

# SERVICE MANUAL

CF250  
CF250-A

# 250NK



# CFMOTO

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Edition Date: 20190812

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## FOREWORD

This manual introduces CF250/CF250-A maintenance information, removal & installation procedures, Inspection & adjustment methods, troubleshooting and technical specifications.

Chapter 1 mainly introduces general operation information, service tools, vehicle structure and basic specifications.

Chapter 2 mainly introduces inspection & adjustment methods and how to do vehicle maintenance.

Chapter 3 mainly introduces disassembly, installation, adjustment, maintenance and troubleshooting information.

Due to constant improvements in the design and quality of production components, some minor discrepancies may result between the actual vehicle and the information presented in this publication. Depictions and/or procedures in this publication are intended for reference use only. The most current version of this manual can be found on-line at [www.cfmoto.com](http://www.cfmoto.com).

This Model (CF250/CF250-A) is subject to standard: Q/CFD 013. This manual is in accordance with standard: GB/T9969-2008 and GB/T19678-2005.

CFMOTO reserves right to make improvements and modifications to the products without prior notice. Overhaul and maintenance should be done according to actual condition of vehicle.

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Conversion table			
A	Ampere	lb	Pound
ABDC	After Bottom Dead Center	m	Meter
AC	Alternating Current	min	Minute
ATDC	After Top Dead Center	N	Newton
BBDC	Before Bottom Dead Center	Pa	Pascal
BDC	Bottom Dead Center	PS	Metric Horse Power
BTDC	Before Top Dead Center	psi	Pound/Square Inch
°C	Centigrade	r	Revolutions
DC	Direct Current	rpm	Revolutions Per Minute
F	Farad	TDC	Top Dead Center
°F	Fahrenheit	TIR	Total Indicator Reading
ft	Feet	V	Volt
g	Gram	W	Watt
h	Hour	Ω	Ohm
L	Litre	in	Inch
US gal	Gallon(Us)	US qt	Quart(US)
oz	Ounce	HP	British Horsepower
cm Hg	Centimeter Of Mercury	pint	Pint
cu in	Cubic Inch	mL	Milliliter

This service manual is not only specially designed for professional machinist, but also it is used to instruct the user how to do maintenance work. It is necessary to know technology knowledge, tools usage and have a well understanding of service procedures before you perfectly solve all service problems. Or get the service support by professional machinist. Read this service manual and understand it before operation. Always use CFMOTO approved special service tools and equipments. All service and scheduled maintenance should be executed base on the instructions of service manual. Any consequences are responsible by the owner resulted from any rule-breaking operations.

## How To Get Long Service Life

- Follow scheduled maintenance and service operations base on service manual.
- Non-periodical maintenance in special situations.
- Use tools properly and use CFMOTO genuine parts.

Special tools has been listed into this service manual for necessary genuine parts.

- Strictly operated bas on the correct service procedures.
  - Keep fully service records and specify the date of new parts replacement.
-

Please read below explanations carefully. It explains the meaning of “DANGER/WARNING/CAUTION”:

**⚠ DANGER:** The Danger alert and icon indicates a potential hazard that may cause serious injuries or death.

**⚠ WARNING:** The Warning alert and icon indicates a potential hazard that may cause light or medium injury.

**⚠ CAUTION:** The Caution alert and icon indicates a potential hazard that requires you to pay attention.

The other three symbols below are to distinguish the different levels of warning information in service manual.

- Procedure or operation should be acted
  - One step of whole procedures or how to operate after acted procedures. Probably it is the guidance before attention matters.
  - ★ To take actions based on the front steps or test results from the front procedures. It shows detail illustration including torque, lubrication oil, lubrication grease and tighten glue during assembling.
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# 01 Maintenance Information

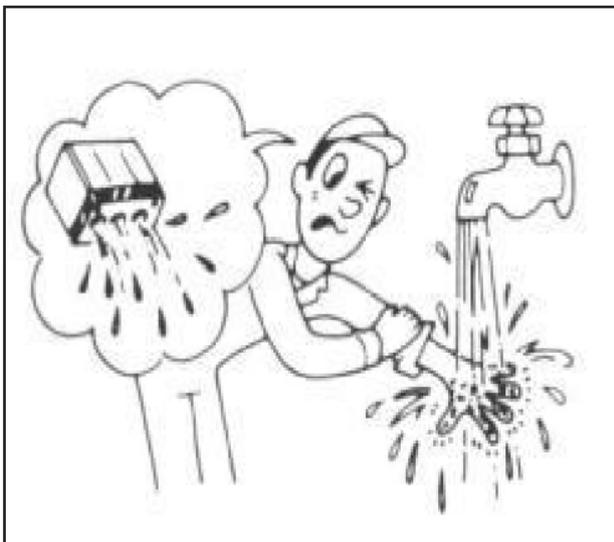
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## 1.1 Operation Cautions

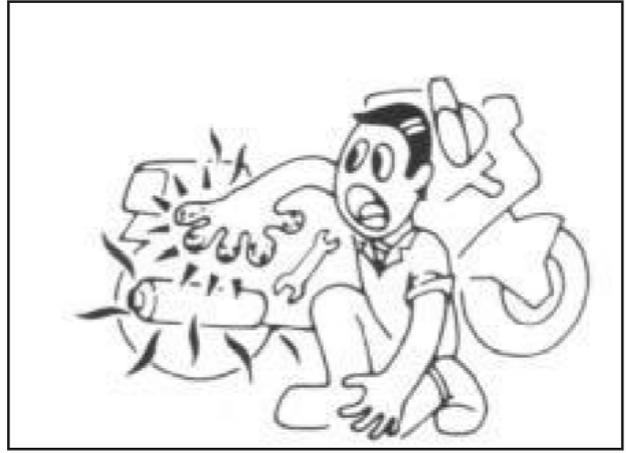
**⚠ CAUTION:** Hazardous compents in exhaust. Do not run the engine in a enclosed or poor ventilated place for a long time.



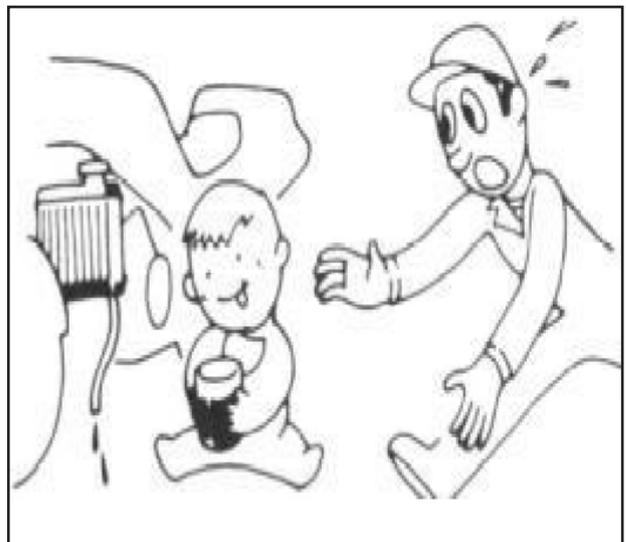
**⚠ CAUTION:** Battery liquid (dilute sulfuric acid) is highly caustic and may cause burns to skin and eyes. Flush with water if splashed to skin and get immediate medical attention. Flush with water if splashed to clothes to avoid burns. Keep battery and liquid away from reach of children.



**⚠ CAUTION:** Don't touch the engine or muffler with bare hands when the engine has just stopped to avoid hurt. Wear long-sleeve work clothes.

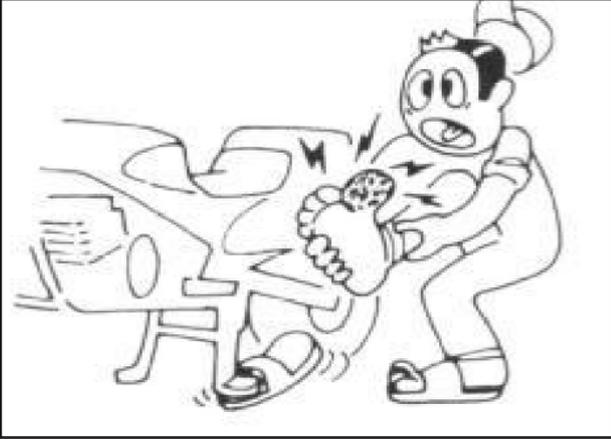


**⚠ CAUTION:** Coolant is poisonous. Do not drink or splash to skin, eyes or clothes. Flush with plenty of soap water if splashed to skin. Flush with water and consult doctors. If drinking the coolant, induce vomiting and consult doctors. Keep coolant away from reach of children.



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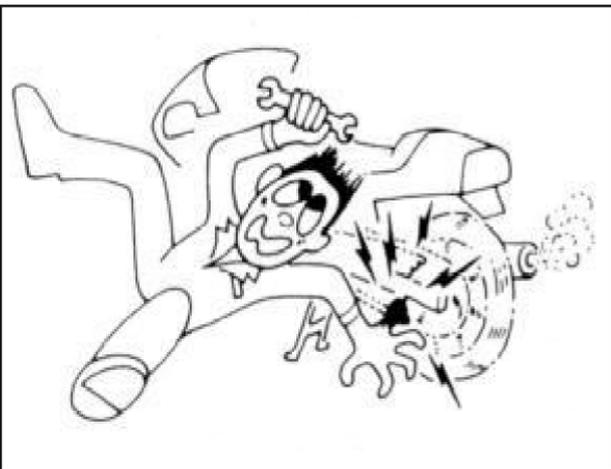
**⚠ CAUTION:** Wear proper work clothes, cap and boots. Wear dust-glass, gloves and mask if necessary.



**⚠ CAUTION:** When charged, Battery may generate hydrogen which is explosive. Charge the battery in a well-ventilated place.



**⚠ CAUTION:** Be careful to get clamped by the turning parts like wheels and clutch.



**⚠ CAUTION:** Coolant Gasoline is highly flammable. No smoking or fire. Also keep against sparks. Vaporized gasoline is also explosive. Operate in a well-ventilated place.

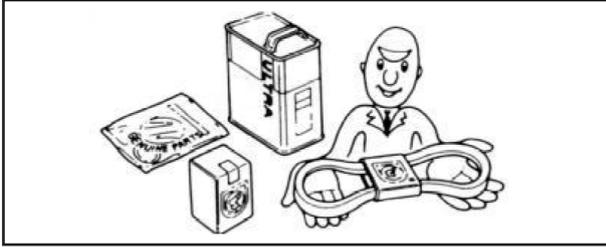


**⚠ CAUTION:** The asbestos dust on the brake drum is carcinogenic. Do not clean off the dust with compressed air. Use cleaning detergent to avoid dust proliferation.

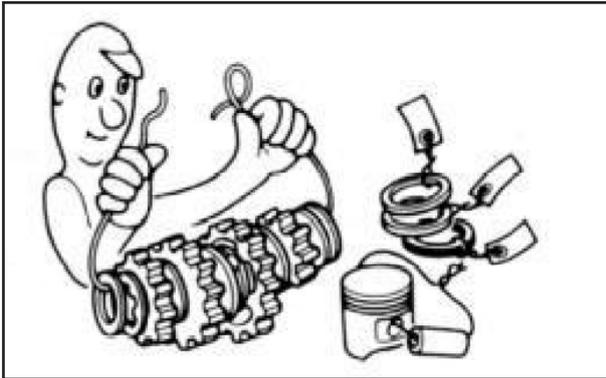


## 1.2 Disassembly and Assembly Cautions

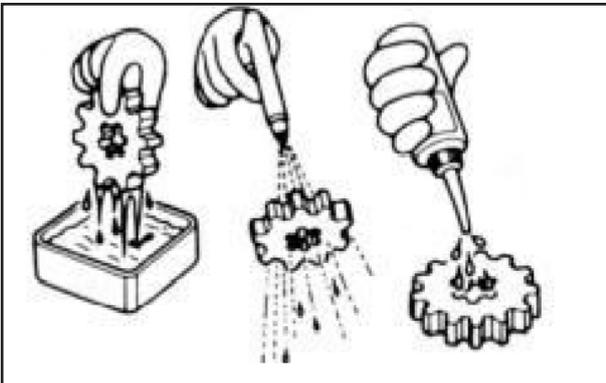
- Use genuine CFMOTO Parts, lubricants and grease.



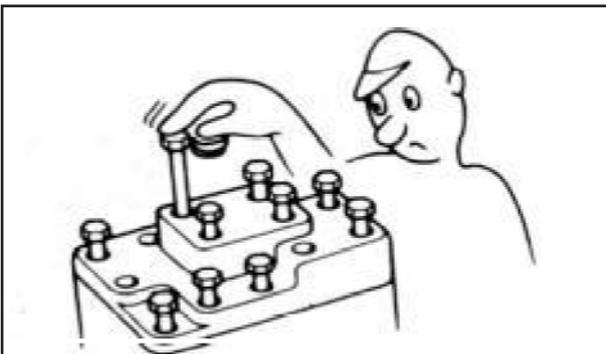
- Place and store the disassembled parts separately in order for correct assemble.



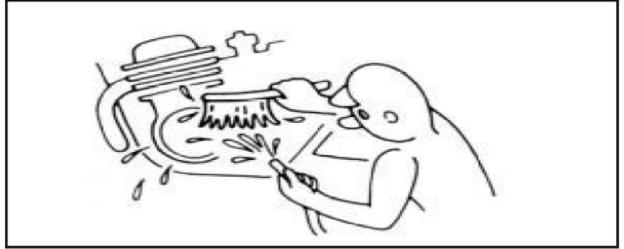
- Clean and blow off the detergent after disassembling the parts. Apply lubricants on the surface of moving parts.



- If not know the length of screws, install the screws one by one and tighten with same torque.



- Clean the mud, dust before overhauling.



- Replace the disassembled washers, O-rings, piston pin circlip and cotter pin with new ones.

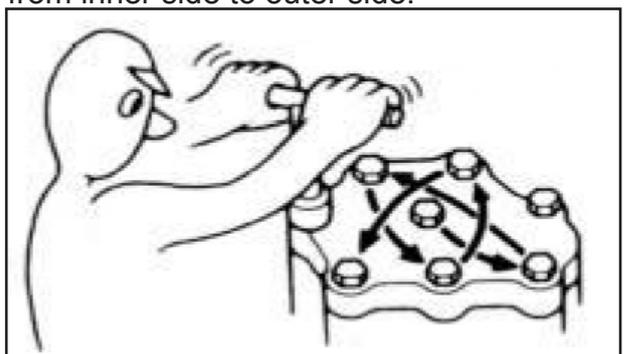
- Elastic circlips might get distorted after disassembled. Do not use the loosed circlips.



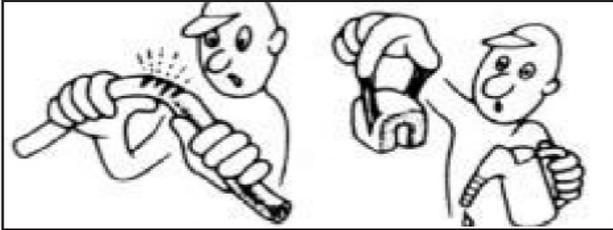
- Measure the data during disassembly for correct assembly.



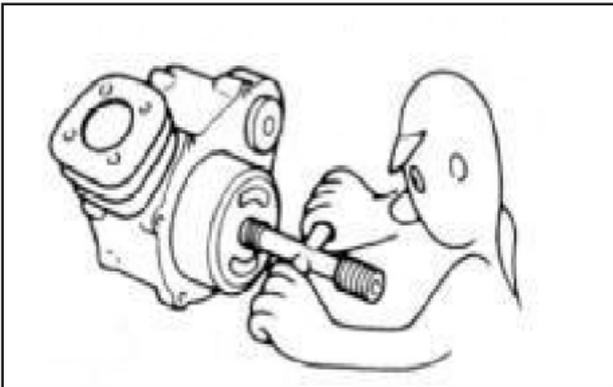
- Pre-tighten the bolts, nuts and screws, then tighten them according to the specified torque, from big to small and from inner side to outer side.



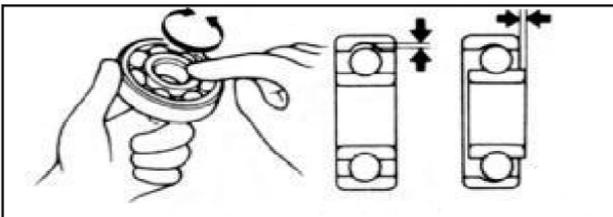
■ Check if the disassembled rubber parts are aged and replace it if necessary. Keep the rubber parts away from grease.



■ Use special tools wherever necessary.



■ Turn the ball bearing with hands to make sure the bearing will turn smoothly. Replace if the axial or radial play is too big. If the surface is uneven, clean with oil and replace. If the cleaning does not help. When pressing the bearing into the machine or to the shaft, replace the bearing if it could not be pressed tight.



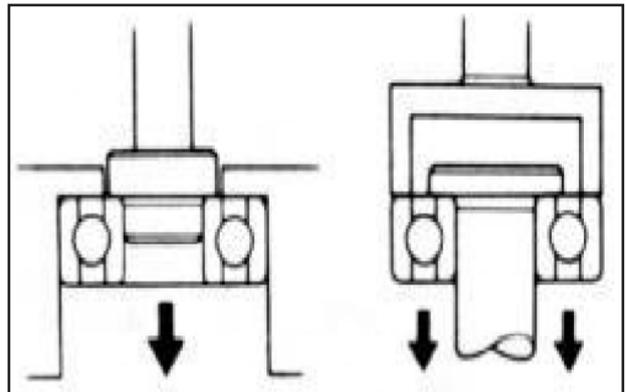
■ Keep the bearing block still when blowing dry the bearing after washing clean. Apply oil or lubricant before assembling.



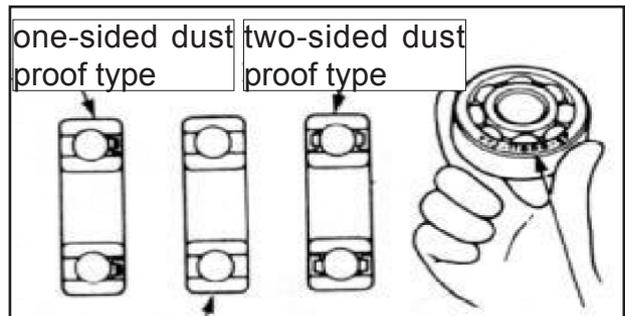
■ Apply or inject recommended lubricant to the specified parts.



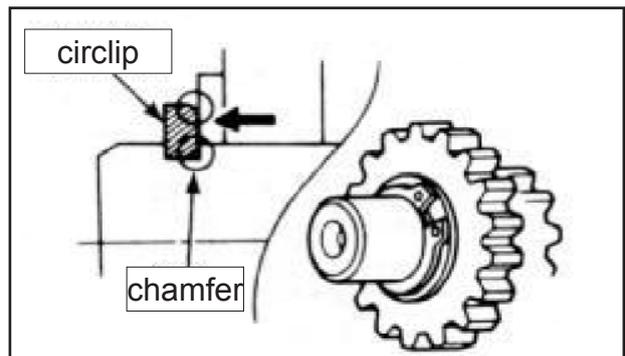
■ If the disassembling of pressed ball bearing is done by pressing the balls, the disassembled should not be used again.



■ Install the one-side dust-proof bearing in the right direction. When assembling the open type or double-side dust-proof bearing, install with manufacturer's mark outward.

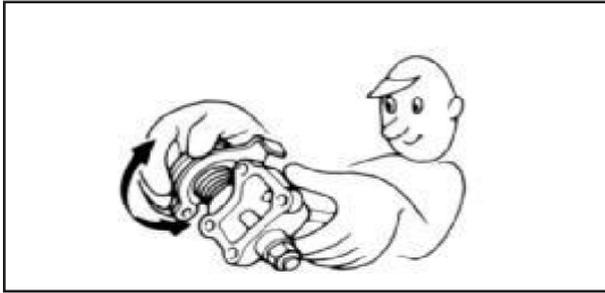


■ Install the elastic circlip after assembling to make sure it has been installed into the slot.

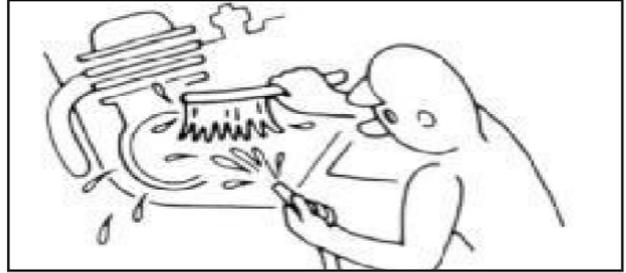


# 01 Maintenance Information

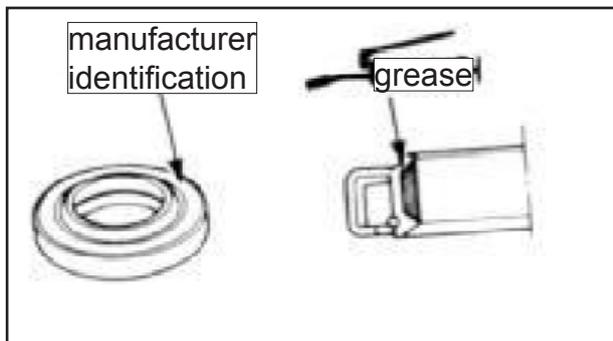
■After assembling,check if all the tightened parts are properly tightened and can move smoothly.



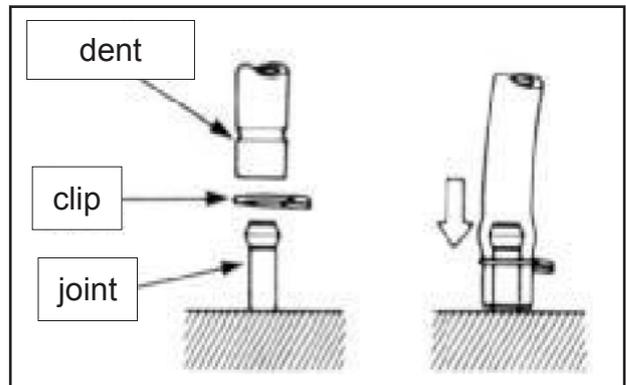
■Brake fluid and coolant may damage coating, plastic and rubber parts. Flush these parts with water if splashed.



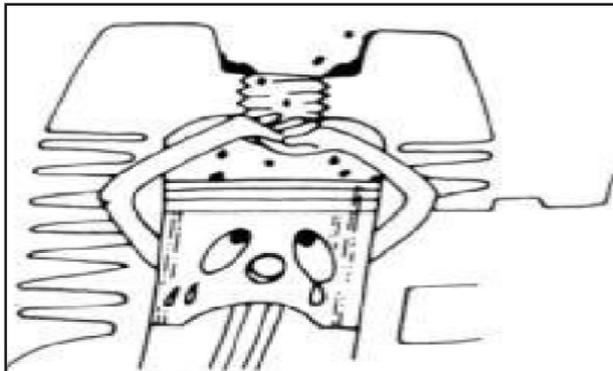
■Install oil seal with the side of manufacturer's mark outward. Do not fold or scratch the oil seal lip. Apply grease to the oil seal lip before assembling.



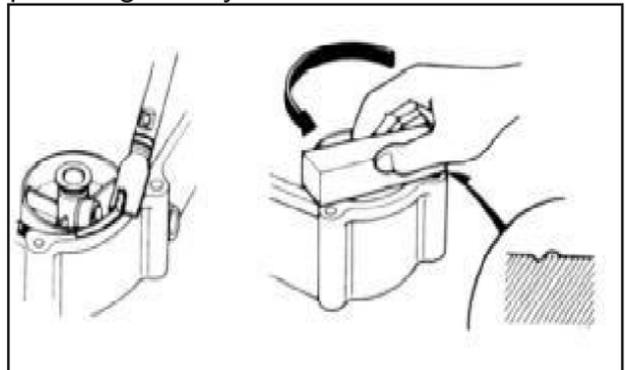
■When installing pipes,insert the pipe till the end. Fit the pipe clip, if any, into the rove. Replace the pipes or hoses that cannot be tightened.



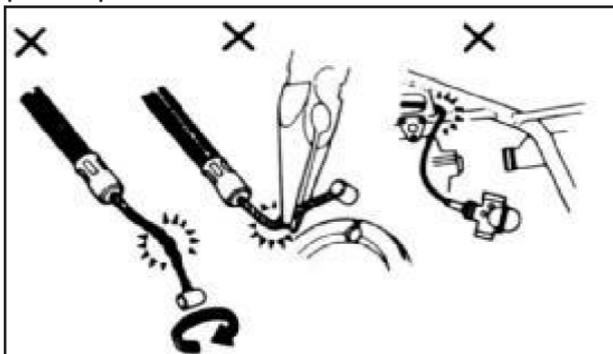
■Do not mix mud or dust into engine or the hydraulic brake system.



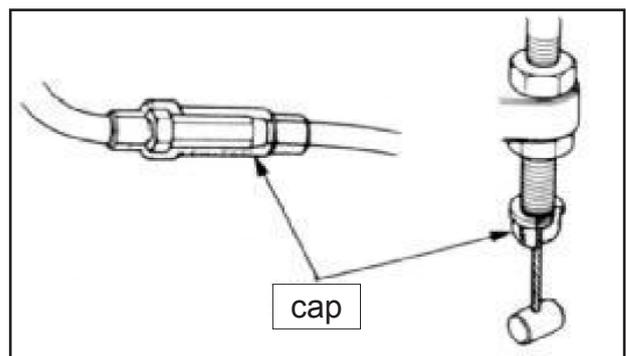
■Clean the gaskets and washers of the engine cases before assembling. Remove the scratches on the contact surfaces by polishing evenly with an oil stone.



■Do not twist or bend the cables too distorted or damaged cables may cause poor operation.



■When assembling the parts of protection caps, insert the caps to the grooves, if any.



## 1.3 VIN and EIN location: CF250/CF250-A

CF250

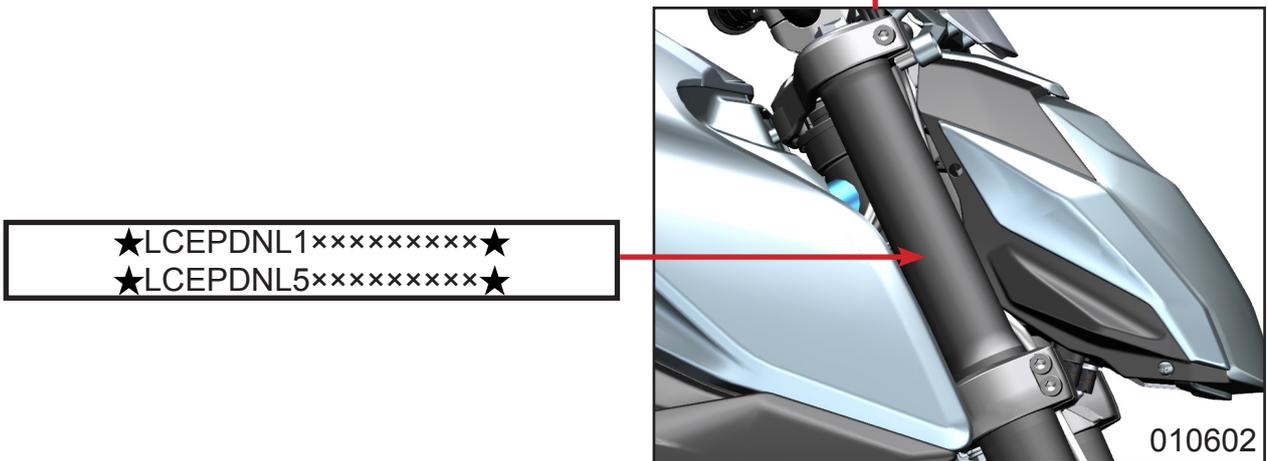
VIN: ★LCEPDNL1xxxxxxxx★

EIN: 172MM-2

CF250-A

VIN: ★LCEPDNL5xxxxxxxx★

EIN: 172MM-2A



★LCEPDNL1xxxxxxxx★  
★LCEPDNL5xxxxxxxx★

## 1.4 Main Specifications

Item		Specifications	
Model		CF250/CF250-A	
Length		1990mm	
Width		780mm	
Height		1070mm	
Wheel Base		1360mm	
Engine Model		172MM-2/172MM-2A	
Displacement		249mL	
Fuel Grade		92# Or Higher	
Gross Weight		151kg	
Persons Allowed		2 (Include Operator)	
Load Allowed		150kg	
Tire	Front	110/70R17 M/C 54S	
	Rear	140/60R17 M/C 63S	
Min. Ground Clearance		150mm	
Turning Circle Diameter		5000mm	
Steering	Steering Angle	Left	35°
		Right	35°
Brake System		Front	Hydraulic Disc
		Rear	Hydraulic Disc
Shock Absorber	Suspension	Front Wheel	Telescopic
		Rear Wheel	Cantilever Type
Frame Type		Steel Tube	
Item		Standard	
Fuel System	Fuel Capacity	12.5L	
	Injector	Type: F01r00mg11	
	Fuel Pump	Voltage: DC13.5V	
		Pressure: 0.33MPa±0.01MPa	
		Low:≥45L/H	
Idle Speed	Current:≤2.20A		
		1500r/min±150r/min	

## 1.5 Specifications for Maintenance

### Front Wheel

Item		Standard	Service Limit	
Front Wheel	Front Wheel Shaft Bending	-	0.2mm	
	Rim Run-Out	Longitudinal	0.6mm	
		Horizontal	0.6mm	
	Tire	Remaining Groove	-	0.8mm
		Tire Pressure	225kPa (2.25kgf/cm <sup>2</sup> )	-

### Rear Wheel

Item		Standard	Service Limit	
Rear Wheel	Rear Wheel Shaft Bending	-	0.2mm	
	Rim Run-Out	Longitudinal	0.6mm	
		Horizontal	0.6mm	
	Tire	Remaining Groove	-	0.8mm
		Tire Pressure	1 Person 225kPa (32.6PSI) 2 Persons 250kPa(36.3PSI)	-
Rear Brake Pad Thickness	-	4mm	2mm	

### Brake System

Item		Standard	Service limit
Front Brake	Front (Hand Brake) Free Travel	5mm~20mm	-
	Brake Disc Wear	4mm	3mm
Rear Brake	Rear (Foot Brake)Free Travel	5mm~20mm	-
	Brake Disc Wear	4mm	3mm

### Fuse, Lights and Indicators on Dashboard

Item		Standard
Fuse	Main	30A
	Auxiliary	10A×2 15A×4
Lights and Indicators	Front Headlight (Hi /Lo )	LED 12V 11W/7.5W/2.7W
	Front& Rear Turning Light	LED 13.5V 1.5W
	Brake Light/Tail Light	LED 12V 4W/0.5W
	License Light	LED 12V 0.2W
	Left Turning Indicator	LED
	Neutral Indicator	LED
	EFI Fault Indicator	LED
	ABS Fault Indicator	LED
	Right Turning Indicator	LED
	Engine Water Temperature Indicator	LED
	Fuel Alarm Indicator	LED
	High Beam Indicator	LED
Position Indicator	LED	

## 1.6 Tightening Torque

Item	Torque N·m(kgf·m)	Item	Torque N·m(kgf·m)
5mm Bolt, Nut	5 (0.5)	5mm screw	4 (0.4)
6mm Bolt, Nut	10 (1.0)	6mm screw	9 (0.9)
8mm Bolt, Nut	22 (2.2)	6mm SH Flange bolt	10 (1.0)
10mm Bolt, Nut	34 (3.5)	6mm Flange bolt, nut	12 (1.2)
12mm Bolt, Nut	54 (5.5)	8mm Flange bolt, nut	26 (2.7)
		10mm Flange bolt, nut	39 (4.0)

Please use standard torque to those items that didn't mention below.

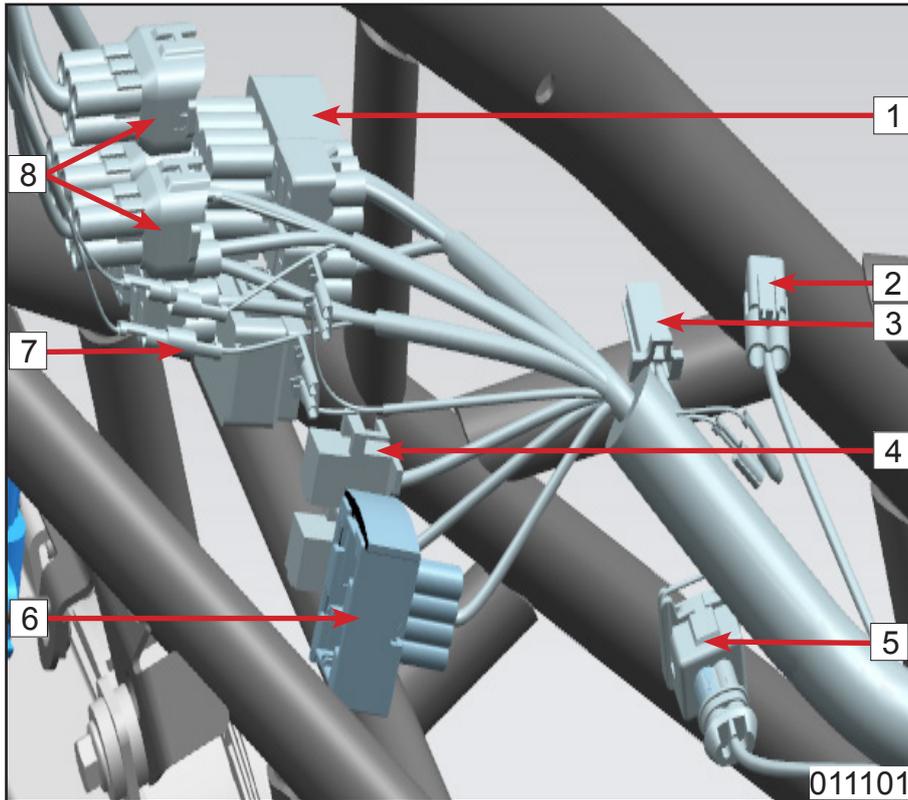
- 1.Lubrication oil should be applied on screw thread and contact surface
- 2.Replace a new one when self-locking bolts disassembled.

