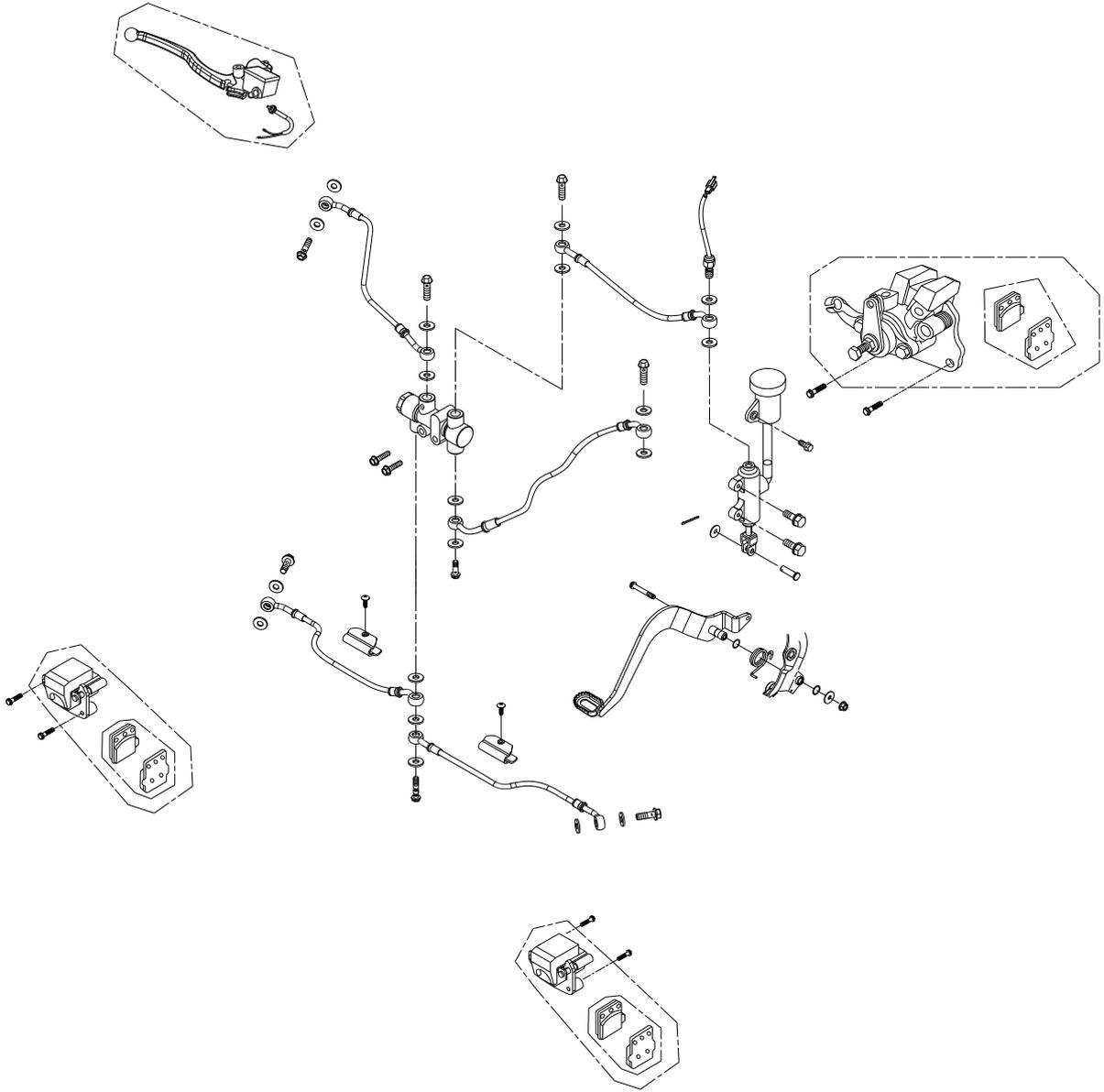
## BRAKE SYSTEM

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SERVICE INFORMATION -----	11-2
TROUBLESHOOTING -----	11-2
FRONT HYDRAULIC BRAKE-----	11-3
FRONT BRAKE FLUID CHANGE/AIR BLEED-----	11-4
BRAKE MASTER CYLINDER-----	11-6
FRONT BRAKE CALIPER-----	11-9
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REAR BRAKE CALIPER -----	11-18

# 11.BRAKE SYSTEM

---



# 11.BRAKE SYSTEM

---

## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- During servicing, keep oil or grease off the brake pads and brake disk.
- Drain the brake fluid from the hydraulic brake system before disassembly.
- Contaminated brake disk or brake pads reduce stopping power.
- Clean the contaminated brake disk with high-performance brake degreaser and replace the brake pads.
- Do not use brake fluid for cleaning.
- Bleed air from the brake system if the brake system is removed or the brake is soft.
- Do not allow any foreign matters entering the brake reservoir when filling the brake reservoir with brake fluid.
- Brake fluid will damage painted, coated surfaces and plastic parts.
- When working with brake fluid, use shop towels to cover and protect painted, rubber and plastic parts.
- Wipe off any splash of brake fluid with a clean towel.
- Do not wipe the machine with a towel contaminated by brake fluid.
- Make sure to use recommended brake fluid.
- Use of other unspecified brake fluids may cause brake failure.
- Inspect the brake operation before riding.

### SPECIFICATIONS

Unit: mm (in)

Item	Standrad		Service Limit
Brake disk thickness	front	3.3~3.6 (0.129~0.141)	2.7 (0.0106)
	rear	3.9~4.1 (0.153~0.161)	3 (0.12)
Brake disk runout	—		0.3 (0.012)

### TROUBLESHOOTING

#### Loose brake lever

- Air in hydraulic brake system
- Brake fluid level too low
- Hydraulic brake system leakage

#### Poor brake performance

- Air in brake system
- Deteriorated brake fluid
- Contaminated brake pads and brake disk
- Worn brake pads
- Worn brake mater cylinder piston oil seal
- Clogged brake fluid line
- Deformed brake disk
- Unevenly worn brake caliper

#### Tight brake lever

- Seized piston
- Clogged hydraulic brake system
- Smooth or worn brake pad

#### Brake noise

- Contaminated brake pad surface
- Excessive brake disk run out
- Incorrectly installed caliper
- Brake disk or wheel not aligned

#### Hard braking

- Seized hydraulic brake system
- Seized piston

# 11.BRAKE SYSTEM

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## FRONT HYDRAULIC BRAKE

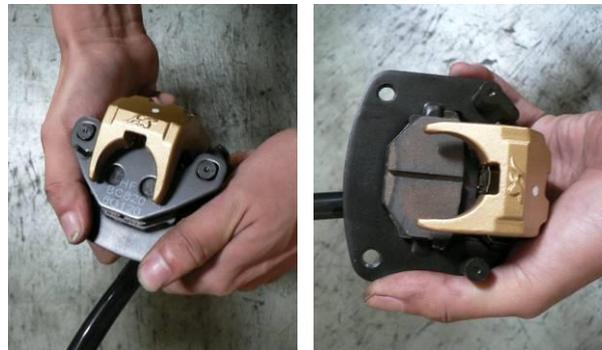
### BRAKE PADS REMOVAL

Remove the front wheel. (⇒chapter 12)  
Remove the two bolts and then remove  
brake caliper.



Bolts

Compress the brake caliper holder and  
remove brake pads.



A wear indicator is provided on each brake.  
The indicators allows checking of brake  
pads wear.  
Check the position of the indicator.



# 11.BRAKE SYSTEM

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## FRONT BRAKE DISK

Measure the brake disk thickness.

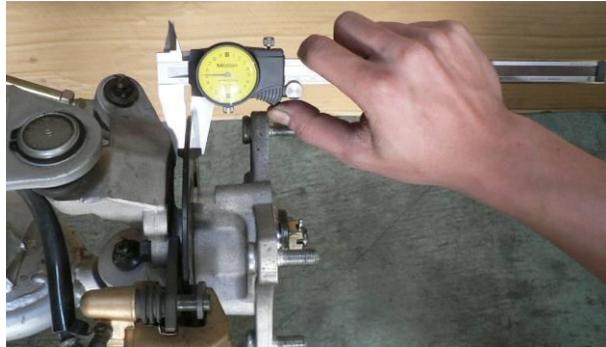
**Service Limit:** 2.7 (0.0106 in)

Measure the brake disk run out.

**Service Limit:** 0.3 mm(0.012 in)

## INSTALLATION

Reverse the “BRAKE PADS REMOVAL” procedures.



## FRONT BRAKE FLUID CHANGE/AIR BLEED

### BRAKE FOUID DRAINING

Place the vehicle on a level surface and keep the handlebar straight.

Remove the master cylinder reservoir cap and diaphragm.

Suck up the old brake fluid as much as possible.

Fill the reservoir with new brake fluid.

\* Use shop towels to cover plastic parts and coated surfaces to avoid damage caused by splash of brake fluid.



Connect a transparent hose to the brake caliper bleed valve and then loosen the bleed valve nut.

Use a syringe to draw the brake fluid out through the hose.



Bleed Valve

# 11.BRAKE SYSTEM

---

## BRAKE FLUID REFILLING

Connect a transparent hose and syringe to the brake caliper bleed valve and then loosen the bleed valve nut.

Fill the brake reservoir with brake fluid and use the syringe to draw brake fluid into it until there is no air bubbles in the hose. Then, tighten the bleed valve nut.

**Torque:** 6.0 kgf-m (6Nm, 4.32 lbf-ft)

Brake reservoir



- \* When drawing brake fluid with the syringe, the brake fluid level should be kept over 1/2 of the brake reservoir height.

**Recommended Brake Fluid:** DOT-4

## BRAKE SYSTEM BLEEDING

Connect a transparent hose to the bleed valve and fully apply the brake lever after continuously pull it several times.

Then loosen the bleed valve nut to bleed air from the brake system. Repeat these steps until the brake system is free of air.

- \* When bleeding air from the brake system, the brake fluid level should be kept over 1/2 of the brake reservoir.



# 11.BRAKE SYSTEM

---

## BRAKE MASTER CYLINDER

### DISASSEMBLY

Remove the brake reservoir cover.

Drain the brake fluid from the hydraulic brake system.

- \* Do not splash brake fluid onto any rubber, plastic and coated parts. When working with brake fluid, use shop towels to cover these parts.

Remove fluid tube bolt .

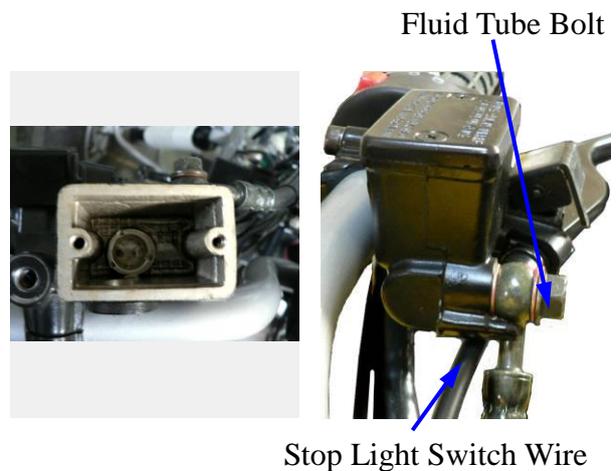
- \* When removing the brake fluid tube bolt, be sure to place towels under the tube and plug the tube end to avoid brake fluid leakage and contamination.

Disconnect the stop light switch wires.

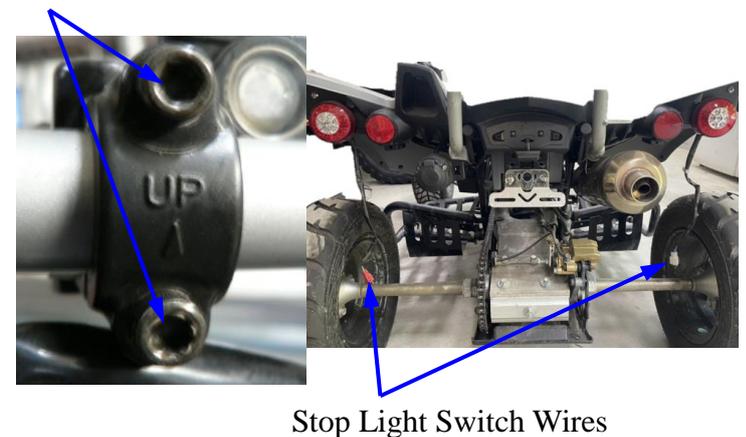
Remove the two master cylinder holder bolts and remove the master cylinder.

Remove the brake lever bolt and the brake lever.

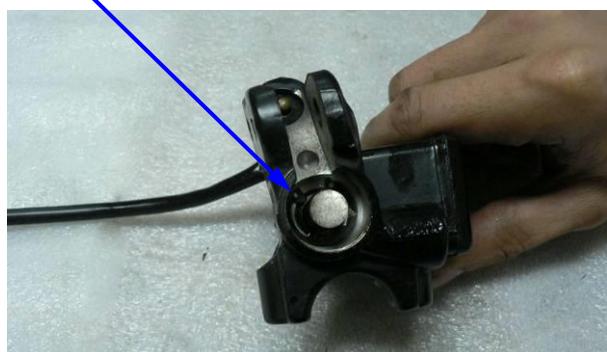
Remove the piston rubber cover and snap ring from the brake master cylinder.



Bolts



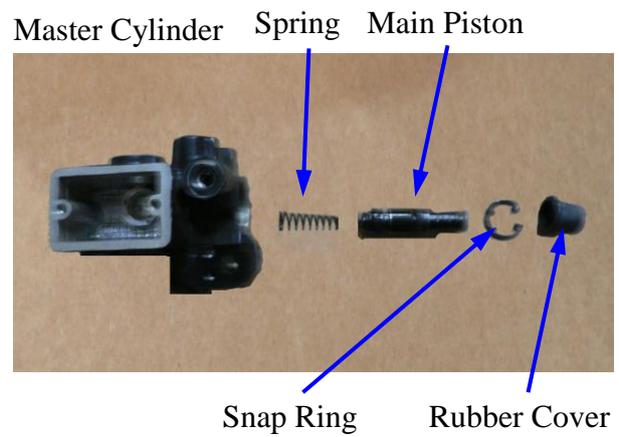
Snap Ring



# 11.BRAKE SYSTEM

---

Remove the washer, main piston and spring from the brake master cylinder.  
Clean the inside of the master cylinder and brake reservoir with brake fluid.



## INSPECTION

Check the cylinder inside wall, and spring for scratch, corrosion or other abnormal condition.  
If any abnormal condition is found, replace the inner parts or master cylinder.



# 11.BRAKE SYSTEM

---

## ASSEMBLY

Before assembly, apply brake fluid to all removed parts.

- \* During assembly, the main piston and spring must be installed as a unit without exchange.
- When assembling the piston, soak the cups in brake fluid for a while.
- Install the cups with the cup lips facing the correct direction.

Install the main piston, spring and snap ring.  
Install the rubber cover.  
Install the brake lever.

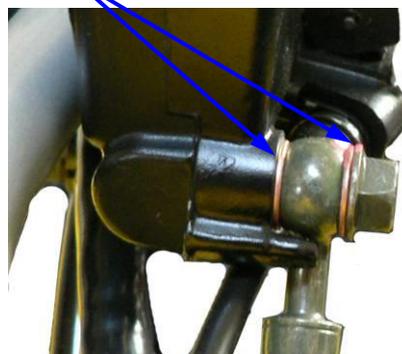
Place the brake master cylinder on the handlebar and install the holder with the “UP” mark facing up .  
First tighten the upper bolt and then tighten the lower bolt.  
**Torque:** 1.0 kgf-m (10Nm, 7.2 lbf-ft)

“UP”Mark



Install the brake fluid tube with the attaching bolt and two sealing washers, then tighten the bolt.  
**Torque:** 3.4 kgf-m (34Nm, 25 lbf-ft)

Washers



Connect the front stop switch wire connector.

Fill the brake reservoir with the specified brake fluid and bleed air from the brake system. (⇒11-4)

Install the brake reservoir cover.

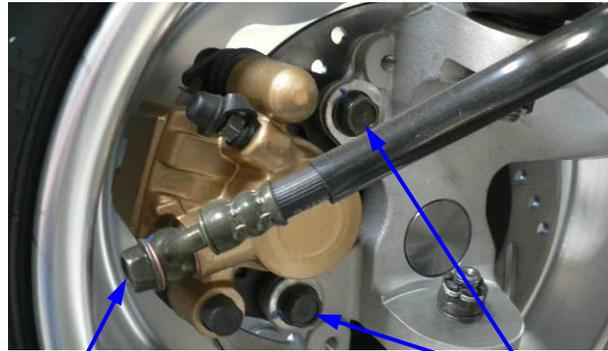
# 11.BRAKE SYSTEM

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## FRONT BRAKE CALIPER REMOVAL

Remove the front wheel. (⇒chapter 12)  
First drain the brake fluid from the  
hydraulic brake system. (⇒11-4)

Remove the brake fluid tube bolt.  
Remove the two caliper holder bolts.  
Remove the brake caliper.



Fluid Tube Bolt

Bolts

## DISASSEMBLY

Remove the brake pads. (⇒11-3)  
Remove the brake pad spring plate.



Spring Plate

Remove the piston from the brake caliper.  
If necessary, use compressed air to squeeze  
out the piston through the brake fluid inlet  
opening and place a shop towel under the  
caliper to avoid contamination caused by  
the removed piston.  
Check the piston cylinder for scratches or  
wear and replace if necessary.



# 11.BRAKE SYSTEM

---

Push the piston dust seal inward to remove.

Pushing the piston oil seal outward to remove it.



Clean the seals groove with brake fluid.

\* Be careful not to damage the piston surface.

Inner Seal



## INSPECTION

Inspect the caliper cylinder wall and piston surface for scratch, corrosion or other damages.

If any abnormal condition is noted, replace the caliper.



# 11.BRAKE SYSTEM

---

## ASSEMBLY

Clean all removed parts.

Apply silicon grease to the piston and oil seals. Lubricate the brake caliper cylinder inside wall with brake fluid.

- \* Install the piston with its outer end protruding 3~5 mm beyond the brake caliper.

Wipe off excessive brake fluid with a clean shop towel.



Install the caliper spring plate into the caliper.

- \* Make sure that the boss on the caliper correctly engages with the location slot on the caliper spring plate.



## INSTALLATION

Reverse the “FRONT BRAKE CALIPER REMOVAL” procedures.

- \* When installing the brake caliper, be sure to position the brake disk between the two brake pads.

Connect the brake fluid tube to the brake caliper and tighten the fluid tube bolt.

**Torque:**3.4 kfg-m (34Nm, 25 lbf-ft)

Fill the brake reservoir with the specified brake fluid and bleed air from the brake system. (⇒11-4)

- \* When installing the brake fluid tube, be sure to install the two sealing washer.