Item	Qty	Thread Diameter(mm)	Torque N·m(kgf·m)	Remark
<b>Engine Disassembly And Assembly</b>				
Engine Hanger Bolt	5	5	30 (3.1)	
Engine Hanger Shaft Nut	1	14	100(10.1)	
<b>Front Wheel, Front Suspension,Steering</b>				
Steering Column Locknut	1	26	100(10.1)	
Handlebar Fastening Screw	4	8	20(2.1)	
Front Wheel Axle	1	12	65(10.1)	
Shock Absorber Fastening Bolt(Upper)	2	8	20(2.1)	
Shock Absorber Fastening Bolt(Lower)	4	8	20(2.1)	
<b>Rear Wheel, Rear Suspension</b>				
Rear Axle Shaft Nut	1	14	100(10.1)	
Shock Absorber Fixed Bolt(Upper)	1	10	40(4.1)	
Shock Absorber Fixed Bolt(Lower)	1	10	40(4.1)	
<b>Brake System</b>				
Front Brake Disc Bolt	5	8	30(3.1)	
Front Brake Caliper Bolt	2	10	40(4.1)	
<b>Muffler</b>				
Muffler Exhaust Pipe Nut	2	8	26(2.7)	
Muffler Body Bolt	1	8	20(2.1)	

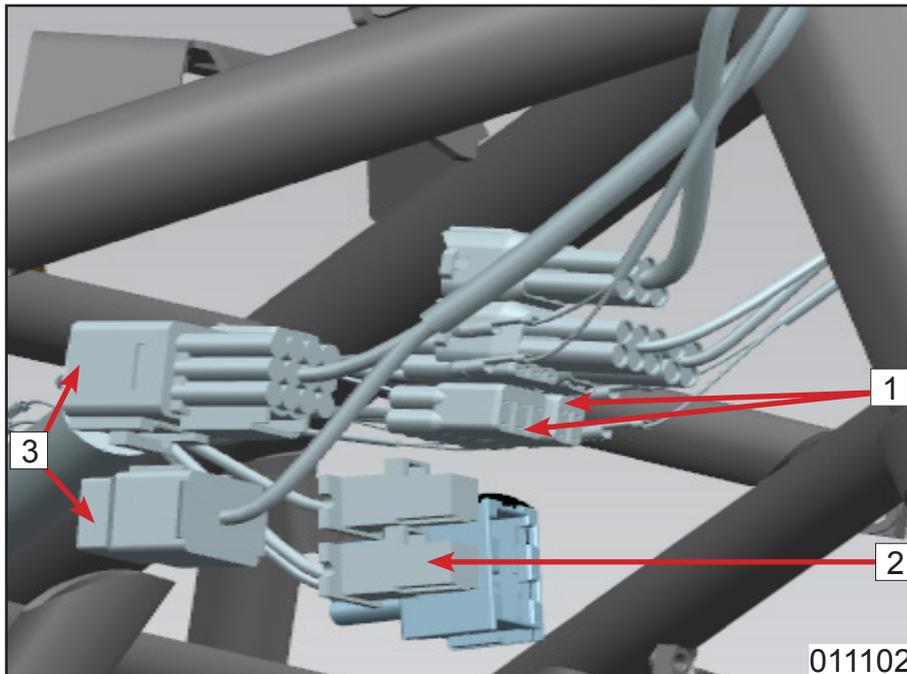
## 1.7 Lubricating Grease

Application areas	Notes	Type
Vehicle's Head Pipe, Bearing Race Wheel Dust-Proof Seal Lip Rear Brake, Cam Joint, Cam Joint, Dashboard Flexible Shaft Joint, Throttle Cable Throttle Handlebar Pivot, Rear Foot Pedal(LH) Pivot, Rear Foot Pedal(RH) Pivot, Side Stand Oil Seal Lip, Rear Fork Gear Surface And Running Part, Counter Gear/Small Gear Axle Part, Main Stand		Multi-purpose lithium base lubrication oil
Thread Of Rear Wheel Axle Nut And Joint Rear Brake, Cam Sealing Felt		Engine oil
Inner Surrounding, Handle Bar		Engine oil

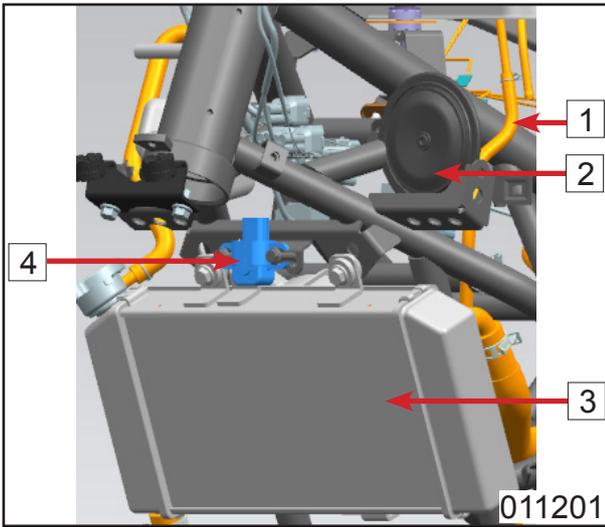
## 1.8 Wires, Pipes and Cables diagram



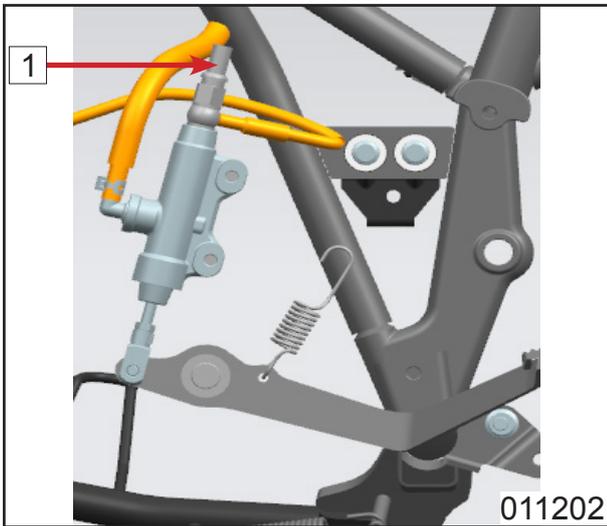
1	Headlight Connector	3	Fuel Sensor Connector	5	Ignition Coil Connector	7	Turning Light Connector
2	Fuel Pump Connector	4	Ignition Switch Lock Connector	6	Oxygen Sensor Connector	8	Right Handlebar Switches Connector



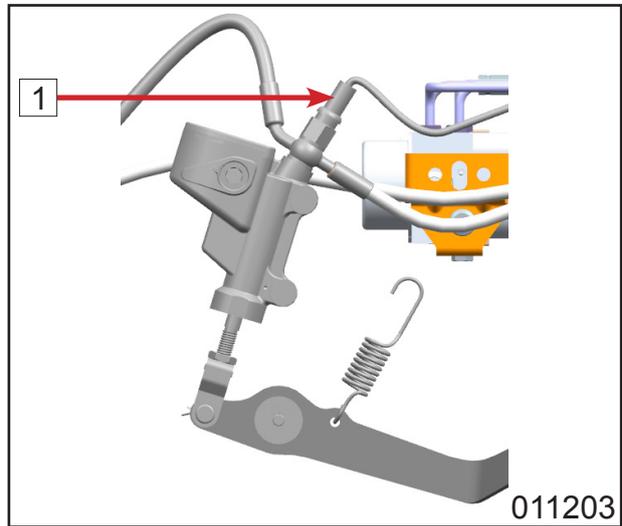
1	Left Handlebar Switches Connector	2	Fan Motor Connector	3	Dashboard Connector
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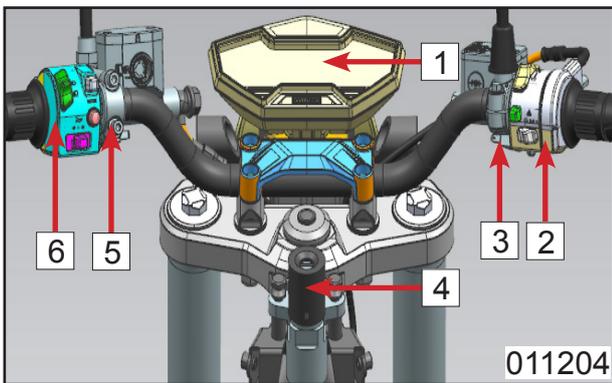
1	Water Pipe	3	Water Reservoir
2	Horn	4	Roll-Over Sensor



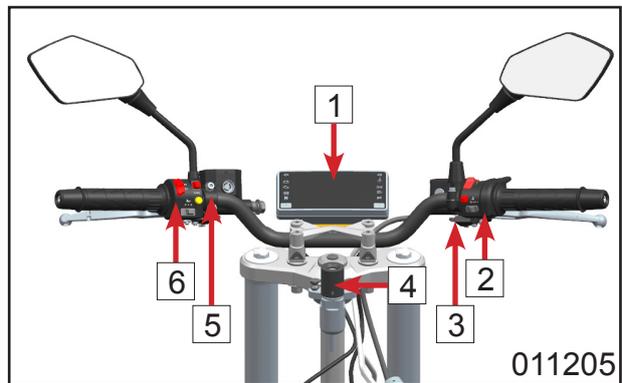
1 Rear Brake Switch (Without ABS)



1 Rear Brake Switch (With ABS)



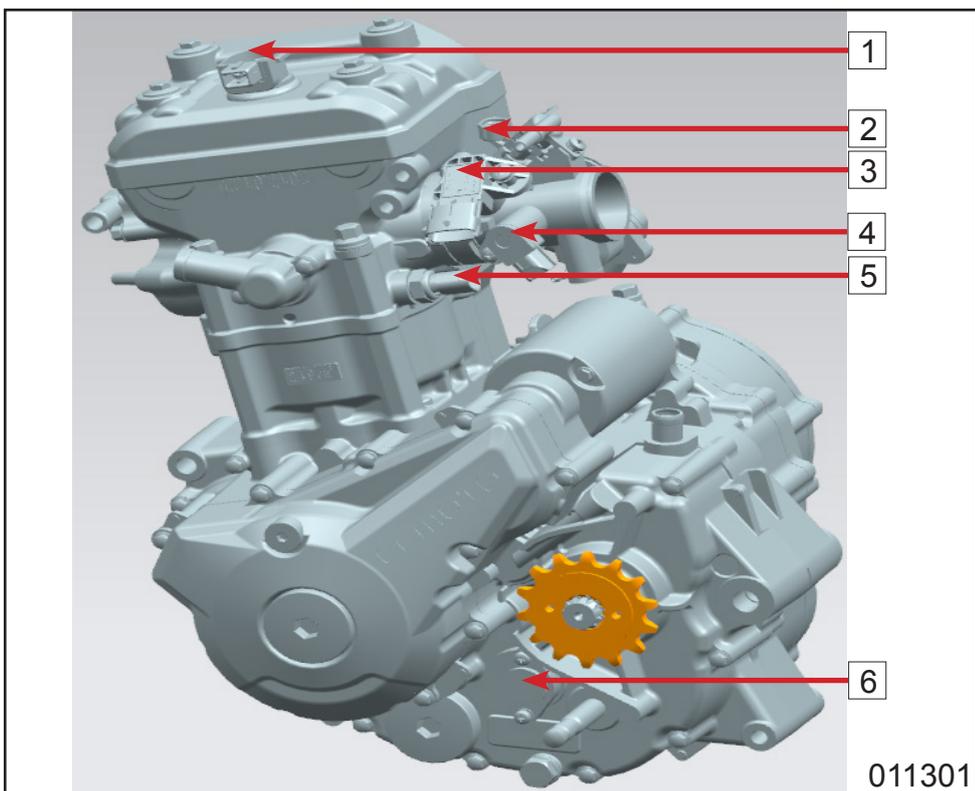
1. Dashboard (Low Configuration)



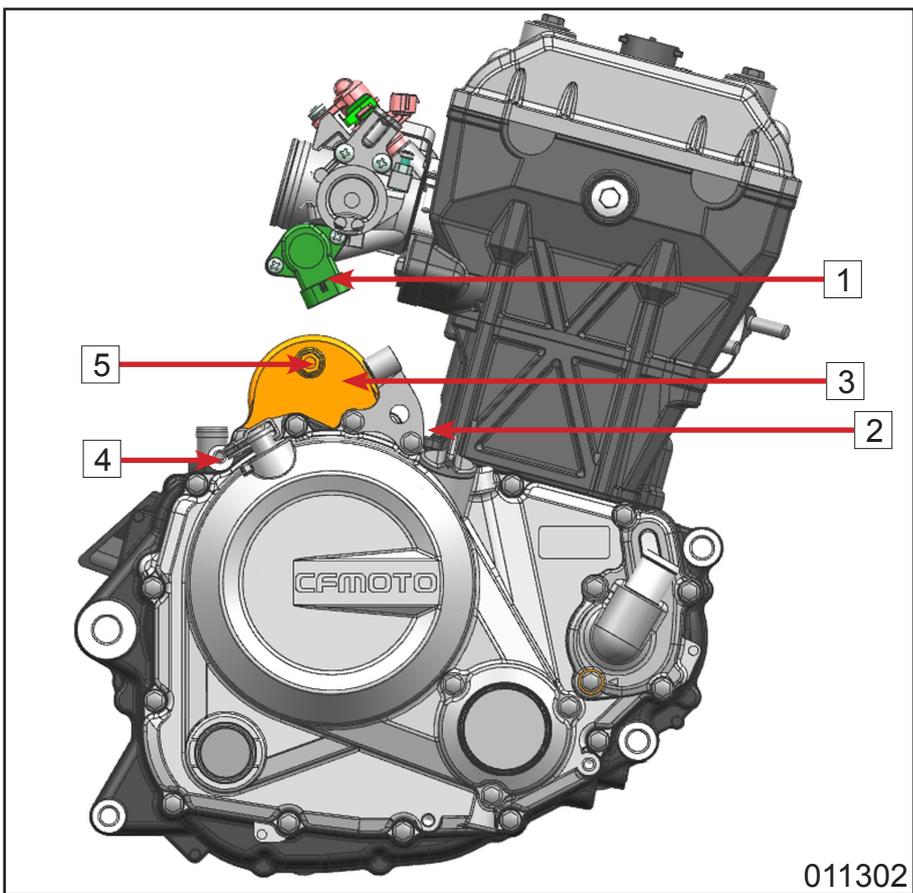
1. Dashboard (High Configuration)

1	Dashboard	3	Brake Lever Switch	5	Clutch Lever Switch
2	Right Handlebar Switches Assembly	4	Ignition Switch Lock	6	Left Handlebar Switches Assembly

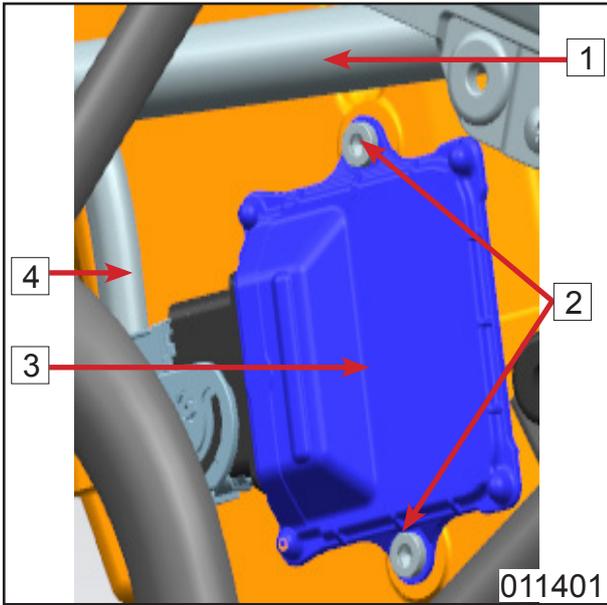
# 01 Maintenance Information



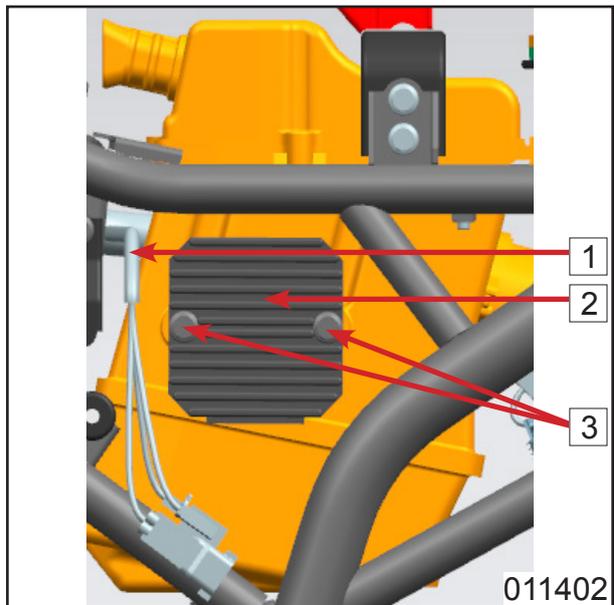
1	Ignition Coil	4	Throttle Position Sensor
2	Fuel Injector	5	Coolant Temperature Sensor
3	T-Map	6	Gear Sensor



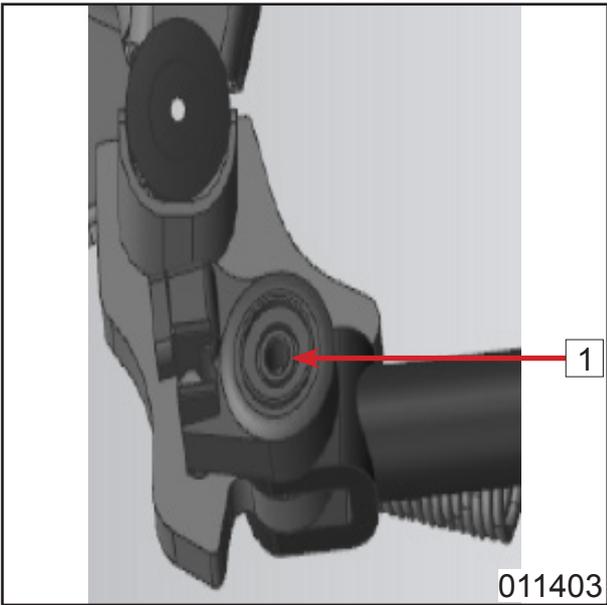
1	Stepper Motor	3	Starter Motor	5	Positive Terminal, Starter Motor
2	Speed sensor	4	Engine housing contact		



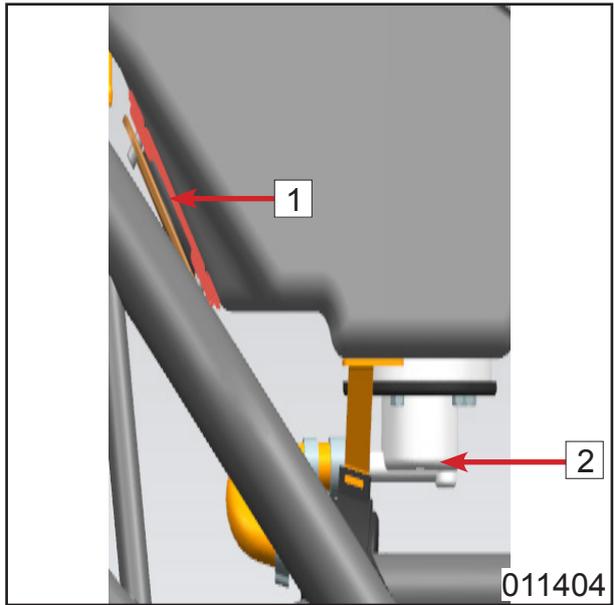
1	Main Cable	3	ECU
2	Bolt	4	ECU Harness



1	Harness	2	Regulator	3	Bolt
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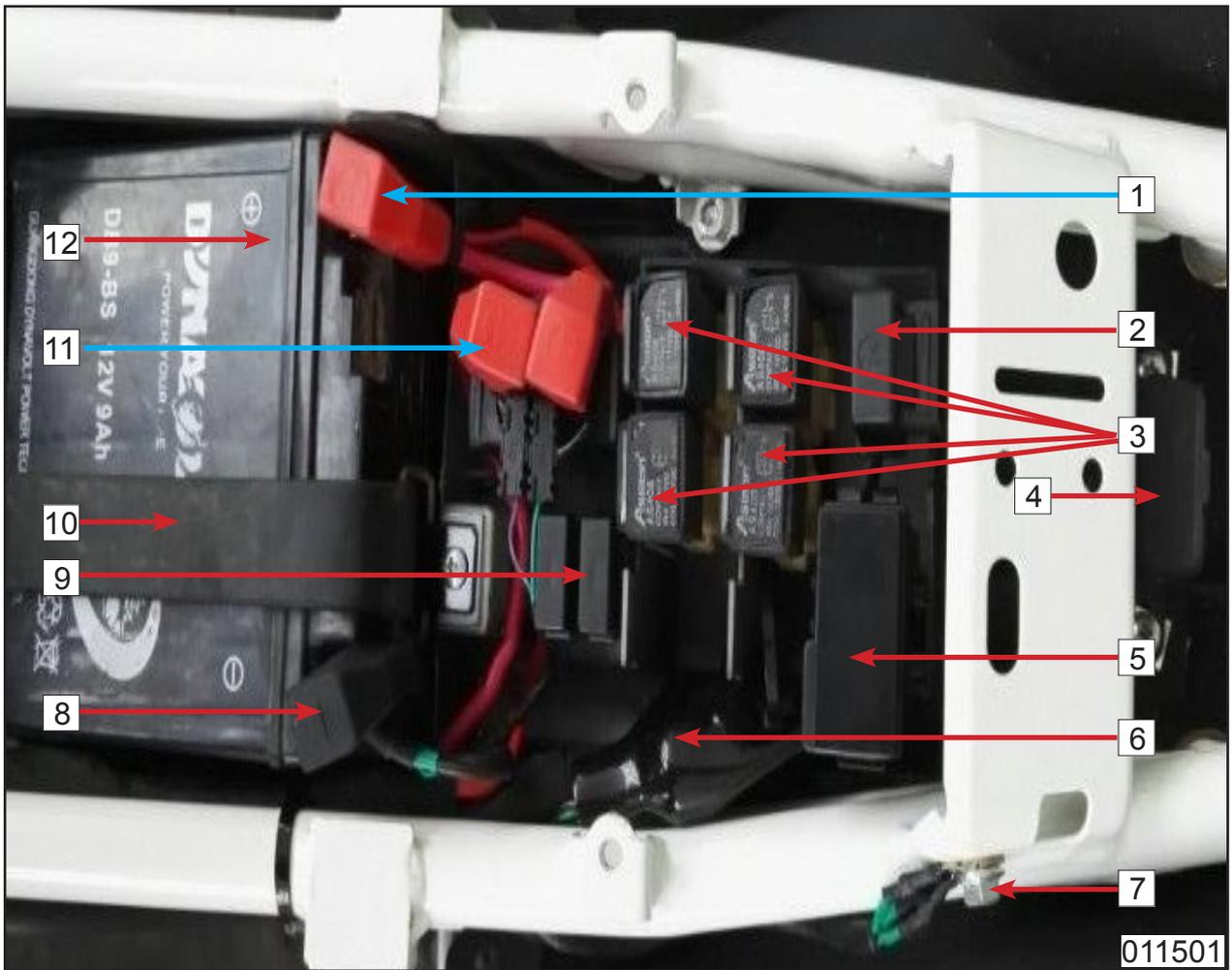


1	Side Stand Switch
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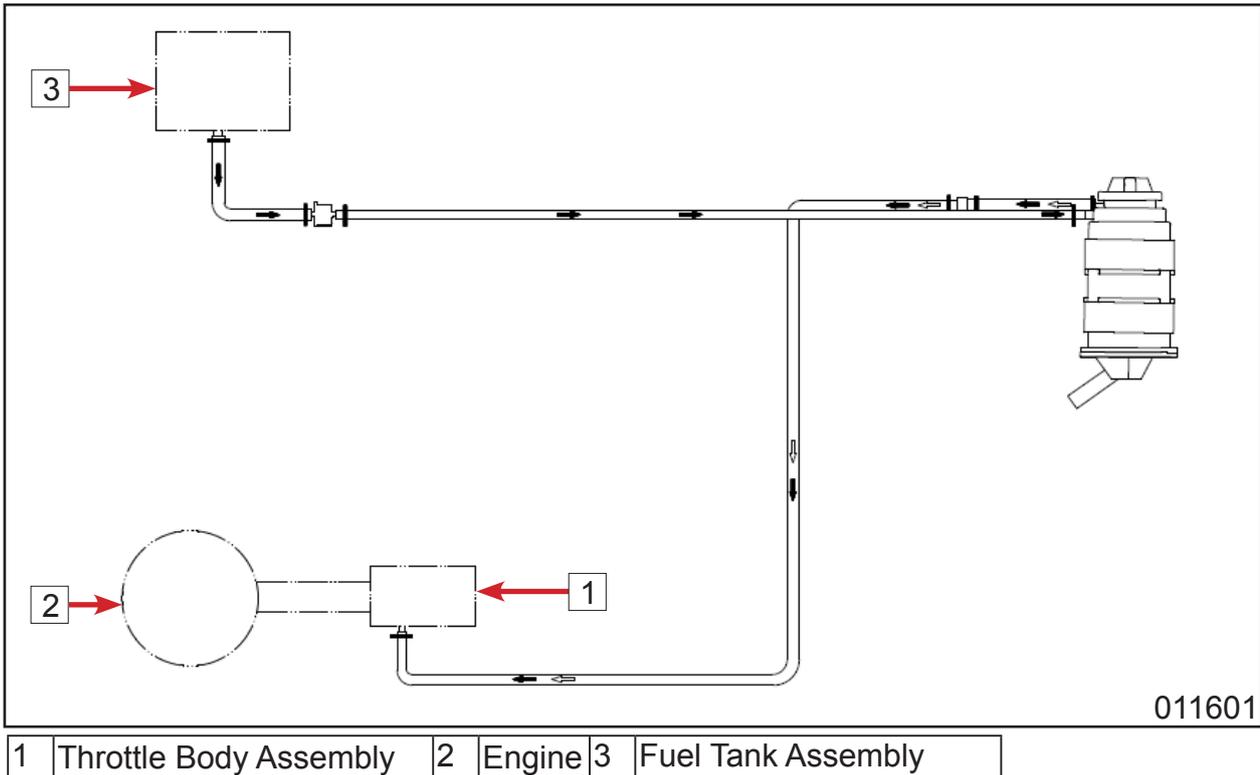
1	Fuel Sensor	2	Fuel Pump
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# 01 Maintenance Information



1	Positive Terminal, Battery	4	OBD Connector	7	Frame Grounding	10	Battery Tie-Band
2	Flasher	5	Fuse Box	8	Negative Terminal, Battery	11	Starter Relay
3	Auxiliary Relay	6	Harness	9	Main Fuse (30A)	12	Battery

## Fuel Evaporation System Schematic Diagram



**⚠ Caution:** Fixed the anti roll-over valve as horizontal position. Don't modify fuel evaporation system. Tubes should be well connected after maintenance, disassembling without air leakage, blocking, squeezing, broken and damage etc. Fuel steam will be released into carbon tank by absorption tube from fuel tank. Absorbing fuel steam by active carbon when engine stop; Fuel steam of carbon tank will follow into combustor for burning when engine working in order to avoid environment pollution if fuel stem released into air directly. Meanwhile, Air pressure of fuel tank should be balanced by absorption tube. If inner pressure of fuel tank is lower than outside, it is available to replenish air pressure by air tube of carbon tank or absorption tube. All tube system should be smooth running without blocking and squeezing, otherwise fuel pump will be damaged, fuel tank will be deformed or broken.

# 02 Inspection and Adjustment

<p><b>2.1 Overhaul Information .....02-1</b></p> <p><b>2.2 Periodic Maintenance Schedule.....02-1</b></p> <p><b>2.3 Fuel Filter .....02-5</b></p> <p><b>2.4 Throttle cable .....02-5</b></p> <p><b>2.5 Chain.....02-6</b></p> <p><b>2.6 Clutch Cable.....02-6</b></p> <p><b>2.7 Front Brake and Rear Brake .....02-7</b></p> <p><b>2.8 Brake Fluid .....02-7</b></p> <p><b>2.9 Suspension .....02-8</b></p> <p><b>2.10 Bolt and Nut .....02-8</b></p>	<p><b>2.11 Front&amp;rear Wheel Axle, Handlebar.....02-8</b></p> <p><b>2.12 Engine Maintenance and Adjustment Process.....02-9</b></p> <p><b>2.13 Valve clearance.....02-9</b></p> <p><b>2.14 Spark Plug .....02-11</b></p> <p><b>2.15 Air Filter .....02-12</b></p> <p><b>2.16 Lubrication System Inspection.....02-13</b></p> <p><b>2.17 Cooling System Inspection .....02-15</b></p> <p><b>2.18 Test Engine Oil Pressure....02-16</b></p>
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## 2.1 Overhaul Information

**⚠ CAUTION:**

- Do not run engine for a long time in a closed place, because exhaust gas contains poisonous elements such as carbon monoxide (CO).
- When engine is just stops, the temperature of muffler and engine is still high. Uniform with long sleeves and gloves must be worn during operation. Overhaul is necessary while engine just stops.
- Gasoline is easily combustible, smoking or naked fire is not allowed at the operation site. Not only flames, but also electric sparks shall be avoided. Besides, the vaporized gasoline is explosive, please operate it in a place with well ventilation.
- Please be cautions that do not let the turning pieces and movable pieces clip your hands or clothes.

The vehicle must be placed in an even and stable place, raise vehicle properly with the main support of the vehicle or maintenance bracket.

## 2.2 Periodic Maintenance Schedule

This motorcycle must do periodic maintenance regularly. Keep motorcycle clean before doing maintenance.

### Cautions:

- ▶ = Severe Use Item. Reduce interval by 50% on vehicles subjected to severe use.
- = Have an authorized dealer perform repairs that involve this component or system.

### Maintenance Schedule

Item	Maintenance before operation			
	Hour	Calendar	km	Remarks
<b>Fuel system</b>				
Fuel hose	-	Daily	-	Inspect for aging
<b>Electrical system</b>				
Switches	-	Daily	-	Inspect
Lights and horns	-	Daily	-	

## Break-in Maintenance Schedule

Item	Break-in Maintenance Interval (Service whichever interval comes first)			
	Hour	Calendar	km	Remarks
<b>Engine</b>				
■ Engine oil and oil filter	-	-	1000	Replace。
■ Oil strainer	-	-	1000	Clean
Idle	-	-	1000	Inspect
■ Coolant	-	-	1000	
Throttle system	-	-	1000	
<b>Electrical system</b>				
■ Functions of electrical parts	-	-	1000	Inspect
Battery	-	-	1000	
Fuses or circuit breakers	-	-	1000	
<b>Brake system</b>				
Brake discs	-	-	1000	Inspect
Brake pads	-	-	1000	
Brake fluid level	-	-	1000	
Brake lever	-	-	1000	Inspect for free play
■ Brake hoses	-	-	1000	Inspect for damage and sealing
<b>Wheels</b>				
Tire condition	-	-	1000	Inspect
Tire pressure	-	-	1000	
<b>Suspension system</b>				
■ Rear shock absorber and front forks	-	-	1000	Inspect for leaking (maintain parts according to the requirement)
<b>Cooling system</b>				
Coolant level	-	-	1000	Inspect
■ Coolant	-	-	1000	
■ Radiator fan function	-	-	1000	
Coolant hoses	-	-	1000	
<b>Steering system</b>				
■ Steering bearings	-	-	1000	Inspect
<b>Other parts</b>				
■ Diagnosis connector	-	-	1000	Read with PDA
■ Mobile parts	-	-	1000	Lubricate; inspect for flexibility
■ Bolts and nuts	-	-	1000	Inspect for fastness
■ Cables and wires	-	-	1000	Inspect for damage, bending and routing

## 02 Inspection and Adjustment

### Periodic Maintenance Schedule

Item	Periodic Maintenance Interval (Service whichever interval comes first)			
	Hour	Calendar	km	Remarks
<b>Engine</b>				
Engine oil and oil filter	-	6M	5000	Replace
Oil strainer	-	6M	5000	Clean
■ Clutch	-	-	5000	Inspect
Idle	-	-	10000	
■ Coolant	-	24M	35000	Replace
Throttle system	-	-	5000	Inspect
■ Throttle valve	-	-	6000	Clean
▶ ■ Air filter element	-	-	5000	Clean
	-	24M	20000	Replace
■ Spark plug	-	-	5000	Inspect
	-	-	10000	Replace
■ Valve clearance	-	-	40000	Inspect
<b>Electrical system</b>				
■ Functions of electrical parts	-	12M	10000	Inspect
Battery	-	6M	5000	
Fuses or circuit breakers	-	6M	5000	
■ Wires	-	12M	10000	Inspect for damage, bending and routing
<b>Brake system</b>				
Front and rear brake system	-	12M	10000	Inspect
	-	24M	20000	
Brake discs	-	12M	10000	
	-	24M	20000	
▶ Brake pads	-	12M	10000	
	-	24M	20000	
Brake fluid level	-	12M	10000	
	-	-	20000	
Brake lever	-	24M	20000	Inspect for free play
	-	12M	10000	
■ Brake hoses	-	24M	20000	Inspect for damage and sealing
	-	12M	10000	
■ Brake fluid	-	24M	-	Replace
<b>Wheels</b>				
Tire condition	-	12M	10000	Inspect
	-	24M	20000	
Tire pressure	-	12M	10000	
	-	24M	20000	
■ Wheel bearings	-	-	10000	
	-	-	30000	

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Item	Periodic Maintenance Interval (Service whichever interval comes first)			
	Hour	Calendar	km	Remarks
<b>Suspension system</b>				
■ Suspension system	-	-	10000	Inspect
■ Rear shock absorber and front forks	-	12M	10000	Inspect for leaking (maintain parts according to the requirement)
	-	24M	20000	
■ Swing arms	-	-	10000	Inspect
	-	-	30000	
<b>Cooling system</b>				
Coolant level	-	12M	10000	Inspect
	-	24M	20000	
■ Coolant	-	12M	10000	
	-	24M	20000	
■ Radiator fan function	-	12M	10000	
	-	24M	20000	
■ Coolant hoses	-	12M	10000	
	-	48M	30000	
<b>Frame system</b>				
Frame	-	-	30000	Inspect
<b>Steering system</b>				
■ Steering bearings	-	12M	10000	Inspect
	-	24M	20000	
<b>Chain</b>				
▶ Chain, rear sprocket and engine sprocket	-	12M	10000	Inspect
	-	24M	20000	
<b>Other parts</b>				
■ Diagnosis connector	-	12M	10000	Read with PDA
	-	24M	20000	
■ Mobile parts	-	12M	10000	Lubricate; inspect for flexibility
	-	48M	30000	
■ Bolts and nuts	-	12M	10000	Inspect for fastness
	-	48M	30000	
■ Cables and wires	-	12M	7500	Inspect for damage, bending and routing
	-	24M	15000	
■ Pipes, ducts, hoses and sleeves	-	12M	10000	Inspect for cracks, sealing and routing
	-	48M	30000	

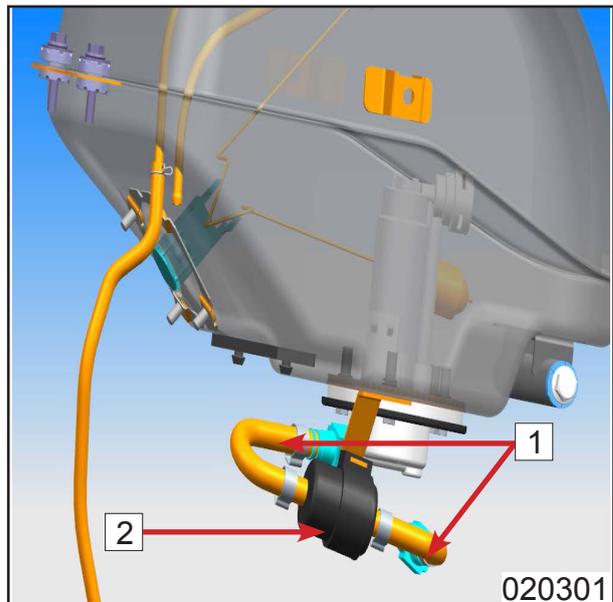
### 2.3 Fuel Filter

Check high pressure fuel pipe (1). If aged or broken or leakage, replace it.

Check fuel filter (2), if blocking or polluting, replace it.

**⚠ WARNING: No smoking, no fire.**

**⚠ CAUTIONS: Fuel filter arrow mark indicates fuel flow direction.**

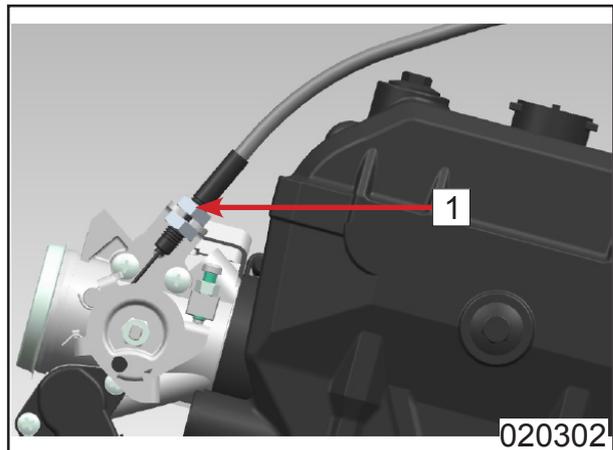


### 2.4 Throttle cable

Turn the throttle grip, and check if it can turn smoothly.

**Check free play of throttle cable:  
2 ~3mm**

Turn adjuster to adjust throttle cable free play. Rough adjust throttle cable free play: lose nut (1), turn the adjuster properly, and then tighten lock nut.



## 2.5 Chain

Inspect transmission chain slackness

**Standard slackness: 20mm~30mm**

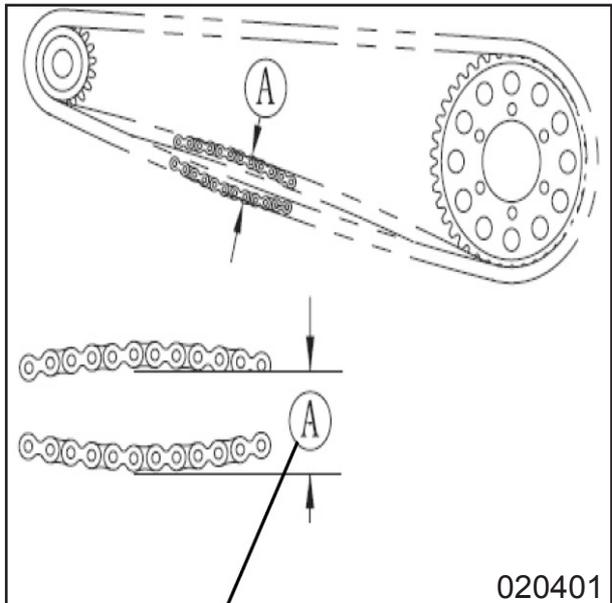
Chain adjustment:

Loose nut of rear axle;

Loose nut of chain adjuster, adjust left and right chain adjusters to same scale;

Turn rear wheel, check chain slackness;

Fasten adjuster nut, and then fasten rear axle nut;



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Standard slackness: 20mm~30mm

## 2.6 Clutch Cable

Clutch is controlled by cable;

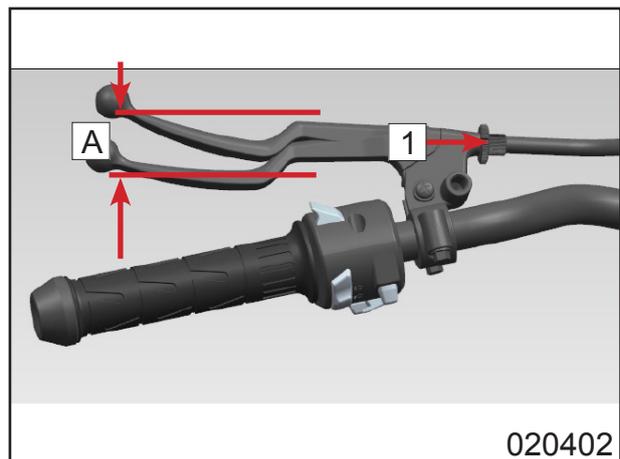
Install clutch lever on the left handlebar;

Clutch free play

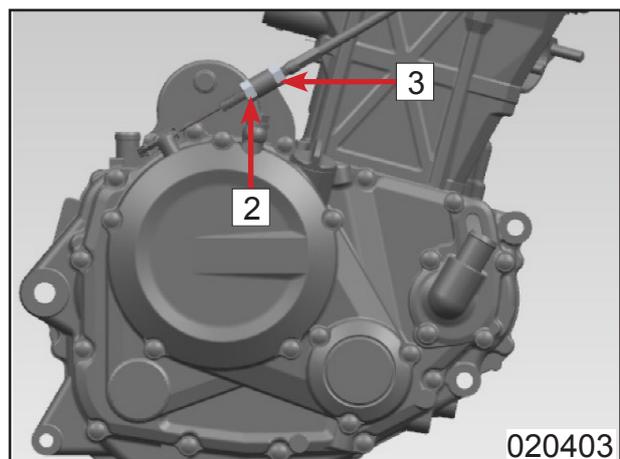
Check clutch free play A: **10mm~20mm**

1. Slight adjustment: loose locking nut (1), turn adjusting screw and adjust free play

2. Large adjustment: loose locking nut (2), turn adjusting screw (3) and adjust free play.



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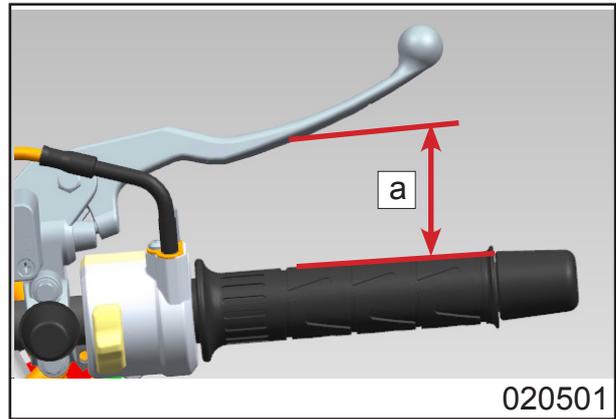
### 2.7 Front Brake and Rear Brake

Check brake pad, brake disc wear, if they wear to the limit mark, replace it timely.