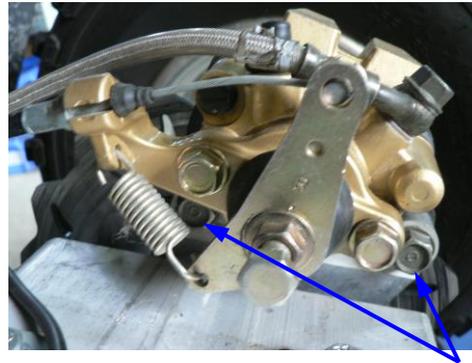
# 11.BRAKE SYSTEM

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## REAR HYDRAULIC BRAKE

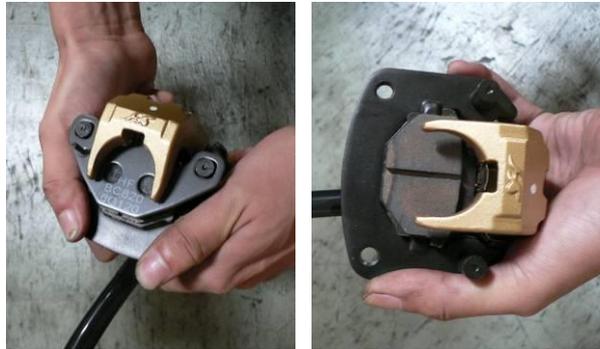
### REAR BRAKE PADS REMOVAL

Remove the two caliper holder bolts.  
Remove the brake caliper.



Bolts

Compress the brake caliper holder and  
remove brake pads.



## INSTALLATION

Reverse the “REAR BRAKE PADS  
REMOVAL” procedures.



# 11.BRAKE SYSTEM

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## BRAKE FLUID DRAINING

Place the machine on the level ground.

Remove the reservoir cap.

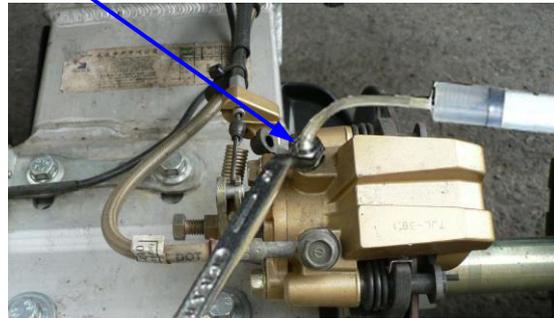
- \* Use shop towels to cover plastic parts Front Left Lever and coated surfaces to avoid damage caused by splash of brake fluid.



Connect a transparent hose to the brake caliper bleed valve and then loosen the bleed valve nut.

Use a syringe to draw the brake fluid out through the hose.

Bleed Valve



## BRAKE FLUID REFILLING

Connect a transparent hose and syringe to the brake caliper bleed valve and then loosen the bleed valve nut.

Fill the brake reservoir with brake fluid and use the syringe to draw brake fluid into it until there is no air bubbles in the hose.

Then tighten the bleed valve nut.

Torque: 0.6 kfg-m (6Nm, 4.32 lbf-ft)

- \*
  - When drawing brake fluid with the syringe, the brake fluid level(pedal) should be kept over 1/2 of the brake reservoir height.
  - Use only the recommended brake fluid.

# 11.BRAKE SYSTEM

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**Recommended Brake Fluid:DOT-4**



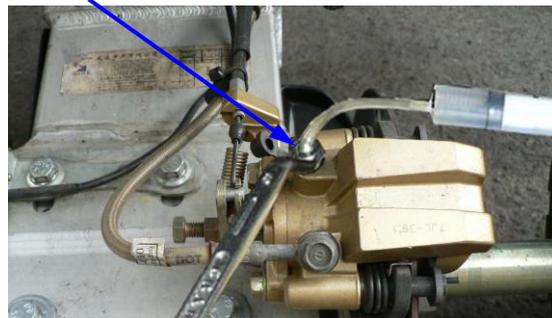
## **BRAKE SYSTEM BLEEDING**

Connect a transparent hose to the bleed valve and fully apply the brake lever(pedal) after continuously pull it several times. Then loosen the bleed valve nut to bleed air from the brake system. Repeat these steps until the brake system is free of air.



\* When bleeding air from the brake system, the brake fluid level(pedal) should be kept over 1/2 of the brake.

Bleed Valve



# 11.BRAKE SYSTEM

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## FOOT BRAKE MASTER CYLINDER (FOOT BRAKE PEDAL)

### FOOT MASTER CYLINDER

#### DISASSEMBLY

Refer to the “FRONT BRAKE MASTER CYLINDER DISASSEMBLY” section in the chapter 11.

#### ASSEMBLY

Refer to the “FRONT BRAKE MASTER CYLINDER ASSEMBLY” section in the chapter 11.

### REAR MASTER CYLINDER ON THE REAR BRAKE PEDAL DISASSEMBLY

Remove the brake reservoir cap.

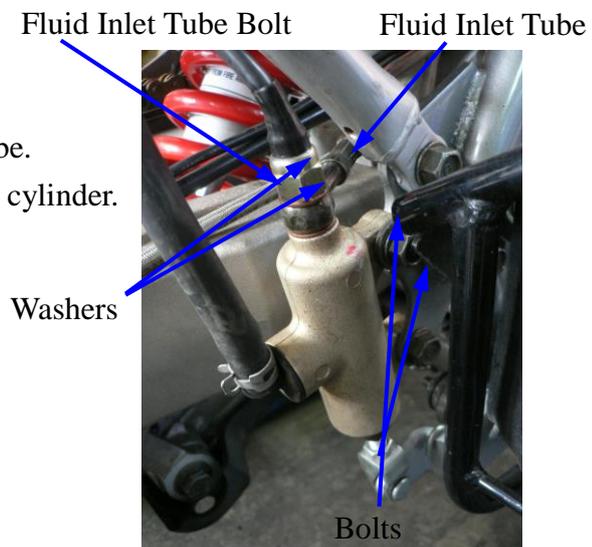
Drain the brake fluid from the hydraulic brake system. (⇒11-13)

Loosen the lower nut.



Lower nut

Disconnect the fluid inlet tube and remove the fluid bolt to disconnect the fluid outlet tube. Remove the two bolts and remove the master cylinder.



# 11.BRAKE SYSTEM

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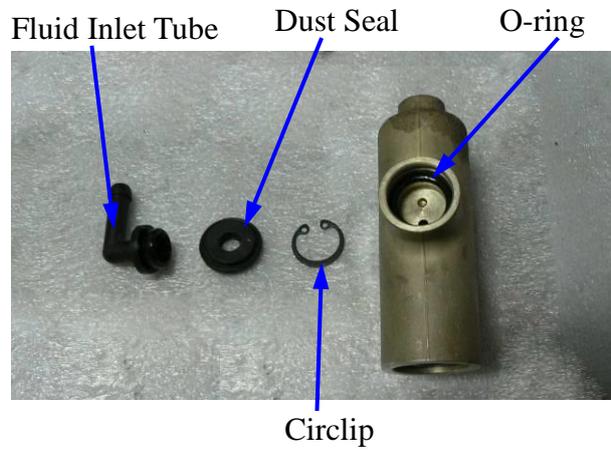
Remove the inlet tube.

Remove the Dust Seal and remove the circlip.

Remove the the fluid inlet duct.

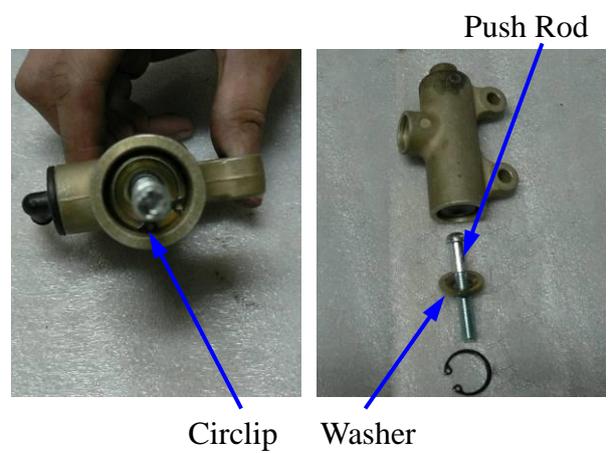
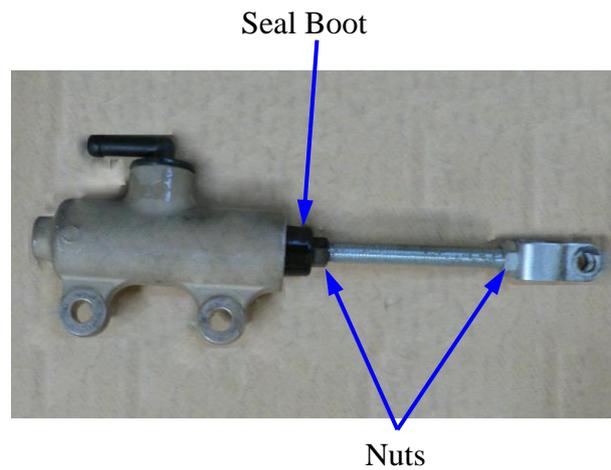
Remove the O-ring.

Check the O-ring for wear or damage and replace if necessary.



Remove the seal boot.

Remove the circlip and then pull out the push rod, washer, piston and spring.



# 11.BRAKE SYSTEM

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## INSPECTION

Check the cylinder inside wall, and spring for scratch, corrosion or other abnormal condition.

If any abnormal condition is found, replace the inner parts or master cylinder.

Before assembly, inspect the 1st and 2nd rubber cups for wear.



## ASSEMBLY

Before assembly, apply brake fluid to all removed parts.

\* During assembly, the master cylinder, piston and spring must be installed as a unit without exchange.

Reverse the “MASTER CYLINDER ON THE REAR BRAKE PEDAL DISASSEMBLY” procedures.

Connect the brake fluid tube to the master cylinder with the fluid bolt and new sealing washers.

Tighten the fluid tube bolt.

**Torque:** 3.4 kgf-m(34Nm, 25 lbf-ft)

Fill the brake reservoir with recommended brake fluid to the upper level.

Bleed air from the hydraulic brake system.

(⇒11-13)



# 11.BRAKE SYSTEM

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## REAR BRAKE CALIPER

### REMOVAL

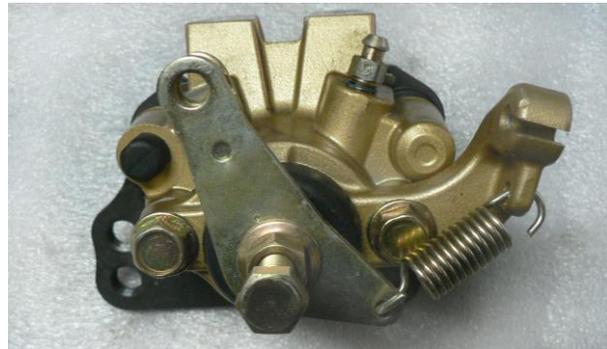
Drain brake fluid of both the rear brake side and the combination brake side. (⇒11-13)

- \* To prevent brake fluid from splashing on the parts nearby, cover the parts with cloth.



Bolts

Remove the caliper mounting bolts and remove the caliper.  
Remove the brake pads. (⇒11-12)



Using an air blow gun, pressurize the caliper fluid chamber to push out the piston.

- \* Place a rag over the piston to prevent it from popping out and flying and keep hand off the piston.  
Be careful of brake fluid which can possibly splash.  
Do not use high pressure air but increase the pressure gradually.

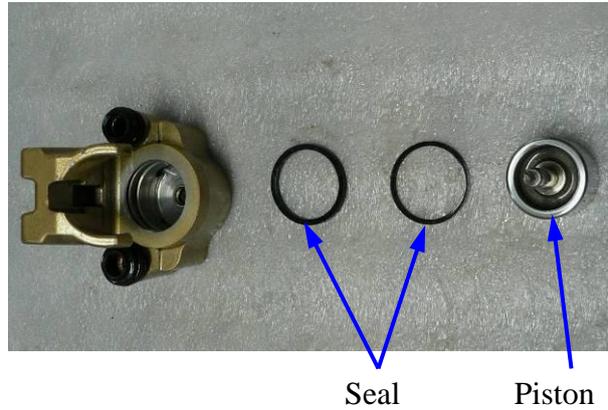


# 11.BRAKE SYSTEM

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Remove the dust seals and piston seals.

\* Use care not to cause scratch on the cylinder bore.  
Do not reuse the piston seal and dust seal that have been removed.



## INSPECTION

Inspect the caliper cylinder wall and piston surface for scratch, corrosion or other damages.  
If any abnormal condition is noted, replace the caliper.

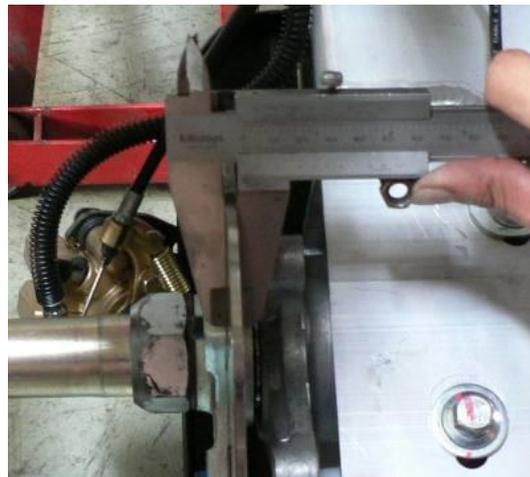
## BRAKE DISK

Measure the brake disk thickness.

**Service Limit:**3.0 mm (0.12in)

Measure the brake disk run out.

**Service Limit:**0.3 mm (0.012in)



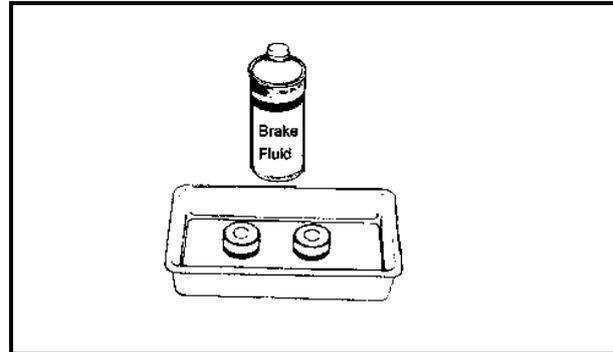
# 11.BRAKE SYSTEM

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## ASSEMBLY

Reassemble the caliper in the reverse order of disassembly procedures and observe the following points.

- \* Wash the caliper components with fresh brake fluid before assembly.  
Do not wipe off brake fluid after washing the components.  
Replace the piston seal and dust seal with new ones with brake fluid applied.



**Brake fluid specification and classification: DOT4**

## INSTALLATION

Install the rear caliper and tighten the two mounting bolts.

With the tube ends contacted to the caliper and install the washers and tighten the fluid tube bolts.

**Torque:** 3.4 kgf-m(34Nm, 25 lbf-ft)

Fill the system with brake fluid and bleed air. (⇒11-13)



Washers

# **12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM**

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## **FRONT WHEEL/ FRONT SUSPENSION\STEERING SYSTEM**

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SERVICE INFORMATION-----	12-1
TROUBLESHOOTING-----	12-1
FRONT WHEEL-----	12-3
FRONT WHEEL HUB-----	12-4
FRONT SUSPENSION-----	12-8
TIE-ROD-----	12-15
HANDLEBAR-----	12-18
STEERING COLUMN-----	12-24

# 12.FRONT WHEEL/FRONT SUSPENSION

## STEERING SYSTEM

---

### SERVICE INFORMATION

#### GENERAL INSTRUCTIONS

- Jack the machine front wheel off the ground be careful to prevent the machine from falling Down.
- During servicing, keep oil or grease off the brake disk.
- Inspect the brake system before riding.

#### SPECIFICATIONS

Unit: mm( in)

Item	Standard	Service Limit
Front wheel rim run out	Radial	—
	Axial	2(0.08)
Tie rod length	430±1 (11.98±0.02)	—

#### TORQUE VALUES

Steering stem nut	7.0kgf-m (70Nm, 50 lbf-ft)
Front swing arm nut	4.5kgf-m (45Nm, 32 lbf-ft)
Front wheel nut	4.5kgf-m (45Nm, 32 lbf-ft)
Front wheel hub nut	7.0kgf-m (70Nm, 50 lbf-ft)
Steering knuckle nut	3.5kgf-m (35Nm, 25 lbf-ft)
Front shock absorber upper mount bolt	4.0kgf-m (40Nm, 29 lbf-ft)
Front shock absorber lower mount bolt	4.0kgf-m (40Nm, 29 lbf-ft)

#### SPECIAL TOOLS

Oil seal and bearing install	71620-E10-000
Ball join remover	71608-A03-000

#### TROUBLESHOOTING

##### Hard steering (heavy)

- Insufficient tire pressure

##### Steers to one side or does not track straight

- Uneven front shock absorbers
- Bent front arm
- Bent steering knuckle

##### Front shock absorber noise

- Slider bending
- Loose arm fasteners
- Lack of lubrication

##### Front wheel wobbling

- Bent rim
- Excessive wheel bearing play
- Bent spoke plate
- Faulty tire
- Improperly tightened axle nut

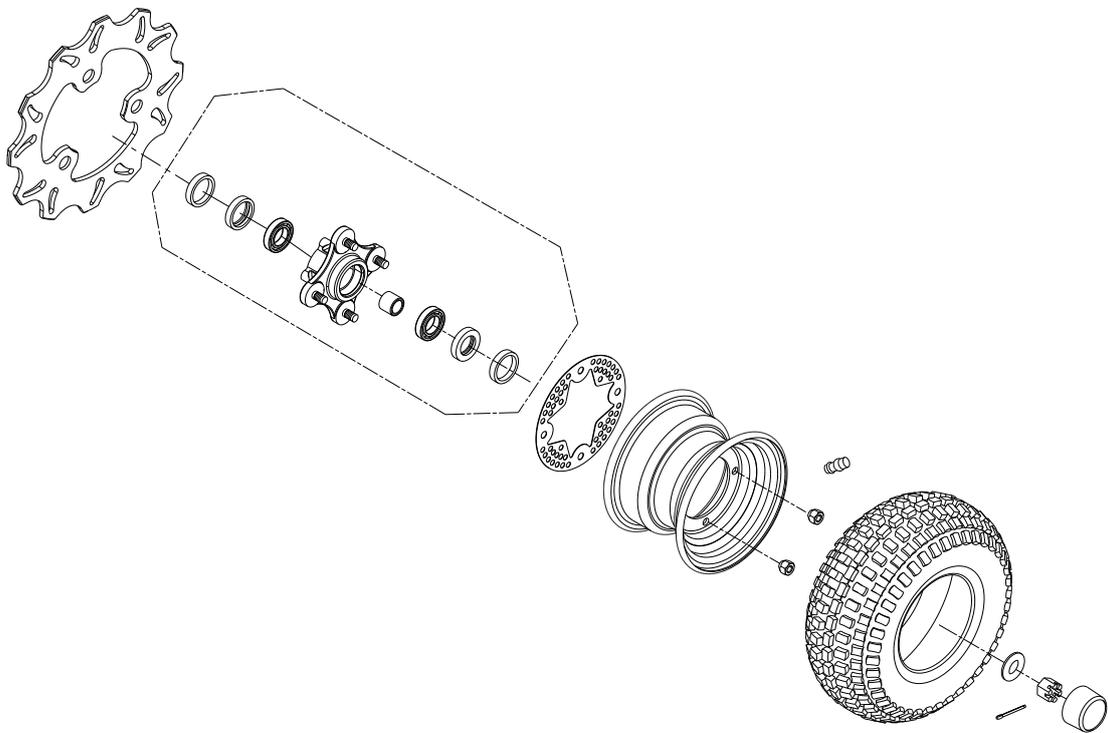
##### Soft front shock absorber

- Weak shock springs
- Insufficient damper oil

# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## FRONT WHEEL CONSTRUCTION



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## FRONT WHEEL REMOVAL AND INSPECTION

Place the machine on a level place.  
Remove four nuts attaching the front wheel hub and front wheel.  
Elevate the front wheels by placing a suitable stand under the frame.

\* **Support the machine securely so there is no danger of it falling over.**



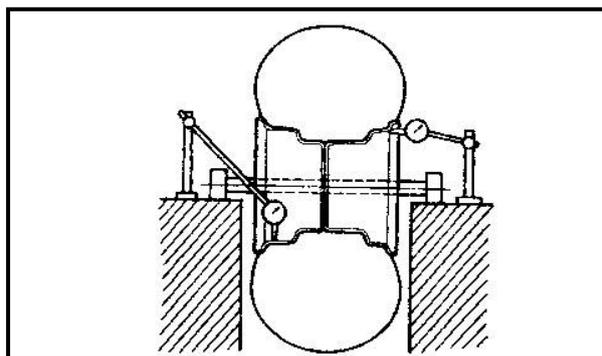
Nuts

Measure the wheel run out.  
Replace wheel or check bearing play if out of specification.

### Rim run out limits:

Vertical: 2 mm (0.08 in)

Lateral: 2 mm (0.08 in)

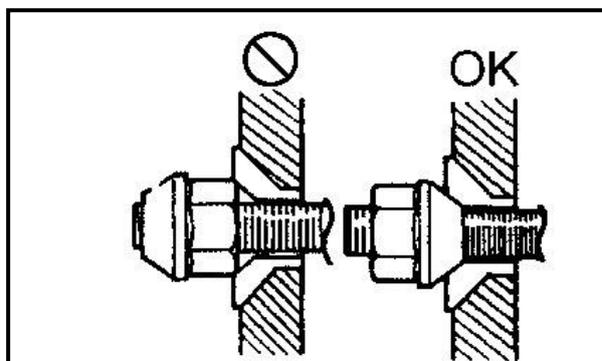


## INSTALLATION

When reinstalling a wheel, tighten the wheel nuts in a crisscross (rather than a circular) pattern.

**Torque:** 4.5kgf-m (45Nm,32lb-ft)

\* **Be sure the tapered side of the wheel nuts face the wheel rim.**



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## FRONT WHEEL HUB REMOVAL AND INSPECTION

Place the machine on a level place.

Remove the front wheel (⇒12-3) and caliper (⇒11-9).

Elevate the front wheels by placing a suitable stand under the frame.

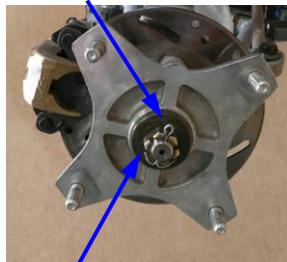
\* **Support the machine securely so there is no danger of it falling over.**

Remove the nut cap.

Remove the cotter pin.

Remove nut from the front wheel hub and then remove front wheel hub.

Cotter Pin



Nut



Nut Cap

## DISASSEMBLY

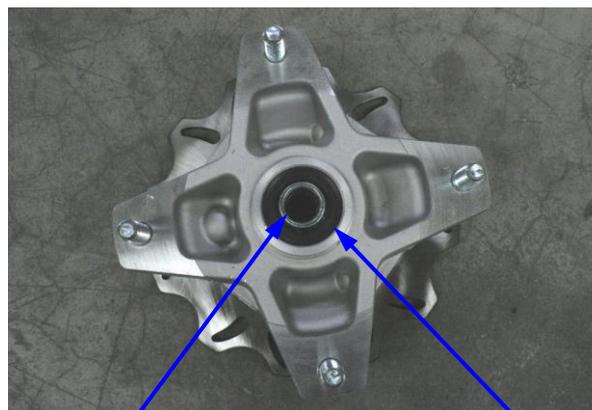
Remove the outside collars.

Inspect the dust seals for wear or damage.

If any defects are found, replace the dust seal with a new one.

Remove the dust seals by a flat-head screw driver.

\* **Place a wood block against the outer edge to protect this edge.**



Outside Collar

Dust Seal

Outside Collar

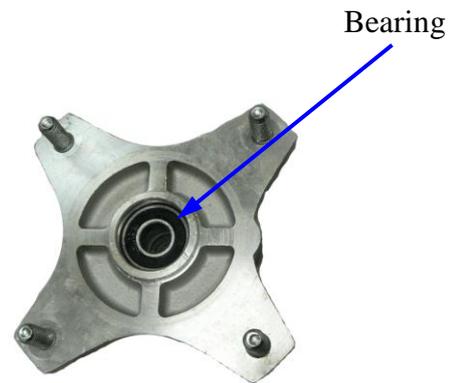
Dust Seal



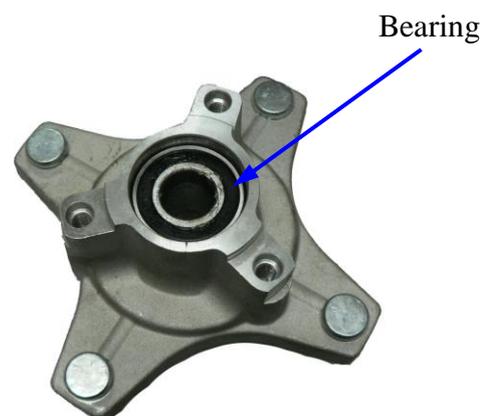
## 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Inspect the bearings for allow play in the front wheel hub or the wheel turns roughly.



If any defects are found, replace the Bearings.



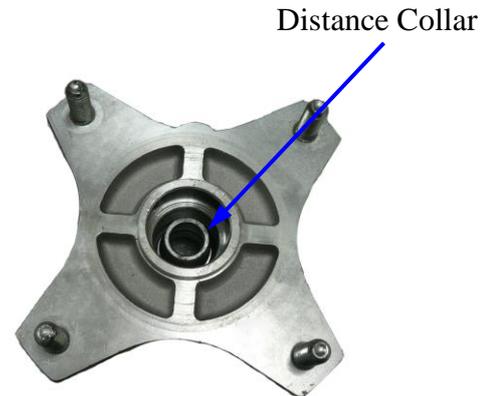
Remove the bearings using a general bearing puller.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Remove the distance collar from the front wheel hub.



## ASSEMBLY

Install the left new bearing and dust seal into the front wheel hub.

Special Tool:

Oil seal and bearing install 71620-E10-000

\* Apply the grease onto the oil seal lips, bearing.



Install the distance collar.

\* Be sure the tapered side of the distance collar face the wheel.

- \*
- Do not allow the bearings to tilt while driving them in.
  - Do not strike the center race or balls of the bearing. Contact should be made only with the outer race.
  - Pack all bearing cavities with grease.
  - Drive in the bearing squarely with the sealed end facing out.



Distance Collar

# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## INSTALLATION

Reverse the “FRONT WHEEL HUB REMOVAL AND INSPECTION”

- \* Apply the grease onto the bearing and dust seal lips of the wheel panel.

Tighten the front wheel hub nut.

Torque: 7.0 kgf-m (70 Nm, 50 lbf-ft)

Install the cotter pin and band ends of cotter pin.

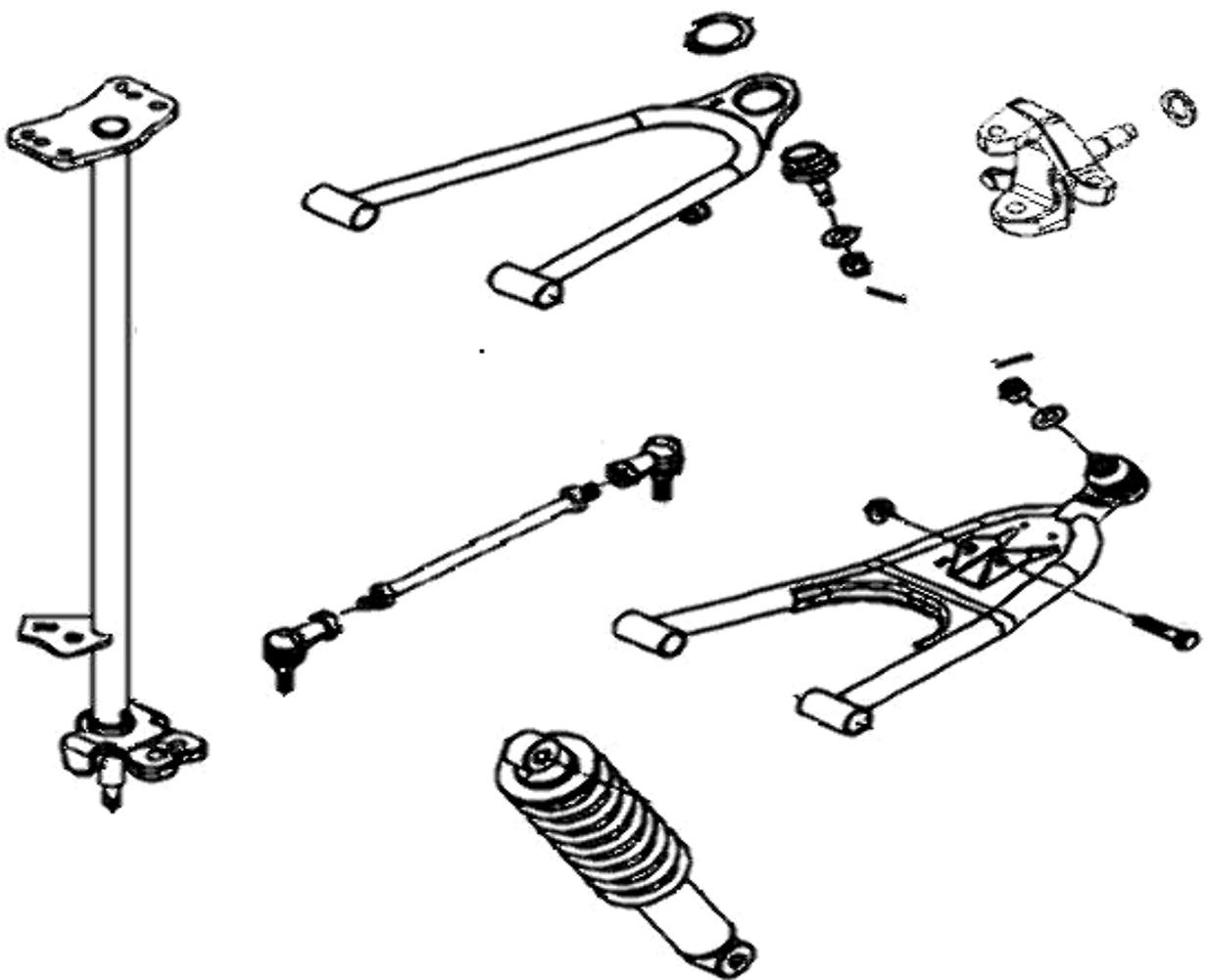
- \* Do not loosen the wheel hub nut after torque tightening.  
If the wheel hub nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the wheel hub nut.  
Always use a new cotter pin.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## FRONT SUSPENSION CONSTRUCTION



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

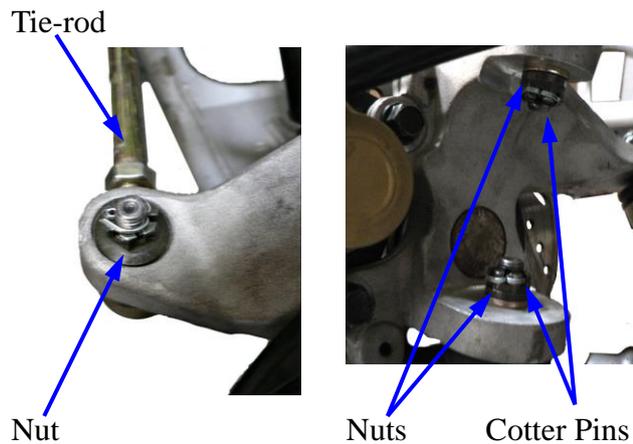
## FRONT SUSPENSION REMOVAL AND INSPECTION

Elevate the front wheels by placing a suitable stand under the frame.

\* Support the machine securely so there is no danger of it falling over.

Remove the front wheel (⇒12-3), caliper(⇒11-9) and front wheel hub. (⇒12-4)

Remove the cotter pins, washer and nuts from tie-rod, upper and lower front arm. Disconnect the tie-rod ball from the steering knuckle.



Release the ball joints of the upper and lower arms off the knuckle, using the special tool according to the following instructions.

### Special tool: Ball joint remover 71608-A03-000

Apply grease to the ball joint remover at the point shown.

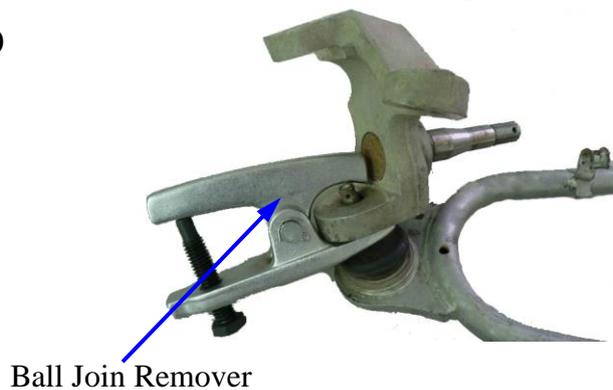
This will ease installation of the tool and prevent damage to the pressure bolt threads.

Insert the jaws carefully, making sure that you do not damage the ball joint boot.

Adjust the jaw spacing by turning the pressure bolt.

Tighten the pressure bolt with a wrench until the ball joint stud pops loose.

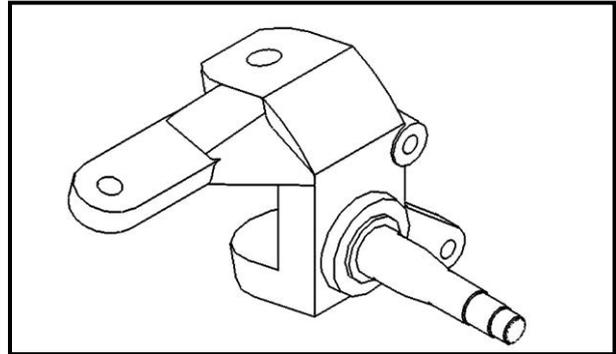
Remove the knuckle from the upper and lower arms.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Inspect the steering knuckle for cracks, pitting or damage.  
If any defects are found, replace the steering knuckle with a new one.



Remove the front shock absorber upper mount and lower mount bolts/nuts, then remove the front shock absorber.



Inspect the shock absorber rod.  
Bends/damage → Replace the shock absorber assembly.  
Inspect the shock absorber.  
Oil leaks → Replace the shock absorber assembly.  
Inspect the spring of the shock absorber by move the spring up and down.  
Fatigue → Replace the shock absorber assembly.



Shock Absorber

# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Check the upper front arm brackets of the frame.

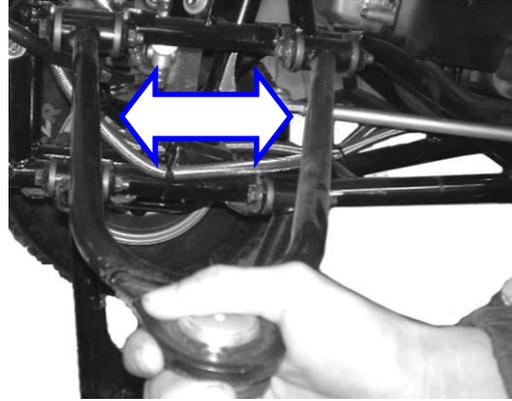
If bent, cracked or damaged, repair or replace the frame.

Check the tightening torque of the front arms securing nuts.

**Torque:** 4.5 kgf-m (45 Nm, 32 lbf-ft)

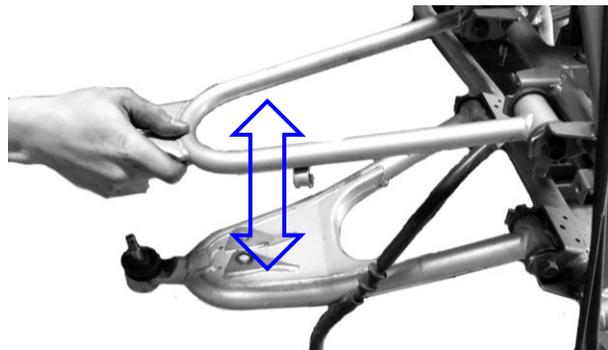
Check the upper front arm side play by moving it from side to side.

If side play noticeable, replace the inner collars and bearings as a set.



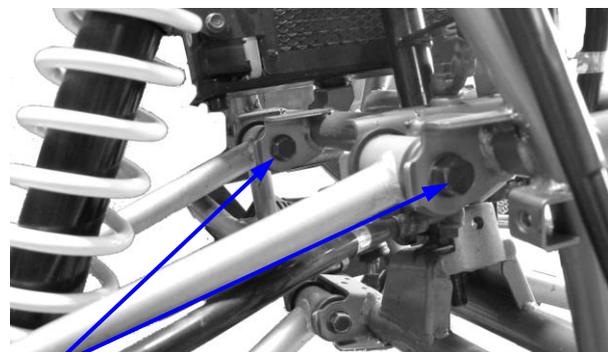
Check the front arm vertical movement by moving it up and down.

Roughs, replace the inner collars and bearings as a set.



Remove the band and then disconnect the front brake fluid tube from the upper front arm.

Remove the two nuts and two bolts attaching the upper front arm, then remove the upper front arm.



Bolts

# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Inspect the front arm.

Cracks/bends/damage→ Replace.

\* Do not attempt to straighten a bent arm, this may dangerously weaken the arm.

Inspect bearings.

Wear/damage→ Replace.



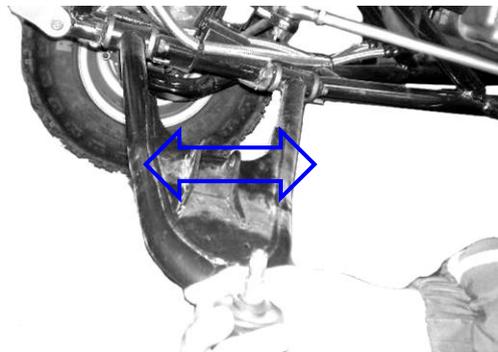
Check the lower front arm brackets of the frame.

If bent, cracked or damaged, repair or

Check the tightening torque of the front arms securing nuts.

**Torque:** 4.5 kgf-m (45 Nm, 32lbf-ft)

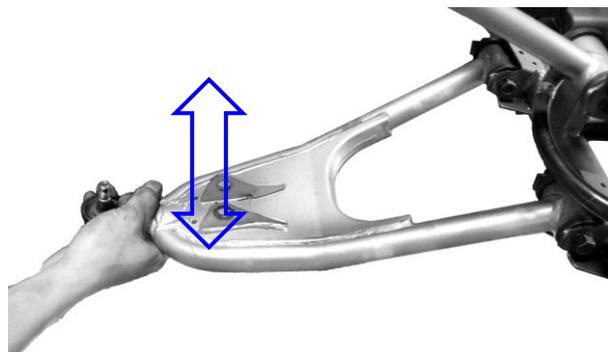
Check the lower front arm side play by moving it from side to side.



If side play noticeable, replace the inner collar and bearing as a set.

Check the lower front arm vertical movement by moving it up and down.

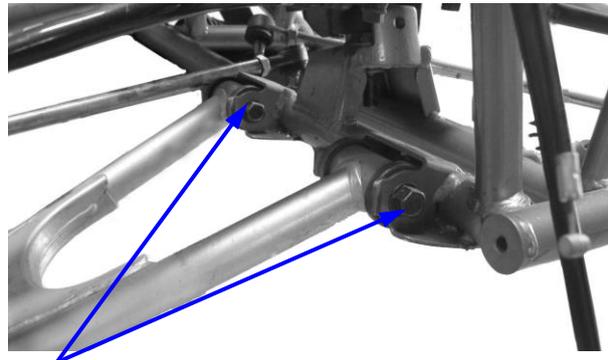
If vertical movement is tight, binding or roughs, replace the inner collar and bearings as a set.