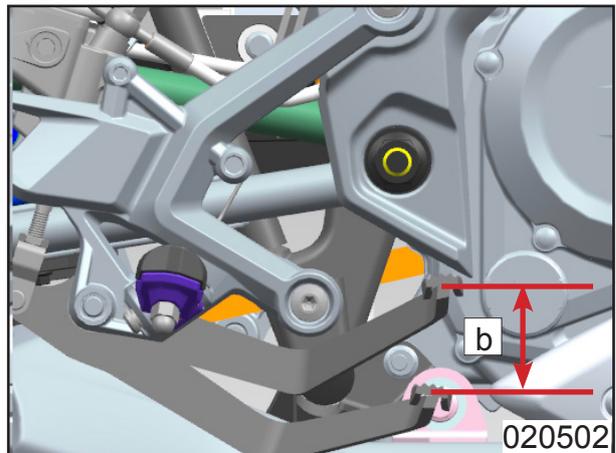
#### Brake free play:

**A Front (hand) brake free play:**  
5mm~20mm

**B Rear (hand) brake free play:**  
5mm~20mm



a Front (hand) brake free play:  
5mm~20mm



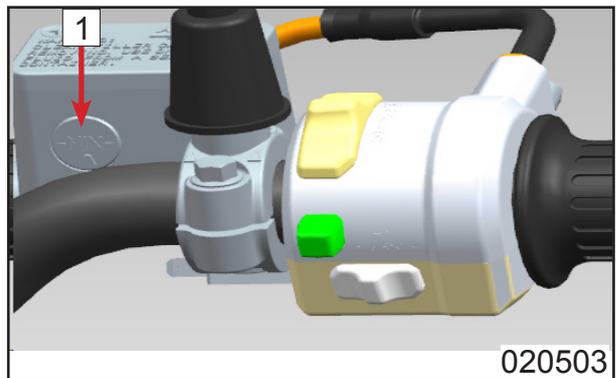
b Rear (hand) brake free play:  
5mm~20mm

### 2.8 Brake Fluid

#### Check front brake fluid

Keep steering handlebar straight, inspect brake fluid level (1) of upper brake pump and ensure the level is between upper limit and lower limit.

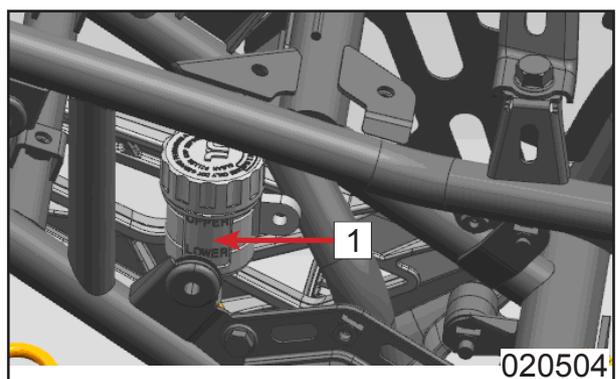
Appointed brake fluid: DOT4 non-petroleum base brake fluid.



#### Check rear brake fluid

Keep steering handlebar straight, inspect brake fluid level (1) of lower brake pump and ensure the level is between upper limit and lower limit.

Appointed brake fluid: DOT4 non-petroleum base brake fluid.



## 2.9 Suspension

### Front suspension

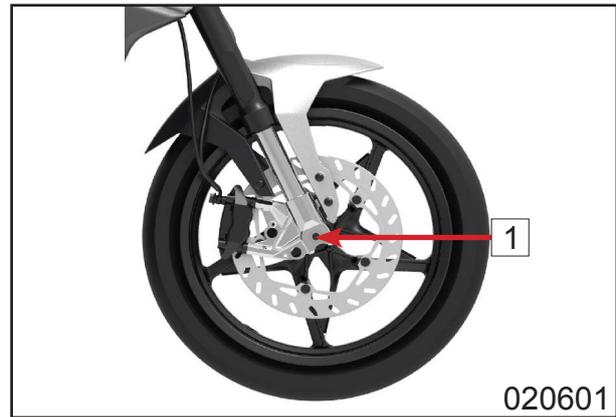
Hold front brake, press the front suspension down for several times to check front suspension performance.

Check if front shock absorber has oil leakage, looseness or abnormal noise.

### Rear suspension

Press rear suspension up and down for several times to check if rear shock absorber works smoothly, or part has abnormal noise and looseness.

Put up main support, press rear wheel and move it side to side. Check if rear suspension pivot has abnormal noise or looseness



## 2.10 Bolt and Nut

Check if bolts or nuts have looseness. If loose, tighten it as appointed torque;

## 2.11 Front&rear Wheel Axle, Handlebar

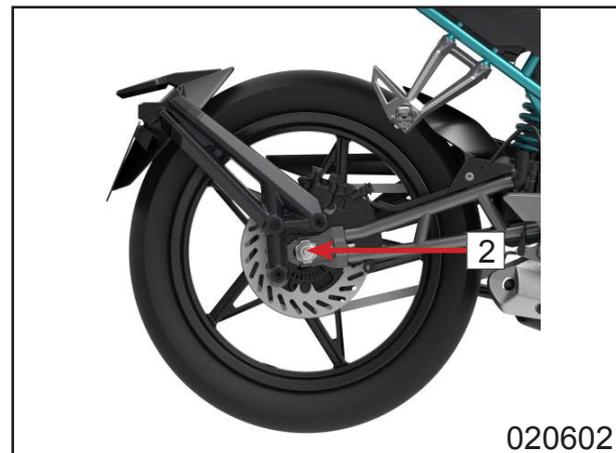
### Front&reat Wheel Axle

Check if front axle nut (1) is loosen. If loose, tighten it as appointed torque.

**Standard torque: 50N·m~80N·m**

Check if rear axle nut (2) is loosen. If loose, tighten it as appointed torque.

**Standard torque: 80N·m~100N·m**

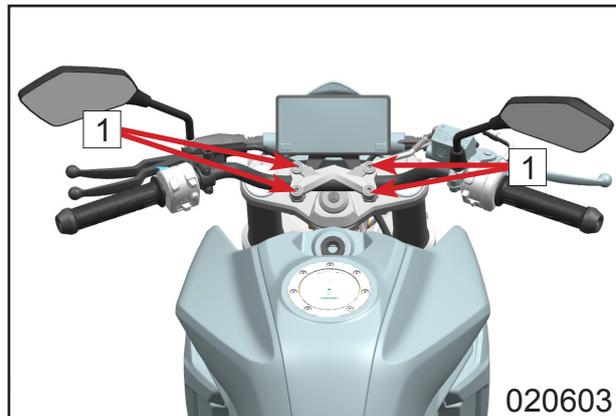


### Handlebar

Move handlebar side to side. And check if wires have interference. Turn front wheel, check if it has interference. If it does not move smoothly, check if steering bearing nut is tighten or not;

Adjust handlebar angle to proper position, tighten four screws of handlebar;

**Torque: 20N·m~30N·m**



**⚠ Note: The clearance between handlebar upper cover plate and lower seat is even. Four bolts are tightend in criss-cross way. Cover palte and knurl should try to overlap.**

### 2.12 Engine Maintenance and Adjustment Process

Introduce inspection information based on the above items.

### 2.13 Valve clearance

Inspect every 40000km;

If valve clearance is too large, it will cause the engine valve become noisy;

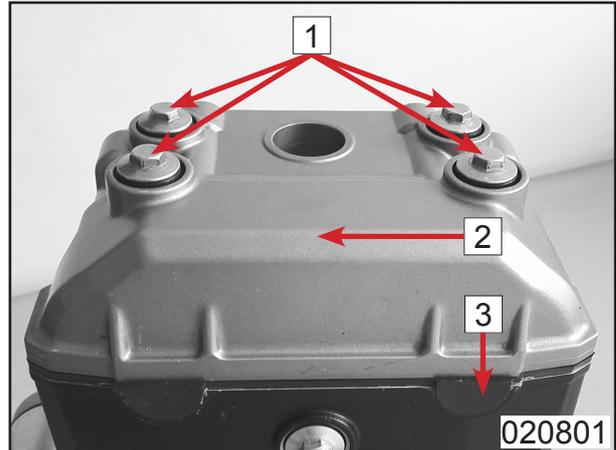
If valve clearance is too small, it will lead to valve damage, engine power reduction;

Check the valve clearance according to the prescribed inspection period, and adjust if necessary, procedures as follows:

Remove four cylinder head cover bolt (1) and sealing ring;

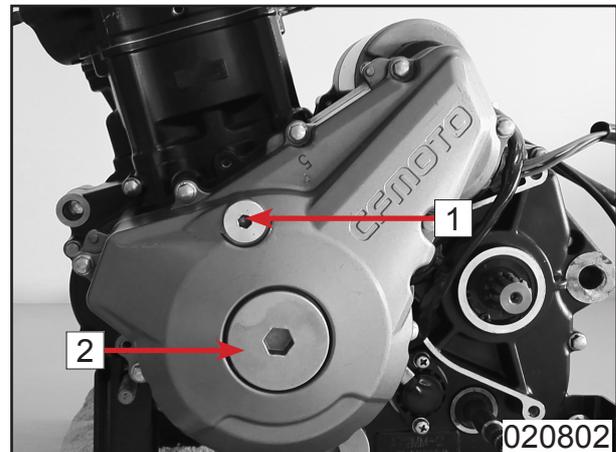
Remove cylinder head cover (2);

Remove cylinder head cover sealing ring assembly (3);

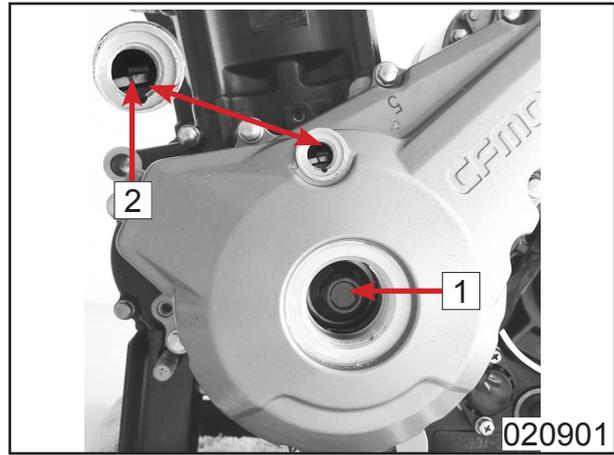


Remove strainer cap (1) and O-ring 35×3.5;

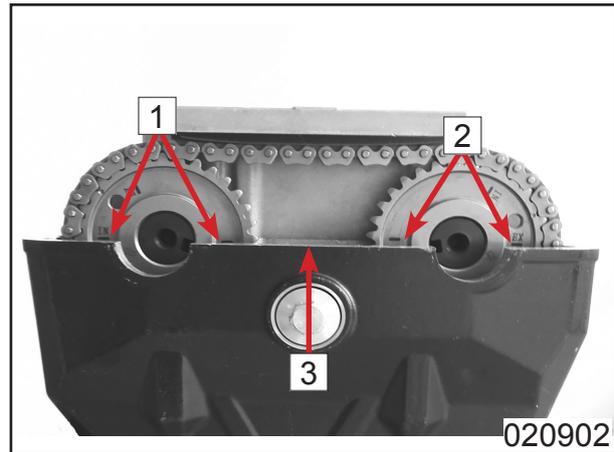
Remove observation hole cover (2) and o-ring 13×2.



Rotate crankshaft (1) counterclockwise;  
Align mark line (2);



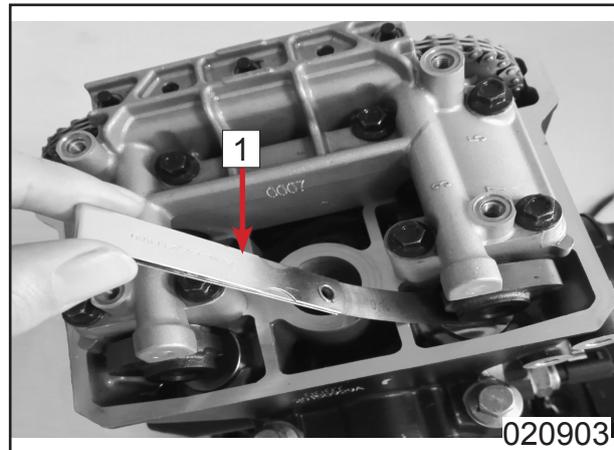
Air inlet sprocket (IN) are parallel and flat with cylinder cover (3);  
Air exhaust sprocket (EX) are parallel and flat with cylinder cover (3);



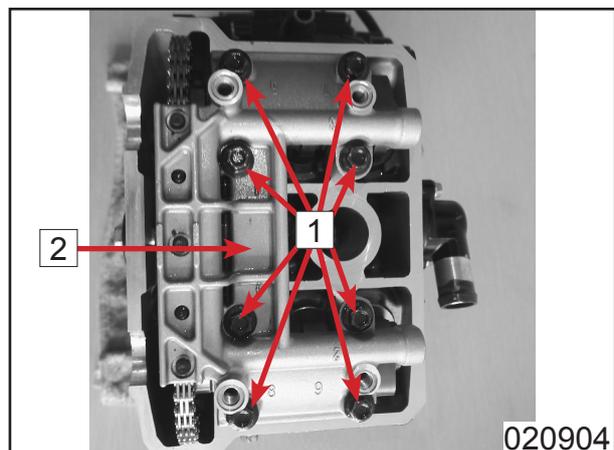
### Check valve clearance

Check valve clearance by using a feeler (1);  
If valve clearance does not meet the specified value, replace tappet to adjust;

**Valve clearance (Cold engine):**  
**Intake: 0.12mm~0.17mm**  
**Exhaust: 0.17mm~0.22mm**

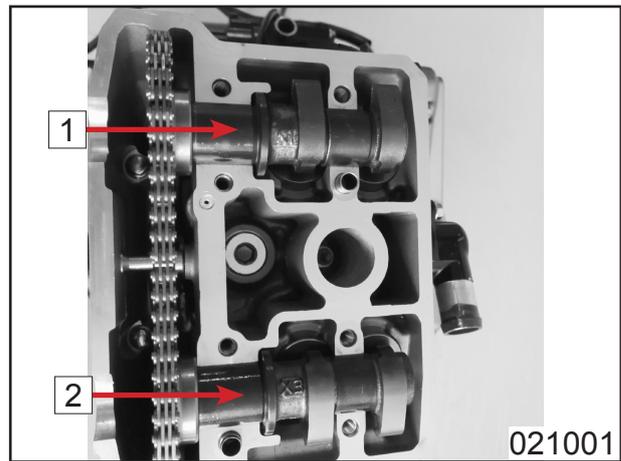


Remove eight bolt (1);  
Remove camshaft seat (2);



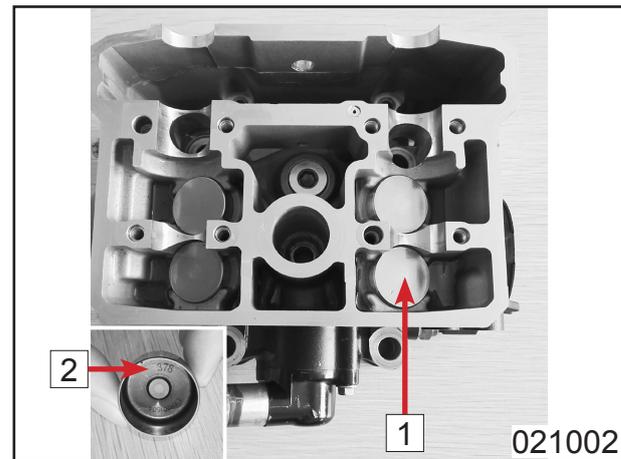
## 02 Inspection and Adjustment

Remove intake camshaft (1);  
Remove exhaust camshaft (2);



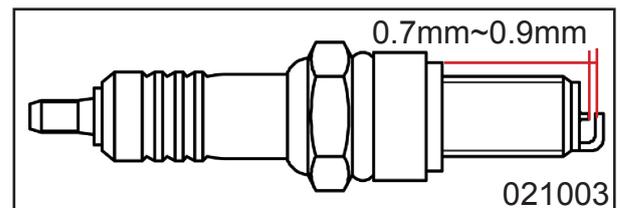
Remove tappet (1);  
Replace thinness mark (2);  
Install camshaft, camshaft seat and bot M6×45;  
Re-check valve clearance if it is out of specification. Re-adjust if not;  
Install sealing rings, cylinder head cover, bolt;  
Install strainer cap, o-ring 35×3.5, inspection hole, o-ring 13×2;

**⚠ Note: Apply mixing liquid (ratio 10:1) of molybdenum disulfide grease and oil on the thread of bolt M6×45 before installation. Three bolts tightening torque is 5N·m, 8N·m and 12N·m.**



### 2.14 Spark Plug

Spark plug specification: CR8EI;  
Disconnect spark plug cap connection, remove spark plug by using a wrench;  
Check the electrode whether there is fouling, ablation. Replace spark plug, or clean the carbon and dirt if necessary;  
Using the spark plug gap thickness gauge to readjust the spark plug electrode clearance. Gap should be between 0.7mm~0.9mm .



## 2.15 Air Filter

### Maintenance During Break-in (1000km) Period

Daily maintenance;

Clean the dust in the air filter element, if there are cartridge dusts, replace a new air filter immediately.

Engine 1000km running-in period Change the oil after break-in period, clean the air filter element, oil filter, remove the spark plug coke, adjust valve clearance;

### Change Air Filter Element

Unscrew four screws (1);

Remove upper housing (2);

Remove paper element assembly (3) from housing assembly;

Replace new paper element assembly (3);

Reverse the removal procedures for installation;

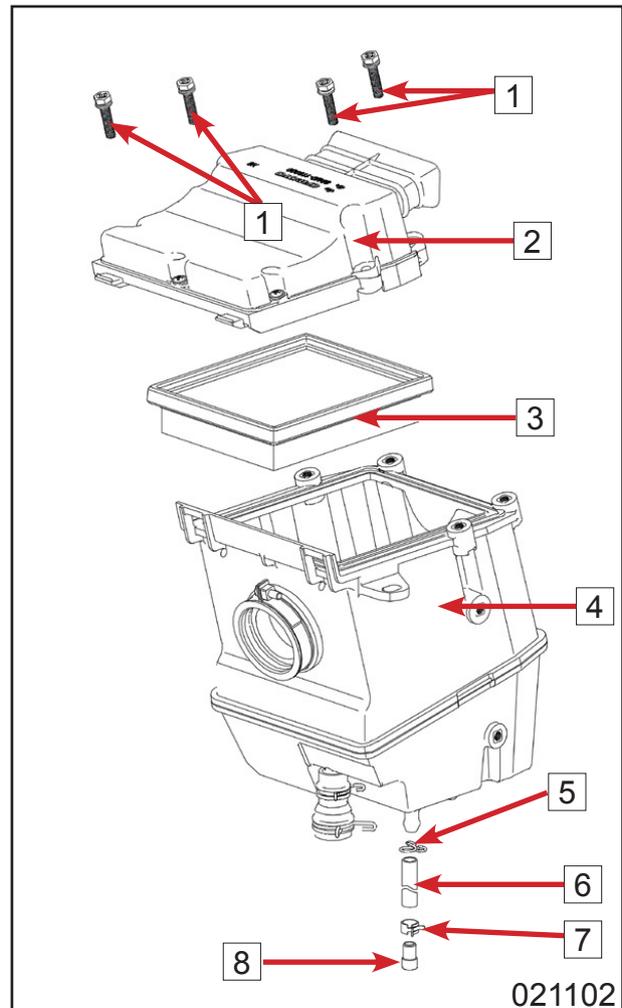
### Air Filter Element Maintenance Procedure

Clean the dust in paper element (3) by using high pressure air. Replace a new element, if damaged.

Check if there is any dust in air inlet pipe of upper housing assembly (2).

Check if there is oil in oil pipe (6). If yes, remove clamp (7) and plug (8) to drain out oil in the oil pipe.

Reverse the removal procedures to install air filter.



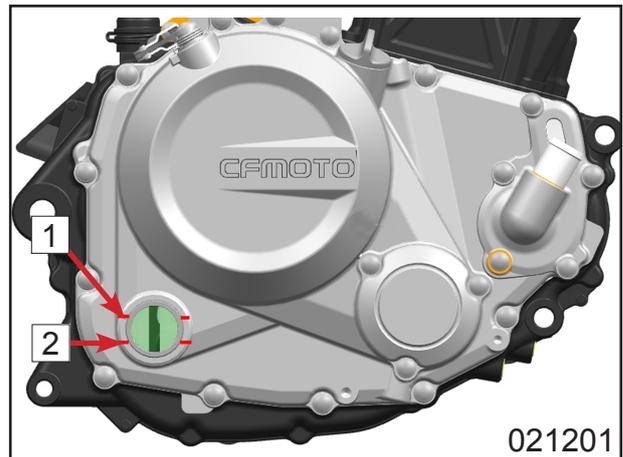
**⚠ Warning: Clean up the air filter element and foregin inside it after engine working for per 3000km. Clean or replace the filter more frequently when workig in severe condition. Excessive fouling or improper installation of the filter will affect the engine life and performance.**

**⚠ Note: If customers use air filters that are different from owner's manual, the air liter performance should match with engine. Otherwise, customers take the responsibilities of accidents due to the improper air filters. Meanwhile, customers are responsible for the air filter clean and maintenance.**

## 2.16 Lubrication System Inspection

### Engine Oil Level Inspection

Check oil level, it should be between upper line (1) and lower line (2).

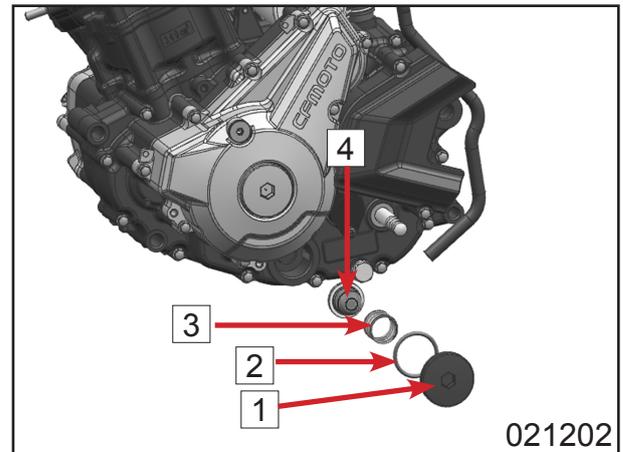


Clean and change primary and secondary oil filter

### Primary oil filter:

Remove strainer cap (1), O-sealing ring (2), spring (3) and strainer (4) from left crankcase assembly.

Check O-sealing ring and strainer for damage. Clean strainer cap, o-sealing ring and strainer.

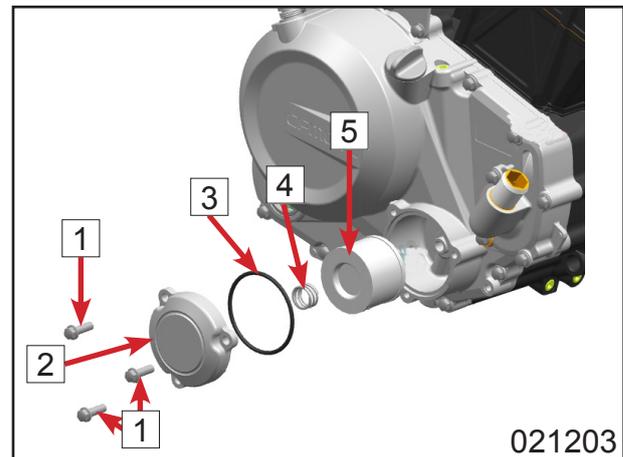


### Secondary oil filter:

Remove three bolts (1), oil filter cap (2), o-sealing ring (3), spring (4) and paper element (5) from right side cover.

Check O-sealing ring and paper element for damage. Clean strainer cap, o-sealing ring and paper element.

**⚠ Note: Three bolts (1) tightening torque: 10 N·m**



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## Change Engine Oil:

Warm the engine and let old oil drain completely;  
Put up vehicle by side stand and remove oil filling port screw plug (1).

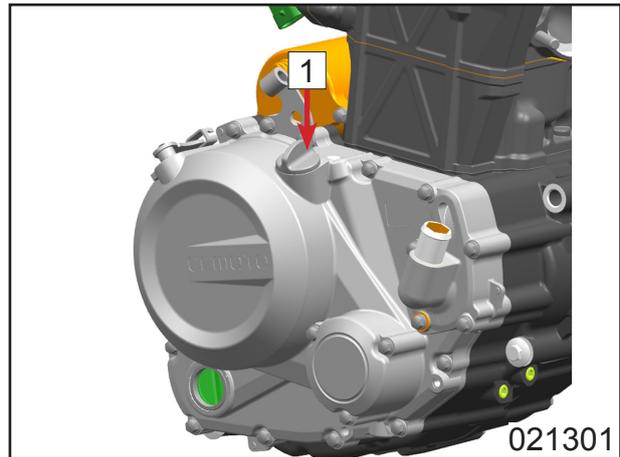
## Engine Oil Change Volume

Change engine oil: 1.3L

Change oil with filter: 1.4L

Engine overhaul: 1.6L

**⚠ Note: Turn off engine for a minute and check the oil level. Oil level should be between upper and lower line.**



### 2.17 Cooling System Inspection

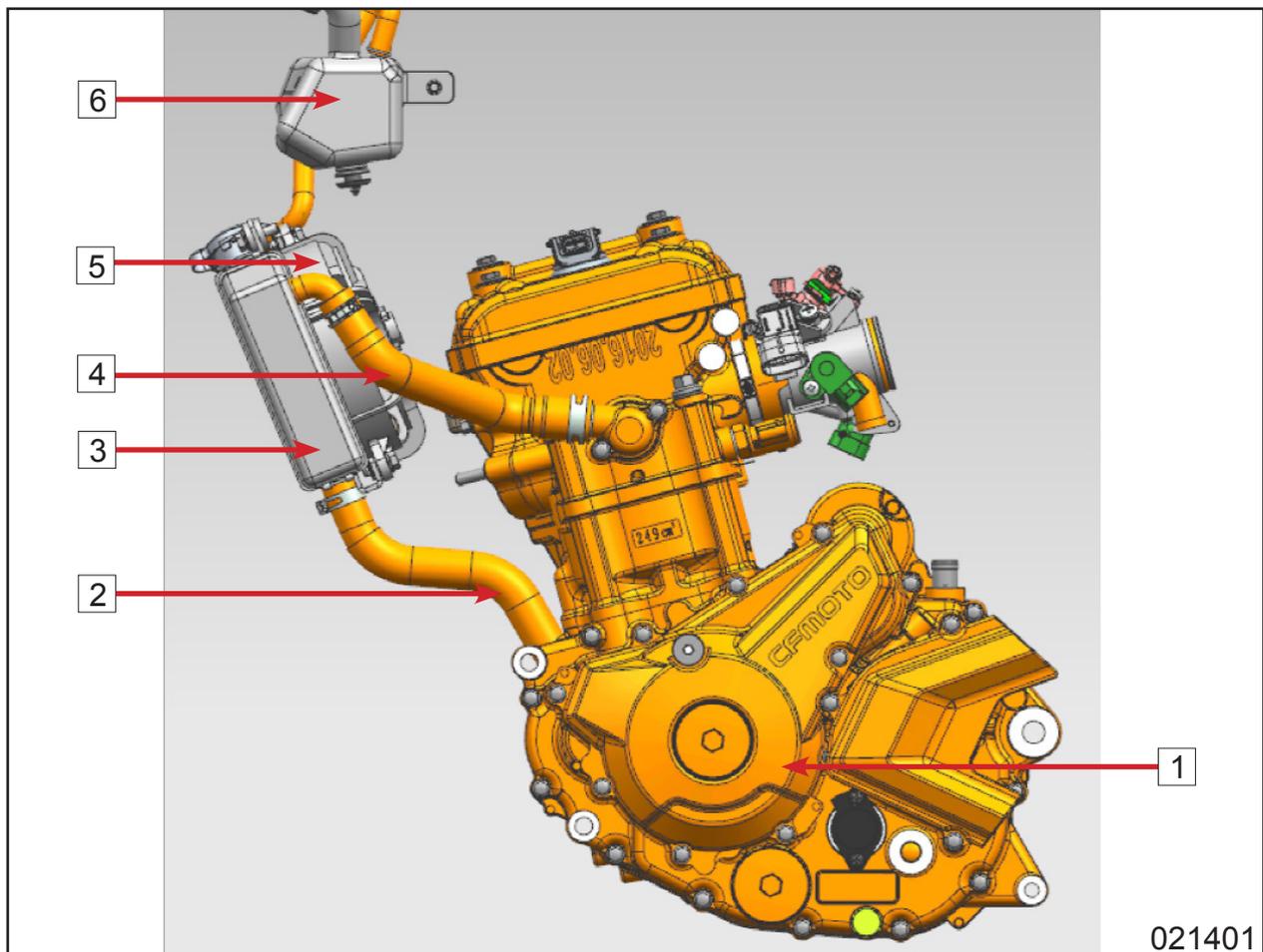
Check radiator, subsidiary water tank, clamp situation, leaking situation of coolant. If damaged, replace it.

Coolant inspection: Observe the level of coolant and up & down level line. If below it, fill coolant to the up line. Meanwhile, open radiator cap, and fill coolant into radiator.

**⚠ Danger: Do not open radiator cap, when engine is hot. Otherwise you will be hurt by water vapor or boiling coolant.**

**⚠ Warning: Coolant is poisonous. Do not drink it. Do not adhere to skin and eyes. Wash it with water at once, or go to hospital if adhere to skin accidentally.**

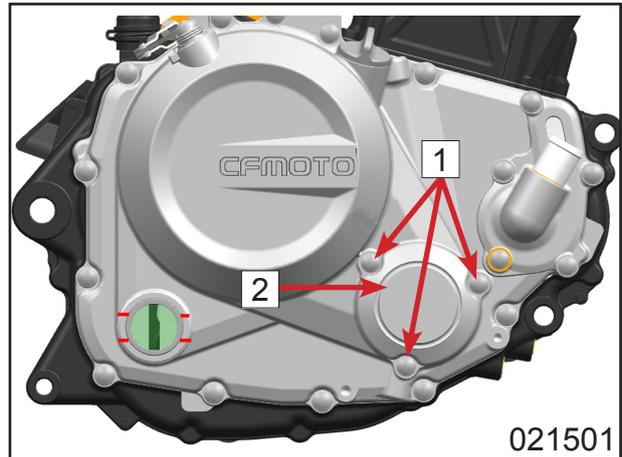
**⚠ Warning: Store coolant well. keep it away from children.**



1	172MM-2 Engine Assy	3	Radiator Assy	5	Fan Motor Assy
2	Water Outlet Pipe, Radiator	4	Water Inlet Pipe, Radiator	6	Water Reservoir Assy

## 2.18 Test Engine Oil Pressure

Remove three M6×20 bolts (1) ;  
Remove oil filter cover (2);



Install oil filter cap (2), which is equipped with oil pressure gauge (1). Install three M6×20 bolt. Tightening torque: **10 N·m**  
Start engine, check engine oil pressure.

Oil temperature at 90 degree RPM at 1500r/min	≥0.07MPa
Oil temperature at 90degree RPM at 5000r/min	≥0.3MPa

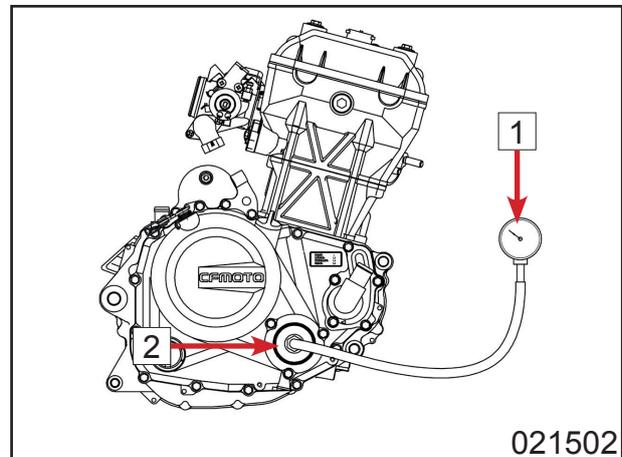
If oil pressure is out of specification, check the oil line and oil pump.

**⚠ Caution: Wear protective clothing to avoid hurt, because engine is very hot after running for a period.**

Remove oil filter cap.

Install oil filter cap and three M6×20 bolt.  
**M6×20 bolt tightening torque: 10N·m**

**⚠ Warning: operate in a well-ventilated place.**



3.1 Maintenance Information .....	03-1
3.2 Front Fender, Seat and Rear hand-rest .....	03-2
3.3 License Plate Light.....	03-3
3.4 Tail Cover, Tail Light and Steering .....	03-4
3.5 Front Left and Right Inner Side Plate, Fuel Tank Guard Removal.....	03-5
3.6 Fuel Tank .....	03-6
3.7 Engine Guard, Water Guard .....	03-7
3.8 Headlight and Dashboard .....	03-8
3.9 Muffler Assembly.....	03-9
3.10 Body Covering Parts .....	03-9

### 3.1 Maintenance Information

**⚠Warning:** Gasoline is highly flammable, smoking and firing are strictly forbidden in the work place. Special attention should also be paid to sparks. Gasoline may also be explosive when it is vaporized. Operation should be done in a well-ventilated place.

Remove and Install muffler after it is fully cold.

1. This chapter introduces operation of disassembly and assembly for body covering parts, muffler and fuel tank.
2. Hoses, cables and wiring should be routed properly.
3. Replace the gasket with a new one after muffler is removed.
4. After muffler is installed, check if there is any exhaust leakage.

#### Tightening Torque

Tail light/brake light screw: 1.8N·m (0.18kgf·m)

Turning signal light screw: 1.8N·m (0.18kgf·m)

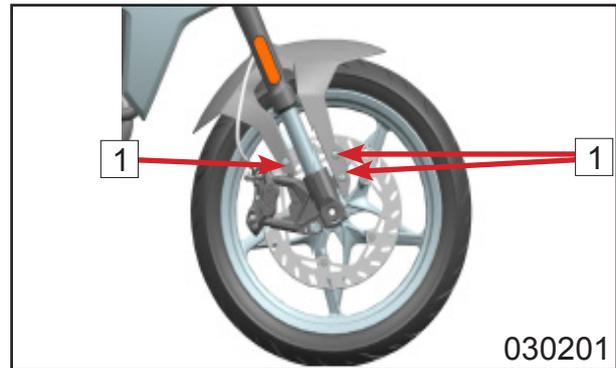
#### Troubleshooting

- Too much noise of muffler
- Muffler breakage
- Exhaust Leak
- Insufficient Power
- Muffler deformation
- Exhaust Leak
- Muffler Blocked

## 3.2 Front Fender, Seat and Rear hand-rest

### Front Fender Installation

Front fender is secured to position by fastening three bolts on left and right side respectively.



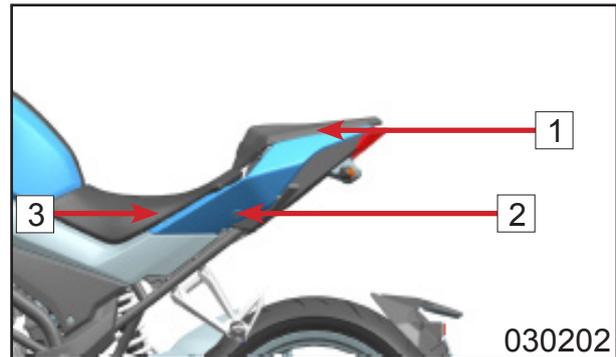
030201

### Seat Removal

Insert key into seat lock (2), open seat lock.

Remove rear seat (1).

Lift up left and rear side of front seat (3).



030202

Remove two bolts (1);

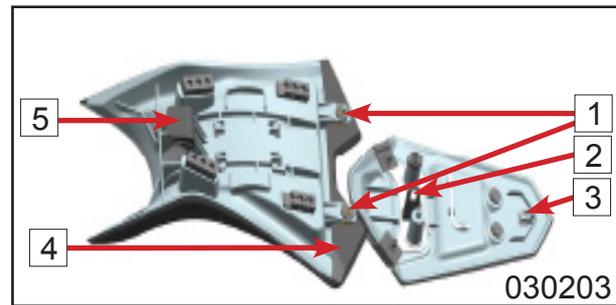
Pull out front seat;

### Installation

To lock the seat into position, slide the front seat into the seat retainer, fasten two bolts. Slide rear seat into slot, till seat lock hook is latched; you will hear a sound then lock the seat.

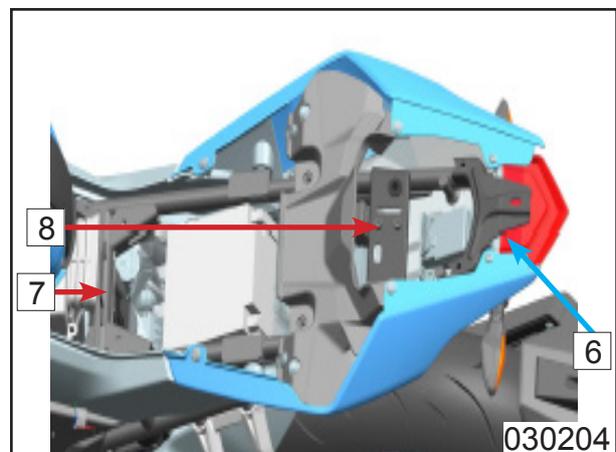
**⚠️ Note: Align five dowel pins before installing. (Bilateral symmetry)**

**⚠️ Note: When installing front seat, make sure it is positioned into slot then push forward. Make it is secured, then fasten two bolts. Rear seat should be secured and then be pressed down firmly. Shaking the seats after installation, make sure they are well positioned.**



030203

1	Inner hex bolt	3	Hook	5	Hook
2	Hook	4	Seat		



030204

6	Clip	7	Clip	8	Groove
---	------	---	------	---	--------

### 3.3 License Plate Light

#### Removal

Disconnect all cables.

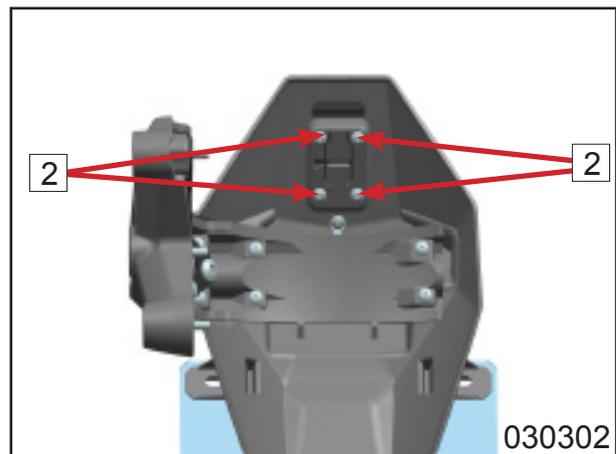
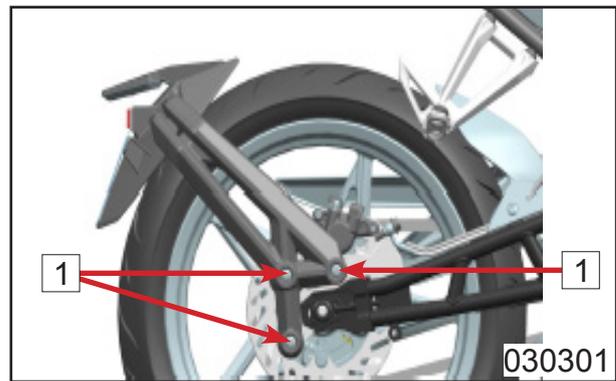
Remove three bolts (1) on the rear fender.

License plate light is fixed on rear fender by four ST4.2x9d bolts (2).

Remove four tapping screws and then pull out license plate light cables.

#### Installation

Reverse removal procedures for installation.



### Left and Right Panel

#### Removal

Remove plastic clip (3);

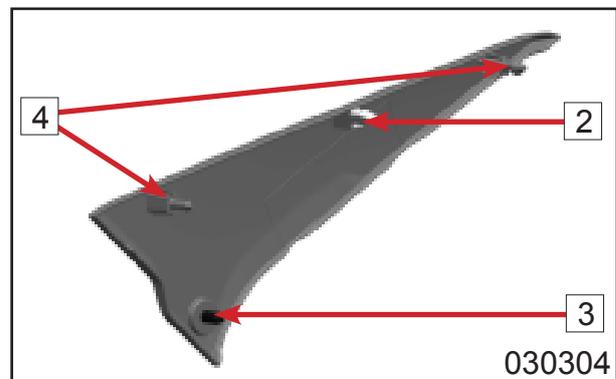
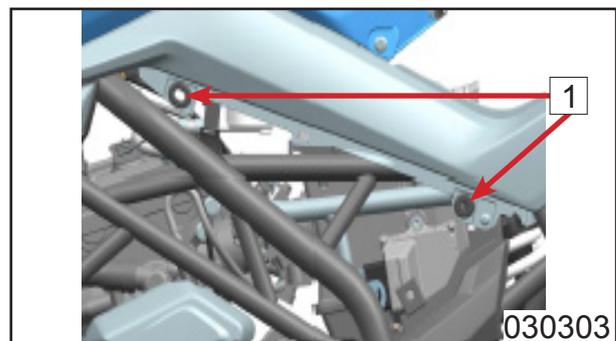
Pull out left panel;

Pull out rubber ring (1);

Remove plastic clip (2);

#### Installation

Reverse removal procedures and direction for installation.



## 3.4 Tail Cover, Tail Light and Steering

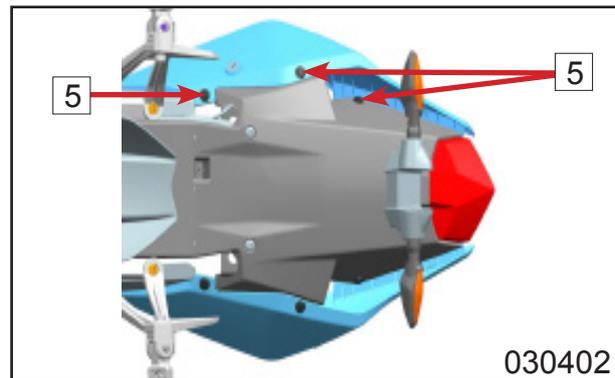
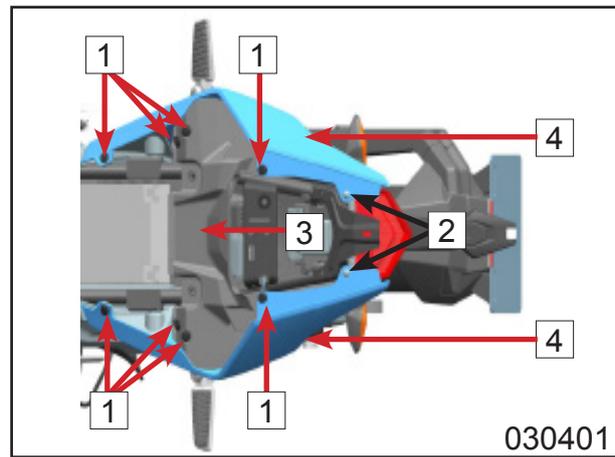
### Tail Cover

#### Removal

- Remove seat;
- Remove eight plastic clips (1);
- Remove two ST4.2 self-tapping screws (2);
- Remove lower six plastic clip (5);
- Remove seat support (3);
- Remove rear left and right deco plate (4);

#### Installation

Reverse removal procedures for installation.

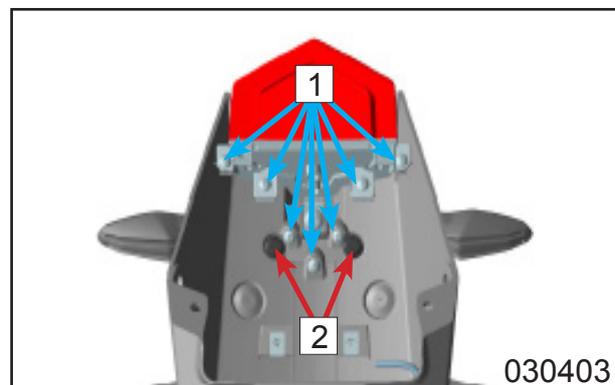


### Tail Light, Rear Turning Light Removal

- Open front and rear seat;
- Remove seat support, rear left and right deco plate and base plate;
- Disconnect connectors between tail light and rear turning light cables & main cable;
- Remove seven self-tapping screw (1);
- Remove two plastic clips (2);
- Remove tail light;
- Remove rear turning light;

#### Installation

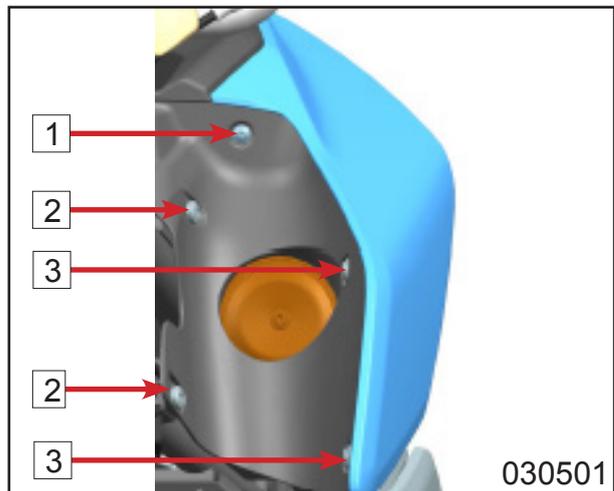
Reverse removal procedures for installation.



### 3.5 Front Left and Right Inner Side Plate, Fuel Tank Guard Removal

#### Front Left/Right Inner Side Plate

Remove two inner hex bolts (2), one self-tapping screw (1) and two plastic lips (3);

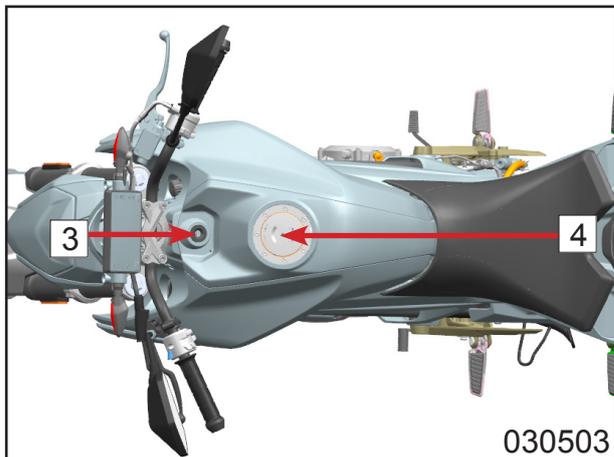
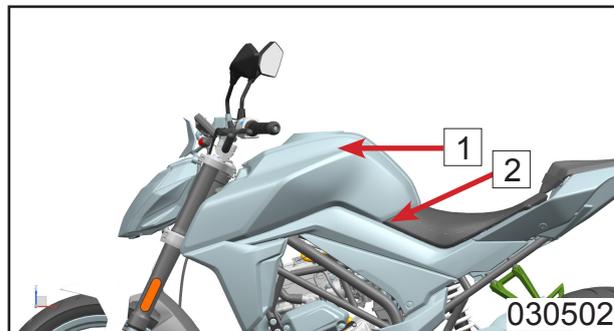


#### Fuel Tank Guard

Open fuel tank lock (4) and remove it;  
Remove cap (3);  
Remove two fuel tank guard screws (2);  
Pull out fuel tank guard (1);

#### Installation

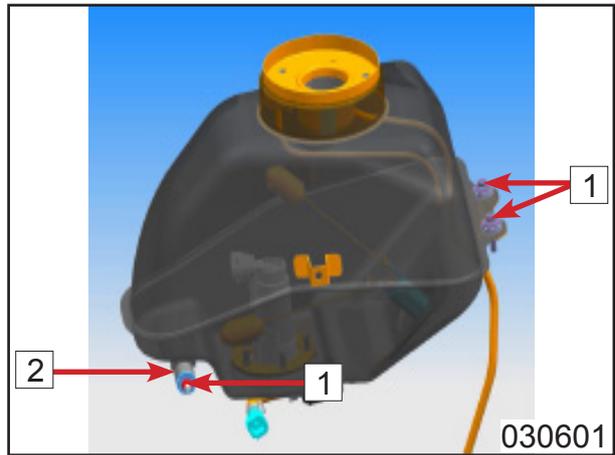
Reverse removal procedures for installation.



## 3.6 Fuel Tank

### Removal

- Remove seat;
- Remove fuel tank lock;
- Remove fuel tank deco cover;
- Remove three bolts (1);
- Remove one nut (2);
- Loosen fuel sensor connector;
- Loosen fuel pump connector;
- Lift up fuel tank, pull out adsorption pipe, remove quick connector;
- Remove fuel tank;

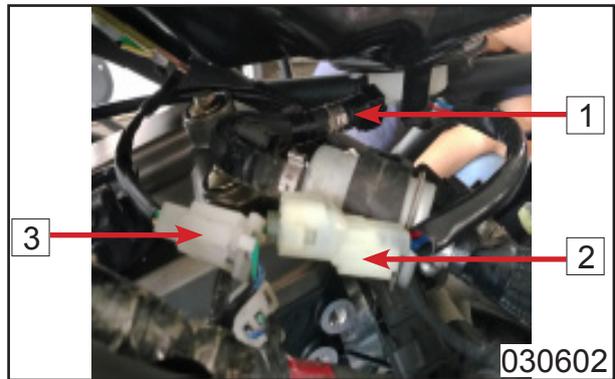


030601

### Installation

Reverse removal procedures for installation.

**⚠ Note: Install quick connector of high pressure fuel pipe first. Check pipe line.**



030602

1	Quick connector	2	Fuel pump connector
3	Fuel sensor connector		

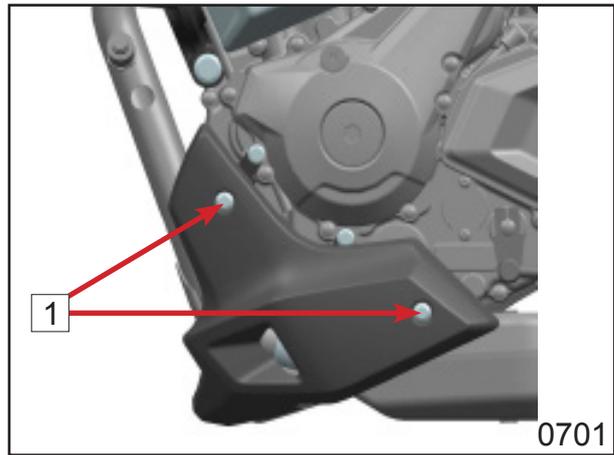
### 3.7 Engine Guard, Water Guard

#### Removal

Remove left and right bolts (1);

#### Installation

Reverse removal procedures for installation.



1 Inner hex bolt

#### Water Panel

#### Removal

Unscrew self-tapping screw (1);

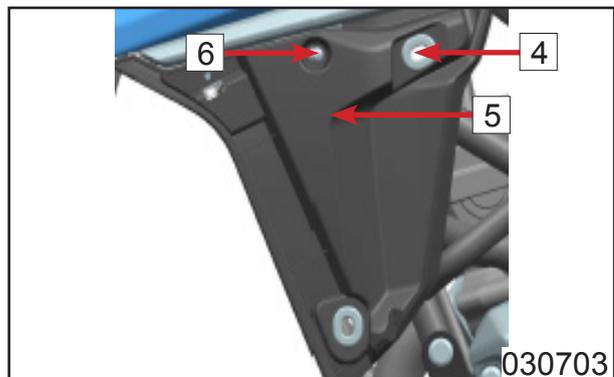
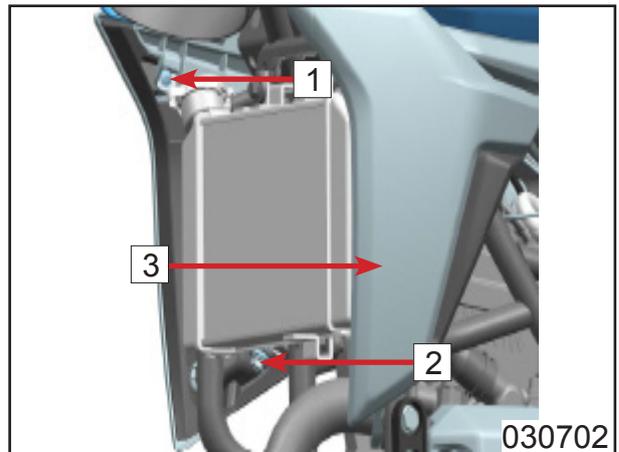
Pull out water panel (3);

Unscrew hex screw (2) and self-tapping screw (6);

Pull out mushroom head from rubber ring (4);

#### Installation

Reverse removal procedures for installation.



## 3.8 Headlight and Dashboard

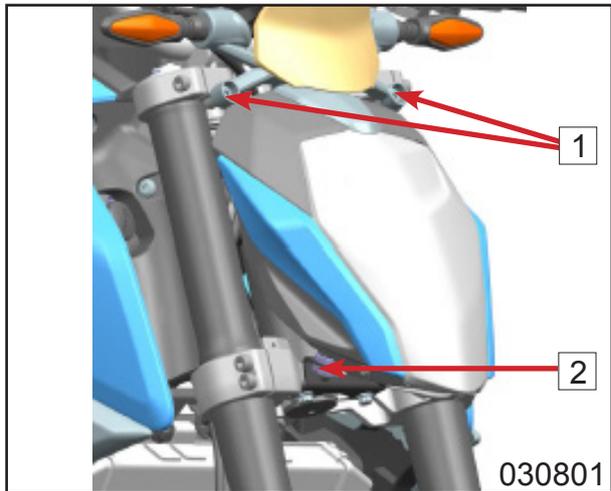
### Headlight Assembly

#### Removal

Remove two inner hex bolts (1);  
Pull two mushroom heads from rubber ring (2);  
Disconnect connectors between headlight assembly cables and main cable;  
Remove headlight assembly;

#### Installation

Reverse removal procedures for installation.



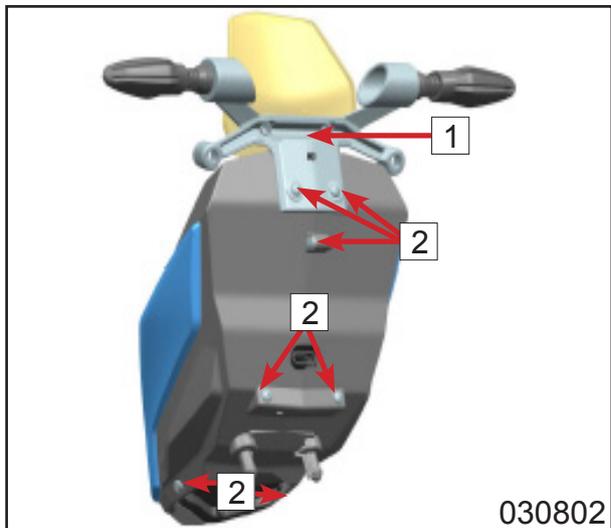
### Front Turning Light

#### Removal

Remove three bolt (2);  
Remove turning bracket (1);  
Remove nut and gasket;  
Disconnect connectors between turning light cables and main cable;  
Remove front turning light;

#### Installation

Reverse removal procedures for installation.



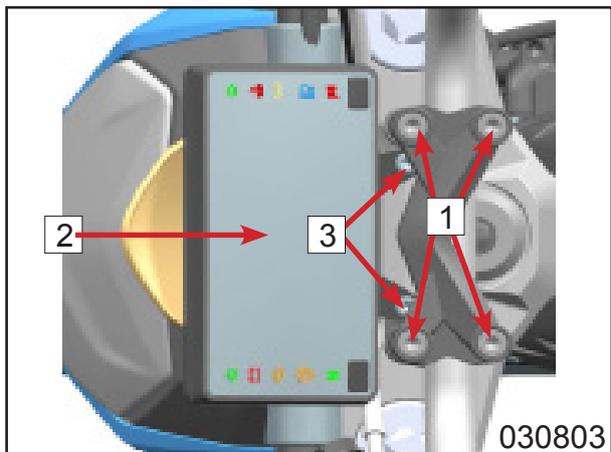
### Dashboard

#### Removal

Remove two bolts of headlight assembly;  
Remove four bolts and press cap (1) of turning handlebar;  
Remove two nuts (3) of dashboard bracket;  
Disconnect connectors between dashboard cables and main cable;  
Remove dashboard (2);

#### Installation

Reverse removal procedures for installation.



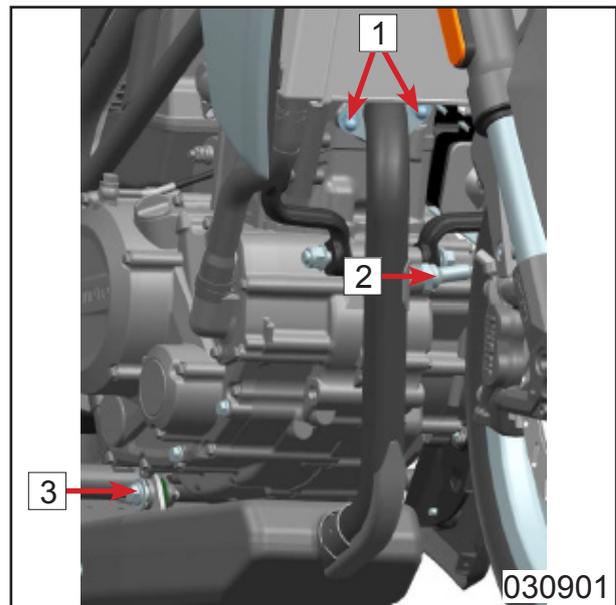
## 3.9 Muffler Assembly

### Removal

Remove oxygen sensor connector (2);  
Remove but (1);  
Remove bracket bolt (3);

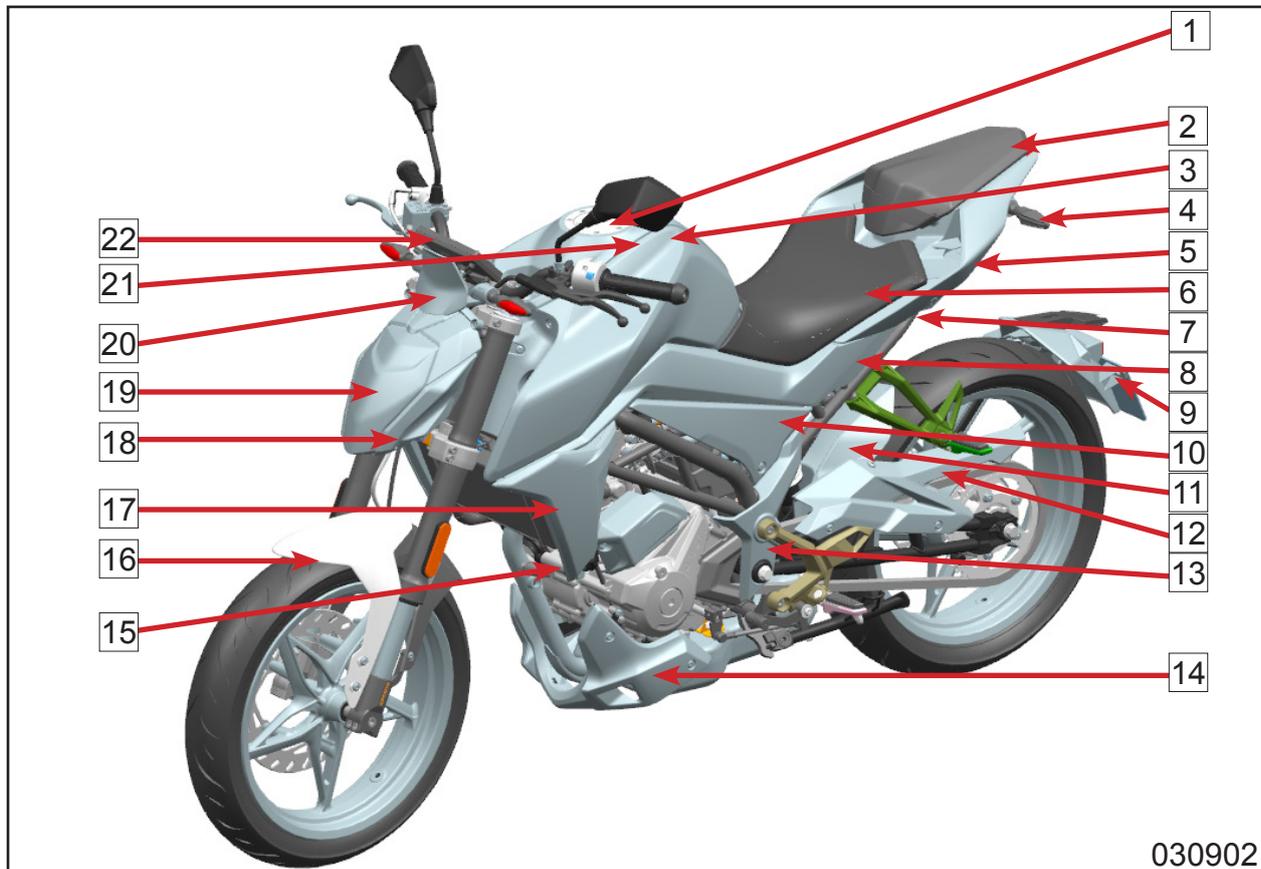
### Installation

Reverse removal procedures for installation.



030901

## 3.10 Body Covering Parts



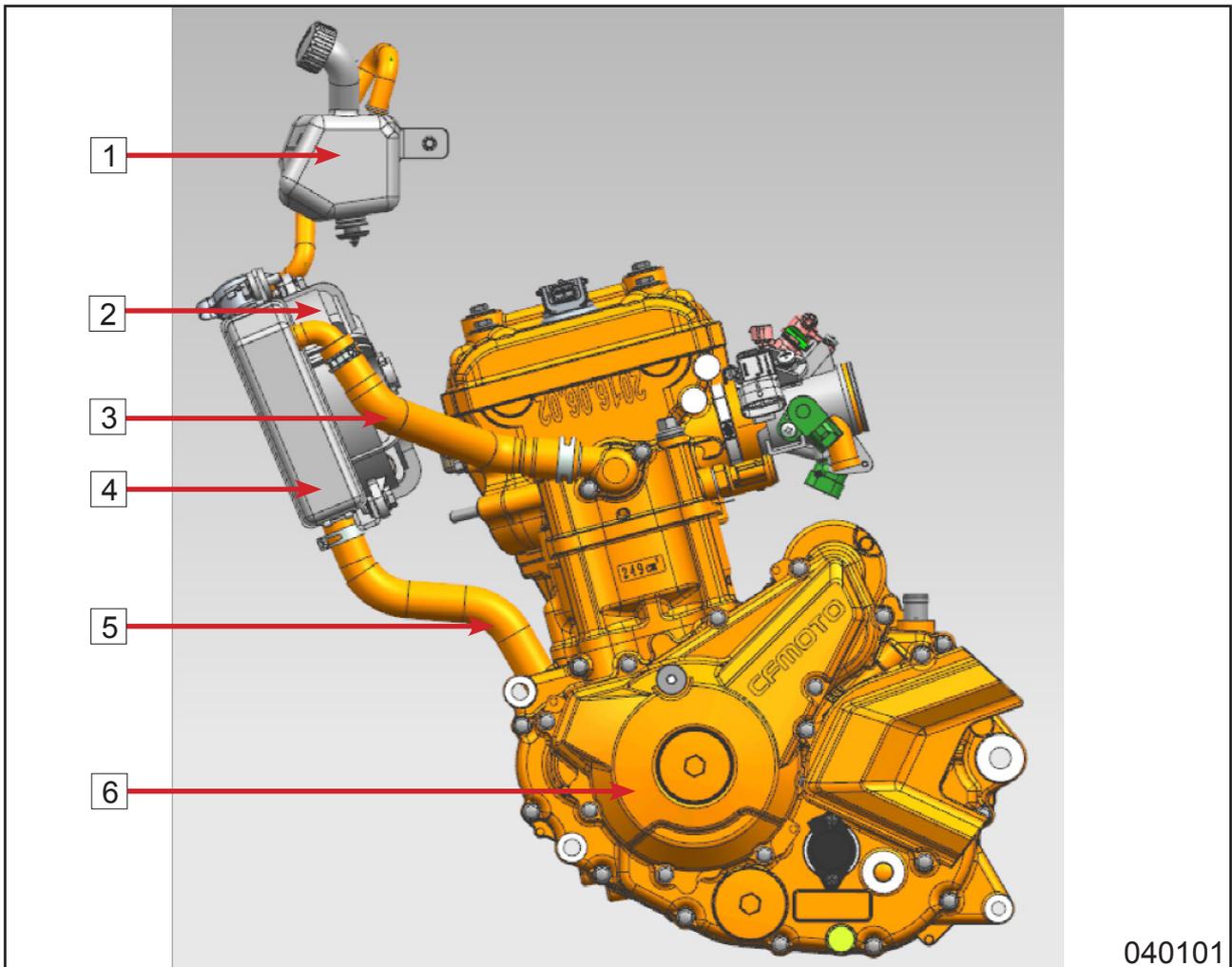
030902

1	Lock, Fuel Tank	6	Front Seat	11	Rear Inner Fender	16	Front Fender	21	Middle Panel, Fuel Tank
2	Rear Seat	7	Base Plate	12	Chain Guard	17	Left Outer Panel, Water Tank	22	Dashboard
3	Left Panel, Fuel Tank	8	Left Panel	13	Left Panel, Frame	18	Front Deflector		
4	Rear Tail Light	9	Rear Fender	14	Left Panel, Engine	19	Headlight		
5	Rear Left Deco Plate	10	Lower Left Deco Strip	15	Left Inner Panel, Water Tank	20	Windshield		

# 04 Cooling and Lubricating System

- 4.1 172MM-2 Engine Cooling System ..... 04-1
- 4.2 Engine Coolant ..... 04-2
- 4.3 Cooling Cycle Tightness Inspection..... 04-2
- 4.4 Radiator and Water Hoses Inspection and Clean..... 04-3
- 4.5 Fan Motor Inspection ..... 04-4
- 4.6 Water Temperature Sensor Inspection ..... 04-5
- 4.7 Inspection of Thermostat..... 04-6
- 4.8 Water Pump..... 04-7
  - 4.8.1 Water Pump Assembly Inspection ..... 04-7
  - 4.8.2 Water Pump Assembly ..... 04-7
- 4.9 Lubricant System Drawing ..... 04-10

## 4.1 172MM-2 Engine Cooling System



040101

1	Coolant Reservoir Assembly	3	Inlet Pipe, Radiator	5	Outlet Pipe, Radiator
2	Fan Motor Assembly	4	Radiator Assembly	6	172Mm-2 Engine Assembly

## 4.2 Engine Coolant

Coolant in cooling system is a mixture of 51.5% distilled water, 46% ethylene glycol antifreeze and 2.5% additive. This mixture ratio provides optimized corrosion resistance and fine heat production. The mixture has good anti-corrosion and endothermic function, and its solidification point is -30 degree. If engine works under -30 degrees centigrade, choose coolant with solidification point at -40 degrees centigrade or -50 degrees centigrade.

**⚠ Warning:**

**Use high quality ethylene glycol base antifreeze mixed with distilled water. Never mix alcohol base anti-freeze or other different brands of antifreeze.**

**The ratio of mixture should not be more than 60% or less than 50%.**

**Do not use anti-leak additive.**

**⚠ Warning:**

**Never open radiator cap when engine is still hot. Or you may be injured by scalding fluid or steam;**

**Coolant is harmful. DO NOT swallow or stain your skin or eyes with coolant. In case of the above, flush with plenty of water and consult a doctor if necessary;**

**Keep coolant away from reach of children.**

## 4.3 Cooling Cycle Tightness Inspection

Idle the engine; turn off the engine when fan starts; check the coolant line for leaks after engine back to cold.

Replace new parts if there is leaks.

**⚠ Warning:**

**NEVER open radiator cap when engine is still hot to avoid hurt by scalding fluid or steam;**

## 04 Cooling and Lubricating System

### 4.4 Radiator and Water Hoses Inspection and Clean

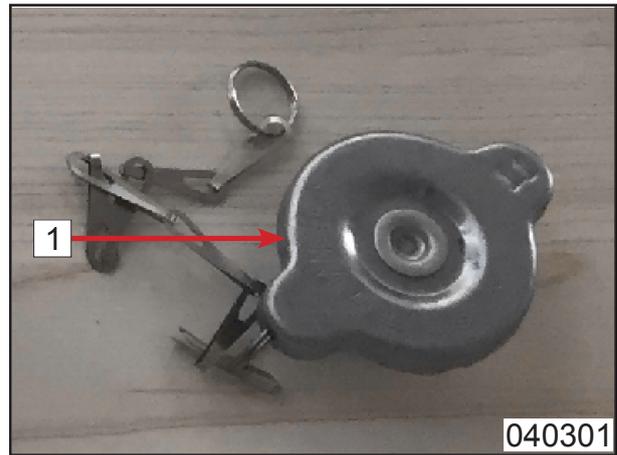
#### Inspection of Radiator cap

Remove radiator cap (1)

Test filling port cap pressure by a pressure guage.

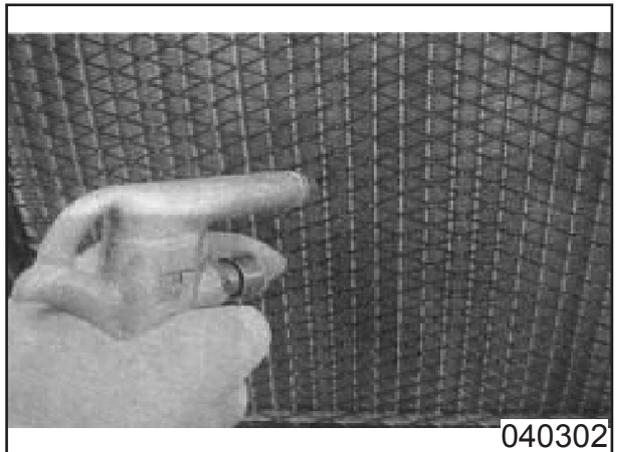
Radiator Cap Opening Pressure Standard:  
**90kPa~120kPa**

If the cap cannot meet the pressure requirement, replace with new one.

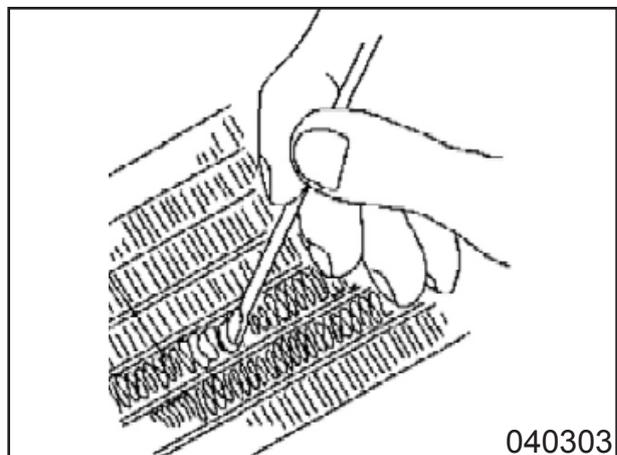


#### Inspection and Clean of Radiator

Remove dirt or trash from radiator.



Repair radiator fins with a small screwdriver;



## Inspection of Water Hoses

Check radiator hoses for leakage or damage. If any, replace with new one.

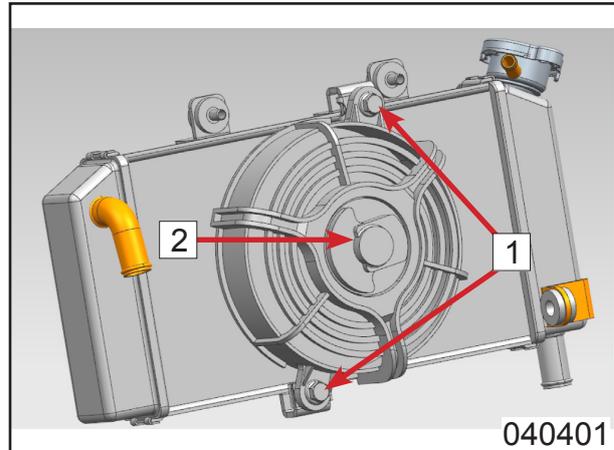
Check water hose clamps. Replace with new one if any looseness found.

After inspection and clean of radiator and hoses, check coolant level. Fill coolant if necessary.

## 4.5 Fan Motor Inspection

Release 2 bolts (1) from fan motor with a wrench. Remove fan motor (2) from radiator.

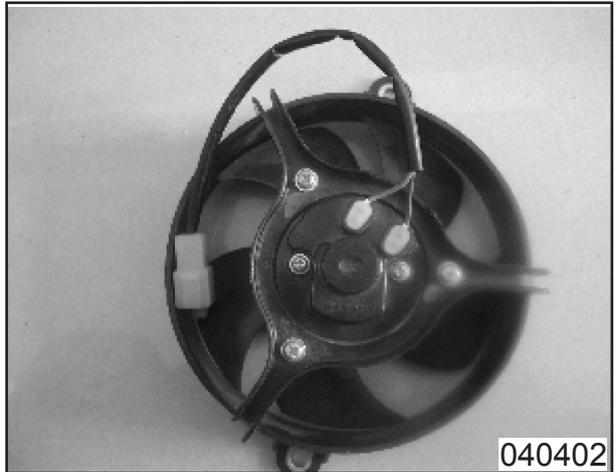
Turn the vanes to check if they can turn smoothly;



Check fan motor as the right chart: Battery: 12 volts, motor runs at full speed with ampere not more then 5A indicating in ammeter. If the motor does not work or the ampere exceeds the limit, replace the motor.

Installation: Apply a little thread locker to the bolts and tighten to the specified torque.

**Fan Motor Bolt Tightening Torque: 10 N·m**



## 4.6 Water Temperature Sensor Inspection

Remove water temperature sensor (1);

Check the resistance of water temperature sensor as illustrated on the right. Place water temperature sensor in a vessel with coolant. Place an alcohol burner under the vessel.

Tool: ohmmeter, thermometer, variable resistors and resistors.

Warm the antifreeze, and check the display of Ohmmeter and thermometer.

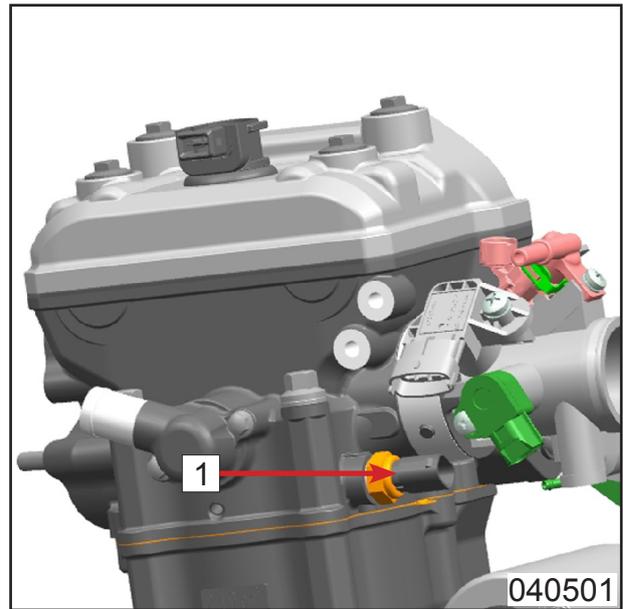


Table of Water temperature and Resistance Value. For 1 and 3.

Temperature	50	80	110
Resistance( $\Omega$ )	811	318 $\pm$ 8	141.7 $\pm$ 1.8

Table of Composited Water Temperature Sensor and Resistance Value. For 2 and grounding.

Temperature	50	120
Resistance( $\Omega$ )	176 $\pm$ 40	17.9 $\pm$ 1.5

Installation of Composited water temperature sensor. Apply a few of thread-locking adhesives on the thread, and install it into cylinder head according to specific process.

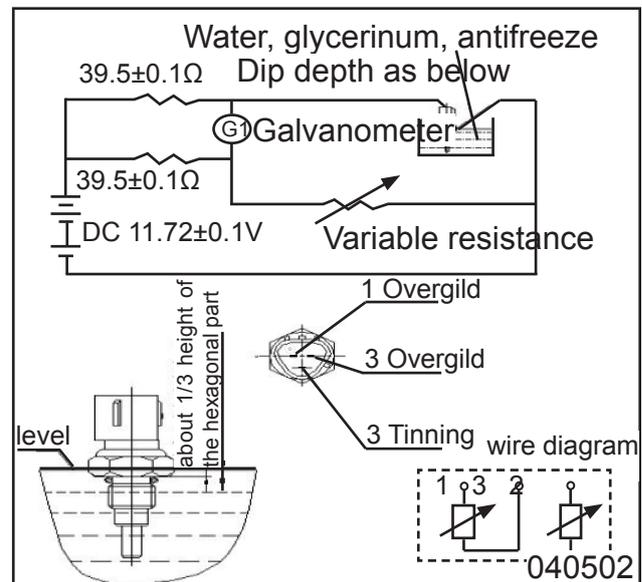
**Tightening torque of Composited water temperature sensor : 10N·m~15N·m**

### Inspection for water temperature sensor

Remove water temperature sensor from cylinder head.

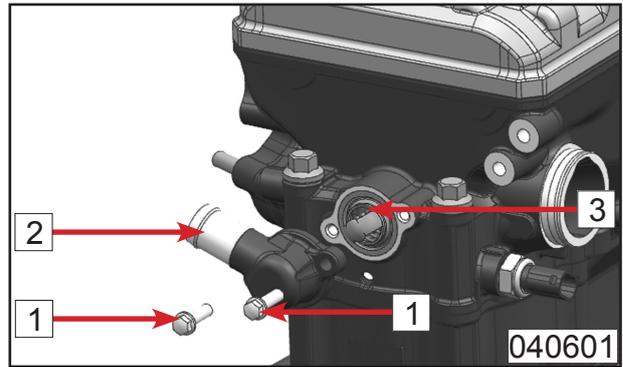
**⚠️ Note: To prevent the damage of water temperature sensor, it is not allow to crash the flint. Composited water temperature sensor and thermometer and not allow to contact with dish.**

Inspect the coolant liquid after installed composited water temperature sensor. Add coolant if necessary.