## 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Remove the two nuts and two bolts attaching the lower front arm, then remove the lower front arm.

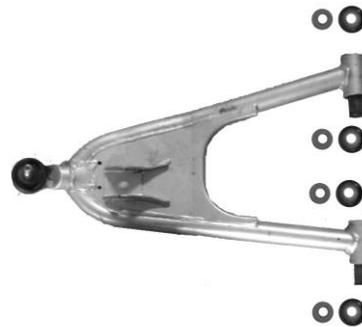


Bolts

Inspect the lower front arm.  
Cracks/bends/damage → Replace.

\* Do not attempt to straighten a bent arm,  
this may dangerously weaken the arm.

Inspect bearings.  
Wear/damage → Replace.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## INSTALLATION

Reverse the “FRONT SUSPENSION REMOVAL AND INSPECTION” procedures.

\* Apply the grease onto the bearings and inner collars.

Install the lower and upper front arms nuts onto the frame and tighten the nuts.

**Torque:** 4.5 kgf-m (45 Nm, 25lbf-ft)

Install the steering knuckle onto the upper and lower front arms and tighten the nuts.

**Torque:** 3.5 kgf-m (35 Nm, 25 lbf-ft)

Install the tie-rod onto the steering knuckle and tighten the nut.

**Torque:** 2.1 kgf-m (21 Nm, 15 lbf-ft)

Install the all cotter pins and band ends of cotter pins.

\* Always use a new cotter pin.

Apply the grease onto the bush, then install the shock absorber and tighten the upper mount and lower mount bolts.

**Torque:** 4 kgf-m (40 Nm, 29 lbf-ft)

Install the front wheel hub (⇒12-7), caliper(⇒11-11)and front wheel (⇒12-3).

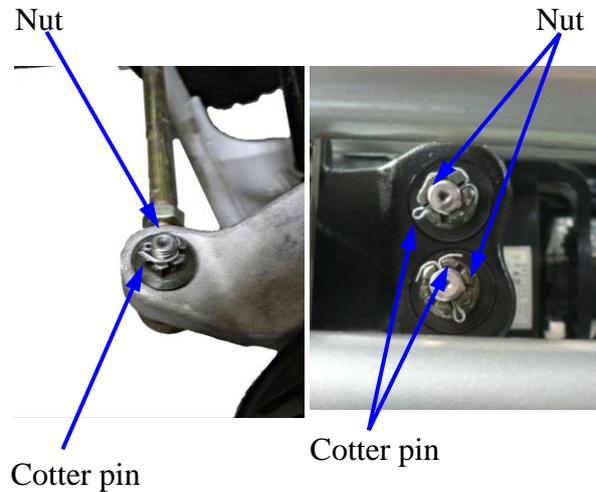
# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

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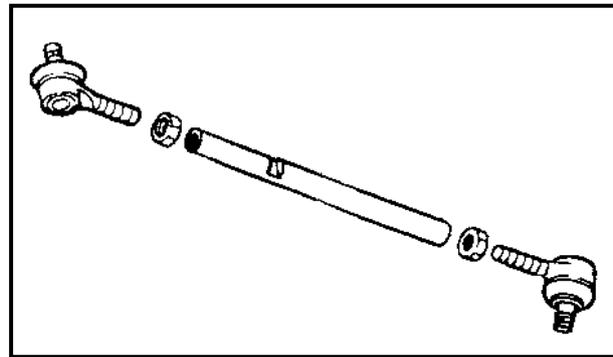
## TIE-ROD

### REMOVAL/INSPECTION

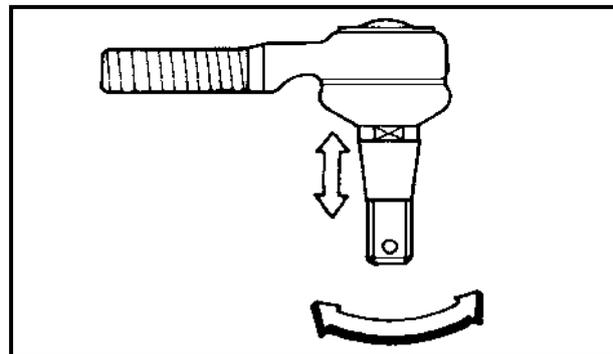
Remove the cotter pin and nut attaching the tie-rod and steering column.  
Remove the cotter pin, and nut attaching the tie-rod and steering knuckle.  
Then remove tie-rod.



Inspect the tie-rod.  
Bend/damage → Replace.



Check the tie-rod end movement.  
Tie-rod end exists free play or turns roughly → Replace.  
Check the tapered surface of the tie-rod end.  
Pitting/wear/damage → Replace.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

## Adjust the tie-rod length.

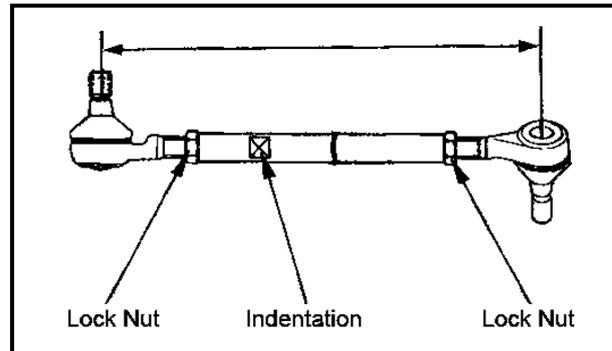
Adjustment steps:

(The following procedures are done on both tie-rods, right and left.)

Loosen the lock nuts.

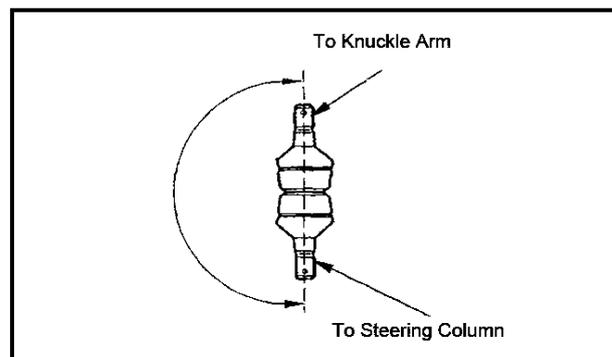
Adjust the tie-rod length by tuning both tie-rod ends.

**Tie rod length:**  $430 \pm 1$  mm



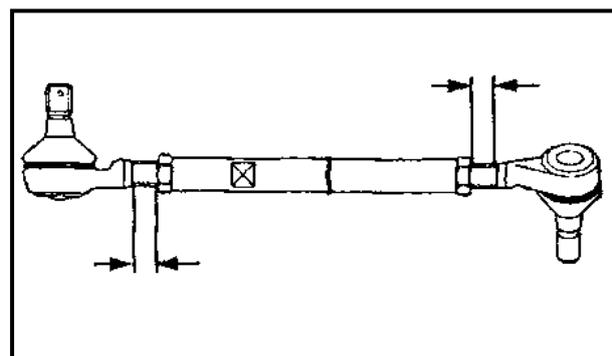
Set the rod-end (steering column side) in an angle where the indentation surface of the toe-rod is parallel to the rod-end shaft, and then tighten the lock nut.

**Torque:** 3.0 kgf-m(30 Nm, 22lbf-ft)



\* After making adjustment on both tie rods be sure to mark them R and L for identification.

\* The threads on both rod-end must be of the same length.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## INSTALLATION

Reverse the “REMOVAL/INSPECTION” procedures.

Install the tie-rod onto the steering knuckle and steering column, then tighten the nuts.

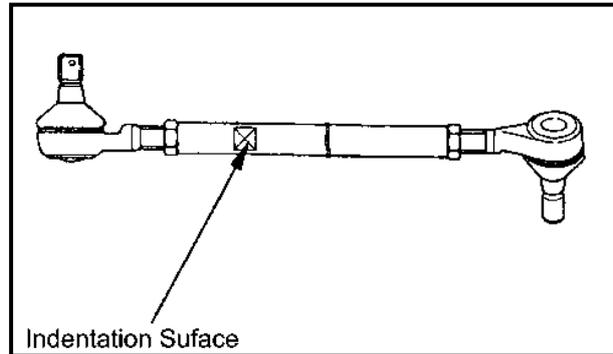
### Torque:

Steering knuckle side:

2.1 kgf-m (21Nm, 15 lbf-ft)

Steering column side:

3.5 kgf-m (35Nm, 25lbf-ft)



\*

Be sure that the rod-end on the indentation surface side is connected to the steering knuckle.

Install the all cotter pins and band ends of cotter pins.

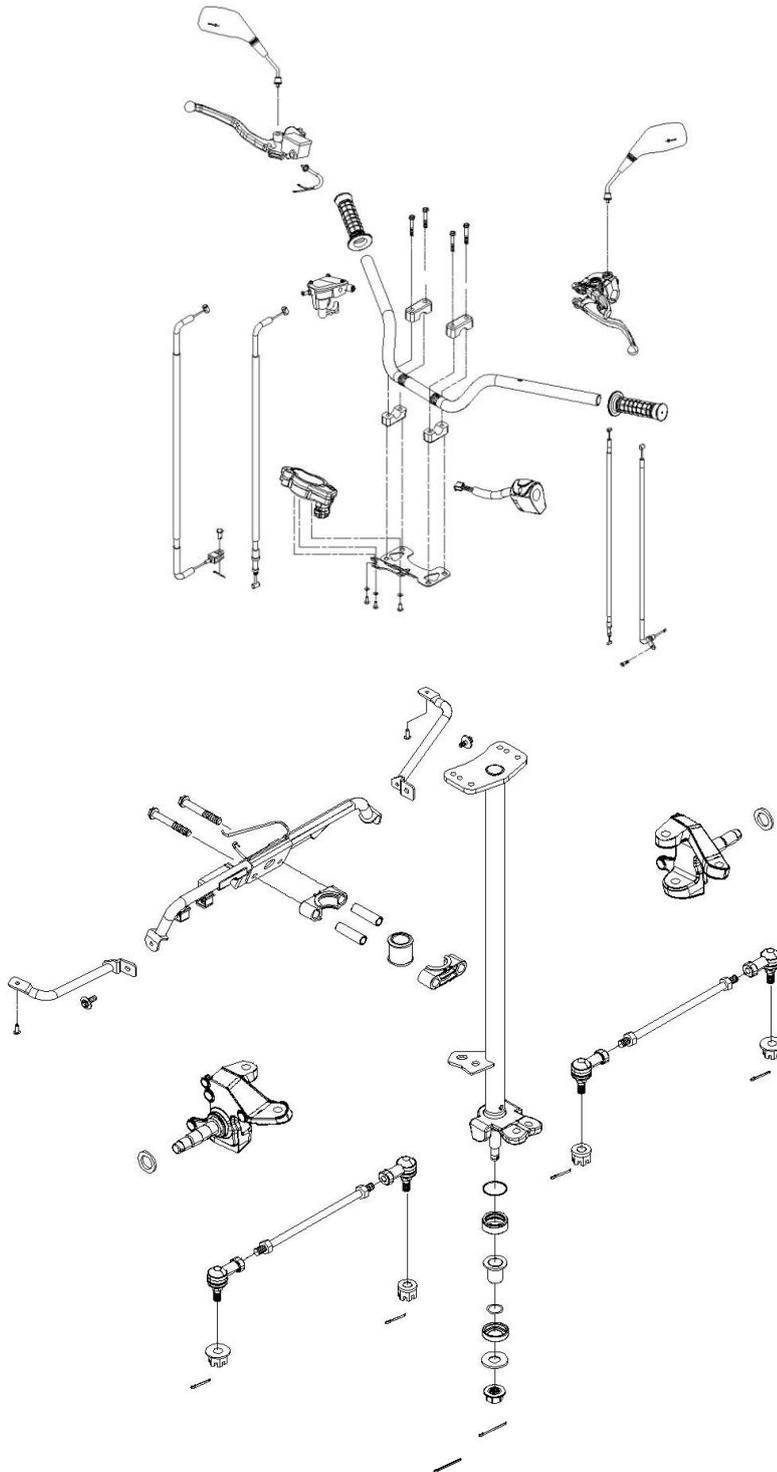
\*

Always use a new cotter pin.

# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## HANDLEBAR CONSTRUCTION



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## HANDLEBAR REMOVAL/INSPECTION

Remove the following parts:  
Seat,cover fender,front and fender .

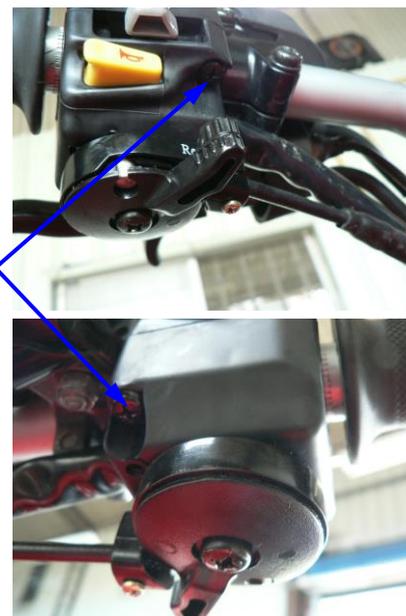
Remove the right master cylinder  
and remove bands then disconnect the  
front fluid tube from the handlebar.

Master cylinder



Remove the two screws and remove the  
handlebar switch.

Screws



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

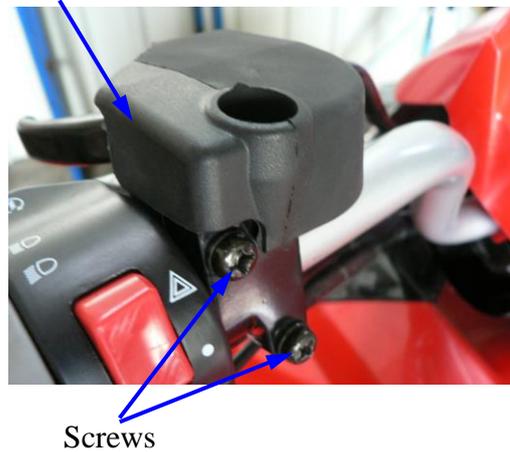
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Remove the two screws and remove throttle unit.

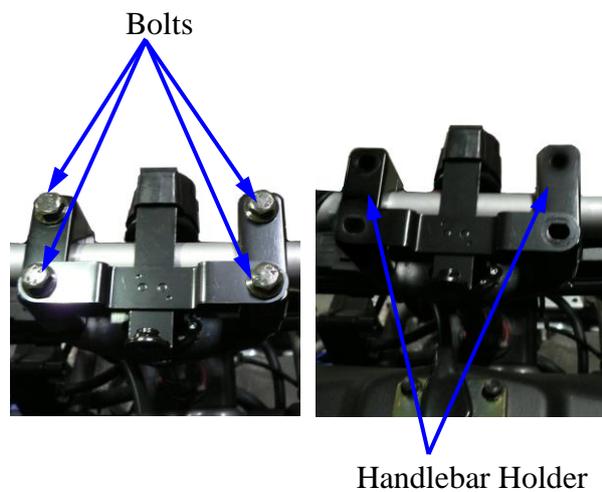


Remove the two screws and remove clutch lever Ass'y.

Clutch lever Ass'y



Remove the handlebar cover, then remove four handlebar holder bolts and handlebar holder.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## INSPECTION

Inspect the handlebar.

Cracks/bends/ damage → Replace.



## INSTALLATION

Install handlebar and handlebar holder, then tighten the four bolts.

**Torque:** 2.2 kgf-m (22Nm, 16 lbf-ft)

- \* Align the mark on the handlebar with the lower handlebar holder surface.



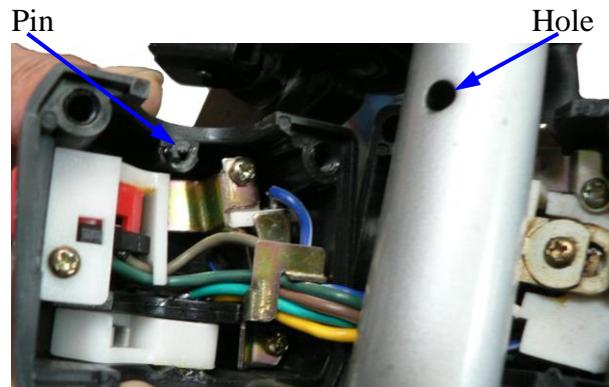
- \*
  - Be sure the upper handlebar holder mark face to front.
  - First tighten the bolts on the front side of the handlebar holder, and then tighten the bolts on the rear side.



## 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Install the handlebar switch by aligning the pin on the handlebar switch with the hole in the handlebar, and then tighten the two screws.



Place the right brake master cylinder on the handlebar and install the master cylinder holder with the "UP" mark facing up. First tighten the upper bolt and then tighten the lower bolt.  
Torque: 1.0 kgf-m (10 Nm, 7.2 lbf-ft)

Master cylinder



Install the throttle unit in the handlebar and then install the lower holder and tighten the two screws.



## 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Install the clutch lever Ass'y in the handlebar and then install the two screws.

Clutch lever Ass'y



Screws

# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

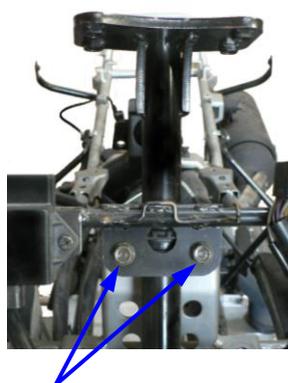
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## STEERING COLUMN

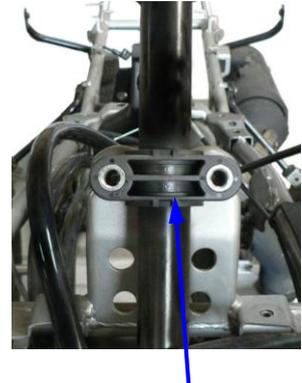
### REMOVAL AND INSPECTION

Remove handlebar. (⇒12-19)

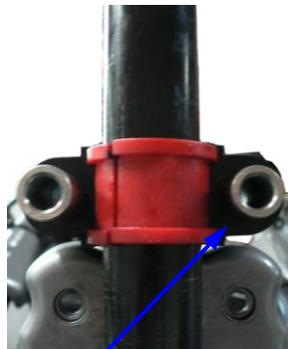
Remove the two bolts and remove the cable holder, steering brackets and dust seal.



Bolts



Steering Bracket

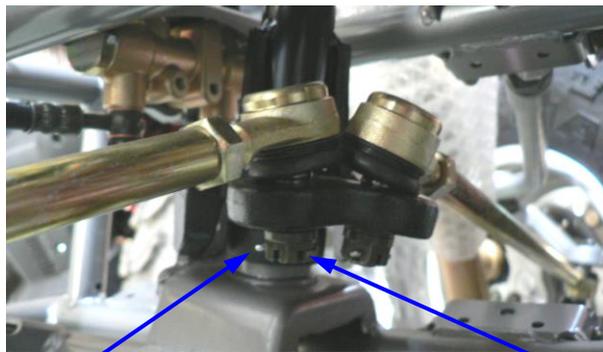


Steering Bracket



Dust Seal

Remove the cotter pins and nuts attaching the tie-rods, then disconnect the tie-rods from the steering column.



Cotter Pin

Nut

## 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

Remove the cotter pin and nut attaching the steering column under the frame body, then remove steering column.



Inspect the steering column.  
Bends/damage → Replace.

\* Do not attempt to straighten a bent shaft,  
this may dangerously weaken the shaft.

Inspect the steering brackets and oil seal.  
Wear damage → Replace.



# 12.FRONT WHEEL/FRONT SUSPENSION STEERING SYSTEM

---

## INSTALLATION

Reverse the “REMOVAL” procedures.

Install the steering column, then tighten the nut under the frame body.

**Torque:** 7.0 kgf-m (70 Nm, 50 lbf-ft)

Install the cotter pin and band ends of cotter pin.



\*

Always use a new cotter pin.

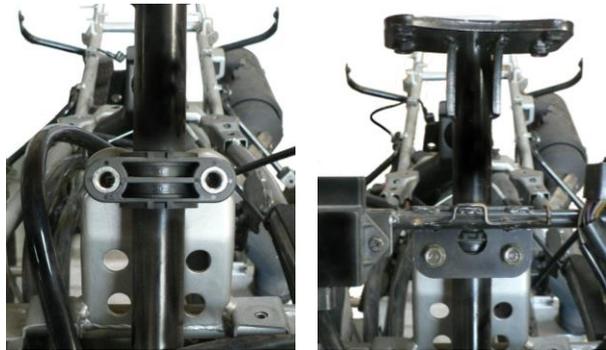
Assembly the steering column and tighten the two bolts.

**Torque:** 2.2 kgf-m (22 Nm, 16 lbf-ft)

Install the tie rods, then tighten the nut.

**Torque:** 3.5 kgf-m (35 Nm, 25 lbf-ft)

Install the cotter pins and band ends of cotter pins.



\*

Always use a new cotter pin.

Refer to the “TOE-IN ADJUSTMENT” section in the CHAPTER 3 to adjust toe-in

# **13.REAR WHEEL/AXLE/SUSPENSION**

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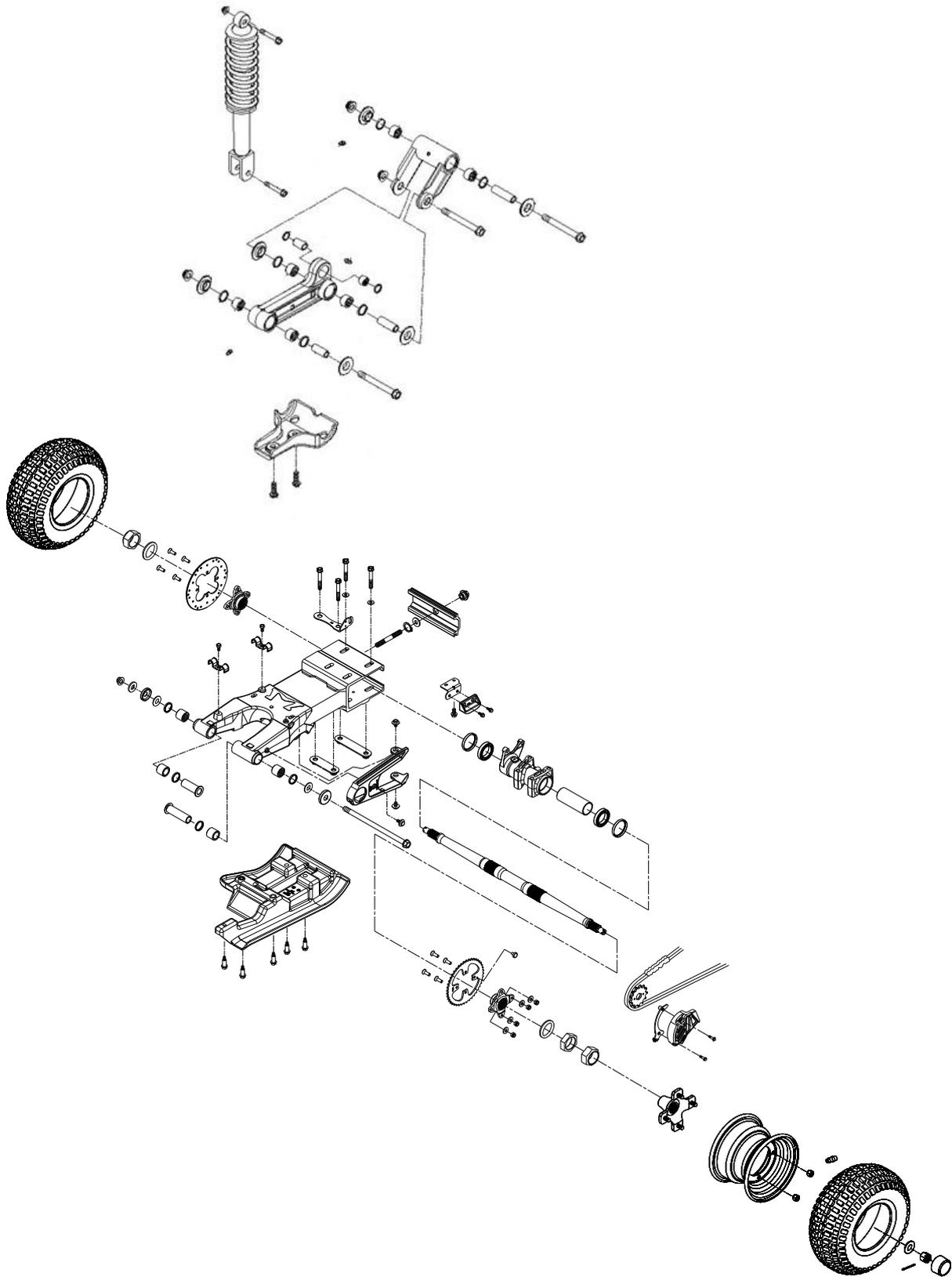
## **REAR WHEEL/ AXLE /SUSPENSION**

---

SERVICE INFORMATION -----	13-2
TROUBLESHOOTING-----	13-2
REAR WHEEL/ AXLE/ AXLE HUB -----	13-3
REAR SHOCK ABSORBER / REAR FORK-----	13-13

# 13.REAR WHEEL/AXLE/SUSPENSION

---



# 13.REAR WHEEL/AXLE/SUSPENSION

---

## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- Jack the machine rear wheel off the ground be careful to prevent the machine from falling down.
- During servicing, keep oil or grease off the brake disk.
- Inspect the brake system before riding.

### SPECIFICATIONS

Unit: mm( in)

Item		Standard	Service Limit	
Rear wheel	Rim run out	Radial	—	2(0.08)
		Axial	—	2(0.08)

### TORQUE VALUES

Rear wheel nut.	4.5kgf-m (45 Nm, 32 lbf-ft)
Real shock absorber upper mount bolt.	4.0kgf-m (40 Nm, 29 lbf-ft)
Real shock absorber lower mount bolt.	4.0kgf-m (40 Nm, 29 lbf-ft)
Rear fork axie.	9.0kgf-m (90 Nm, 65 lbf-ft)
Rear wheel hub nut.	10.0kgf-m (100 Nm,72 lbf-ft)
Rear wheel shaft nut.	18.0-24.0 kgf-m (180-240 Nm,130-173.5 lbf-ft)
Caliper holder bolt.	2.2 kgf-m (22Nm, 16 lbf-ft)

### SPECIAL TOOLS

Nut wrench            71601-E10-000

### TROUBLESHOOTING

#### Rear wheel wobbling

- Bent rim.
- Faulty tire.
- Axle not tightened properly.

#### Soft rear shock absorber

- Weak shock absorber spring.
- Faulty damp.

# 13.REAR WHEEL/AXLE/SUSPENSION

---

## REAR WHEEL/AXLE/AXLE/HUB REMOVAL AND INSPECTION

Place the machine on a level place.

Remove the rear caliper. (refer to the “REAR BRAKE CALIPER REMOVAL” section in chapter 11)

Use the nut wrench to loosen two rear axle nuts (inner and outer )of the rear axle.



Nut

Special Tool:

Nut wrench 71601-E10-000

Remove four nuts attaching the rear wheel hub of the both rear wheels.

Then remove the both rear wheels.

\*

Elevate the rear wheels by placing a suitable stand under the rear of frame. Support the machine securely so there is no danger of it falling over.

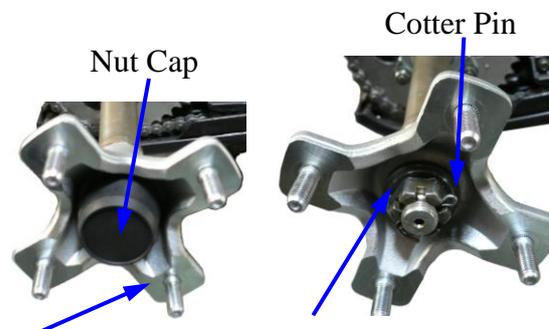


Wheel Nuts

Remove the nut cap.

Remove the cotter pin and then remove nut.

Remove the rear wheel hub.



Nut Cap

Cotter Pin

Rear Wheel Hub

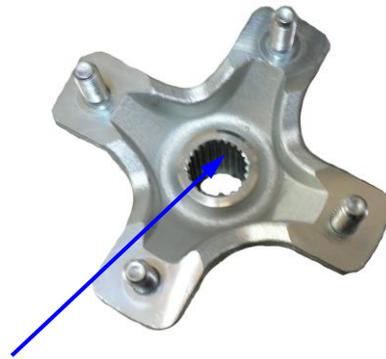
Nut

# 13.REAR WHEEL/AXLE/SUSPENSION

---

Inspect the rear wheel hub.  
Cracks/damage → Replace.

Inspect the rear wheel hub splines.  
Wear/damage → Replace.



Splines

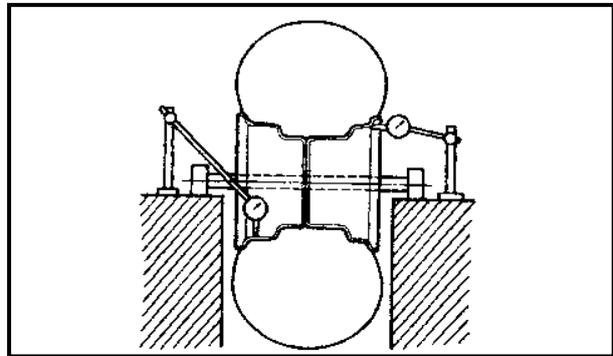
Measure the wheel run out.

**Service Limit:**

Vertical: 2mm (0.08 in)

Lateral: 2 mm (0.08 in)

Out of specification → Replace wheel.



Remove the two rear axle nuts (outer and inner),  
washer.



Nut

# 13.REAR WHEEL/AXLE/SUSPENSION

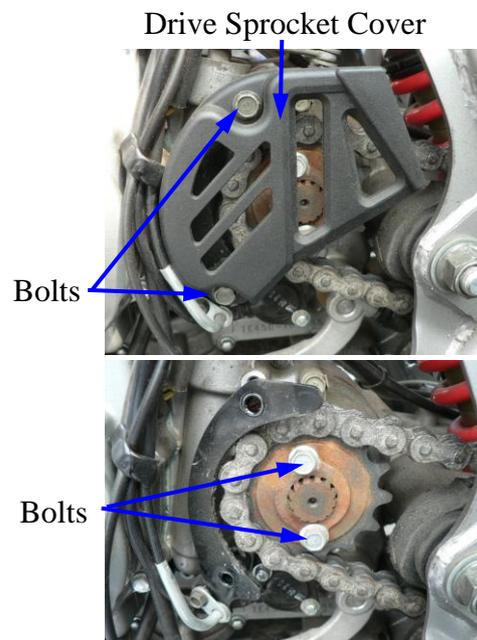
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Loosen the driven chain (refer to the “DRIVE CHAIN SLACK ADJUSTMENT” section in the chapter 3).

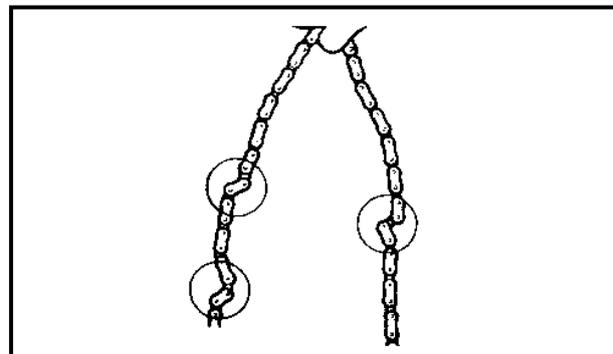
Find the fixed clip and remove it.



Remove the two bolts at the drive sprocket, then disconnect the drive chain from the driven sprocket.



Inspect the drive chain stiffness.  
Stiff → Clean and lubricate or replace.

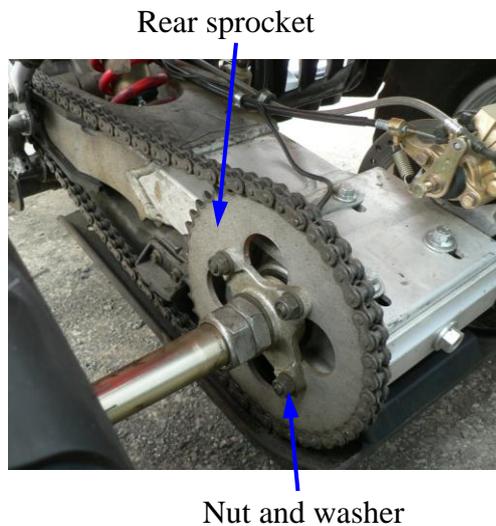


# 13.REAR WHEEL/AXLE/SUSPENSION

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Remove the bolt , washer and nut.

Remove the rear sprocket.

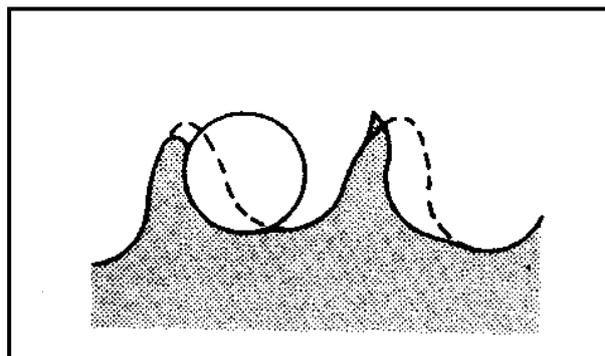


Inspect the rear sprocket.

More than 1/4 teeth wear→Replace.

Inspect the rear sprocket holder splines.

Wear/damage → Replace.



Remove the two caliper holder bolts.

Remove the brake caliper.



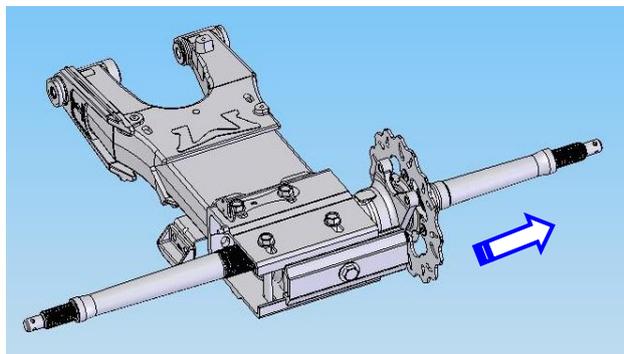
Bolts

# 13.REAR WHEEL/AXLE/SUSPENSION

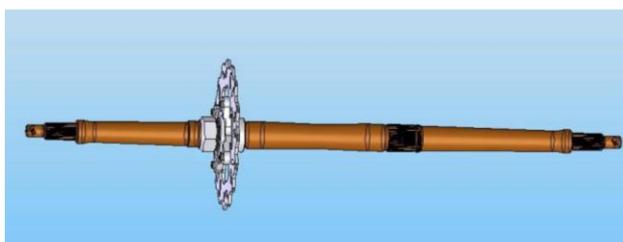
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Remove the rear axle from right side.

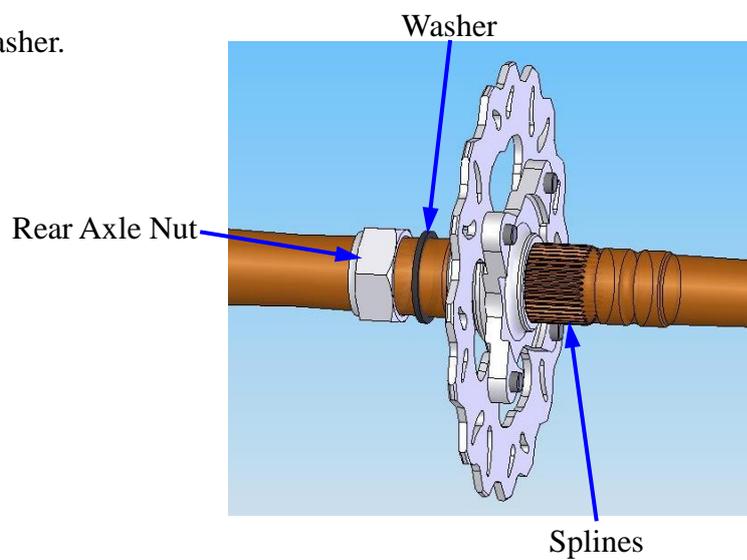
\* Tap the axle and with a rubber hammer, this will avoid damage the axle thread.



## REAR AXLE DISASSEMBLY



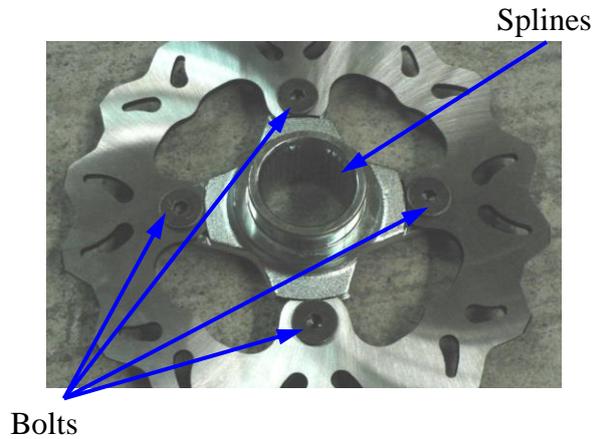
Remove the rear axle nut and washer.



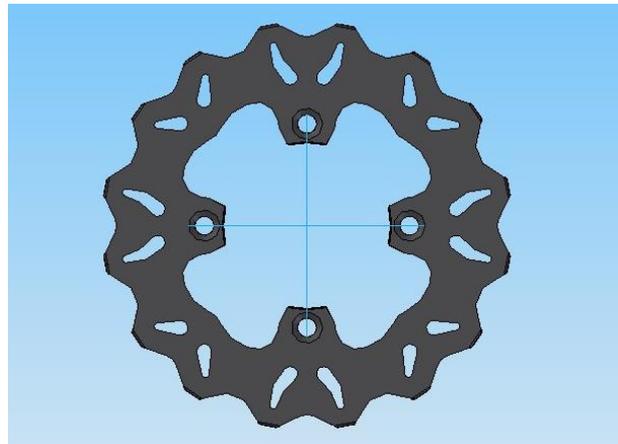
# 13.REAR WHEEL/AXLE/SUSPENSION

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Remove the four bolts attaching the rear brake disk holder at the brake disk and then remove brake disk.



Inspect the rear brake disk.  
Cracks/damage → Replace.  
Inspect the rear brake disk holder splines.  
Wear/damage → Replace.