## 4.7 Inspection of Thermostat

Remove two M6×20 bolt (1).  
Remove thermostat cap (2).  
Remove thermostat (3).



### Thermostat Test

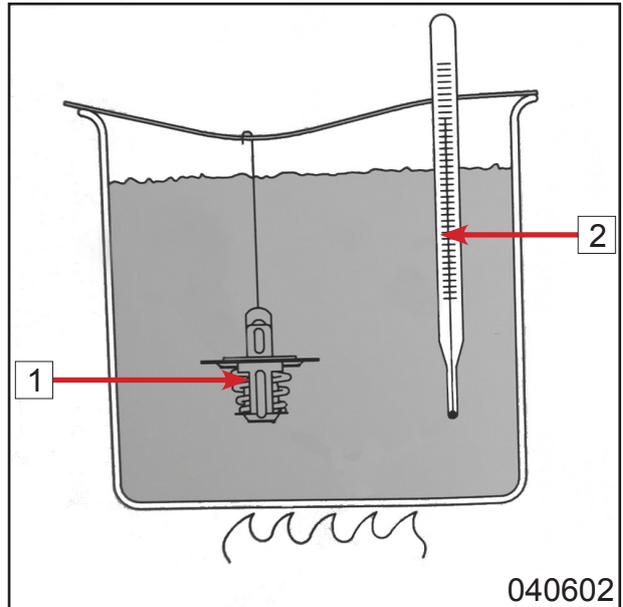
Controlling water temperature (2) to detect the thermostat (1); If damaged, replace a new thermostat;

Thermostat Opening Temperature:

Preliminary open temperature: 82 degrees centigrade  $\pm$  2 degrees centigrade

Full open temperature: 95 degrees centigrade

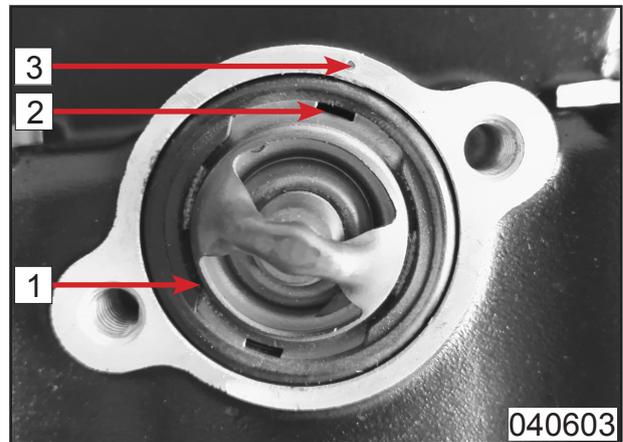
Full open lift:  $\geq$  4.5 (When 95 degrees centigrade )



### Thermostat Installation

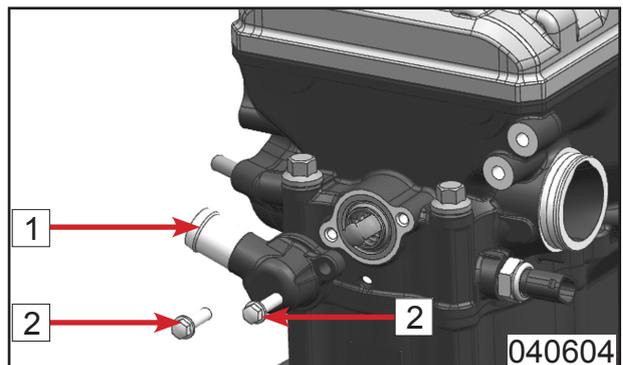
Install thermostat (1).

**⚠ Note: Align any vent hole (2) with the mark (3) on cylinder head installed when installation;**



Install thermostat cap (1) and M6×20 bolt (2).

**⚠ Note: Bolt M6×20 tightening torque: 10 N·m**



## 4.8 Water Pump

### 4.8.1 Water Pump Assembly Inspection

Check water pump cover (1) for damage. Replace a new part if damaged.

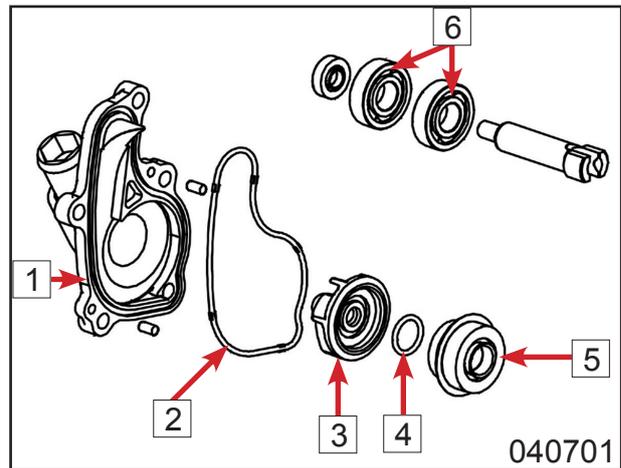
Check water pump cover sealing ring (2) for deformation. Replace a new part if damaged.

Check impeller (3) for damage. Replace a new part if damaged.

Check o-ring 13×2 (4) for deformation. Replace a new part if damaged.

Check for water sealing assembly (5) for damage. Replace a new part if damaged.

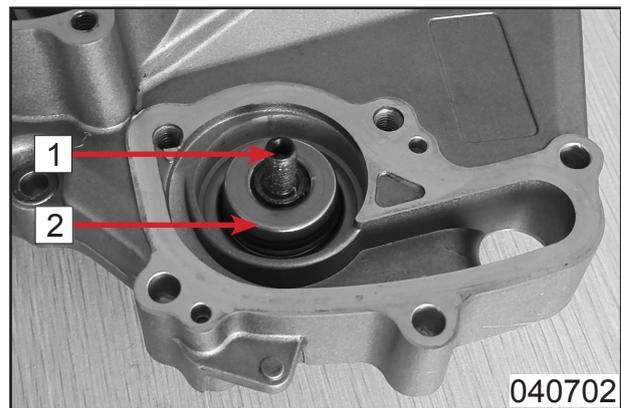
Check bearing 6001 (6) for being stuck. Replace a new part if any.



### Remove Water Seal Assembly

Press out water pump shaft (1). Check water pump shaft for damage. Replace a new one if damaged.

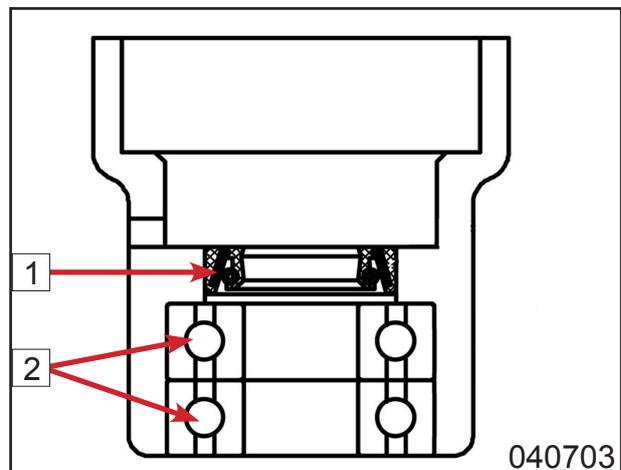
Take out water seal assembly (2), scrap it.



### Remove Bearing 6001 and oil seal 12×20×5

Take out oil seal 12×20×5 (1), scrap it.

Press out two bearing 6001 (2).

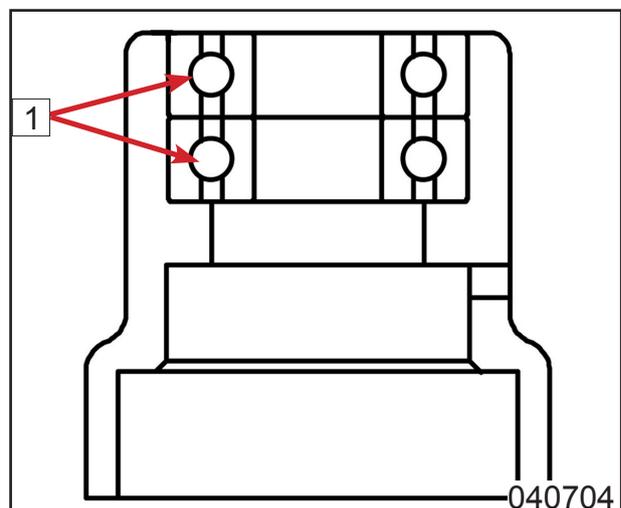


### 4.8.2 Water Pump Assembly

Right image show bearing 6001 (1) press fitting.

Press two bearing 6001 (1) into bearing hole in order.

Apply oil one the outer of bearing when press fitting.

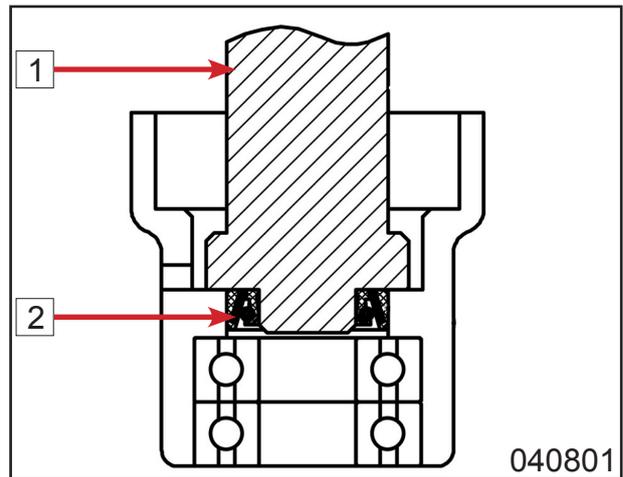


**⚠️ Note:** When bearing press fitting, the pressure head must hold out against the bearing outer ring, hold out against the inner ring will damage the bearing.

## The right image shows oil seal 12×20×5 (2) press fitting:

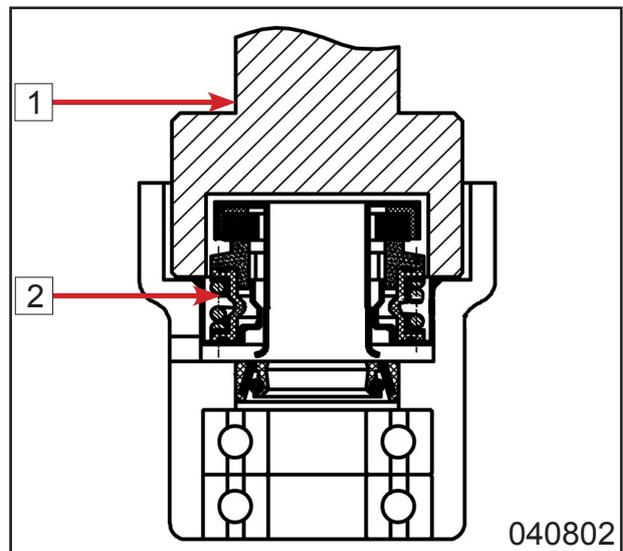
Replace a new oil seal 12×20×5 (2) .  
Press oil seal 12×20×5 (2) into proper position by using a special pressure head.

**⚠Note:** Before the oil seal press fitting, evenly apply solid glue 648 on daub cylindrical surface, evenly apply grease on the lips after press fitting.



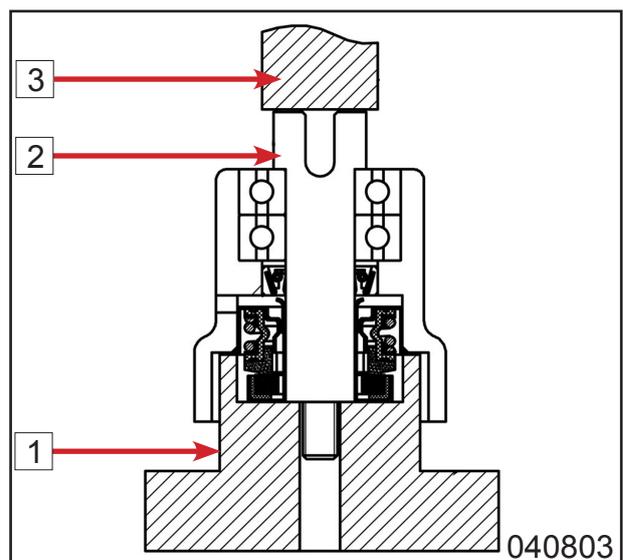
## The right image shows water seal (2) press fitting:

Replace a new water seal assembly (2);  
Press water seal assembly (2) into proper position by using a special pressure head.



## The right image shows water pump press fitting:

Place a support block (1) on the back of the shaft hole;  
Press the water pump shaft (3) into the bearing hole by using a pressure head;  
Apply oil on the water pump shaft outer when press fitting.



## 04 Cooling and Lubricating System

### Water Pump Impeller Installation

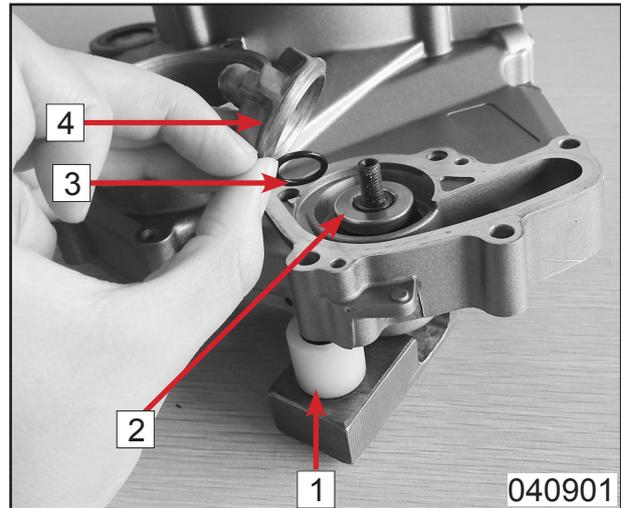
Install special tool (1) on drive end of water pump shaft (2).

Apply grease on o-ring 13×2 (3), and then install it to the groove.

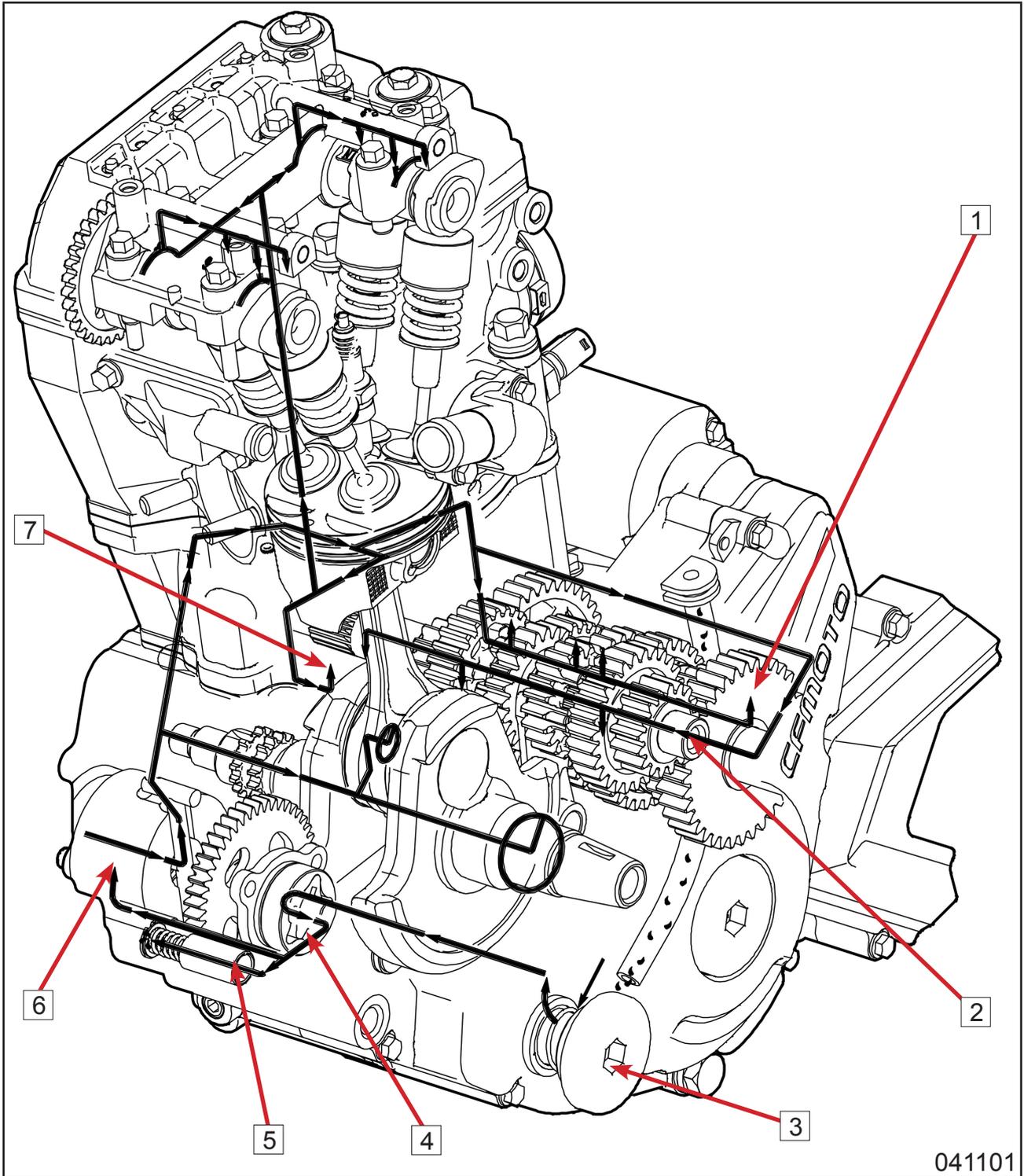
Install water pump impeller.

**Water pump impeller tightening torque:  
10 N·m**

**⚠ Note: After the pump assembly, rotation of pump shaft should be flexible, bearing no block. If found any above problems, operate maintenance.**



## 4.9 Lubricant System Drawing



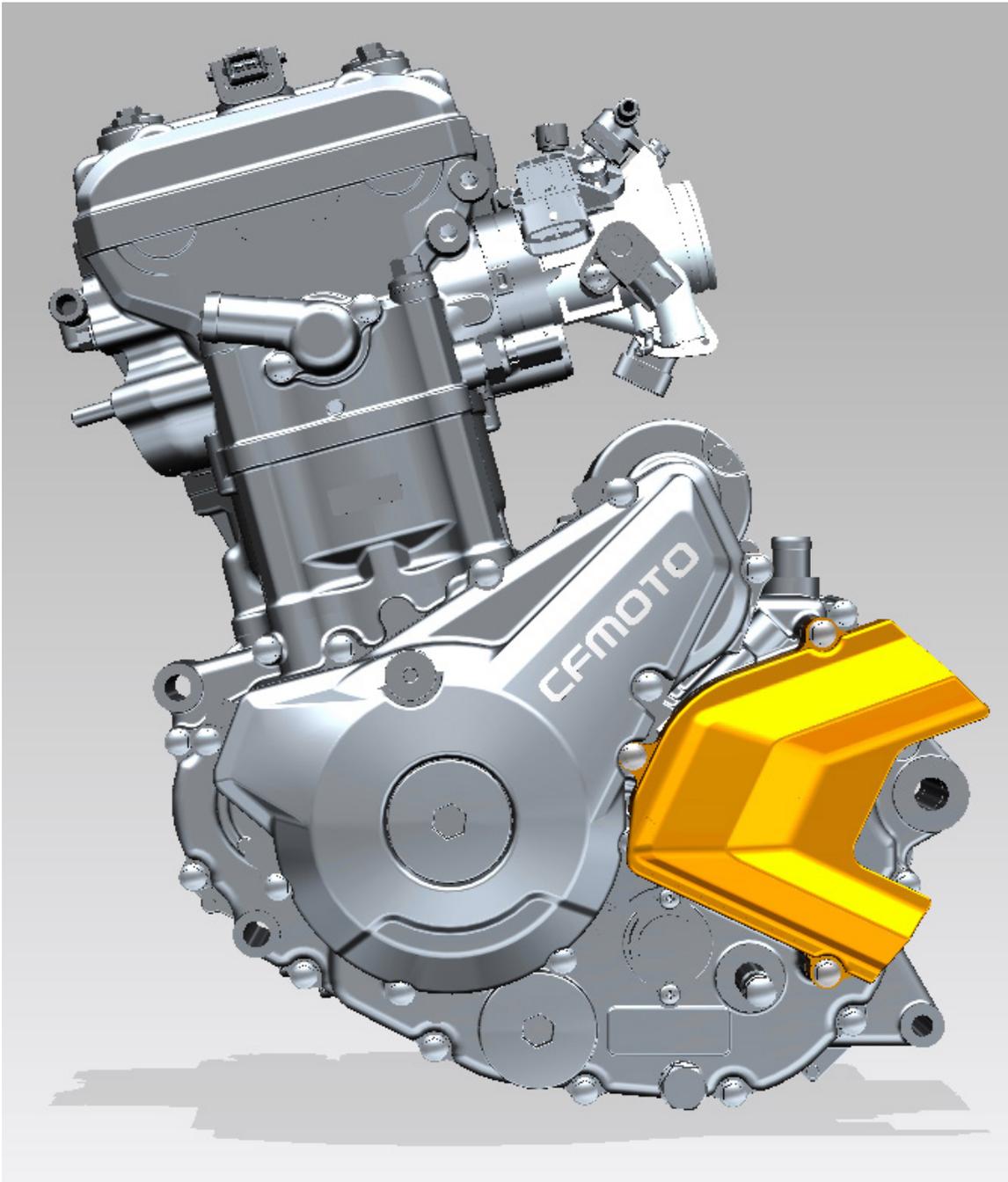
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1	Main Shaft Assy	3	Oil Strainer	5	Relief Valve	7	Piston
2	Secondary Shaft Assy	4	Oil Pump Assy	6	Oil Filter		

Engine lubrication system: Most of parts inside engine which run at high speed, like piston, crankshaft, camshaft all need great lubrication, the good lubrication is the base of the good condition of engine working.

172MM-2 engine is used pressure and splash lubrication system, Apply SAE10W-40/SJ engine oil for 4-Stroke engine, Engine Oil is not only used for lubrication, but also for clean rustproof, sealing and cooling.

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## Preparation Intruction

This chapter introduces maintenance procedures, removal and installation , maintenance point, malfunction excluded and technical data of 172MM-2/172MM-2A engine. With detailed graphical information to guide operations. Read this manual carefully and carry out with standard. It can prolong engine service life, improve engine performance.

## Unit Conversion Table

Item	Unit Conversion
Pressure	1kgf/cm <sup>2</sup> =98.0665kPa
	1kPa=1000Pa
	1mmHg=133.322Pa=0.133322kPa
Torque	1kgf·m=9.80665N·m
Volume	1mL=1cm <sup>3</sup> =1cc
	1L=1000cm <sup>3</sup>
Force	1kgf=9.80665N

## WARNING/CAUTION/NOTE

Please read the following notification carefully which emphasize the special meanings of WARNING, Caution and Note. Always pay attention to these notification when servicing the engine.

-  **Warning:** This symbol indicates a high risk which should be alert to.
-  **Caution:** This symbol indicates a moderate risk which should be alert to.
-  **Note:** This symbol indicates a minor risk which should be paid attention to.

However,WARNING,CAUTION and NOTE notification included in this service manual don't cover all the potential risk in the engine operation and repair. Therefore, mechanics should be equipped with knowledge of basic mechanical safety beside the notification of WARNING and CAUTION. If you are no confident to complete the whole repair,please refer to the senior mechanic for support.

**CFMOTO reserves right to make improvements and modifications to the products without prior notice.**

**Overhaul and maintenance should be done according to actual condition of vehicle.**

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## 5.1 Maintenance Information

### 5.1.1 General Prevention Measures

**⚠ Warning: Serviceman's safety and engine reliability is very important.**

- Keep high safety attention and mutual remind while two or more parts working together.
- Exhaust gas should be exhausted to outside when start engine indoor
- Keep ventilation and operate base on instruction of user manual if need to use poisonous or combustibles
- Don't take gasoline as a leaner
- Don't touch engine oil, radiator and parts of exhaust system avoid scald if uncooled
- Check the mark line and leakage after maintain fuel, lubrication, cooling and exhaust system.
- Don't dispose any replaced parts at will in order to protect the natural environment

**⚠ Caution:**

- **Genuine parts should be used if any parts need to be replaced when maintaining.**
- **Keep all disassembled parts in order in order to any confusion if need to reuse the disassembled parts.**
- **Use special tools base on requirements of service manual.**
- **Keep clean for all assembled parts, and lubricate all parts if it must to be lubricated.**
- **Use specialized lubricating oil, binder and sealant.**
- **Tighten the big torque parts base on standard torque from inside to out while tighten the bolt, nuts and screws.**
- **Use torque wrench to tighten bolt base on standard torque, and need to clean the bolt if thread with grease and oil.**
- **Check all disassembled parts. Clean parts before measuring.**
- **Check parts running and tighten situation after assembled.**
- **Don't reuse the disassembled parts such as oil seal, gasket, self-locking nut, lock washers, cotter, snap ring etc. New parts should be assembled while assembling.**

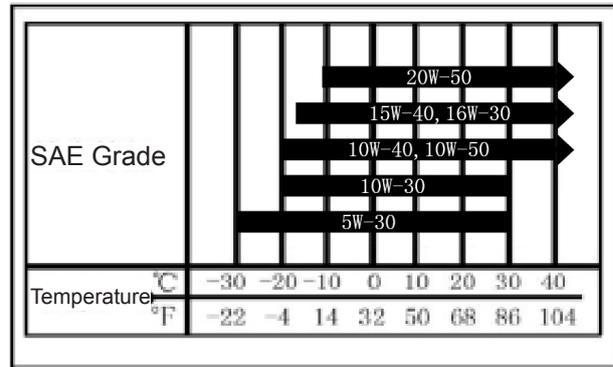
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## 5.1.2 Fuel, Engine Oil Introduction

**Fuel:** Octane 93#/92# or above, unleaded

**Engine oil:** Oil type (SAE10W — 40)  
Oil grade: API (SJ or above)

If above-mentioned oil is unavailable, please choose as right picture shows according to temperature.



## 5.1.3 Engine break-in

There are many moving parts inside engine, such as piston, piston ring, cylinder, gears and so on. It's very important to break-in during initial drive. Break-in can make moving components match each other better, contact better and adjust clearance to guarantee engine better performance and reliability.

Recommended running-in period is **1000km**.

### Notes for break-in:

1. Turn throttle slowly step by step after starting engine. Do not turn faster and slower.
2. Try to drive on a good road, do not drive on up and down road for a long time.
3. Keep oil path smooth.
4. Try to avoid sudden acceleration or high RPM with no-load condition.
5. Do regular repair and maintenance during break-in period. Remove it if any troubles occur.
6. After running-in, please change engine oil, adjust electrode of spark plug and valves clearance, inspect oil path, and clean carbon deposit on head of piston and cylinder head if needed. Do a complete engine inspect and maintenance according to service manual before normal driving.

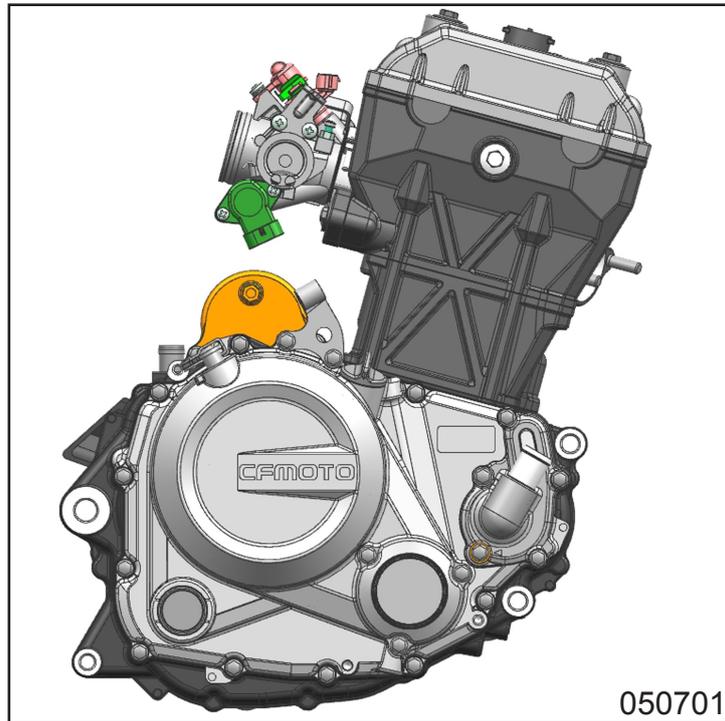
**0~500km:** Do not run engine at  $\geq 50\%$  throttle position; do not change speed frequently; do not run engine at a fixed throttle position; Avoid sudden speed up; Turn throttle slowly.

**500km~1000km:** Do not run engine at  $\geq 75\%$  throttle position for long time.

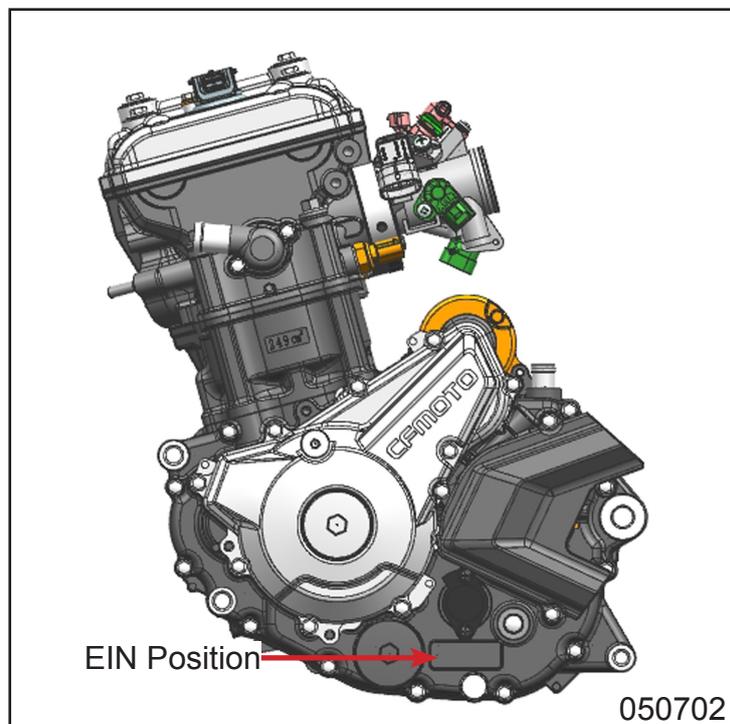
**⚠ Note:** Do regular repair and maintenance during break-in period, if any troubles, please remove it immediately.  
· Maintenance After 1000km break-in, then to normally driving.

## 5.1.4 EIN

### 1. Engine RH Side



### 2. Engine LH Side



5.1.5 Engine Technical Regulations					
No.	Item		Type/Specification		
1	Type		Single cylinder, water-cooled, 4-stroke, 4- valves, OHC		
2	Bore × Stroke		72mm×61.2mm		
3	Displacement		249.2mL		
4	Compression ratio		11.3 : 1		
5	Low idling speed(Idling)		1500r/min±150r/min		
6	Starting		Electric		
7	Electrical system	Ignition type	ECU		
		Spark plug/ Electrode gap	CR8EI/0.8mm~0.9mm		
		Magneto type	Out rotor, flywheel		
8	Combustion system	Combustion Chamber	Triangular		
		Air filter type	Sponge, Paper filter		
		Gasoline	RQ-92 and above		
9	Valves system	Valves type	DOHC/chain drive		
10	Lubrication System	Lubrication type	Pressure and splash		
		Oil pump type	Rotor drive		
		Oil filter type	Paper type, replaceable		
		Engine oil type	SAE10W-40/SJ		
11	Cooling system	Cooling type	Closed coolant circulation		
		Coolant type	-30 anti-rust and antifreeze fluid		
12	Transmission System	Clutch		Wet and multiplate clutch	
		Transmission type		6-gear, constant mesh, step transmission	
		Gearshift methods/orders		Mechanical reciprocating /1-0-2-3-4-5-6-5-4-3-2-0-1	
		Gear ratio	Primary Ratio		2.8
			Secondary ratio	1st	3.333
				2nd	2.118
				3rd	1.571
				4th	1.304
5th	1.115				
6th	0.963				
13	Overall size		469mm×338mm×488mm		
14	Dry weight		35.3kg		
15	Output type		Chain		
16	Rotation of engine output		When moving forward, counterclockwise from left side		

## 5.1.6 Service Specification

## Valve Train / Cylinder Head

Item	Standard		Limit	Remark
Diameter of valve head	IN	28.9 mm~29.1 mm	—	
	EX	24.9 mm~25.1 mm	—	
Valve clearance(cold engine)	IN	0.12 mm~0.17 mm	—	
	EX	0.17 mm~0.22 mm	—	
Valve guide bush and valve stem clearance	IN	0.01 mm~0.037 mm	—	
	EX	0.03 mm~0.057 mm	—	
Inner diameter of valve guide bush	IN & EX	4.5 mm~4.512 mm	4.58 mm	
Outer diameter of valve stem	IN	4.475 mm~4.490 mm	4.46 mm	
	EX	4.455 mm~4.470 mm	4.44 mm	
Run-out of valve stem	IN & EX	0.03 mm	—	
Width, valve seat	IN & EX	0.9 mm~1.1 mm	—	
Free length, valve spring		41.6 mm	39.8 mm	
Valve spring force	Press to 29.8mm	455 N~503 N	—	
	Press to 30.5mm	422 N~466 N	—	
Camshaft Lift	IN	35.743 mm~35.857 mm	35.647 mm	
	EX	35.743 mm~35.857 mm	35.647 mm	
Camshaft to hole clearance		0.028 mm~0.071 mm	0.150 mm	
Outer diameter of camshaft	Φ23	22.95 mm~22.972 mm	22.921 mm	
Inner diameter of camshaft mating Hole	Φ23	23 mm~23.021 mm	—	
Camshaft run-out		0.015 mm	0.1 mm	
Cylinder head warpage		0.03 mm	—	
Camshaft seat warpage		0.04 mm	—	

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## Cylinder/Piston/Piston Ring/Connecting Rod

Item	Standard		Service limit	Remark
Cylinder pressure	kPa		—	
Piston-to-cylinder clearance	0.045mm~0.062mm		—	
Diameter of Piston at skirt	71.950mm~71.965mm Measured at 10mm to skirt end		71.8mm	
Inner diameter of cylinder	72mm~72.019mm		72.07mm	
Cylinder warpage	0.03 mm		0.05mm	
Piston ring end gap	1 Ring	0.15mm~0.3mm	0.55mm	
	2 Ring	0.1mm~0.3mm	0.55mm	
Piston ring to groove clearance	1 Ring	0.03mm~0.07mm	0.17mm	
	2 Ring	0.03mm~0.07mm	0.17mm	
Thickness, piston ring	1 Ring	0.97 mm~0.99mm	0.9mm	
	2 Ring	0.97 mm~0.99mm	0.9mm	
Width, piston ring groove	1 Ring	1.02mm~1.04mm	1.12mm	
	2 Ring	1.02mm~1.04mm	1.12mm	
	Oil ring	2.01 mm~2.03mm	2.11mm	
Inner diameter of piston pin hole	17.002mm~17.008mm		—	
Outer diameter piston pin	16.995mm~17.000mm		—	
Inner diameter of connecting rod small end	17.015mm~17.025mm		—	
Connecting rod big end side clearance	0.25mm~0.45mm		0.65mm	
Connecting rod big end thickness	20.45mm~20.5mm		—	
Crankshaft run-out	≤0.03mm		0.08mm	

## Lubrication System

Item	Standard		Service limit	Remark
Outer rotor to inner rotor clearance	0.07mm~0.15mm		—	
Outer rotor to pump body clearance	0.12mm~0.184mm		—	
Oil pressure	0.1MPa~0.4MPa		—	
Oil type	SAE10W-40, API SJ or above		—	
Oil capacity	Change oil	1300mL	—	
	Change filter	1400mL	—	
	At engine overhaul	1600mL	—	

## Clutch/Transmission

Item		Standard	Service limit	Remark
Clutch plate		2.98mm~3.08mm	2.76 mm	
Quantity		7		
Total thickness of clutch plate		30.3 mm~31.2 mm	—	
Free length, clutch spring		35 mm~36 mm	33.5 mm	
Quantity		6		
Width, gearshift fork groove	S i x - s p e e d driven gear	5.1 mm~5.17 mm	5.22 mm	
	Three-speed, four-speed drive gear	5.1 mm~5.17 mm	5.22 mm	
	F i v e - s p e e d driven gear	5.1 mm~5.17 mm	5.22 mm	
T h i c k n e s s , gearshift fork	Fork(left)	4.93 mm~5 mm	4.83 mm	
	Fork(middle)	4.93 mm~5 mm	4.83 mm	
	Fork(right)	4.93 mm~5 mm	4.83 mm	

## Air Inlet System

Item	Specification	Remark
Throttle model	ODM0-173000	Delphi
Mouth Size(mm)	Φ38mm	
Idle r/min	1500 r/min±150 r/min	

## Electrical System

Item	Specification		Remark
Spark plug	Model	CR8EI	
	Gap	0.7 mm~0.9 mm	
Spark		>8mm, 1 MPa	
Ignition coil resistance	Primary Coil	1.23 Ω	
	Secondary Coil	6kΩ~7.4kΩ	
Magneto coil resistance	Trigger	400Ω	
Magneto voltage, unloading state		>50V(AC), 5000 r/min	
Max power		280W, 5000 r/min	
Stabilized voltage		13.5V~15.0V	
Primary peak voltage, Ignition coil		≥27kV	
Peak voltage, exciter coil		≥17V	

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## 5.1.7 Tighten Torque Chart

Item	Qty.	Thread diameter(mm)	Torque(N·m)	Remark
Bolt,crankcase	15	M6	10	
Bolt, shift drum cam	1	M6	10	With thread locker
Bolt, gear positioning lever	1	M6	10	With thread locker
Bolt, cylinder head	4	M10	New 25→54 Old 25→49	With thread locker and MoS2 grease(ratio 10:1)
Bolt, cylinder head	2	M6	10	
Pin shaft	1	M8	20	With thread locker
Bolt, chain guide	1	M6	10	With thread locker
Bolt plug, tensioner	1	M16×1.5	20	
Damping Bolt, cylinder head cover	1	M6	10	
Nut,output gear	1	M16×1	100	
Nut, clutch	1	M16×1	100	
Bolt, oil pump	3	M6	10	With thread locker
Bolt, speed sensor	1	M6	8	
Bolt, starting motor	2	M6	10	
Bolt, overriding clutch	6	M6	10	With thread locker
Bolt, magneto rotor	1	M12×1.25	120	
Bolt, gear contactor	2	M5	5	With thread locker
Bolt, sprocket plate	2	M6	10	With thread locker
Bolt, cylinder head cover	4	M6	10	
Screw,oil passage	7	R21/8	15	With thread locker
Drain bolt	1	M12×1.5	25	
Strainer cover	2	M35×1.5	25	
Plug, oil filling	1	3/4"	Hand tight	
Cap, inspection hole	1	M12×1.5	4	
Bolt, magneto stator	3	M6	15	With thread locker
Bolt, trigger	2	M5	8	With thread locker
Spark plug	1	M10×1	15	
Water temperature sensor	1	M12×1.5	12.5	
Other screws, bolts and nuts		M5	4.5~6	
		M6	10~12	
		M8	18~25	

<b>5.1.8 Special Tool</b>				
<b>Measuring Tools</b>				
NO	Item	Specification	Usage	Remark
1	Vernier caliper	0~150mm	Measure length, thickness	
2	Micrometer scale	0~25mm	Measure outer diameter of rocker arm shaft, valve stem, camshaft	
3	Dial gauge	25mm~50mm	Measure Max. lift travel of Camshaft	
4	Dial gauge	75mm~100mm	Measure cylinder at skirt	
5	Scale for inner diameter of cylinder		Measure cylinder inner diameter	
6	Internal quick diameter	10mm~34mm	Measure rocker Arm inner diameter, piston pin hole, connecting rod small end	
7	Dial indicator	1/100	Measure Jump Value	
8	Knife straight Edge		Measure warpage	
9	Feeler gauge		Measure Warpage, valve clearance	
10	Plastic gauge		Measure Fit clearance	
11	Spring scale		Measure Spring force	
12	Tachometer		Measure engine RPM	
13	Cylinder pressure gauge	0~2MPa	Measure cylinder pressure	
14	Oil pressure gauge		Measure oil pressure	
15	Ohmmeter		Measure resistance and voltage	
16	Ammeter		Measure current/switch "ON"/"OFF"	
17	Thermometer		Measure liquid temperature	
18	Torque wrench	Set	Measure wrench torque	
<b>Common and Auxiliary Tools</b>				
19	Alcohol burner		Heating up	
20	Magnetic stand		Install dial gauge	
21	Surface plate		Auxiliary tool	
22	V-shaped plate		Help to measure jump	
23	Pliers		Install valve circlip	
24	Circlip pliers		Install/remove circlip	
25	Nipper plier		Install/remove retainer	
26	Impact screwdriver		Remove bolt, cross groove	
27	Straight screwdriver			
28	Cross screwdriver		Remove cross groove screw	
29	Wrench sleeve	Set	Remove bolt and nut	
30	Inner hexagonal wrench	Set		

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Special Tool				
NO	Item	Specification	Usage	Remark
1	Spark plug wrench		Install/remove spark plug	
2	Holder wrench, clutch		Install/remove clutch nut, crankcase nut	
3	Remover, magneto rotor		Remove magneto rotor	
4	Press tool, valve spring		Install/remove valve spring	
5	Grinder, valve		Grind valve	
6	Installing tool, bearing	Set	Install bearing and oil seal	
7	Removal tool, bearing	Set	Remove bearing	
8	Removal tool, oil seal		Remove oil seal	
9	Holder wrench, magneto rotor		Remove magneto rotor	

## 5.1.9 Engine Consumption Materials & Assembling Materials

Engine consumption materials include lubricant oil (engine oil), lubricant grease (butter) and coolant; Assembling materials include flange sealants, thread locker

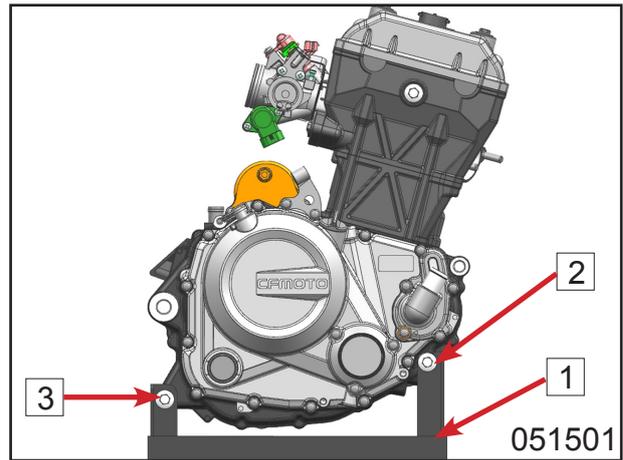
Item	Specification	Using parts	Remark
Lubricant/Oil	For 4-stroke motorcycle SAE10W-40, API SJ or above	Rotation and moving section in Cylinder; Rotation and moving section in Crankcase; Rotation and moving section in Cylinder Head; Piston pin, valve stem, valve oil seal and cam shaft.	
Lubricant grease	#3 MoS 2 lithium grease	Oil Seal, O-ring and rubber seal face, bearing with sealant	
Flange Sealant		Crankcase faying face, crankcase and cylinder joint cylinder head and Cylinder head cover joint	
Tread Locker		Parts of thread	

## 5.2 Engine disassembly

### 5.2.1 Preparation

Place engine on support tool (1);  
Fix engine on support tool with  $\phi 8 \times 100$  shaft (2) and  $\phi 9 \times 120$  shaft (3) or other bolts with same specifications.