Inspect the rear axle.  
Scratched (excessively)/damage → Replace.  
Inspect the splines and threads of the rear Axle.  
Wear/damage → Replace.



# 13.REAR WHEEL/AXLE/SUSPENSION

---

Measure the rear axle run out.

**Service limit:** less than 1.5mm (0.06 in)

Out of specification → Replace.

\*

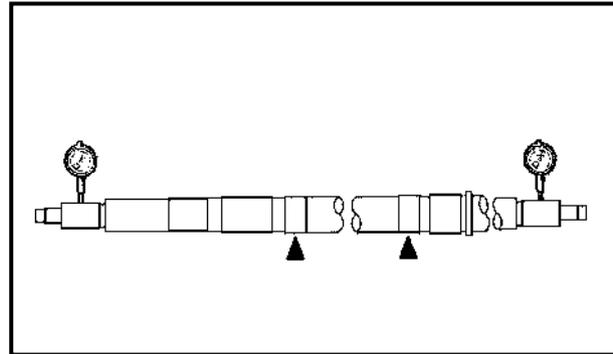
Do not attempt to straighten a bent axle.

## REAR AXLE ASSEMBLY

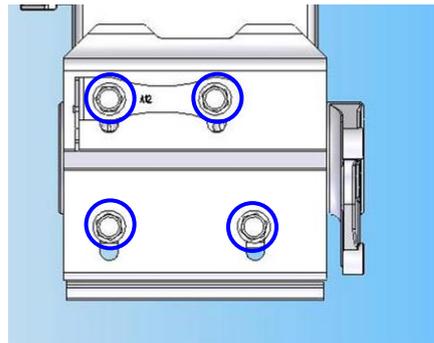
Reverse the “REAR AXLE DISASSEMBLY” procedures.

\*

Apply grease onto the rear axle splines.

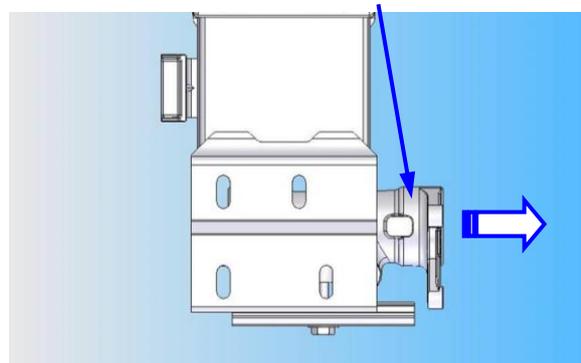


Remove the four bolts attaching the rear axle hub at the rear fork.



Rear axle hub

Remove the rear axle hub from left side.



# 13. REAR WHEEL/AXLE/SUSPENSION

Inspect rear axle hub.

Bearings allow play in the axle hub or the bearing turns roughly → Replace.

Dust seals is wear/damage → Replace.

Axle hub is cracks/damage → Replace.



## REAR AXLE HUB DISASSEMBLY

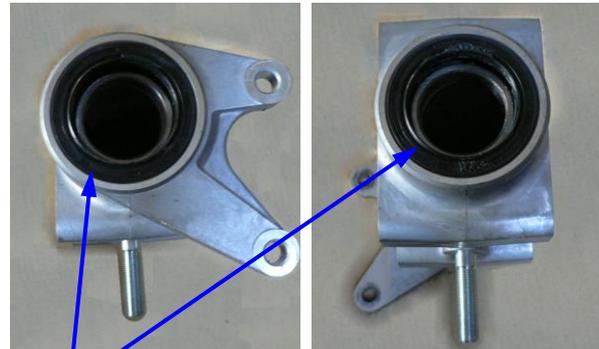
Bearing and dust seal replacement steps:

Clean the outside of the rear axle hub.

Remove the dust seal by a flat-head screw driver.

- \* Place a wood block against the outer edge to protect this edge.

Remove the bearing by a general bearing puller.

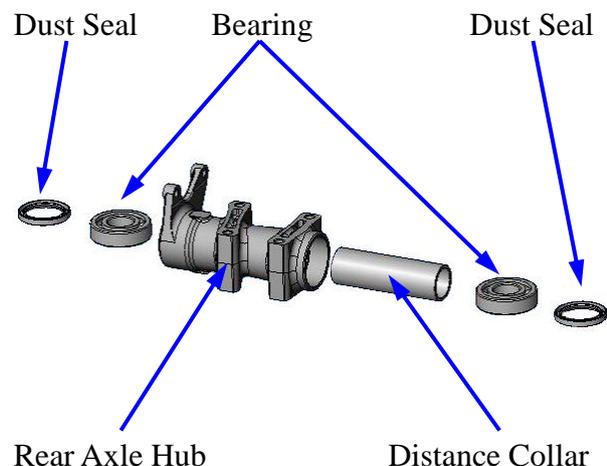


Dust Seal

## REAR AXLE HUB ASSEMBLY

Install the new bearing and dust seal by reversing the previous steps.

- \* Do not strike the center race or balls of the bearing.  
Contact should be made only with the outer race.  
Make sure install the distance collar into the rear axle hub.



# 13.REAR WHEEL/AXLE/SUSPENSION

---

## INSTALLATION

Reverse the “REAR SHEEL/AXLE/AXLE/HUB REMOVAL AND INSPECTION” procedures.

- \* Apply grease onto the dust seal lips and Bearings.

Install the rear axle hub.

- \* At this time, the rear axle hub should not be tightened completely. Final tightening is done after the chain slack adjustment.

Install the rear axle.

Connect the drive chain.

Install the rear brake disk, collar inner nut, washer and outer nut.

- \* At this time, the nuts should not be tightened completely.

Install the rear wheel hub and tighten the nut.

**Torque:** 10.0 kgf-m (100 Nm, 72 lbf-ft)

Install cotter pin (new)

- \* Do not loosen the wheel hub nut after torque tightening. If the wheel hub nut groove is not aligned with the cotter pin hole, align groove with the hole by tightening up on the wheel hub nut. Always use a new cotter pin.

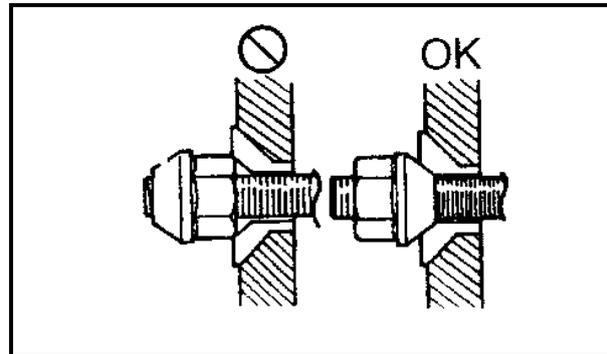


# 13.REAR WHEEL/AXLE/SUSPENSION

Install the rear wheel and tighten the four nuts.

**Torque:** 4.5kgf-m (45 Nm, 32 lbf-ft)

- \* Be sure the tapered side of the wheel nuts face the wheel rim.



Tighten the rear axle nuts

- \* Apply thread lock “243” or “1324” to the thread portion of the rear axle shaft

 Thread lock “243” or “1324”

**Torque:**

180-240 kgf-m (180-240 Nm, 130-173.5lbf-ft)



Tighten the two rear axle nuts (inner and outer).

- \* Apply thread lock “243” or “1324” to the thread portion of the rear axle shaft

 Thread lock “243” or “1324”

Specialb Tool:

Nut wrench 71601-E10-000

**Torque:**

180-240 kgf-m (180-240 Nm, 130-173.5lbf-ft)

Adjust drive chain slack. (Refer to the “DRIVE CHAIN SLACK ADJUSTMENT”)

**Drive chain slack: 30~40mm**



# 13.REAR WHEEL/AXLE/SUSPENSION

## REAR SHOCK ABSORBER/ REAR FORK REMOVAL AND INSPECTION

Place the machine on a level place.  
Elevate the rear wheels by placing a suitable stand under the rear of frame.

\* Support the machine securely so there is no danger of it falling over.

Remove the rear wheels, rear axle and rear hub.

Refer to the "REAR WHEEL/AXLE/AXLE HUB REMOVAL AND INSPECTION" section in chapter 13.

Remove the upper and lower mount bolts/nuts, then remove rear shock absorber.

Inspect the shock absorber rod.

Bends/damage → Replace the shock absorber assembly.

Inspect the shock absorber.

Oil leaks → Replace the shock absorber assembly.

Inspect the bush.

Wear/damage → Replace.

Check the tightening torque of the pivot shaft (rear fork)securing nut.

**Torque:** 9.0 kgf-m (90 Nm, 65 lbf-ft)



Bolts



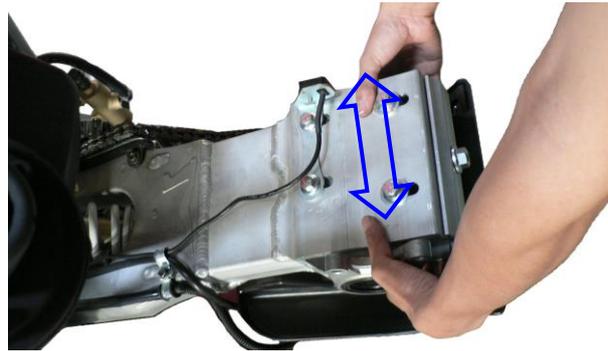
Pivot Shaft



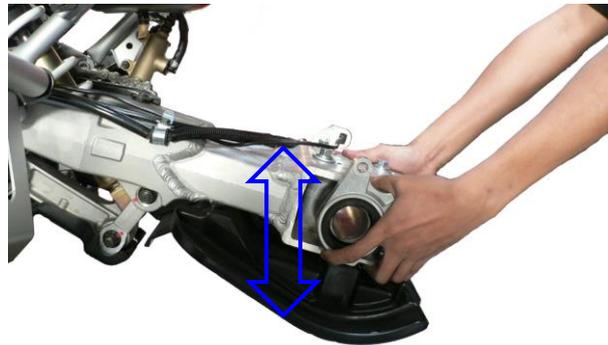
# 13.REAR WHEEL/AXLE/SUSPENSION

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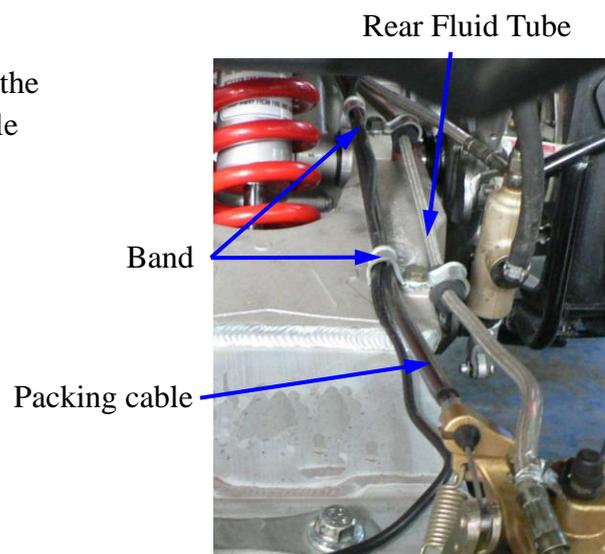
Check the rear fork side play by moving it from side to side.  
If side play noticeable, check the inner collar, bearing, bushing and thrust cover, or adjust the shim.



Check the rear fork vertical movement by moving it up and down.  
If vertical movement is tight, binding or rough, check the inner collar, bearing, bushing and thrust cover, or adjust the shim.



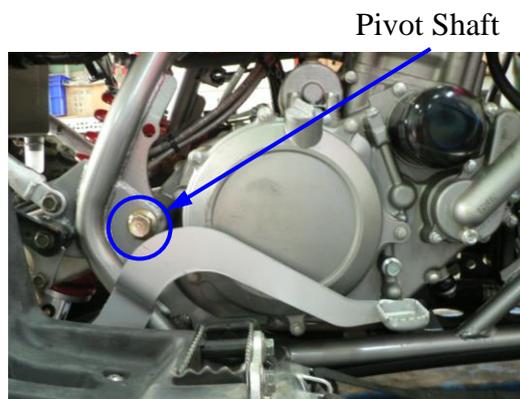
Remove the band and then disconnect the rear brake fluid tubes and packing cable from the rear fork.



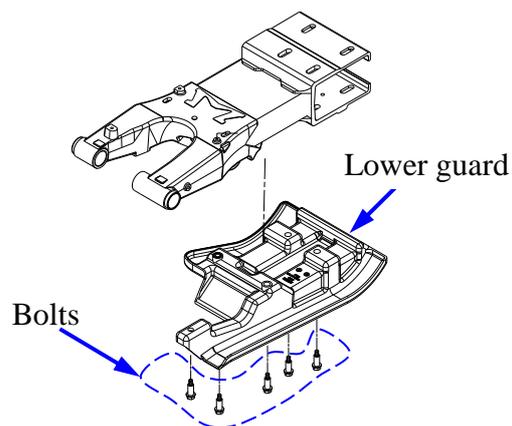
# 13.REAR WHEEL/AXLE/SUSPENSION

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Remove the nut and pivot shaft, then remove rear fork and drive chain.



Remove the five bolts from the lower guard, and then remove the lower guard.



Remove the thrust covers.



# 13. REAR WHEEL/AXLE/SUSPENSION

Inspect the rear fork.

Crack/bend/damage → Replace.

Roll the axle on a flat surface to inspect the pivot shaft.

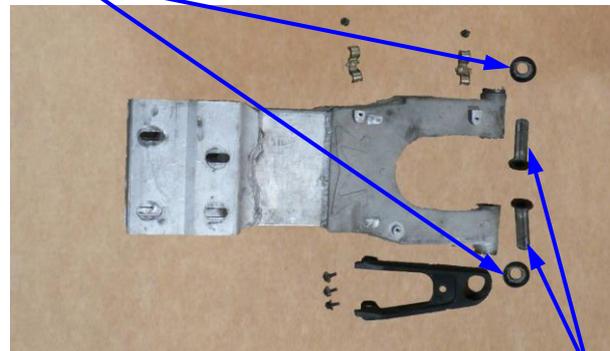
Bends → Replace.

\* Do not attempt to straighten a bent axle.

Inspect the thrust covers, collar and bushes.

Wear/damage → Replace.

Thrust Covers



Collar

Inspect the shock link, rear.

Crack/bend/damage → Replace.

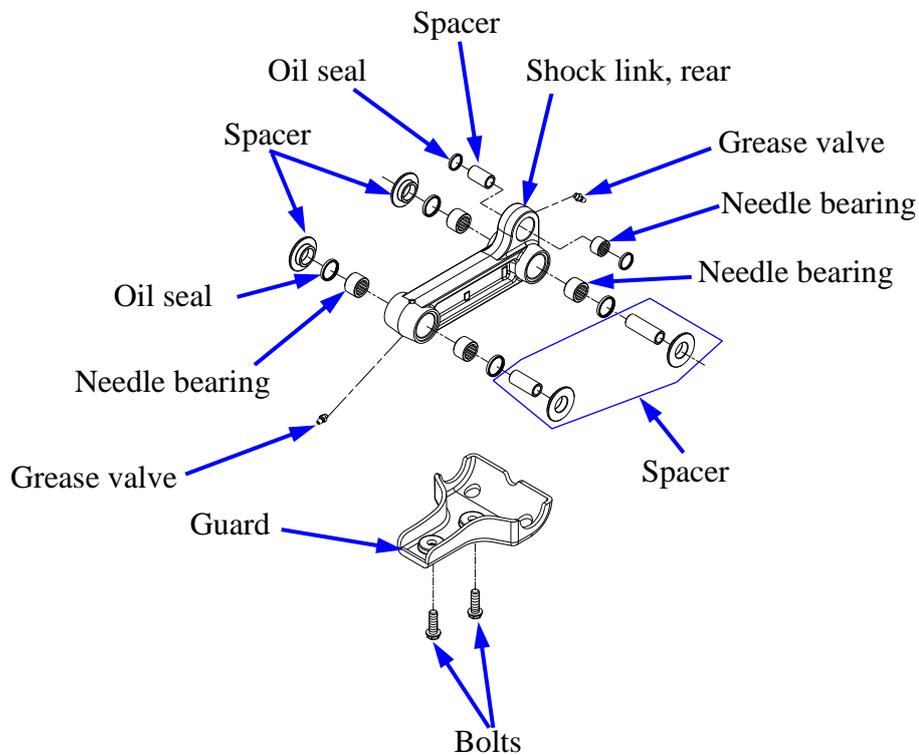
Inspect the space.

Wear/damage → Replace.

Bearings allow play in the shock link, rear.

bearing turns roughly → Replace.

Dust seals is wear/damage → Replace.



# 13.REAR WHEEL/AXLE/SUSPENSION

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Inspect the housing, shock link, rear.

Crack/bend/damage → Replace.

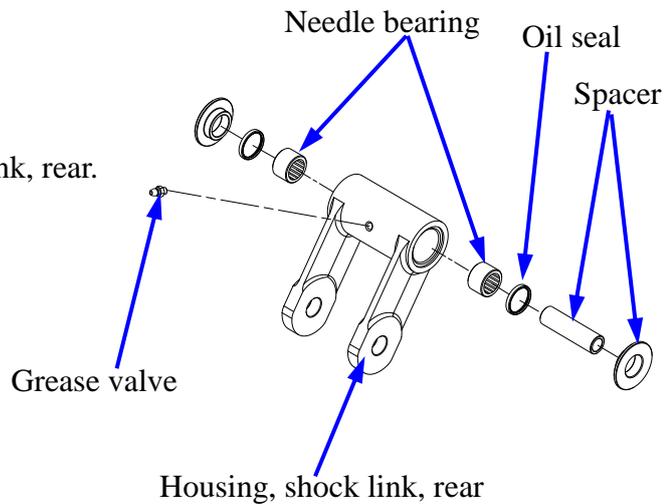
Inspect the space.

Wear/damage → Replace.

Bearings allow play in the housing, shock link, rear.

bearing turns roughly → Replace.

Dust seals is wear/damage → Replace.



## INSTALLATION

Reverse the “REAR FORK/SHOCK ABSORBER REMOVAL AND INSPECTION” procedure.

Apply grease onto the collar, bush, pivot shaft and thrust cover.

Install the rear fork and drive chain.

Install the pivot shaft and tightening the nut and pivot shaft.

**Torque:** 9.0 kgf-m (90 Nm, 65 lbf-ft)

Install the shock absorber and tightening the bolts.

**Torque:** 4.0 kgf-m (40 Nm, 29 kbf-ft)

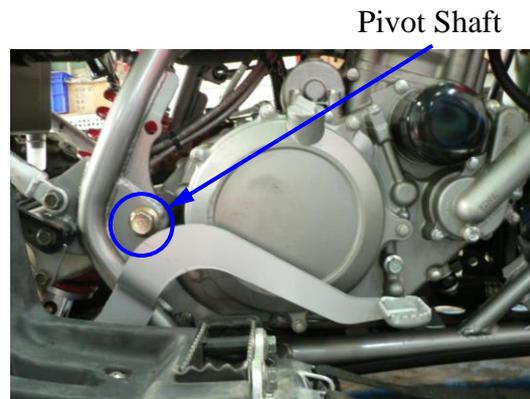
Install the rear hub and rear wheels.

Refer to the “REAR WHEEL INSTALLATION” section.

Adjust the drive chain slack.

Refer to the “DRIVE CHAIN SLACK ADJUSTMENT” section in the CHAPTER 3.