**⚠ Note:** Place a piece of cloth under support tool, to collect the engine oil that comes out during disassembling.



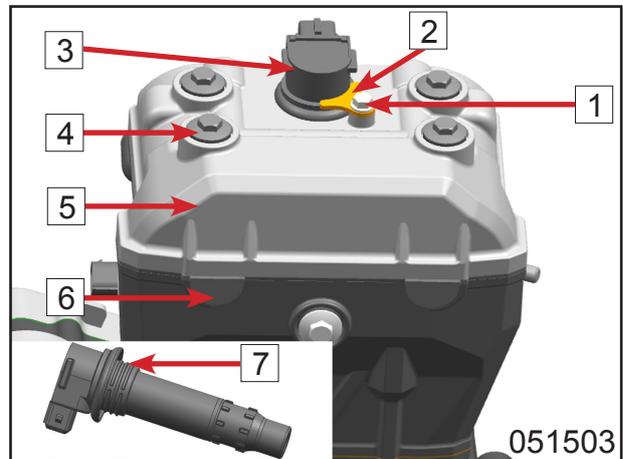
Remove drain bolt (1) and washer;  
Drain out engine oil;



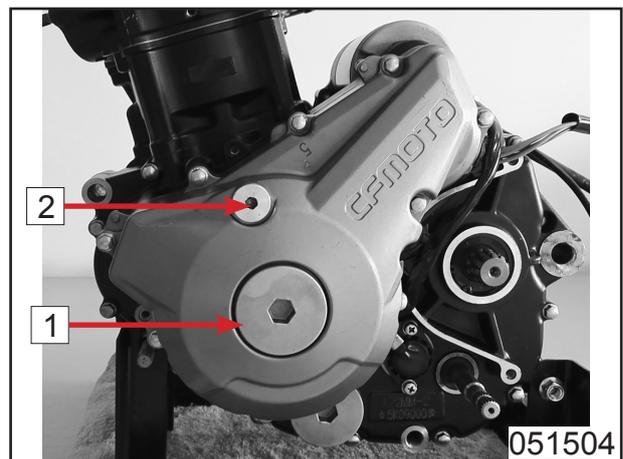
### 5.2.2 Engine Timing Setup

Remove M6×12 bolt (1) and baffle plate (2);  
Remove ignition coil (3) and remove spark plug CR8EI with special tool;  
Remove four cylinder head cover bolts (4) and seal rings;  
Remove cylinder head cover (5);  
Remove cylinder head cover gasket (6);

**⚠ Note:** Apply heat-resistant lithium grease on position (7) when installing ignition coil.

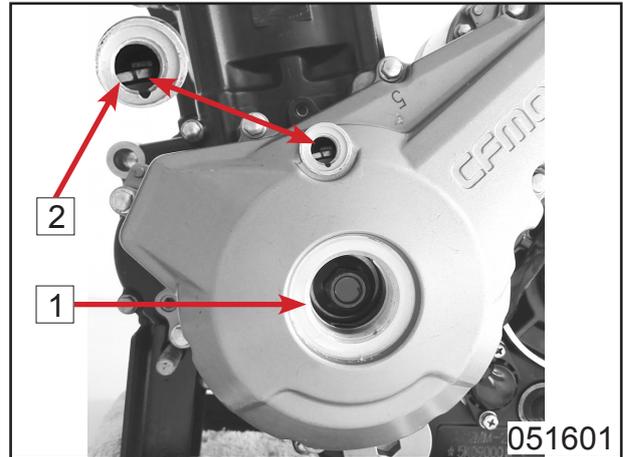


Remove strainer cover (1) and 35×3.5 O-ring;  
Remove timing inspection hole cap (2) and 13×2 O-ring;

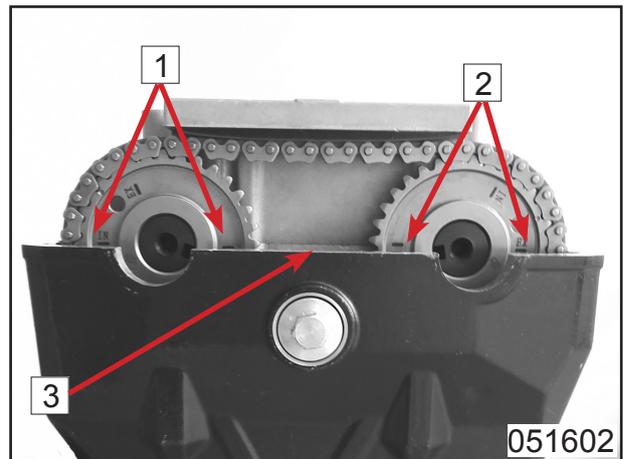


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Rotate crankshaft (1) counterclockwise;  
Align timing inspection hole marks (2);

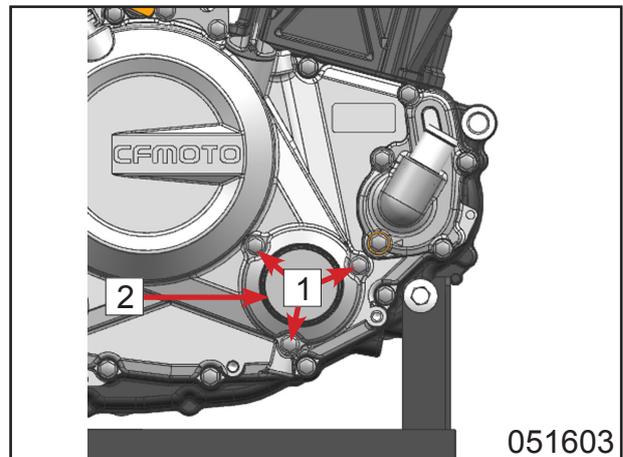


Sprocket (IN) line (1) align with cylinder head upper plane (3);  
Sprocket (EX) line (2) align with cylinder head upper plane (3).



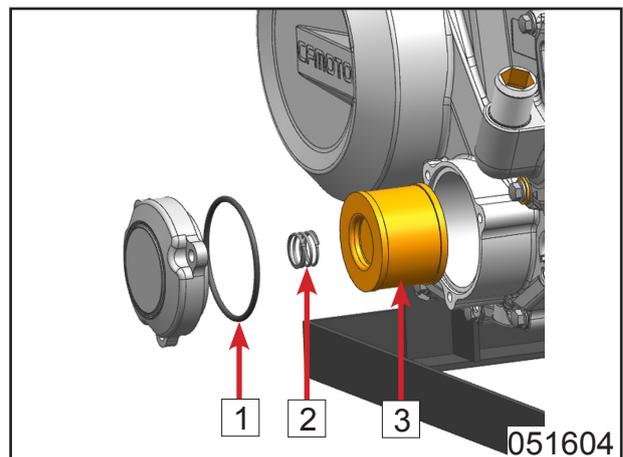
## 5.2.3 Oil Filter Removal

Remove three M6×20 bolts (1);  
Remove oil filter cover (2);



Remove 57×3 O-ring (1);  
Remove filter spring (2);  
Remove oil filter (3);

**⚠ Note: There is remaining oil that comes out during removing oil filter.**



## 5.2.4 Right Side Cover

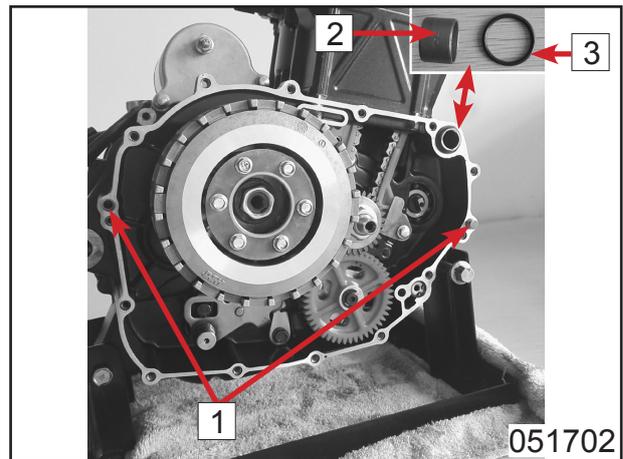
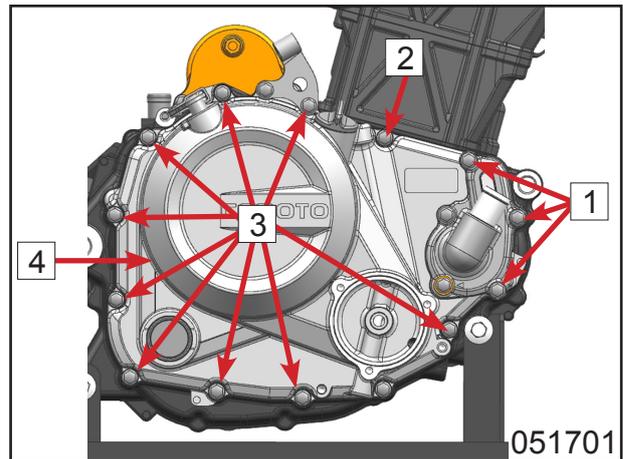
Remove three M6×45 bolts (1);  
 Remove M6×30 bolt (2) and 5×2 O-ring;  
 Remove ten M6×30 bolts(3);  
 Remove right side cover (4);

**⚠ Note: Inspect 5×2 O-ring if deformed. Replace new one if necessary.**

Dowels pins (1) are transition fit. It is okay not to remove them during maintenance.  
 Remove right side cover gasket;  
 Remove water pipe (2) and 18×1.8 O-ring (3);

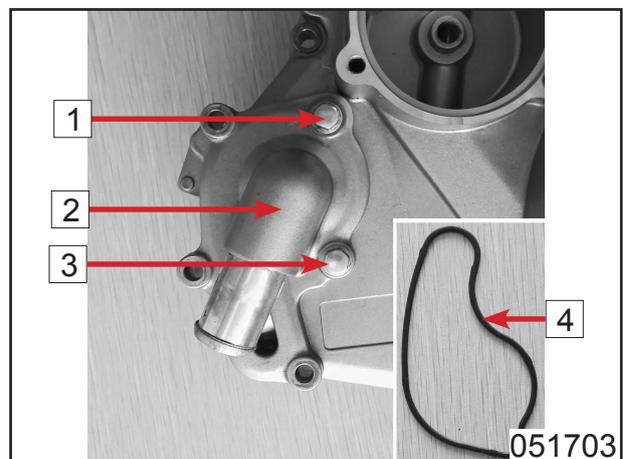
**⚠ Caution: Right cover gasket can not be reused.**

**⚠ Note: There is remaining oil that comes out during removing right side cover.**

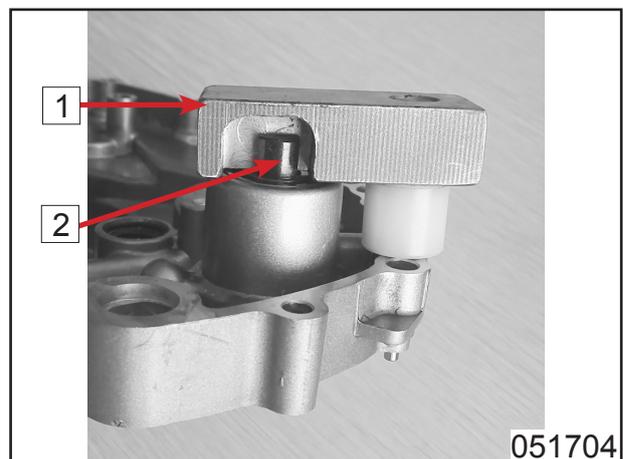


## 5.2.5 Water Pump Impeller

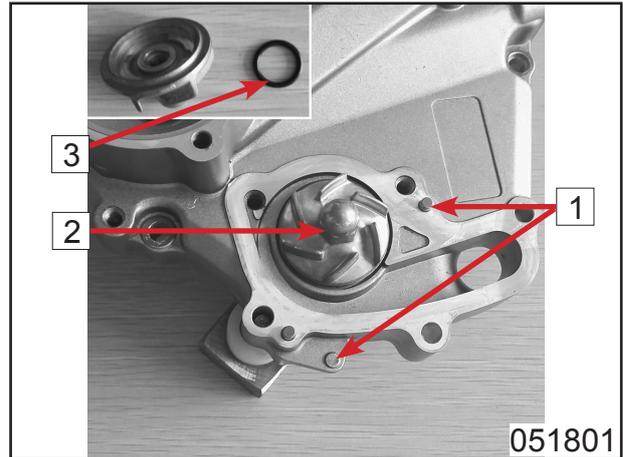
Remove M6×20 bolt (1) and washer;  
 Remove M6×20 bolt (3);  
 Remove water pump cover (2) and gasket (4);



Install special tool (1) on water pump shaft (2);

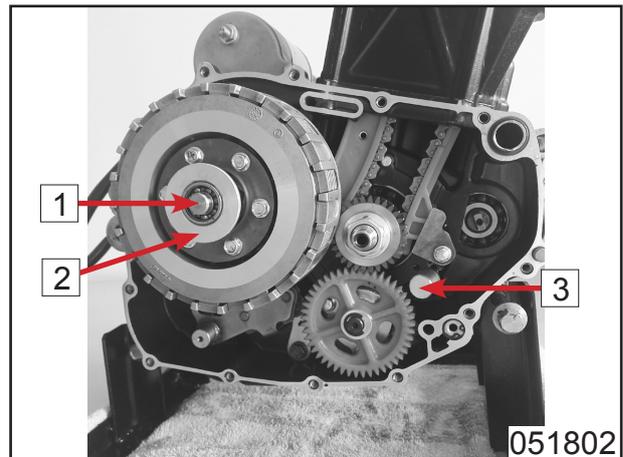


Remove water pump cover dowel pin (1);  
Remove water pump impeller (2) and 13×2  
O-ring (3).

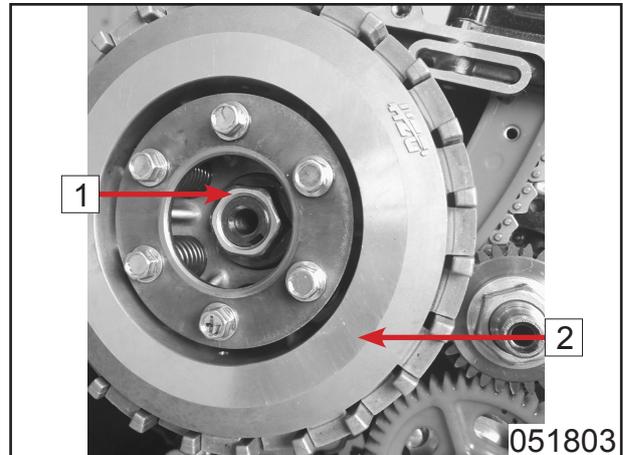


## 5.2.6 Clutch Removal

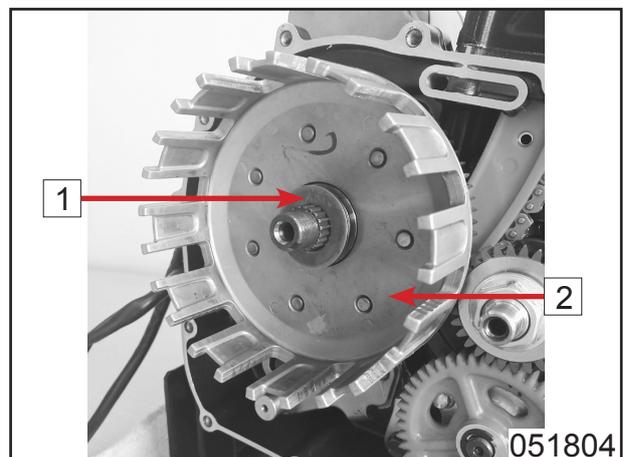
Remove damper rod (1);  
Remove bearing seat and bearing (2);  
Install crankshaft fixing pin (3) to stop  
crankshaft rotating;



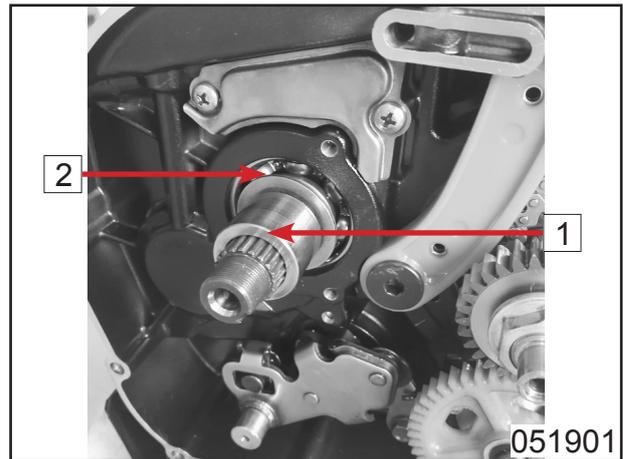
Remove M16×1 nut (1) and retainer;  
Remove center sleeve (2);



Remove 20×37×2 washer (1);  
Remove primary driven gear assembly (2);

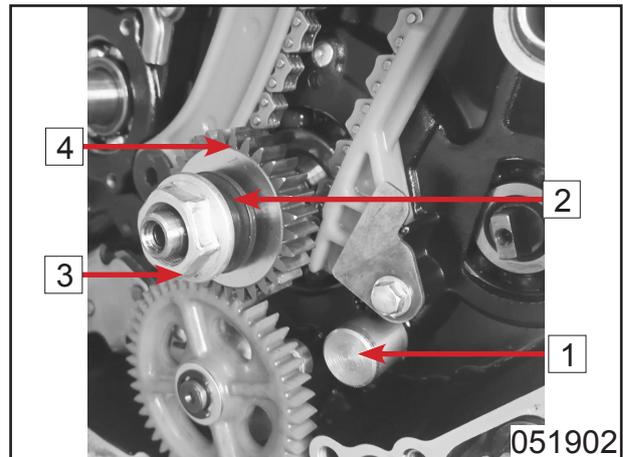


Remove shaft sleeve (1);  
Remove 20×37×2 retainer (2).



## 5.2.7 Output Gear Removal

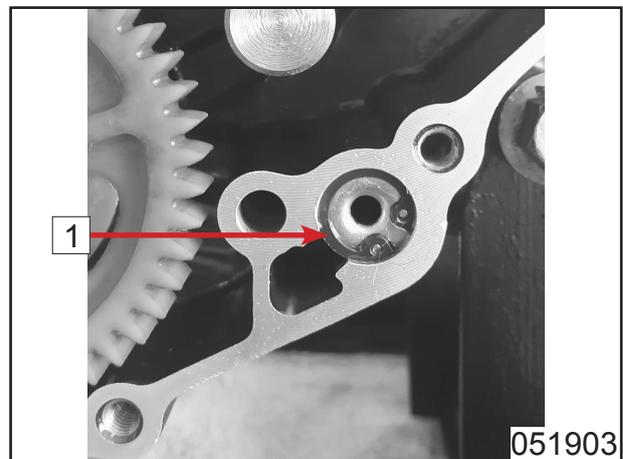
Install crankshaft fixing pins (1) to stop crankshaft rotating;  
Remove M16×1 nut (3);  
Remove 16 circlip (2);  
Remove output gear (4);



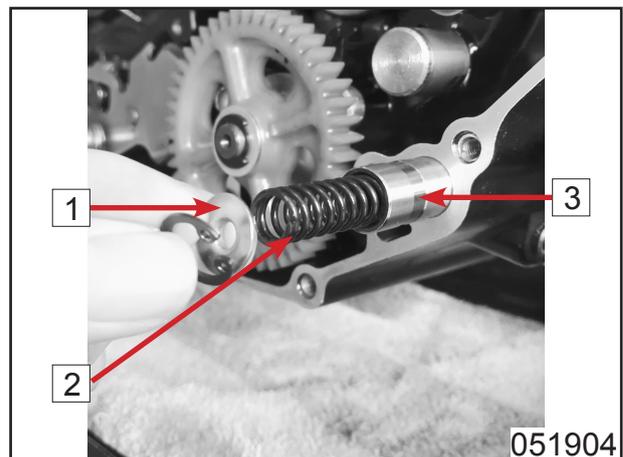
## 5.2.8 Relief Valve Removal

Remove 14 circlip (1);

**⚠ Caution: Circlips can not be reused.**



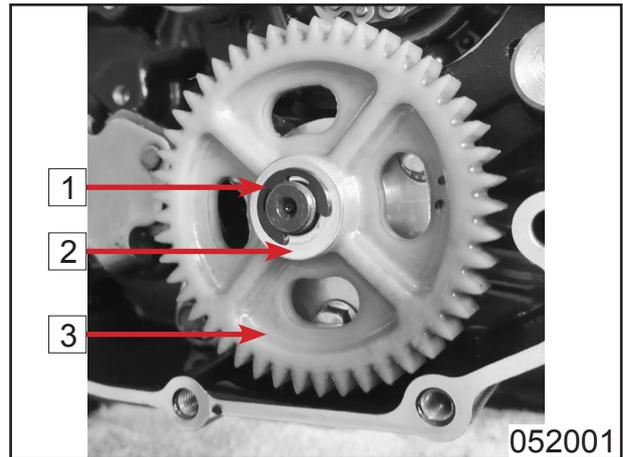
Remove relief valve spring seat (1);  
Remove relief valve spring (2);  
Remove relief valve core (3);



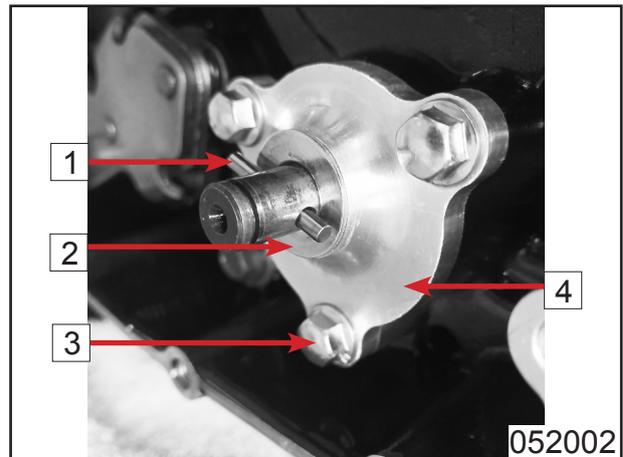
## 5.2.9 Oil Pump Removal

Remove 8 circlip (1);  
Remove washer (2);  
Remove oil pump gear (3);

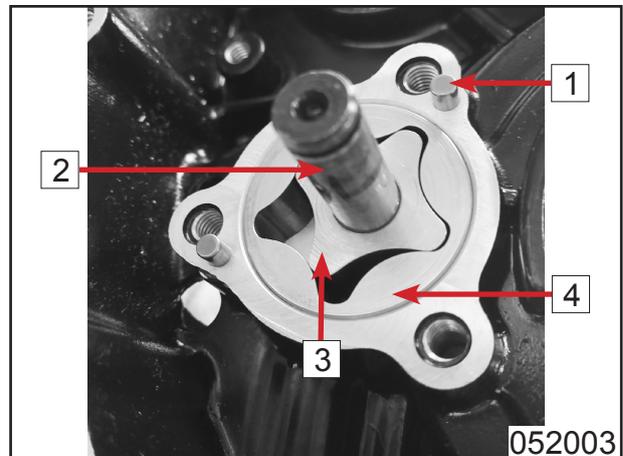
**⚠ Caution: Circlips can not be reused.**



Remove P3×21.8 roller needle (1);  
Remove 10 washer (2);  
Remove three M6×16 bolts (3);  
Remove oil pump cover (4);

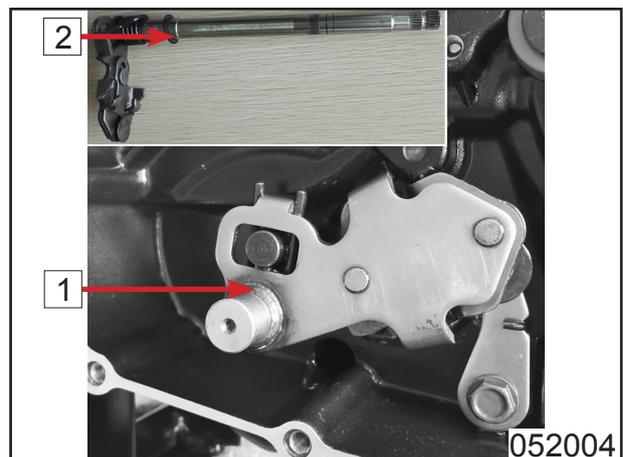


Remove two oil pump dowel pins (1);  
Remove oil pump shaft (2);  
Remove oil pump inner rotor (3) and  
P3×13.8 roller needle;  
Remove oil pump outer rotor (4).

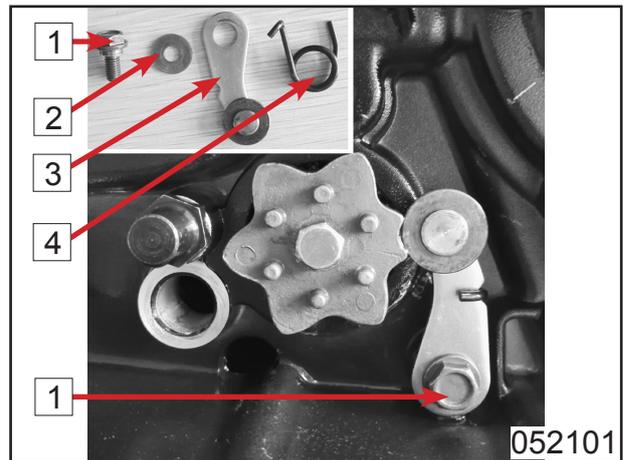


## 5.2.10 Gearshift Lever Assembly, Gear Positioning Parts and Shift Drum Cam Removal

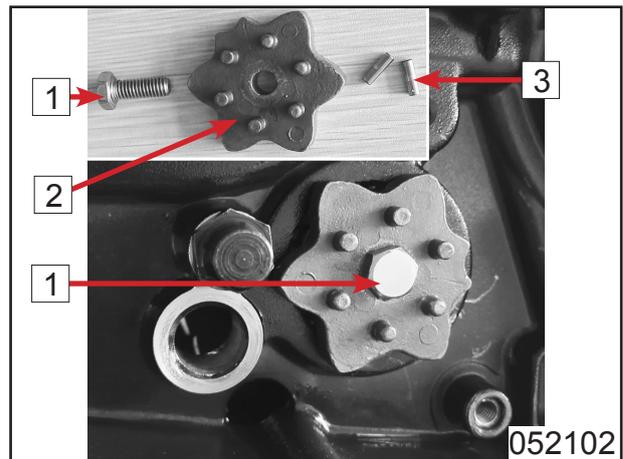
Remove gearshift lever assembly (1);  
Remove 14×20×1 washer (2);



Remove shift cam positioning bolt (1);  
Remove 6.3×16.3×1.2 washer (2);  
Remove gear positioning lever (3);  
Remove gear positioning lever spring (4);

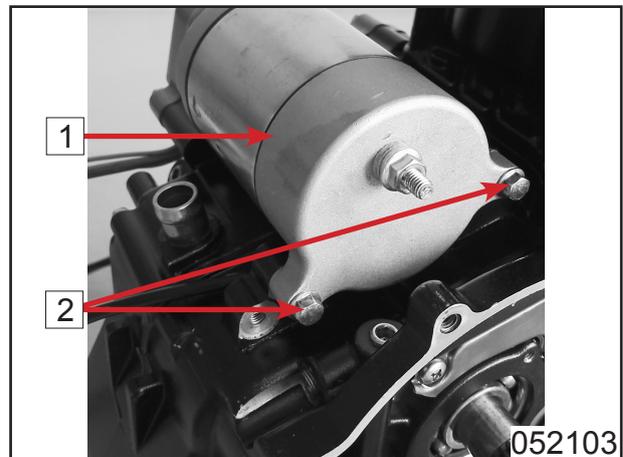


Remove M6×16 bolt (1);  
Remove shift drum cam (2);  
Remove two P3×9.8 roller needles (3);



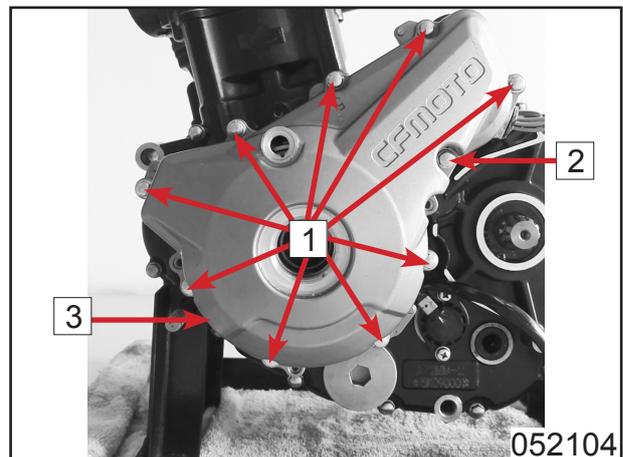
## 5.2.11 Starter Motor Removal

Remove two M6×25 bolts (2);  
Remove starter motor (1).



## 5.2.12 Left Side Cover

Remove nine M6×30 bolts (1);  
Remove M6×50 bolt (2);  
Remove left side cover (3);

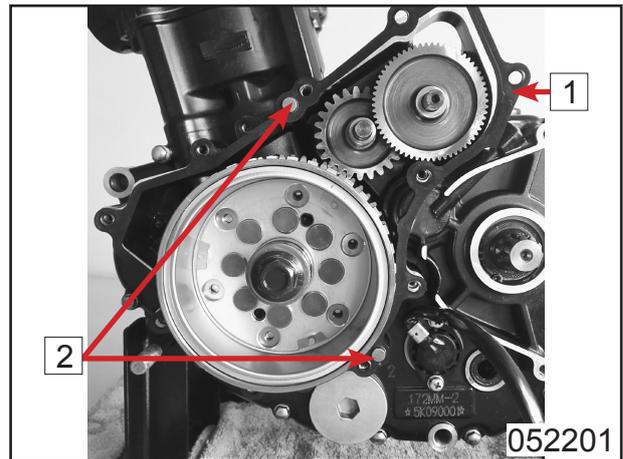


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Remove left side cover gasket (1);  
Dowels pins (2) are transition fit. It is okay  
not to remove them during maintenance.

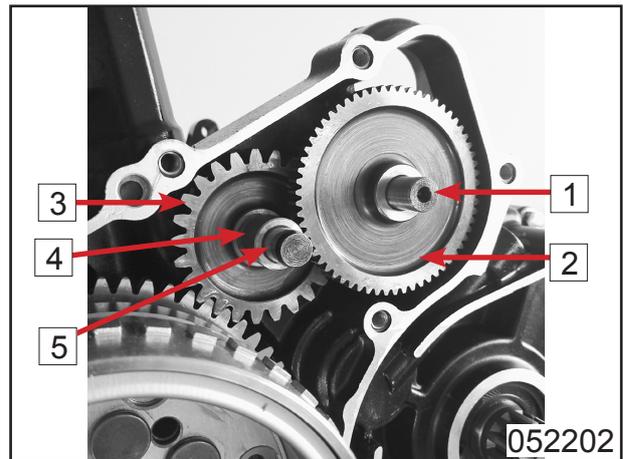
**⚠ Caution: Left cover gasket can not be reused.**

**⚠ Note: There is remaining oil that comes out during removing left side cover.**

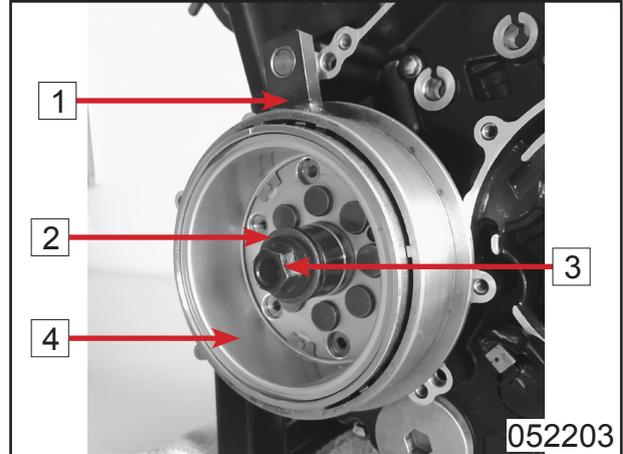


## 5.2.13 Dual Gear, Starter Middle Gear and Magneto Rotor Removal

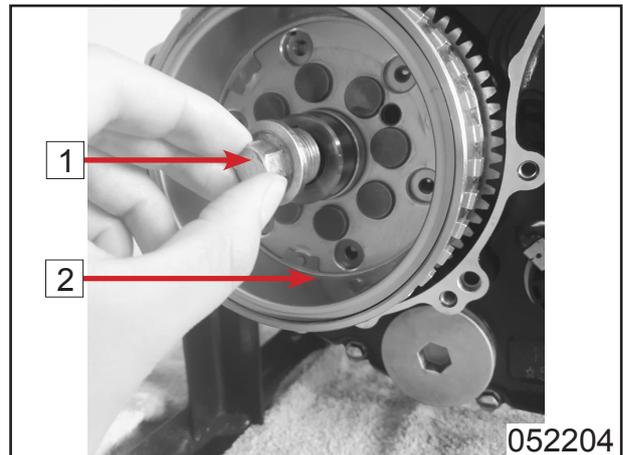
Remove shaft (1) and dual gear (2);  
Remove shaft (3) and middle gear sleeve (4);  
Remove starter middle gear (5);



Install stopper (1) on magneto rotor (4);  
Remove M12×1.25×45 bolt (3);  
Remove washer 12.5×33×5 (2);

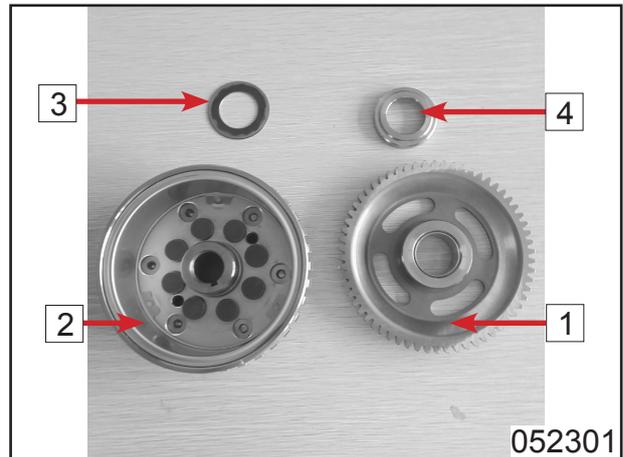


Install magneto rotor remover (1);  
Rotate magneto rotor remover to remove  
magneto rotor (2);



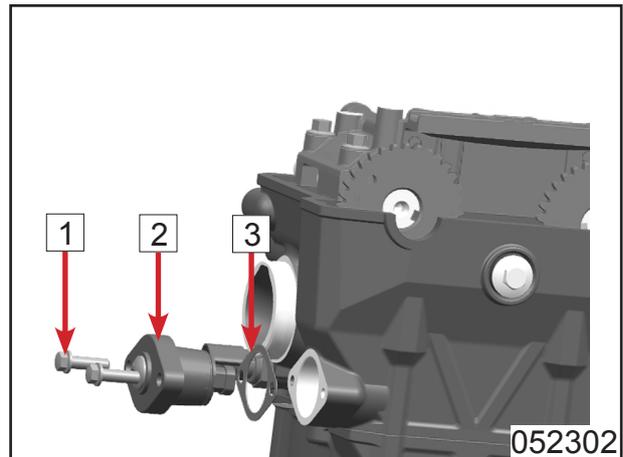
Remove starting big gear (1);  
 Remove 27×44×1 washer (3);  
 Remove retainer (4);

**⚠ Note: (2) is the assembly part of magneto rotor and override clutch.**



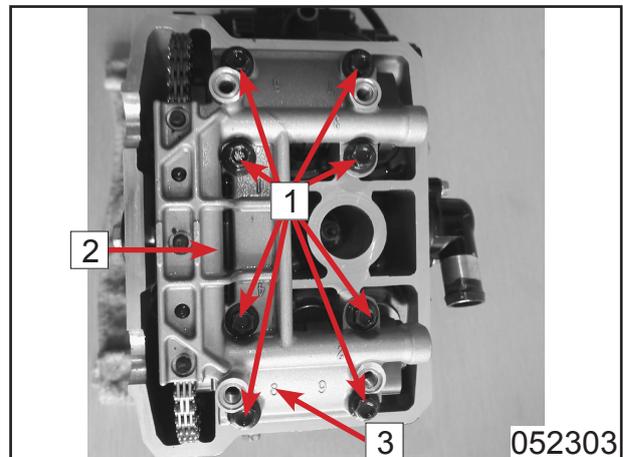
## 5.2.14 Valve System Removal

Remove M16×22 bolt (1);  
 Remove tensioner (2);  
 Remove tensioner gasket (3);

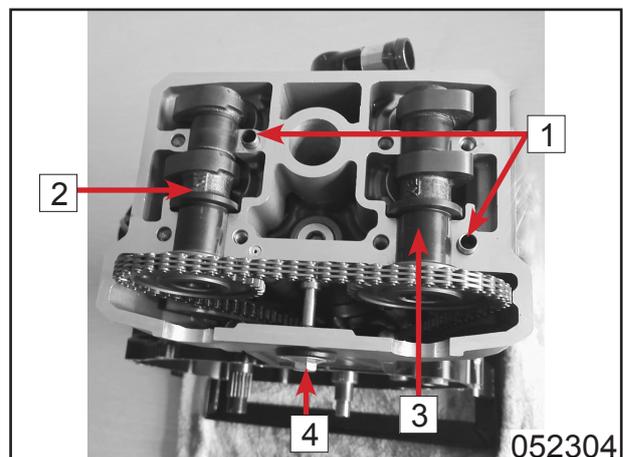


Remove eight hex flange bolts (1);  
 Remove camshaft seat assembly (2);

**⚠ Note: Follow the bolt tightening order mark (3) on camshaft seat to remove bolts from big to small.**

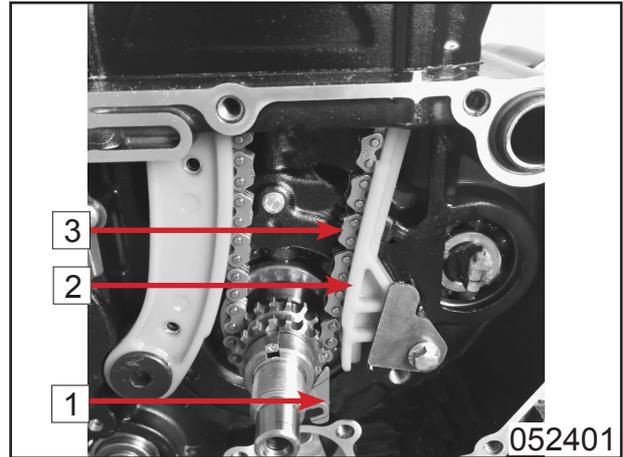


Dowel pins (1) are interference fit and not to be removed;  
 Remove air inlet camshaft assembly (2);  
 Remove air outlet camshaft assembly (3);  
 Remove cylinder head cover damping bolt (4) and cylinder head cover gasket;

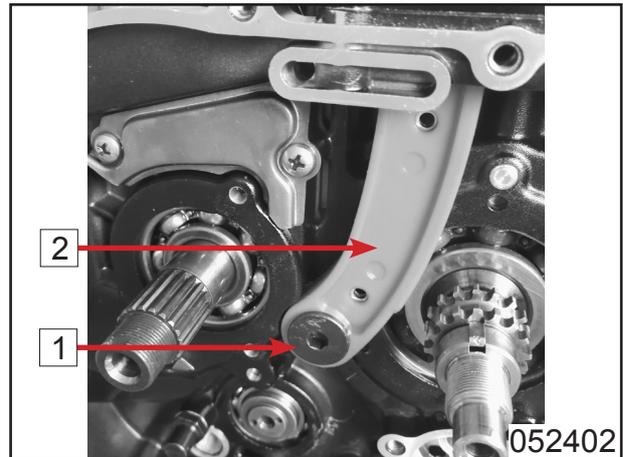


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Remove chain guard (1);  
Remove chain guide (2);  
Remove timing chain (3);

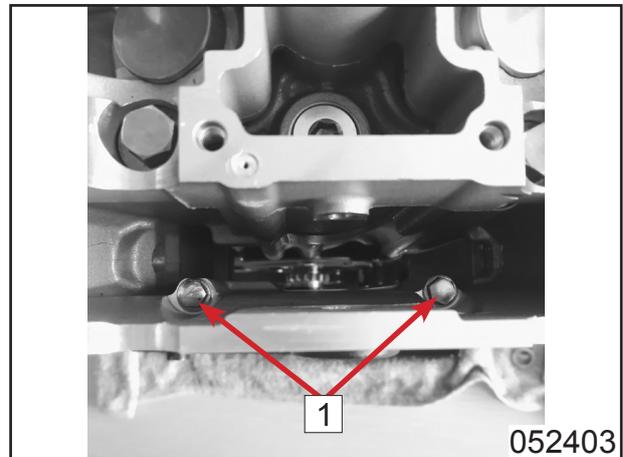


Remove pin shaft (1);  
Remove tensioner plate (2);

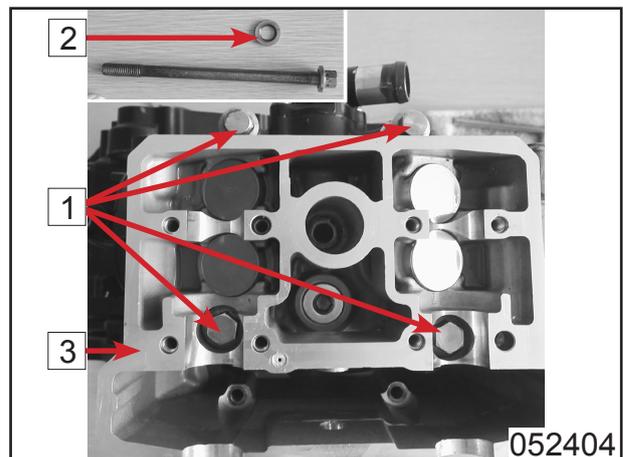


## 5.2.15 Cylinder head, Cylinder Body Removal

Remove two M6×125 bolts (1);

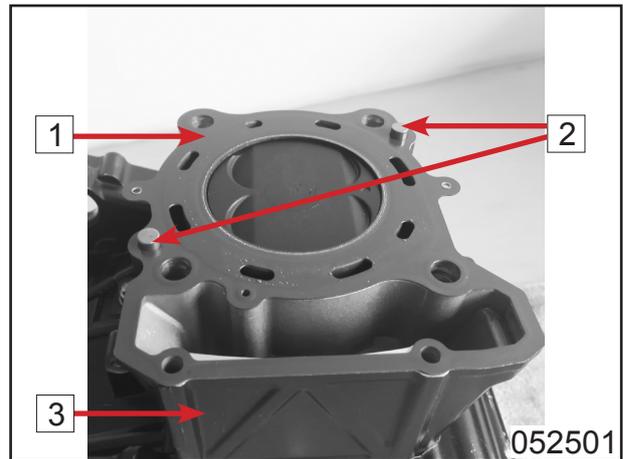


Remove four M10×158 cylinder head cover bolts (1);  
Remove four 10.5×19×2.3 washers (2);  
Remove cylinder head cover (3);



Remove cylinder head cover gasket (1);  
Dowels pins (2) are transition fit. It is okay  
not to remove them during maintenance.  
Lift cylinder body (3) to remove it;

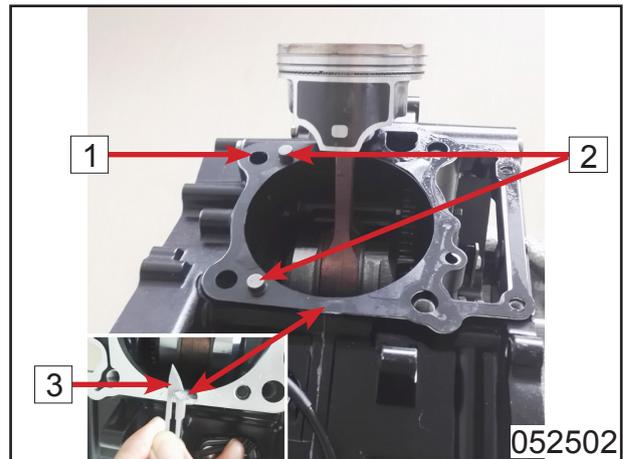
**⚠ Caution: Cylinder head cover gasket  
can not be reused.**



Remove cylinder body seal gasket (1);  
Dowels pins (2) are transition fit. It is okay  
not to remove them during maintenance.

**⚠ Caution: Cylinder body seal gasket  
can not be reused.**

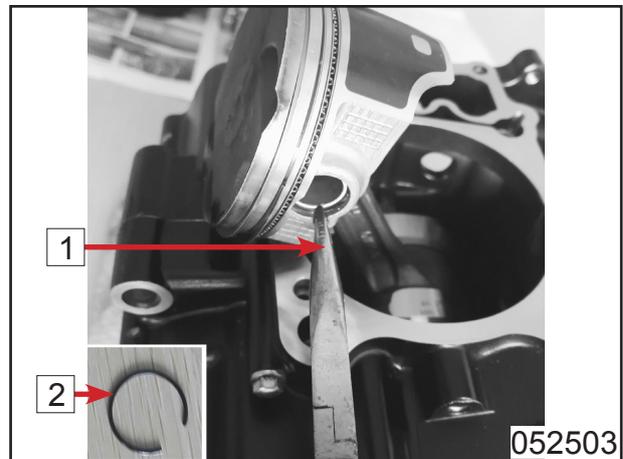
**⚠ Note: Clean the remaining gasket  
and sealant (3) on the junction surface  
after removing cylinder body seal  
gasket.**



## 5.2.16 Piston, Piston Pin Removal

Remove piston pin circlip (2) with nipper  
plier (1);

**⚠ Caution: Piston pin circlips can not  
be reused.**

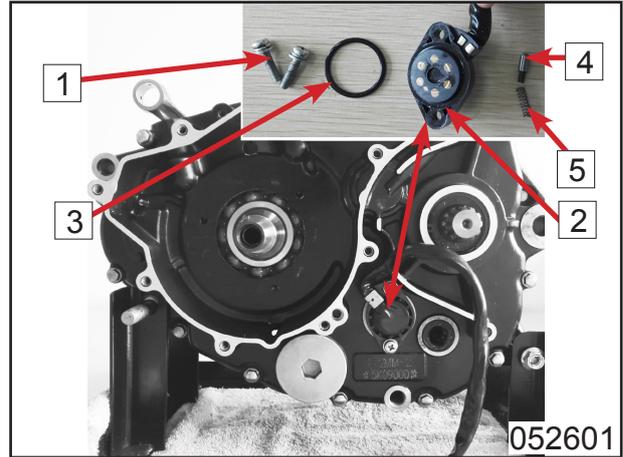


Pull out piston pin (1);  
Remove piston (2).

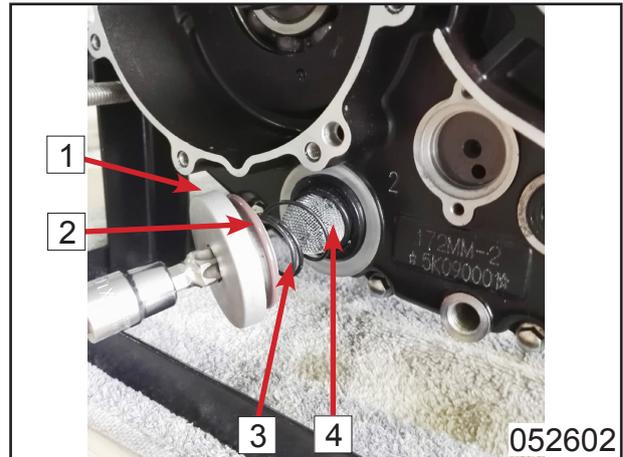


## 5.2.17 Gear Contactor, Oil Strainer and Speed Sensor Removal

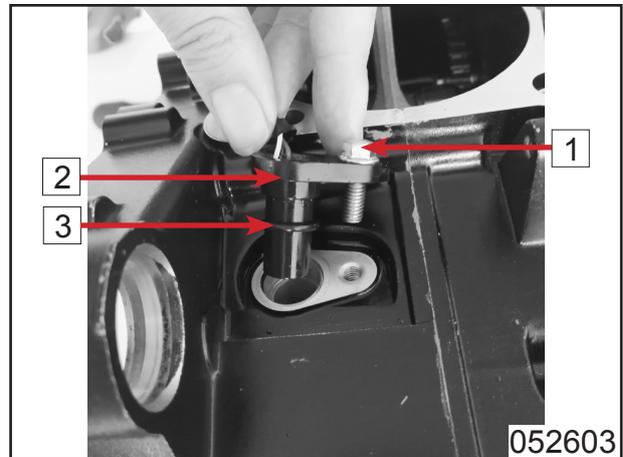
Remove two M5×25 screws (1);  
Remove gear contactor (2);  
Remove 26.2×2.4 O-ring (3);  
Remove gear switch connector (4);  
Remove connector spring (5);



Remove strainer cover (1);  
Remove 35×3.5 O-ring (2);  
Remove strainer spring (3);  
Remove oil strainer (4);

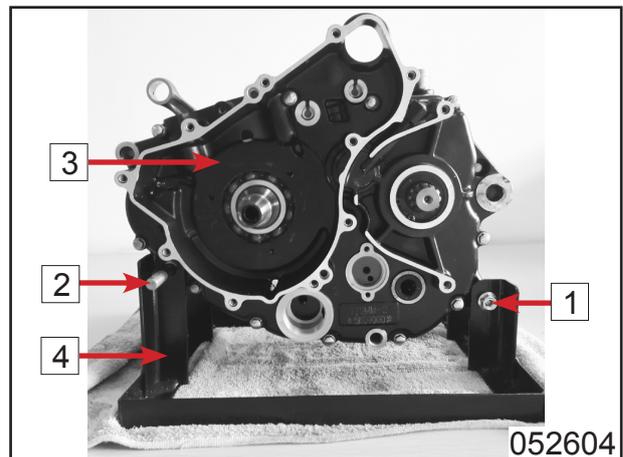


Remove M6×16 bolt (1);  
Shake the speed sensor (2) to remove it;  
Remove 13×2 O-ring (3).



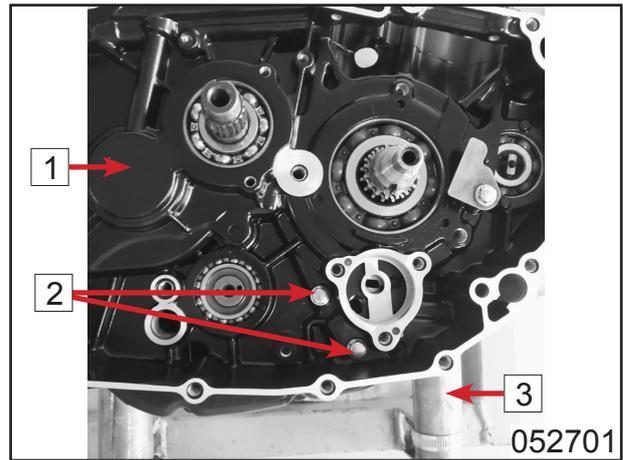
## 5.2.18 Right Crankcase Removal

Remove  $\phi 8 \times 100$  shaft (1) and  $\phi 9 \times 120$  shaft (2);  
Remove engine case (3) from support tool (4);

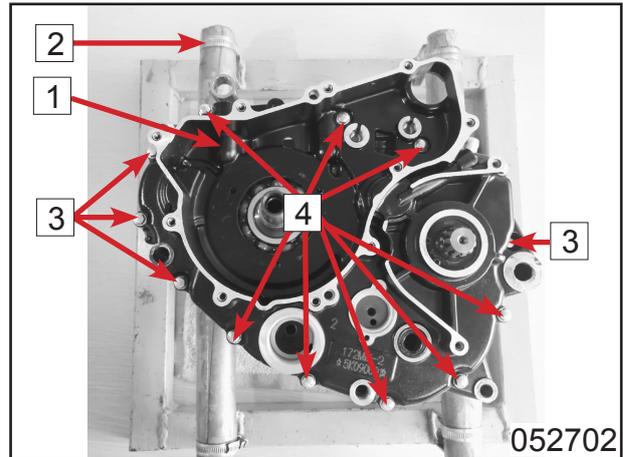


Place engine case (1) on support platform (3);  
Remove two M6×70 bolts (2);

**⚠ Note: Place a piece of cloth under support platform, to collect the engine oil that comes out during disassembling.**

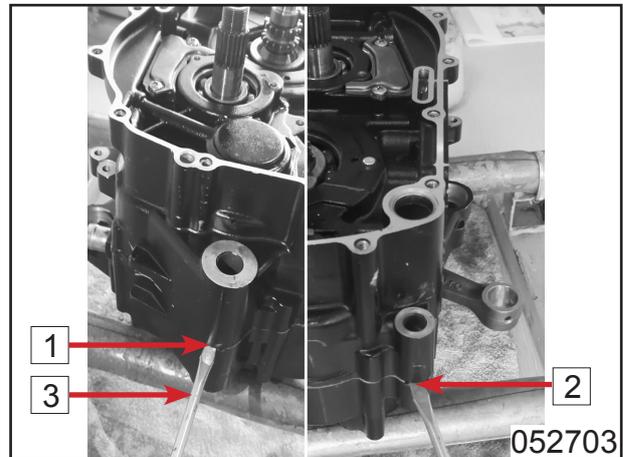


Turn engine case up side down to place the left case upward on support platform (2);  
Remove four M6×50 bolts (3);  
Remove nine M6×70 bolts (4);

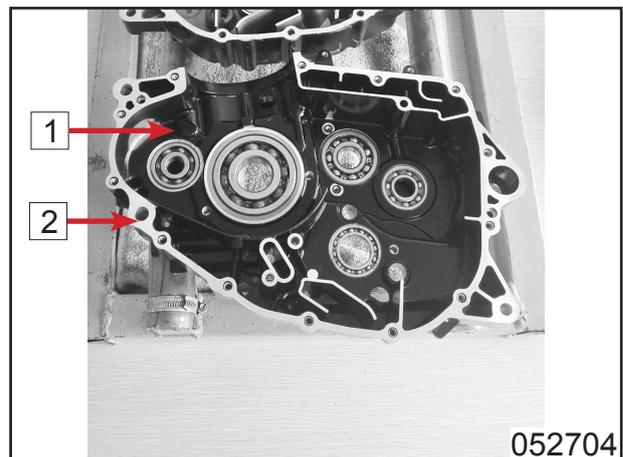


There is a reserved groove (1) used for prying case on the rear hanging place of case junction surface;  
There is a reserved groove (1) used for prying case on the rear hanging place of case junction surface;  
Use straight screwdriver to pry case on the reserved groove to make it separated;  
Remove right crankcase;

**⚠ Caution: The other places of the junction surface mustn't be pried.**

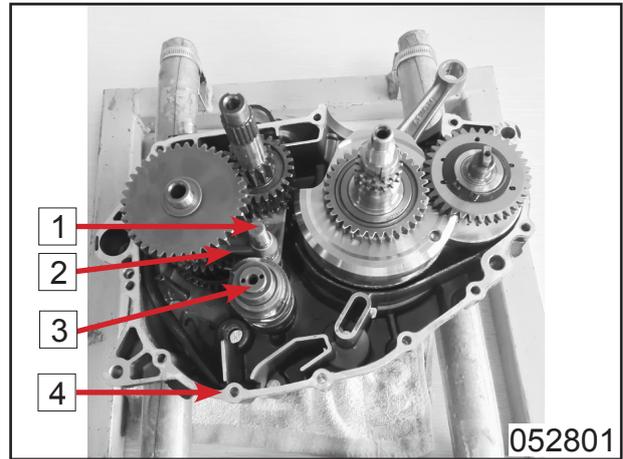


Clean remaining sealant (2) on the right crankcase (1) junction surface.

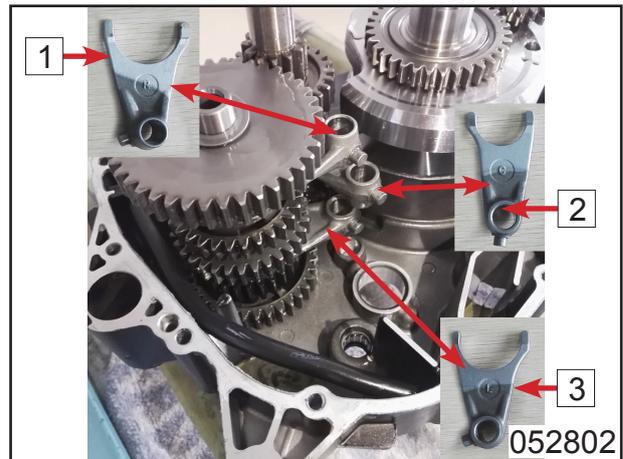


## 5.2.19 Gearshift Assembly Removal

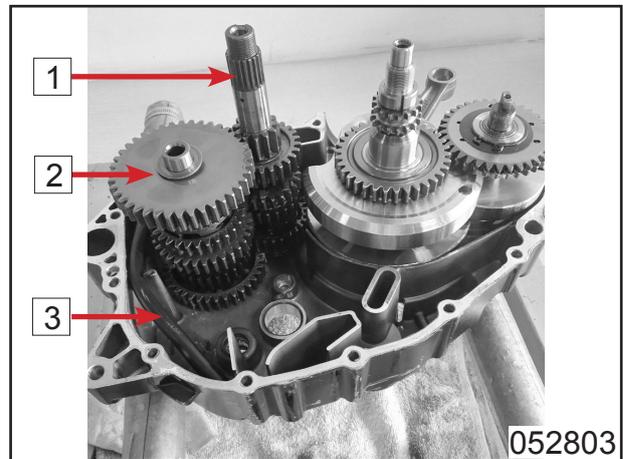
Remove shift fork shaft (1);  
Put the shift fork aside (2);  
Remove shift drum (3);  
Clean remaining sealant (4) on left crankcase junction surface;



Remove shift fork (1), the mark of which is "R";  
Remove shift fork (2), the mark of which is "C";  
Remove shift fork (3), the mark of which is "L";

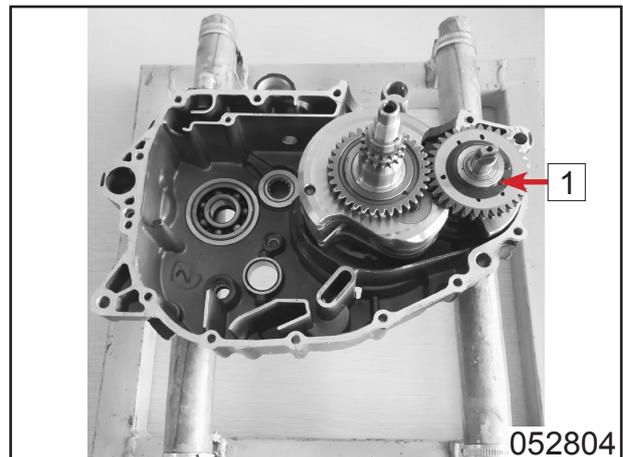


Remove main shaft assembly (1) and counter shaft assembly (2);  
Remove oil return hose (3).



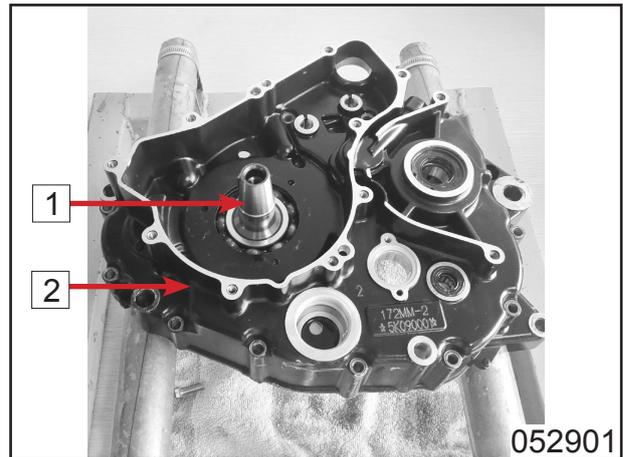
## 5.2.20 Balance Shaft Removal

Rotate the balance shaft to the position as the picture shows, and remove balance shaft (1).



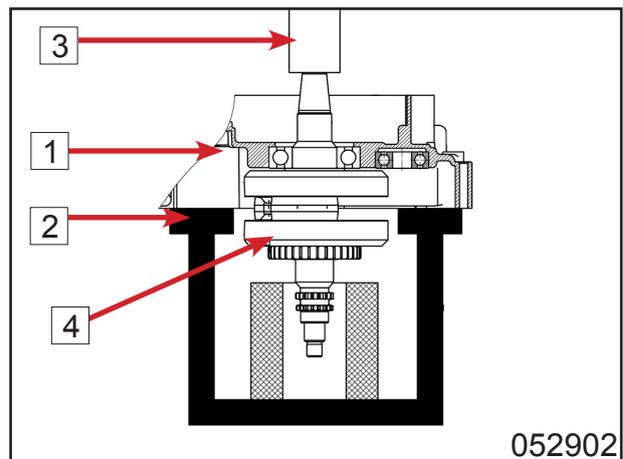
## 5.2.21 Crankshaft Removal

Crankshaft (1), left crankcase (2);



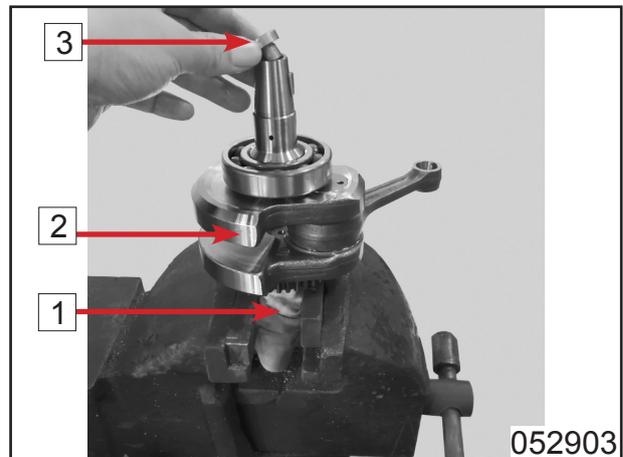
Place left crankcase (1) on support tool (2);  
Use press tool to push out crankshaft (4);

**⚠ Note: Left crankcase main bearing will be removed from the case with the crankshaft.**

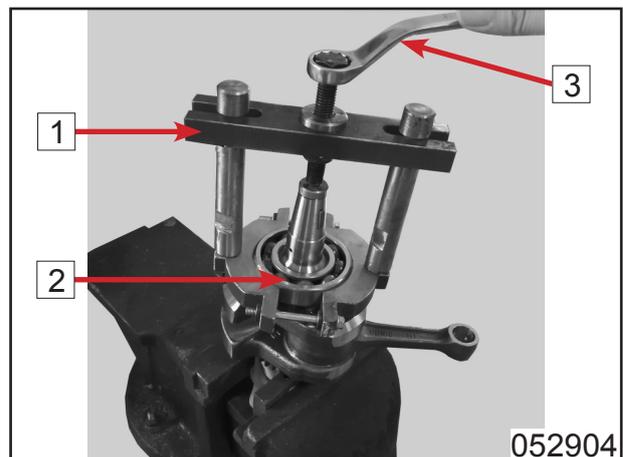


## 5.2.22 Bearing 6207 Removal

Cover right side of the crankshaft with cloth.  
Fix crankshaft (2) with bench vice (2);  
Place T-type block in the top of right side of crankshaft;



Install special tool puller (1);  
Rotate damper rod (3) to pull out bearing 6207 (2);

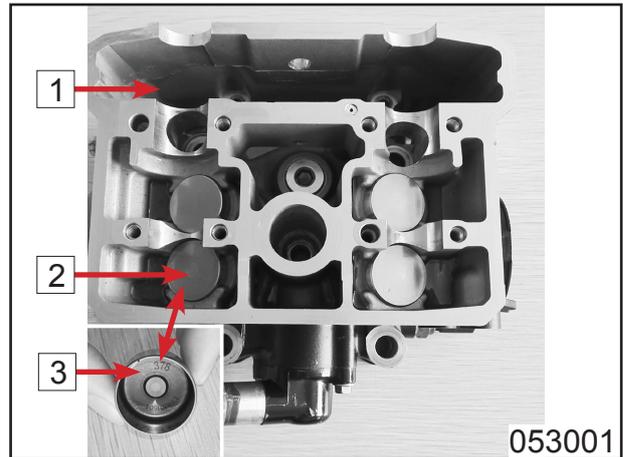


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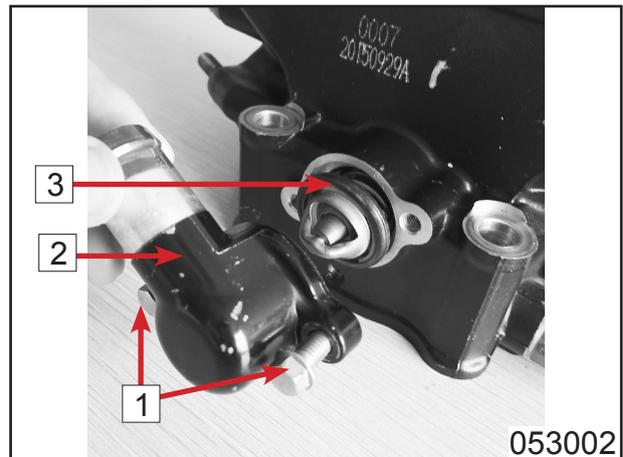
## 5.2.23 Cylinder Head Assembly Removal

Remove tappet (2);

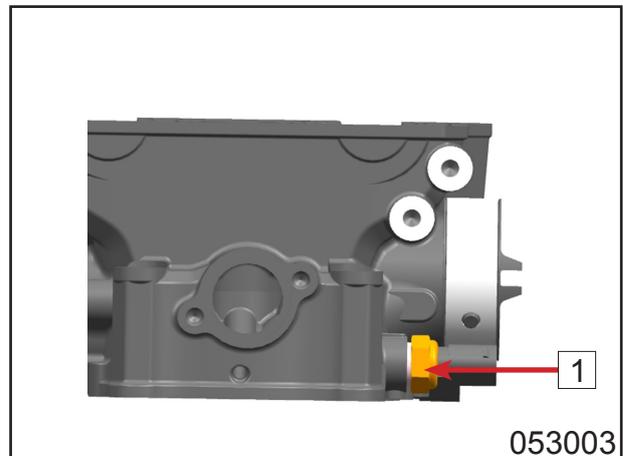
**⚠ Note: Record tappet thickness mark (3), and align it with the cylinder head (1) tappet hole, to avoid wrong installation.**



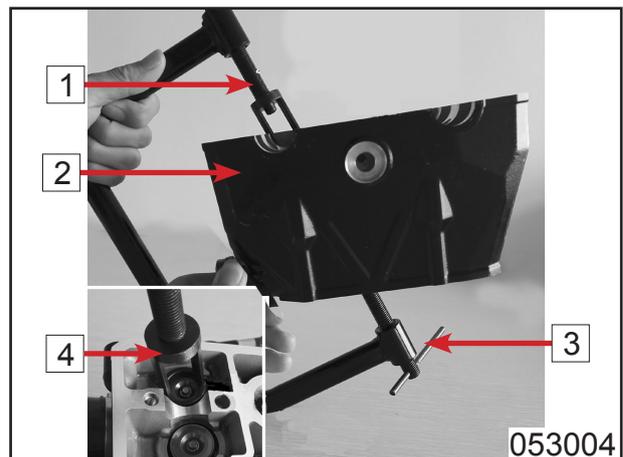
Remove two M6×20 bolts (1);  
Remove thermostat cover (2);  
Remove thermostat (3);



Remove water temperature sensor (1);

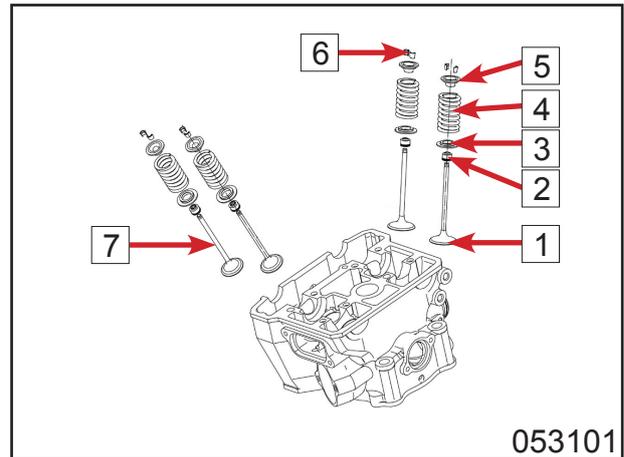


Install valve remover (1) on cylinder head (2);  
Rotate rod (3) to press valve spring (4);



Remove intake valves and exhaust valves in proper order:

- Remove eight valve lock clips (6);
- Remove four valve spring upper seats (5);
- Remove four valve springs (4);
- Remove two intake valves (1);
- Remove two exhaust valves (7);
- Remove four valve stem seal rings (2);
- Remove four valve spring lower seats (3).

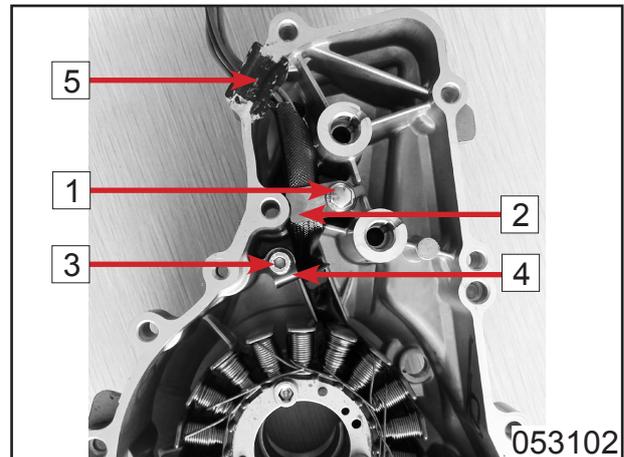


**⚠ Caution: Valve stem seal ring (2) can not be resued. Invalidate it after removing.**

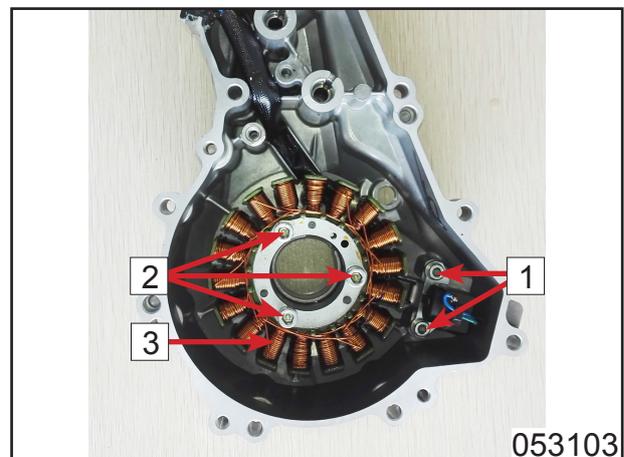
## 5.2.24 Magneto Stator Removal

- Remove M6×12 bolt (1);
- Remove harness fixing pad (2);
- Remove M5×12 bolt (3);
- Remove harness press plate (4);
- Remove wiring block (5);

**⚠ Note: Wiring block and sealant have to be cleaned up.**



- Remove two M5×12 screws (1) and loose pick up assembly and pick up wiring pad ;
- Remove three M6×30 screws;
- Remove magneto stator assembly (3).



## 5.3 Inspection and Installation

### 5.3.1 Right Crankcase Inspection and Installation

Inspect right crankcase (1) bearings whether it is stuck. Replace a new one if it is stuck;

Inspect 6304 bearing (3);

Inspect 6203-RS bearing (4);

Inspect 61905 bearing (5);

Inspect 6306 bearing (6);

Inspect 6302 bearing (7);

Before replacing 6304 bearing (3), remove M6×16 bolt (2) and washer;

**⚠ Note: Clean up case body before operation.**

#### Bearing replacement

1. Use press tool (1) to press out bearing (2);  
2. Inner bearing can be removed by inner bearing puller;

#### Bearing installation

Place support shoe (2) at the reverse side of bearing hole. Use press tool (1) to install bearing (3) into the hole;

Apply engine oil on outer ring of the bearing. The side with words faces outside.