**Drive chain slack: 30~40mm**



# 19.LIGHTS/SWITCHES

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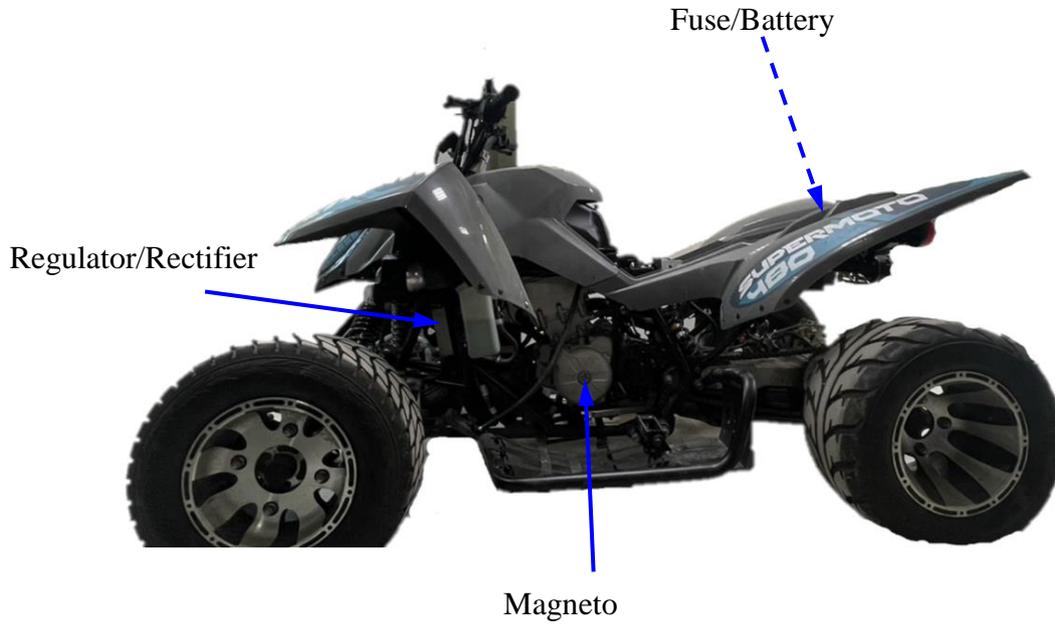
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## BATTER/CHARGING SYSTEM/MAGNETO

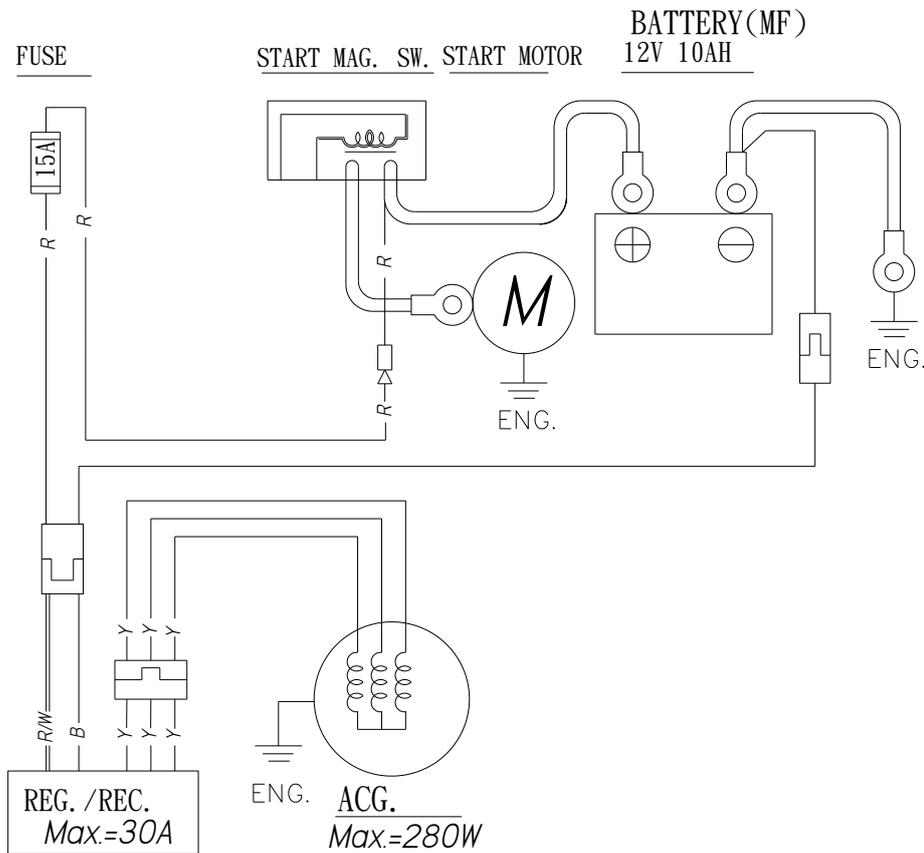
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MAGNETO .....	14-9

# 19.LIGHTS/SWITCHES



## CHARGING SYSTEM



# 19.LIGHTS/SWITCHES

---

## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

The battery electrolyte (sulfuric acid) is poisonous and may seriously damage the skin and Eyes.

Avoid contact with skin, eyes, or clothing.

In case of contact, flush with water and get prompt medical attention.

- The battery can be charged and discharged repeatedly. If a discharged battery is not used for a long time, its service life will be shortened. Generally, the capacity of a battery will decrease after it is used for ~ 3years. A capacity-decreased battery will resume its voltage after it is recharged but its voltage decreases suddenly and then increases when a load is added.
- When a battery is overcharged, some symptoms can be found. If there is a short circuit inside the battery, no voltage is produced on the battery terminals. If the rectifier won't operate, the voltage will become too high and shorten the battery service life.
- If a battery is not used for a long time, it will discharge by itself and should be recharged every 3 months.
- A new battery filled with electrolyte will generate voltage within a certain time and it should be recharged when the capacity is insufficient. Recharging a new battery will prolong its service life.
- Inspect the charging system according to the sequence specified in the Troubleshooting.
- Do not disconnect and soon reconnect the power of any electrical equipment because the electronic parts in the regulator/rectifier will be damaged. Turn off the ignition switch before operation.
- It is not necessary to check the GS battery electrolyte or fill with distilled water.
- Check the load of the whole charging system.
- Do not quick charge the battery. Quick charging should only be done in an emergency.
- Remove the battery from the machine for charging.
- When replacing the battery, do not use a traditional battery.
- When charging, check the voltage with a voltmeter.

### SPECIFICATIONS

Item		Standard	
Battery	Capacity/ Model	12V-10AH	
	Voltage ( 20°C )	Fully charged	13.1V
		Undercharged	12.3V
	Charging current	STD:1.2A Quick: 12A	
Charging time	STD: 5~ 10hr Quick: 30 min		
Magneto coil resistance	Pick-up coil	90~110 Ω G-L	
	Charging coil	0.3~0.8 Ω Y-Y	
Regulator/Rectifier	Limit voltage	Lighting	12.0~14.0V
			10~ 13.0V
		Charging	13.5~ 15.5V

# 19.LIGHTS/SWITCHES

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## TESTING INSTRUMENTS

Pocket tester

## TROUBLESHOOTING

### No power

- Dead battery
- Disconnected battery cable
- Fuse burned out
- Faulty ignition switch

### Low power

- Weak battery
- Loose battery connection
- Charging system failure

### Intermittent power

- Loose battery cable connection
- Loose charging system connection
- Loose connection of short circuit in lighting system

### Charging system failure

- Loose, broken or shorted wire or connector
- Faulty regulator/rectifier
- Faulty A.C. generator

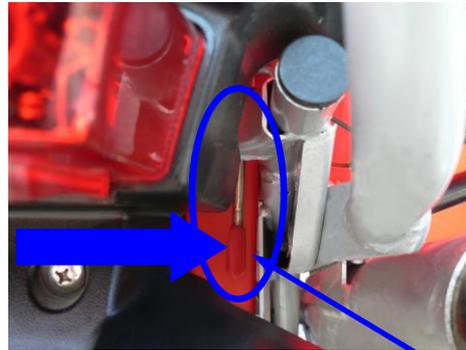
# 19.LIGHTS/SWITCHES

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## BATTERY

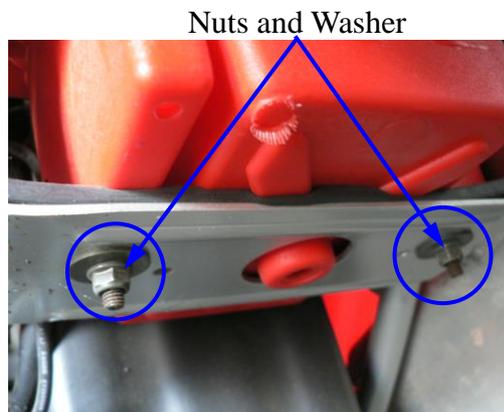
### REMOVAL/INSTALLATION

1. Make sure the ignition switch is OFF.
2. Pull right the lock lever and pull up the seat at the rear.



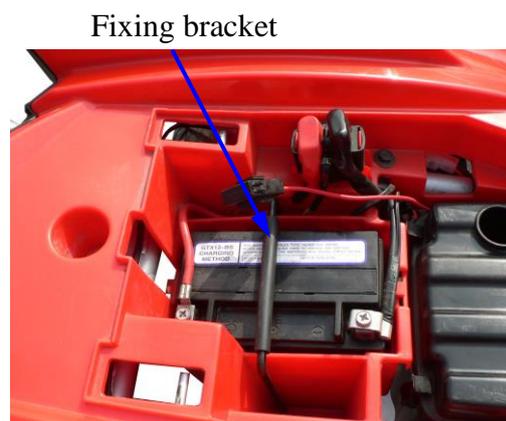
Lever

3. Remove the nuts and washer.



Nuts and Washer

4. Remove the fixing bracket.



Fixing bracket

# 19.LIGHTS/SWITCHES

---

5. Disconnect the negative (-) terminal lead from the battery first, then disconnect the positive (+) terminal lead.

positive (+)                      negative (-)



Remove the battery.

\*

When disconnecting the battery positive (+) cable, do not touch the frame with tool; otherwise it will cause short circuit and sparks to fire the fuel.



## INSTALLATION

1. Installation is in the reserve order of removal.

\*

First connect the positive (+) cable and then negative (-) cable to avoid short circuit.

2. Make sure the battery is installed upright as shown.
3. Check all bolts and other fasteners are secure.
4. After installing the battery, check to see if the battery cables are routed correctly.

# 19.LIGHTS/SWITCHES

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## BATTERY VOLTAGE (OPEN CIRCUIT VOLTAGE) INSPECTUIN

Remove the seat.

Disconnect the battery cables.

Measure the voltage between the battery terminals.

**Fully charged** : 13.1V

**Undercharged** : 12.3V max



\*

Battery charging inspection must be performed with a voltmeter.

## CHARGING

Connecting the charger positive (+) cable to the battery positive (+) terminal.

Connecting the charger negative (-) cable to the battery negative (-) terminal.

\*

- Keep flames and sparks away from a charging battery.
- Turn power ON/ OFF at the charger, not at the battery terminals to prevent sparks near the battery to avoid explosion.
- Charge the battery according to the current specified on the battery.

\*

- Quick charging should only be done in an emergency.
- Measure the voltage 30 minutes after the battery is charged.



Charging current: Standard: 1.2A

Quick : 3.0A

Charging time : Standard: 5 ~ 10 hours

Quick : 30 minutes

After charging: Open circuit voltage: 12.8 V min

# 19.LIGHTS/SWITCHES

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## CHARGING SYSTEM

### CURRENT LEAKAGE TEST

Remove the seat (see p2-3).

Turn the ignition switch “OFF”, and disconnect the negative(-) cable from the battery.

Connect the ammeter (+) probe to the negative (-) cable and the ammeter (-) probe to the battery(-) terminal.

With the ignition switch “OFF”, check for current leakage.



- \* • When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level.
- Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition switch “ON”. A sudden surge of current may blow out the fuse in the tester.

**Specified current leakage:**

**1 mA maximum**

If current leakage exceeds the specified value, a shorted circuit is likely.

Locate the short by disconnecting connections one by one and measuring the current.

### CHARGING VOLTAGE INSPECTION

Start the engine and warm it up to operating temperature; stop the engine.

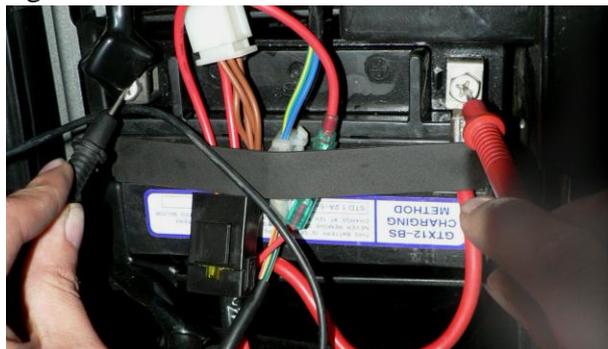
Connect the multi-meter between the positive and negative terminals of the battery.

- \* • Make sure the battery is in good condition before performing this test.
- To prevent a short, make absolutely certain which are the positive and negative terminals or cable.

With the headlight on high beam, restart the engine.

Measure the voltage on the multimeter when the engine runs at 5000 rpm.

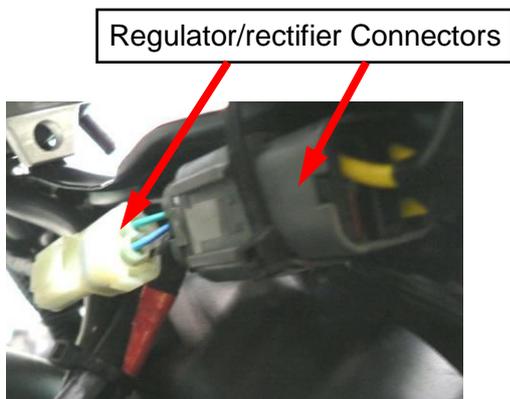
Limit Voltage/Current: 13.5 ~ 15.5 V/0.5A max



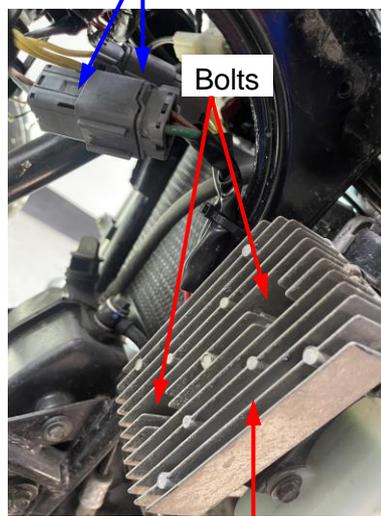
# 19.LIGHTS/SWITCHES

## REGULATOR/RECTIFIER INSPECTION

Remove the regulator/rectifier wire connectors.  
Check the continuity between the wire terminals.



Regulator/rectifier Connectors



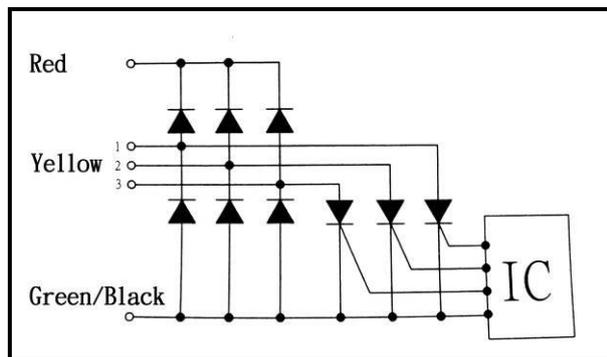
Regulator/rectifier

### Normal Direction: Continuity

	(+) probe	(-)probe
I	Green	Yellow
II	Yellow	Red

### Reverse Direction: No Continuity

	(+) probe	(-)probe
I	Green	Yellow
II	Yellow	Red



## VOLTAGE REGULATION TEST

Connect a voltmeter across the battery terminals.

Start the engine and gradually increase the engine speed.

The battery terminal voltage should be within 14.0 ~ 15.0V.

# 19.LIGHTS/SWITCHES

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## A.C. GENERATOR INSPECTION

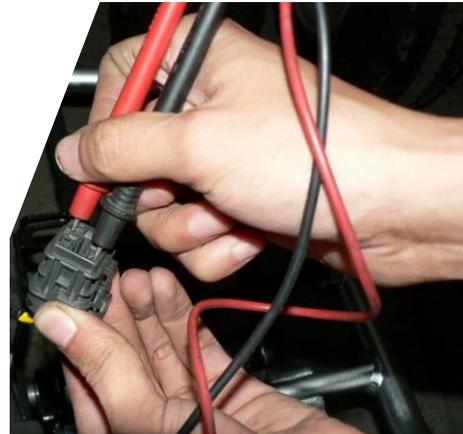
\* This test can be made without removing the stator from the engine.

Disconnect the A.C. generator connector. Check the continuity between the yellow wires and ground.

There should be continuity between the yellow wires and no continuity between each yellow wire and ground.

**Resistance** (at 20 °C):

Yellow ~ Yellow	500~700mΩ
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\* When mounting the stator on the magneto cover, apply a small quantity of “thread lock” to the threaded parts of screws.



# 15.IGNITION SYSTEM

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## IGNITION SYSTEM

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SERVICE INFORMATION .....	15- 1
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IGNITION UNIT /CHANGE GEAR CINTRIL INSPECTION .....	15- 4
IGNITION COIL INSPECTION .....	15- 4

# 15.IGNITION SYSTEM



## SERVICE INFORMATION GENERAL INSTRUCTIONS

- Check the ignition system according to the sequence specified in the Troubleshooting.
- The ignition system adopts ignition unit, ignition timing can adjusted with ECU.
- If the timing is incorrect, inspect the ignition unit, ECU,A.C. generator, and replace any faulty parts.
- Inspect the ignition unit with a ignition unit tester.
- Loose connector and poor wire connection are the main causes of faulty ignition system. Check each connector before operation.
- Use of spark plug with improper heat range is the main cause of poor engine performance.
- The inspections in this section are focused on maximum voltage. The inspection of ignition coil resistance is also described in this section.
- Inspect the spark plug referring to chapter 3.

## SPECIFICATIONS

Item		Standard
Spark plug	Standard type	CR8E
Spark plug gap		0.7 ~ 0.8 mm
Ignition timing	“T” Line Full advance	$6^{\circ} \pm 1^{\circ}$ BTDC/ 1500RPM
Ignition coil resistance(20°C)	Primary coil	3.8~5.2Ω
	Secondary Coil(With plug cap)	12~18 KΩ
Pulser coil resistance (20°C)		90 ~ 110Ω
Ignition coil primary side max. voltage		12V
Exciter coil max. voltage		19KV

## TESTING INSTRUMENT

Commercially available electric tester with resistance over 10MΩ/CDV

# 15.IGNITION SYSTEM

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## TROUBLESHOOTING

### **High voltage too low**

- Weak battery or low engine speed
- Loose ignition system connection
- Faulty ignition unit

- Faulty ignition coil

- Faulty pulser coil

### **Normal high voltage but no spark at plug**

- Faulty spark plug
- Electric leakage in ignition secondary circuit
- Faulty ignition coil

### **Good spark at plug but engine won't start**

- Faulty ignition unit or incorrect ignition timing
- Improperly tightened A.C. generator flywheel

### **No high voltage**

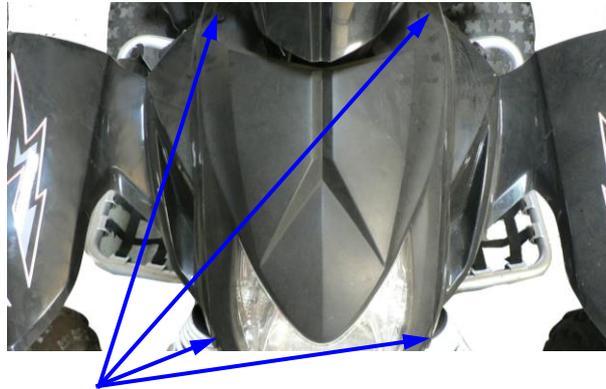
- Faulty ignition switch
- Faulty ignition unit
- Poorly connected or broken ignition unit ground wire
- Dead battery or faulty regulator/ rectifier
- Faulty ignition coil connector
- Faulty pulser coil

# 15.IGNITION SYSTEM

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## IGNITION UNIT REMOVE

Remove the fender cover by 4 plastic rivet.  
Disconnect the ignition unit coupler and  
remove the ignition unit.



Plastic Rivet

## IGNITION COIL INSPECTION CONTINUITY TEST

Remove the front fender. (Refer to the  
chapter 2)  
Remove the spark plug cap. (Refer to the  
chapter 6)  
Disconnect the ignition coil wires.

\* This test is to inspect the continuity of  
ignition coil.



Measure the resistance between the ignition  
coil primary coil terminals.  
**Resistance:** 3.8~5.2Ω/20°C



# 15.IGNITION SYSTEM

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Remove the spark plug cap and measure the secondary coil resistance between the spark plug wire and the primary coil terminal.

**Resistance:**

(with plug cap): 12~18K $\Omega$ /20 $^{\circ}$ C

\* This test is for reference only. Accurate test should be performed with a ECU tester.



## PULSER COIL INSPECTION

Remove the front fender. (Refer to the chapter 2)

Disconnect the pulser coil wire coupler and measure the resistance between the blue and green wire terminals.

**Resistance:** 90~110 $\Omega$  20 $^{\circ}$ C



# 16.STARTING SYSTEM

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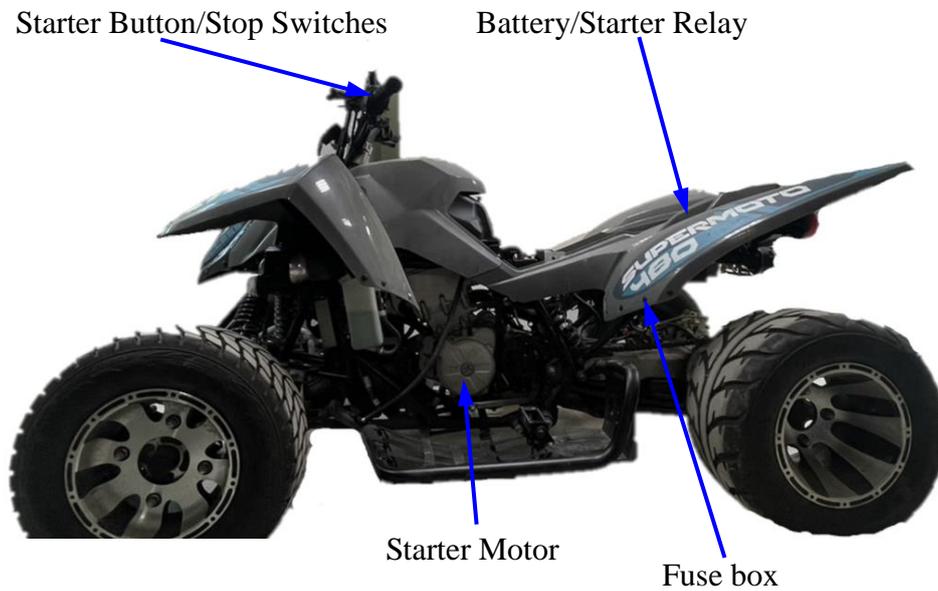
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## STARTING SYSTEM

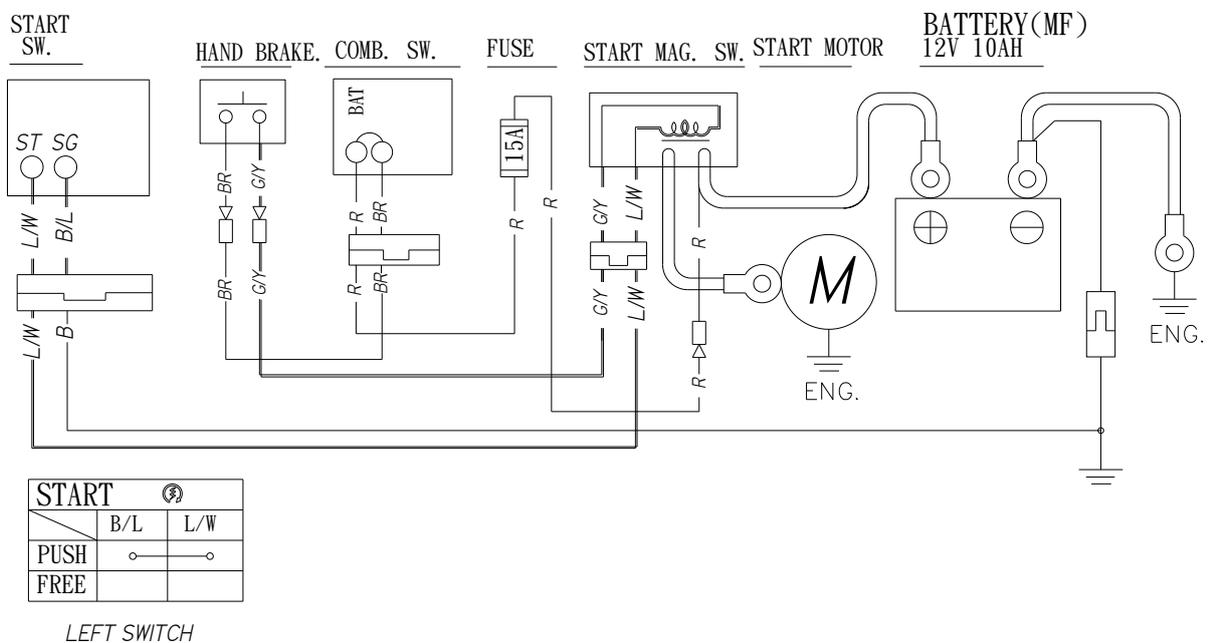
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SERVICE INFORMATION .....	16- 2
TROUBLESHOOTING .....	16- 2
STARTER MOTOR .....	16- 3
STARTER RELAY.....	16- 4
STARTER CLUTCH .....	16- 4

# 16.STARTING SYSTEM



## STARTER SYSTEM DESCRIPTION



This ATV can only start the engine with pulling the clutch lever.

# 16.STARTING SYSTEM

---

## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- The removal of starter motor can be accomplished with the engine installed.

## TROUBLESHOOTING

### Starter motor won't turn

- Fuse burned out
- Weak battery
- Faulty ignition switch
- Faulty starter clutch
- Faulty front or rear stop switch
- Faulty starter relay
- Poorly connected, broken or shorted wire
- Faulty starter motor

### Lack of power

- Weak battery
- Loose wire or connection
- Foreign matter stuck in starter motor of gear

### Starter motor rotates but engine does not start

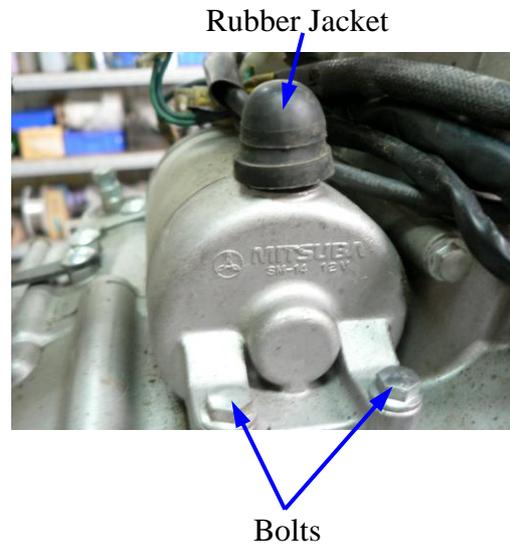
- Faulty starter clutch
- Weak battery

# 16.STARTING SYSTEM

## STARTER MOTOR REMOVAL

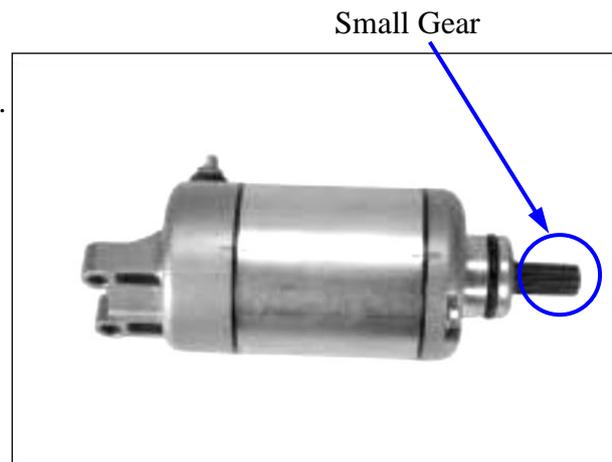
- \* Before removing the starter motor, turn the ignition switch OFF and remove the battery ground. Then turn on the ignition switch and push the starter button to see if the starter motor operates properly.

Remove the waterproof rubber jacket and remove nut to disconnect the starter motor cable connector.  
Remove the two starter motor mounting bolts and the motor.



Remove the starting motor then connect to battery to check if the rotation is abnormal noise.  
Change to new parts, if it is abnormal.

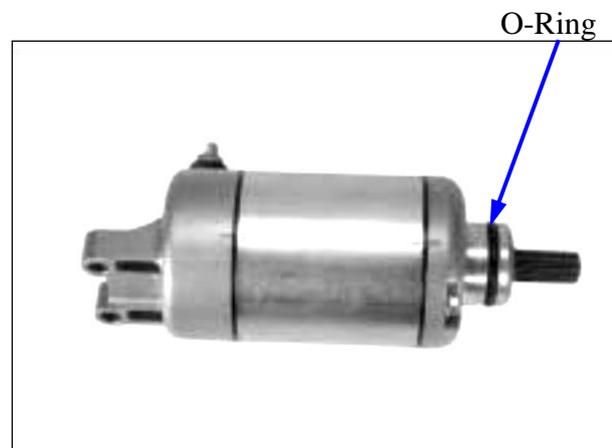
- \* When motor is in operation, do not touch with hand to small gear to prevent from danger.



Connect the starter motor cable connector and properly install the waterproof rubber jacket.  
Check the O-ring for wear or damage and replace if necessary.  
Apply grease to the O-ring and install the starter motor.  
Tighten the two mounting bolts.

**Torque:**0.9~1.2kgf-m

- \* The starter motor cable connector must be installed properly.



# 16.STARTING SYSTEM

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## STARTER RELAY

### INSPECTION

Remove the seat. (Refer to the chapter 2)  
Turn the ignition switch ON and the starter relay is normal if you hear a click when the starter button is depressed.

If there is no click sound:

- Inspect the starter relay voltage
- Inspect the starter relay ground circuit
- Check for continuity between the starter relay yellow/red and green/yellow wire terminals.

Starter Relay



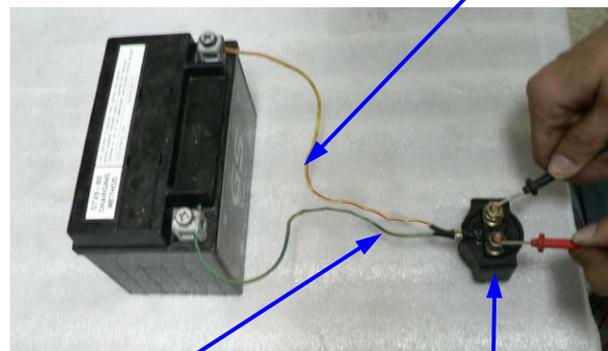
## STARTER RELAY VOLTAGE

### INSPECTION

Connect a 12V battery across the starter relay yellow/red and green /Yellow wire terminals.

Connect an electric tester between the starter relay large terminals and check for continuity between the two terminals.  
The relay is normal if there is continuity.  
Replace the starter relay with a new one if there is no continuity.

Yellow /Red Wire



Green/Yellow Wire

Starter Realy

## STARTER CLUTCH

### REMOVAL / INSTALLATION

Refer to the chapter 9

# 17.LIGHTS/SWITCHES

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## LIGHTS/SWITCHES

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SERVICE INFORMATION .....	17- 1
SIGNAL LIGHT .....	17- 2
HORN (ON ROAD) .....	17- 7
IGNITION SWITCH .....	17- 4
HANDLEBAR SWITCH .....	17- 5
GEAR POSITION SWITCH .....	17- 6

# 17.LIGHTS/SWITCHES

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## SERVICE INFORMATION

- A continuity test can be made with the switches installed on the vehicle.
- All plastic connectors have locking tabs that must be released before disconnecting, and must be aligned when reconnecting.
- To isolate an electrical failure, check the continuity of the electrical path through the part.
- A continuity check can usually be made without removing the part from the vehicle.
- Simply disconnect the connectors and connect a continuity tester to the terminals or connections.

ITEM	SPECIFICATION	
Head lamp	HI	12V/35W
	LO	12V/35W
	POSITION	12V/5W
Brake / Tail lamp	4.2W/2.2W(LED)	
Signal lamp	0.82W(LED)	

# 17.LIGHTS/SWITCHES

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## SIGNAL LIGHT (ON ROAD)

### FRONT

This ATV's signal light is Halogen type.

Disconnect the signal light wire leads.  
Remove the nut.  
Remove the signal light assembly.

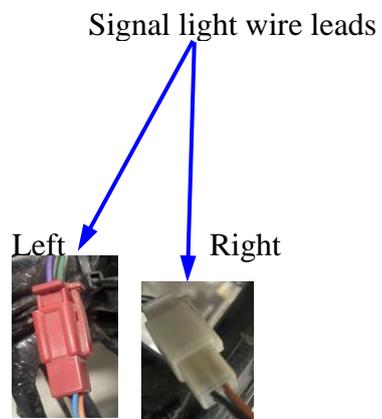
### INSTALLATION

The installation sequence is the reverse of removal.



### REAR

Disconnect the signal light wire leads.  
Remove the nut.  
Remove the signal light assembly.



# 17.LIGHTS/SWITCHES

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## INSTALLATION

The installation sequence is the reverse of removal.



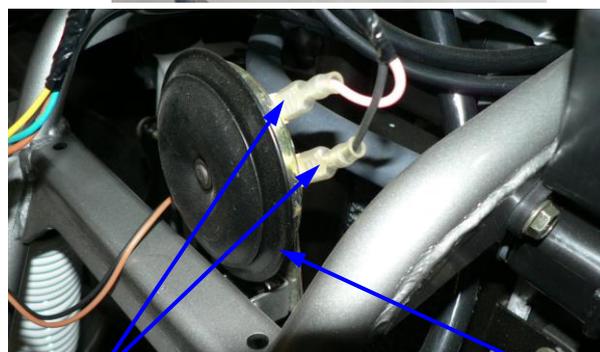
## HORN (ON ROAD)

### REMOVAL

Disconnect the horn wire leads.  
Remove the bolt and remove horn.

### INSTALLATION

The installation sequence is the reverse of removal.



# 17.LIGHTS/SWITCHES

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## IGNITION SWITCH INSPECTION

Disconnect the ignition switch connectors.

Check for continuity between the switch side connector terminals in each switch position.

Continuity should exist between the color coded wires as right:

	R	Br	L	R/W
OFF				
ON	○—○			
⚡	○—○	○—○	○—○	

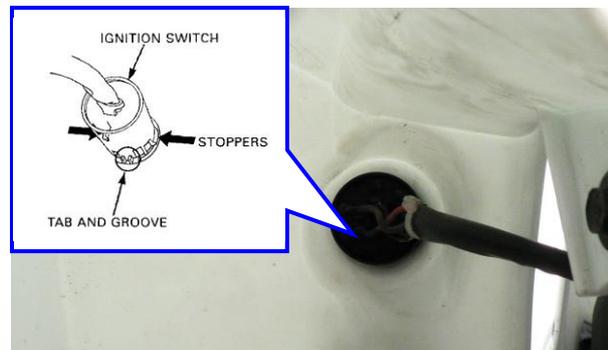
## REPLACEMENT

Remove the ignition switch clips.

Remove the ignition switch from the cover.

Install a new ignition switch by aligning the locating tab with the groove in the cover.

Install the removed parts in the reverse order of removal.

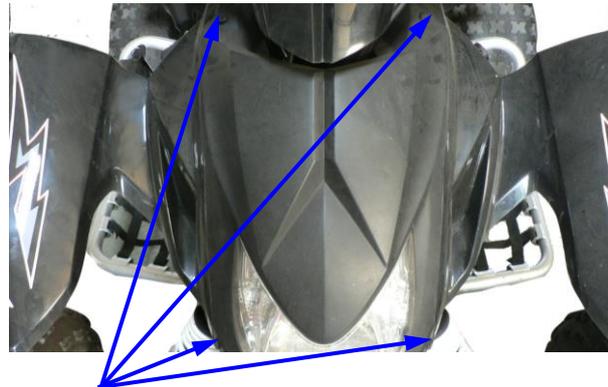


# 17.LIGHTS/SWITCHES

## HANDLEBAR SWITCH INSPECTION

Remove fender cover.  
Disconnect the connectors.

Check for continuity between the switch side connector terminals in each switch position.  
Continuity should exist between the color coded wires as next page:



Plastic Rivet

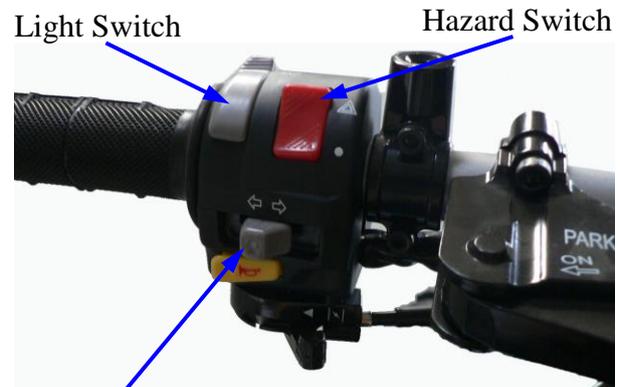
HORN			
	Br	P	
PUSH	○	○	
FREE			

WINKER					
	Br/W	DBR	DG		
	○	○			
	○	○			

START			
	B/L	L/W	
PUSH	○	○	
FREE			

DIMMER					
	L	G	Y		
	○	○			
	○	○			

WARNING					
	Br/W	DBR	DG		
	○	○			
					



Winker Switch



Start Switch

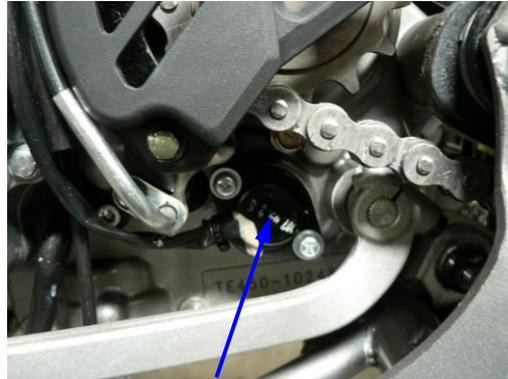
# 17.LIGHTS/SWITCHES

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## GEAR POSITION SWITCH

### INSPECTION

Measure switch for continuity using a tester.  
If any abnormality is found, replace the  
gear position switch with a new one.



Gear position switch