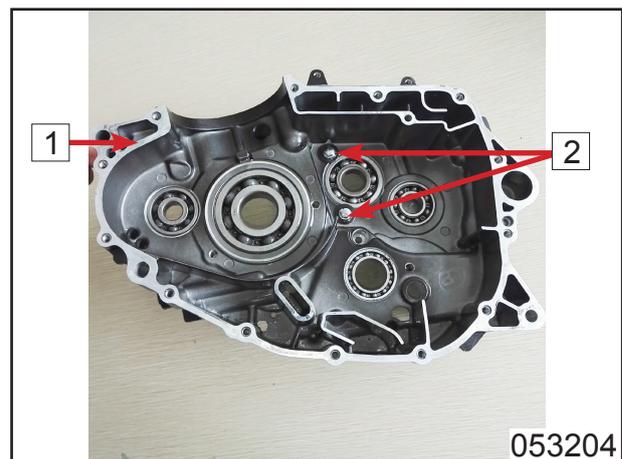
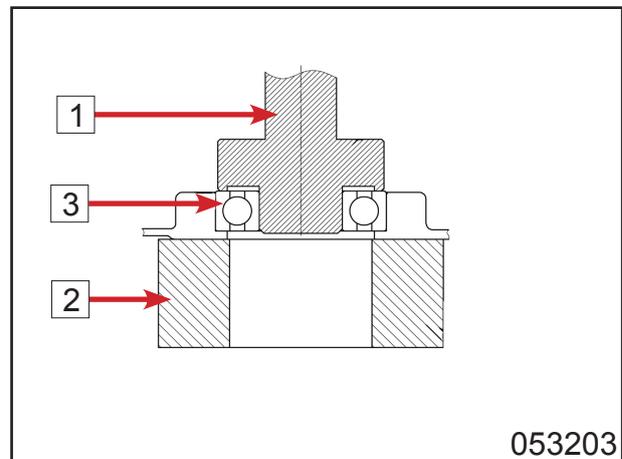
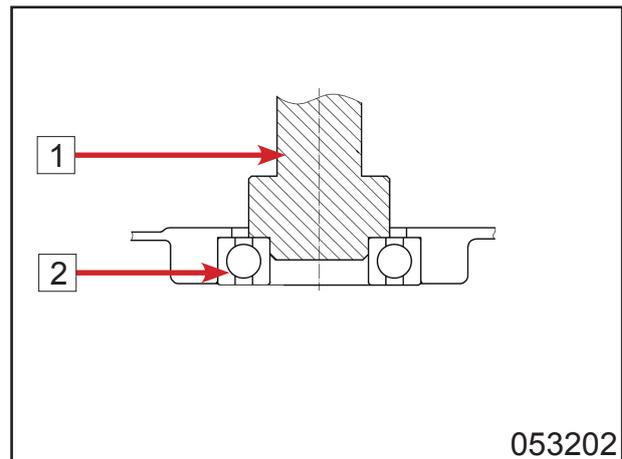
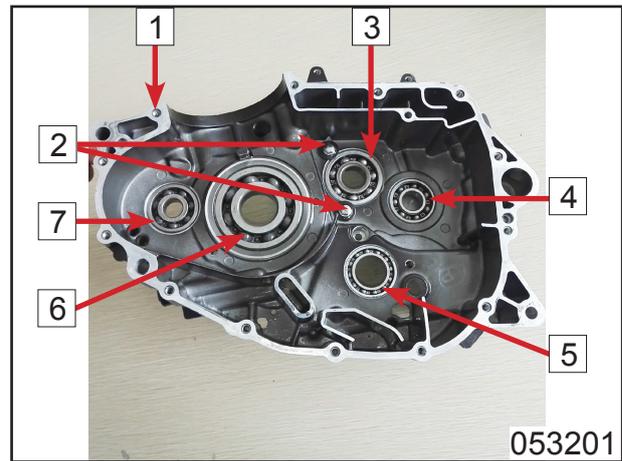
**⚠ Note: When pressing bearings, the press tool must press on the outer rings of the bearings. Or bearings will get damaged if pressed on the inner rings.**

After inspecting and replacing bearings on right crankcase (1), install them in place;

Install 6 washer and M6×16 bolt (2);

**M6×16 bolt tighten torque: 10N·m**

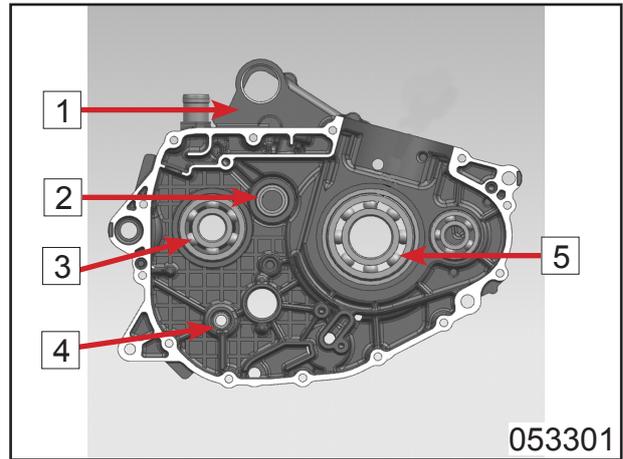
**⚠ Note: Clean up case body after installing. Apply engine oil on bearings evenly.**



## 5.3.2 Left Crankcase Inspection and Installation

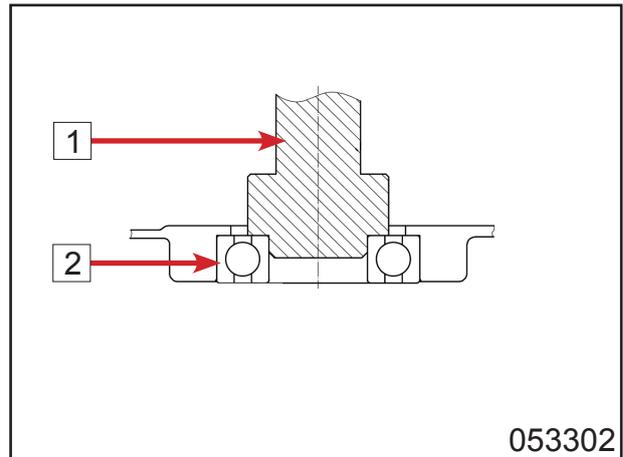
Inspect left crankcase (1) bearings whether it is stuck. Replace a new one if it is stuck;  
 Inspect 17×27×13 bearing (2);  
 Inspect 63/22 bearing (3);  
 Inspect HK1312 bearing (4);  
 Inspect 6302 bearing (5);

**⚠ Note: Clean up case body before operation.**



### Bearing replacement

1. Use press tool (1) to press out bearing (2);  
 2. Inner bearing can be removed by inner bearing puller;

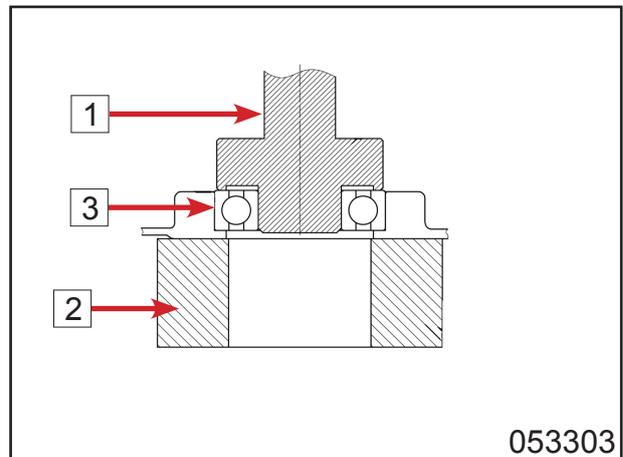


### Bearing installation

Place support shoe (2) at the reverse side of bearing hole. Use press tool (1) to install bearing (3) into the hole;

**Apply engine oil on outer ring of the bearing. The side with words faces outside.**

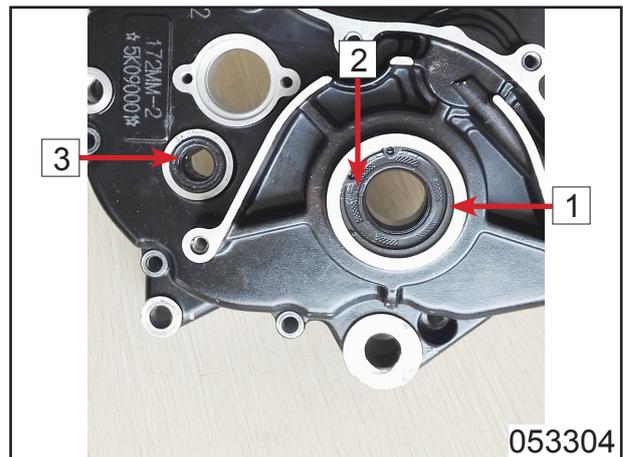
**⚠ Note: When pressing bearings, the press tool must press on the outer rings of the bearings. Or bearings will get damaged if pressed on the inner rings.**



Inspect 22×38×7 oil seal (2) and 13×22×5.5 oil seal (3). Replace new oil seals if damaged;

Remove 40 circlip (1);

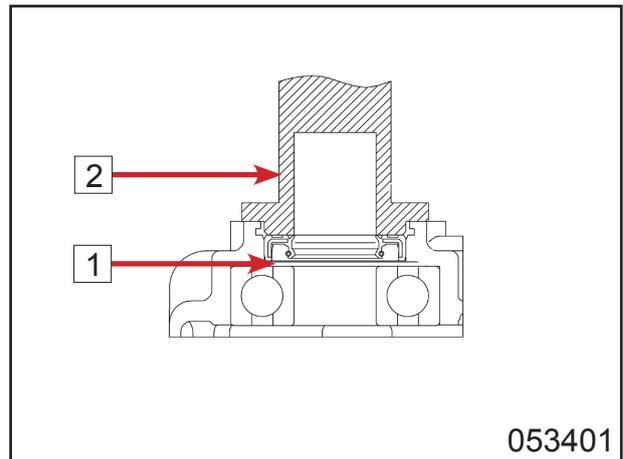
Remove 22×38×7 oil seal (2) and 13×22×5.5 oil seal (3);



The right picture shows how to press 22×38×7 oil seal (1).

Insert 22×38×7 oil seal (1) into bearing hole with lip facing inside;  
Use press tool (2) to install oil seal in place;  
Install 40 circlip.

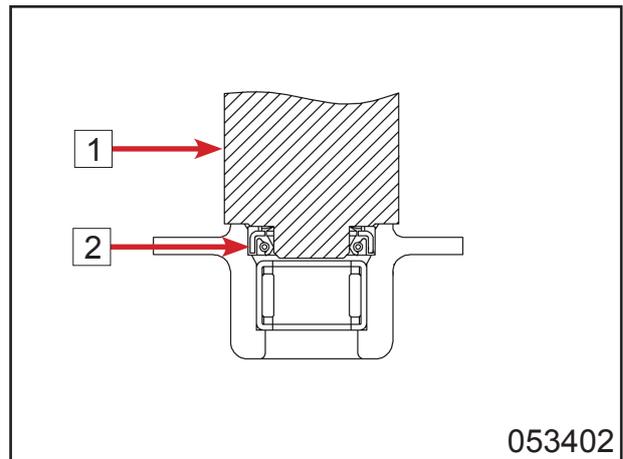
**⚠ Note: Apply grease on oil seal lips after installing.**



The right picture shows how to press 13×22×5.5 oil seal (2).

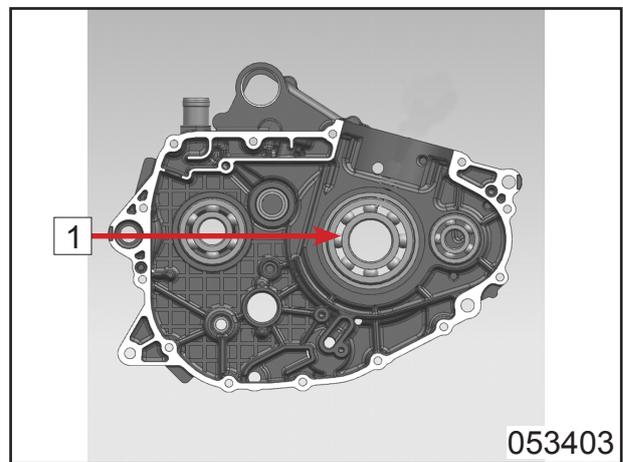
Insert 13×22×5.5 oil seal (1) into bearing hole with lip facing inside;  
Use press tool (1) to install oil seal in place;

**⚠ Note: Apply 648 locking glue on the external circular surface of the oil seal. After installing in place, apply grease on oil seal lip.**



After inspecting and replacing bearings on left crankcase, install them in place;  
6207 bearing (1) must be replaced after removing crankshaft;  
Inspect and replace oil seals, install them in place.

**⚠ Note: Clean up case body after installing. Apply engine oil on bearings evenly.**



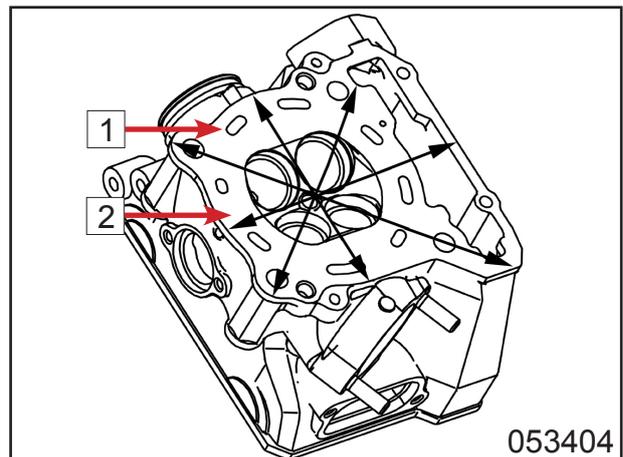
### 5.3.3 Cylinder Head Assembly Inspection and Installation

#### Cylinder Head Sealing Surface (1) Deformation Inspection:

Clean combustor and sealing surface (1);  
Inspect cylinder head sealing surface (1) deformation value with knife straight edge and feeler gauge. Measure values of different positions (2). Replace new cylinder head if out of limitation.

**Service limit: 0.05mm**

**⚠ Note: Clean up cylinder head before operation.**



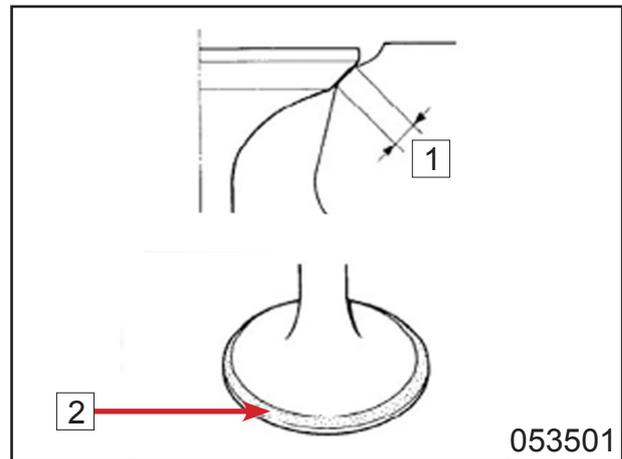
## Valve Seat Sealing Surface Width

Apply colored paint on valve seat (1) evenly; Insert valve. Clamp and rotate it. There will be clear marks on the bottom of the valve; The marks have to be continuous and without interruption;

The width must be in accordance with the standard value. Modify it if out of standard;

**Standard valve: 0.9mm~1.1mm**

Tool: Valve burnisher



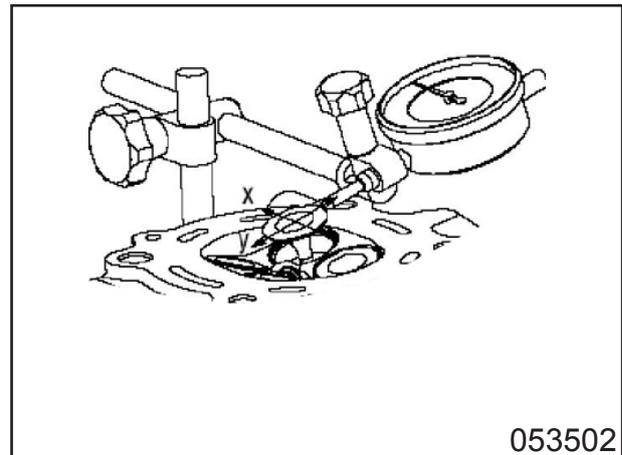
## Valve Stem And Valve Guide Inspection

Lift valve up from valve seat for about 10mm. Measure deflection values at vertical direction of "X" and "Y". If the value is out of limitation, replace either valve or cylinder head. (If valve stem diameter value is out of specification, replace valve. If valve is good, replace cylinder head. After valve or cylinder head replacement, re-measure deflection value.)

**Deflection value limitation:**

**IN: 0.28mm**

**EX: 0.33mm**



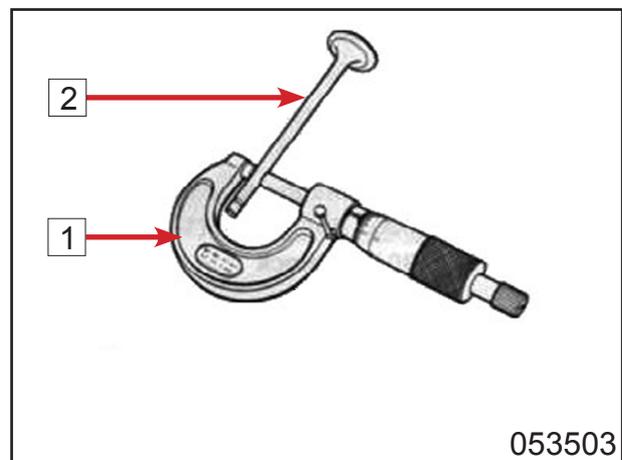
## Valve Stem Outer Diameter Measurement

Measure valve stem outer diameter (2) with micrometer (1).

**Service limit:**

**Intake valve: 4.46mm**

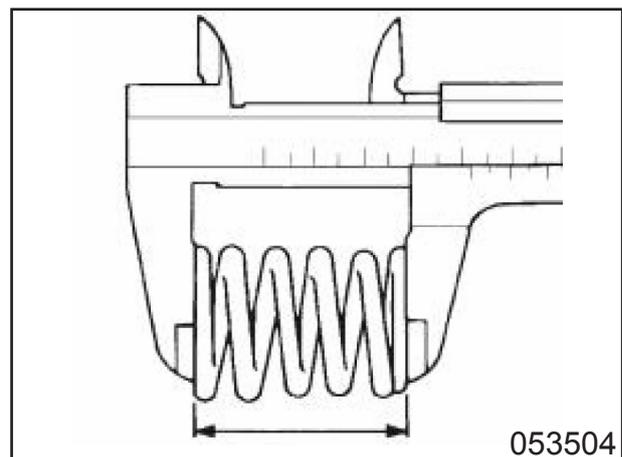
**Exhaust valve: 4.44mm**



## Valve Spring Inspection

Measure valve spring free length. Replace if less than limitation.

**Service limit: 39.8mm**



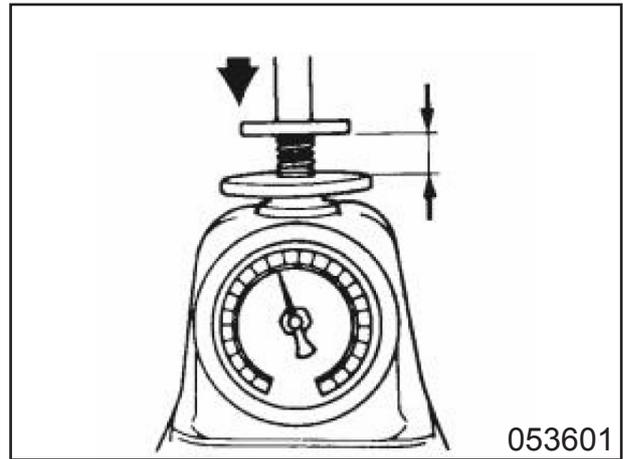
# CFMOTO

Measure the spring when the spring is compressed to the specified height. Replace new spring if the force is out of specified range;

**Valve spring compressed height:**

**29.8mm: 455N ~ 503N**

**30.5mm: 422N ~ 466N**



053601

## Camshaft Inspection

Measure camshaft neck sizes (1) with micrometer. Replace a new camshaft if out of limit;

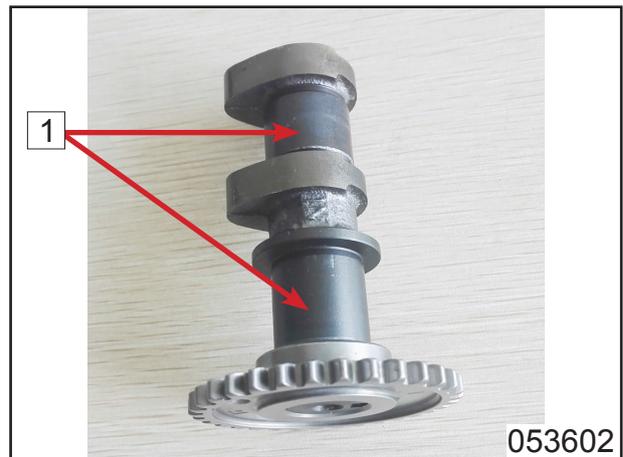
**Limit:**

**Intake camshaft: 22.921mm**

**Exhaust camshaft: 22.921mm**

Measure camshaft neck jump value with dial gauge. Replace a new camshaft if out of limit;

**Service limit: 0.1mm**



053602

Measure intake and exhaust camshaft cam edge sizes with micrometer. Replace a new camshaft if out of limit;

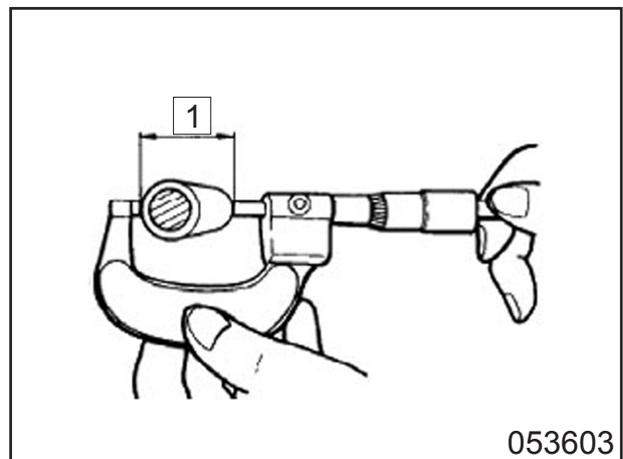
**Service limit: 35.647mm**

Clean up cylinder head and camshaft seat; Place plastigauge (1) with its shaft facing ground on the neck of the camshaft (2), and install camshaft seat;

Remove camshaft seat and measure the maximum impressing clearance width of the plastigauge;

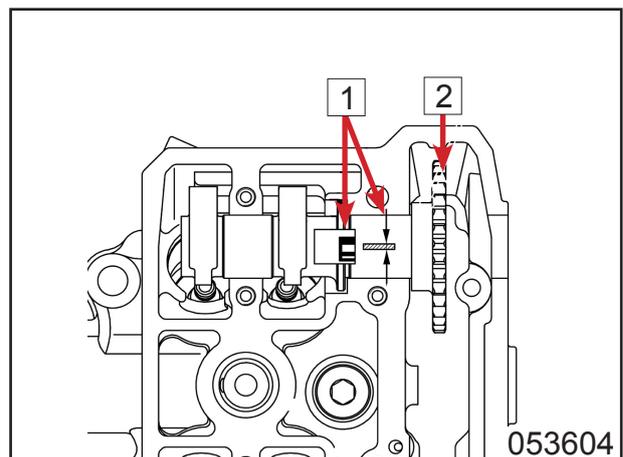
**Limit: 0.15mm**

If the clearance is out of limit, measuring camshaft diameter. Replace a new camshaft if out of limit. Otherwise, replace cylinder head and camshaft seat.



053603

**⚠ Note: Do not rotate camshaft after installing plastigauge.**



053604

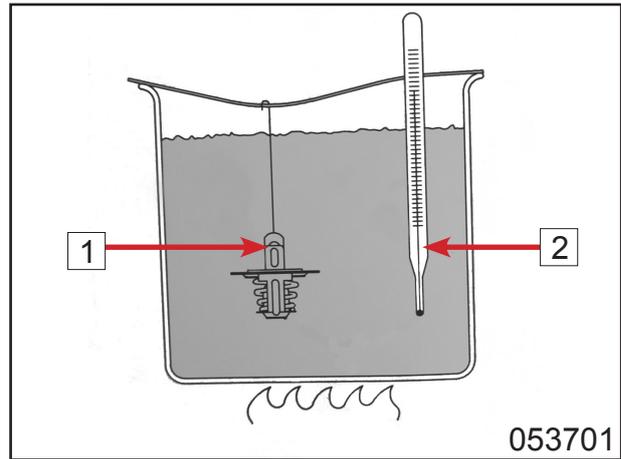
## Thermostat Inspection

Control water temperature (2) to inspect thermostat (1) as picture shows. Replace new thermostat if it is broken;

## Thermostat starting temperature:

Opening temperature:  $82^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Full open temperature:  $95^{\circ}\text{C}$

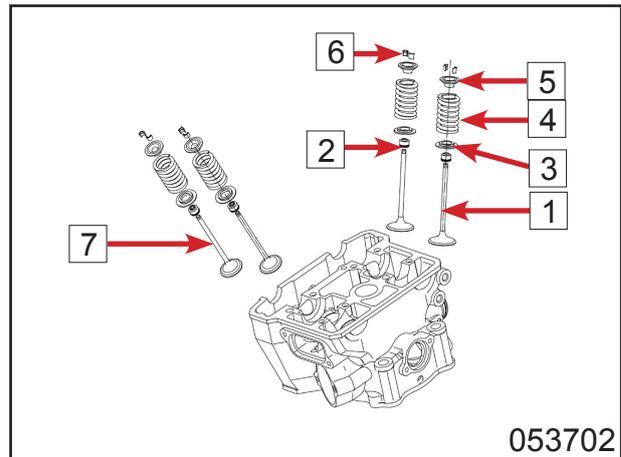


053701

## Cylinder Head Assembly Installation

Install valve spring lower seat (3);  
 Replace new valve stem seal ring (2);  
 Install intake valve (1) and exhaust valve (7);  
 Install valve spring (4);  
 Install valve spring upper seat (5);  
 Install valve lock clip (6);

**⚠ Note: Apply grease on valve stems when installing valves.**



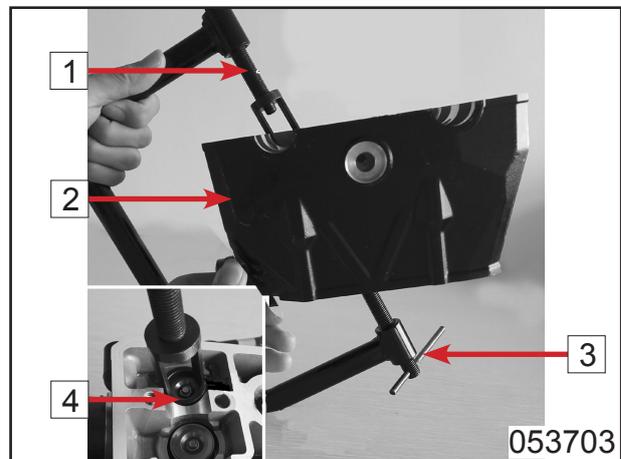
053702

Install valve remover (1) on cylinder head (2);  
 Rotate the rod (3) to compress valve spring (4);

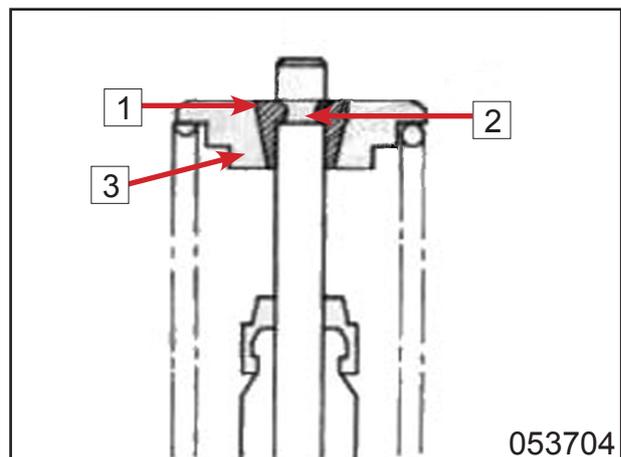
Use tweezers to place valve lock clips (1) into lock clip grooves (2);  
 Remove valve remover;  
 Install corresponding tappets;

**⚠ Note: Use rubber hammer to knock the end of valve slightly to ensure the lock clips are correctly into grooves.**

**⚠ Caution: When knocking the end of the valve with rubber hammer, the valve can not be pressed.**



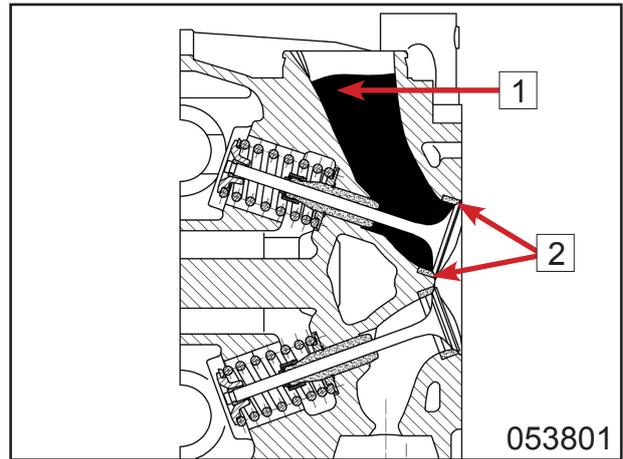
053703



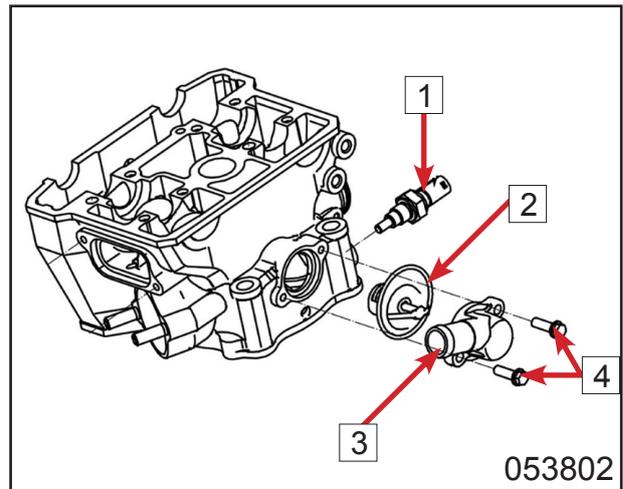
053704

## Cylinder Head Tightness Inspection

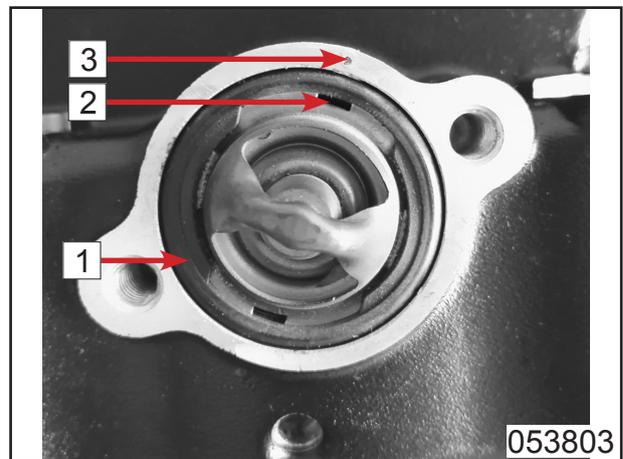
Inject cleaning solvent into inlet/exhaust duct (1), and wait for an appropriate time to check if valve seat (2) leaks or not.



Install water temperature sensor (1), tighten torque 12.3 N·m;  
Install thermostat (2), thermostat cover (3) and M6×20 bolt (4), tighten torque 10 N·m;



When installing thermostat (1), align every exhausting hole (2) with marks (3) on cylinder head;



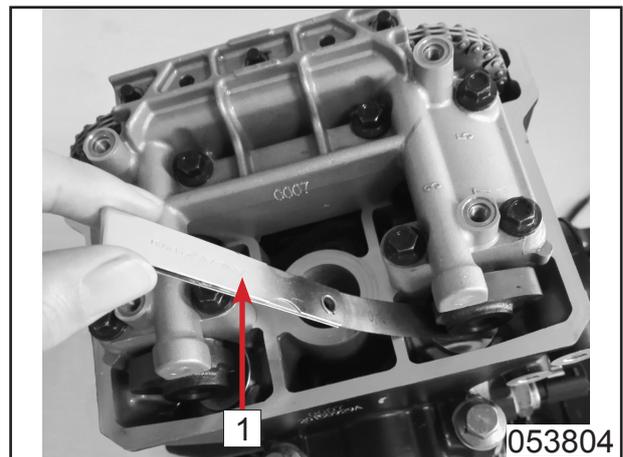
## Pre-inspect valve clearance;

Install camshaft and camshaft seat;  
Inspect valve clearance with clearance gauge (1);  
Replace new tappet if the clearance is out of specification;

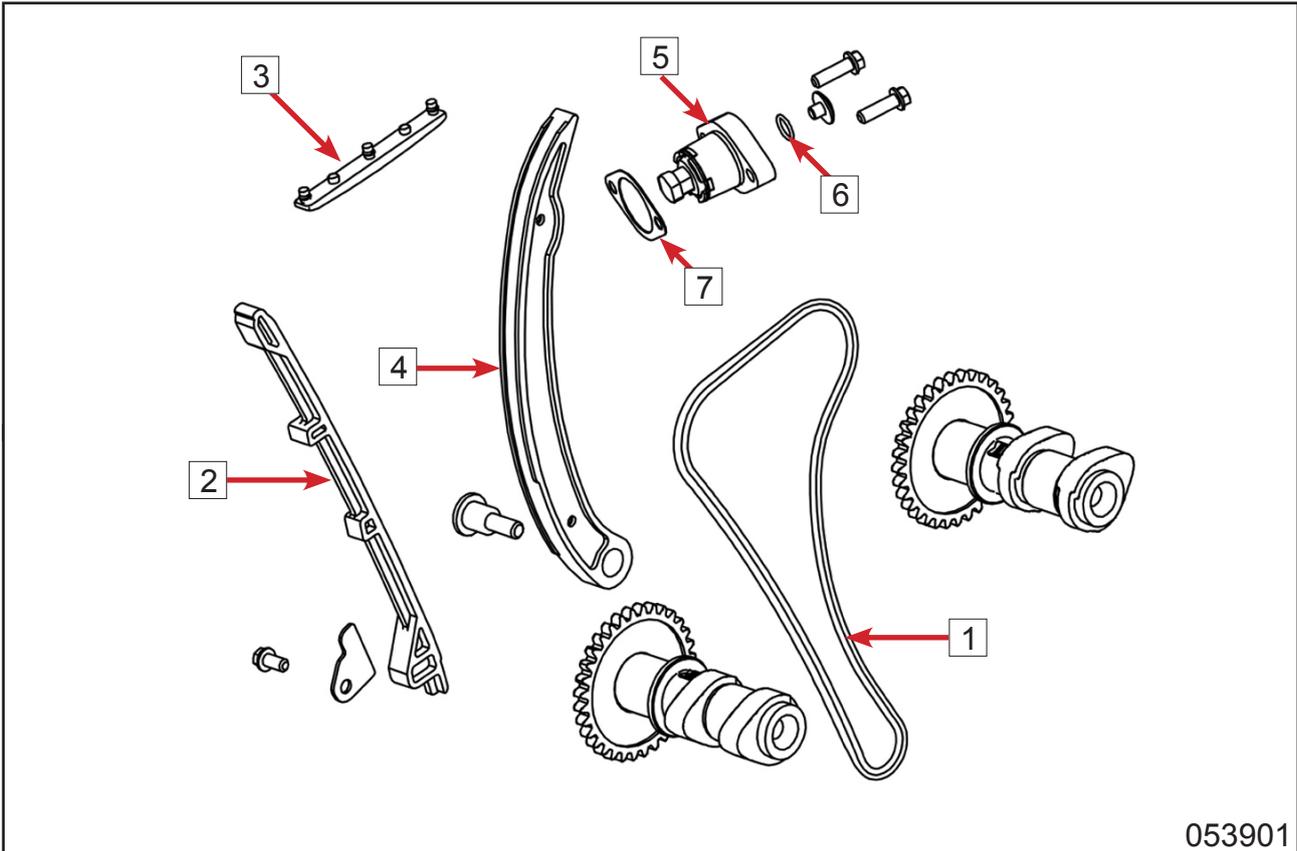
**Valve clearance when engine is cold;**

**Intake valve: 0.12mm ~ 0.17mm**

**Exhaust valve: 0.17mm ~ 0.22mm**



## 5.3.4 Valve System Inspection and Installation



053901

spect timing chain (1) for wear or damages. Replace if necessary;  
 Inspect timing chain (1) for free move. Replace if stuck;  
 Inspect chain guide (2) for damages. Replace if damaged;  
 Inspect chain guide block (3) for damages. Replace if damaged;  
 Inspect tension plate (4) for damages. Replace if damaged;  
 Inspect tensioner (5) for damages. Replace if damaged;  
 Inspect 10×1.6 O-ring (6) for deformation. Replace if deforms;  
 Tensioner gasket (7) can not be reused. Replace a new one after removal.

## 5.3.5 Cylinder Body Inspection and Installation

Inspect cylinder body sealing surface (1) deformation;

Clean cylinder body sealing surface (1);

Inspect cylinder body sealing surface (1) deformation value with knife straight edge and feeler gauge. Measure values of different positions (2). Replace new cylinder body if out of limit.

**Service limit: 0.05mm**

**⚠ Note: Clean up cylinder body before operation.**

### Cylinder Body Inner Diameter Measurement

Inspect cylinder body inner surface for scorings, nicks or other damages. Replace a new cylinder body if severe;

Measure inner diameter at vertical direction of X and Y at three positions. Replace new cylinder body if out of limit;

**Position (1) axial measured value: 10mm**

**Position (2) axial measured value: 50mm**

**Position (3) axial measured value: 20mm**

**Service limit: 72.07mm**

## 5.3.6 Crankshaft and Piston Inspection and Installation

### Piston Skirt Diameter Measurement

Replace a new piston if piston skirt (1) is wore or damaged severely;

Measure diameter at measuring point (2) with micrometer. Replace if out of limit;

Service limit: 71.8mm

**⚠ Note: Clean up piston before poeration.**

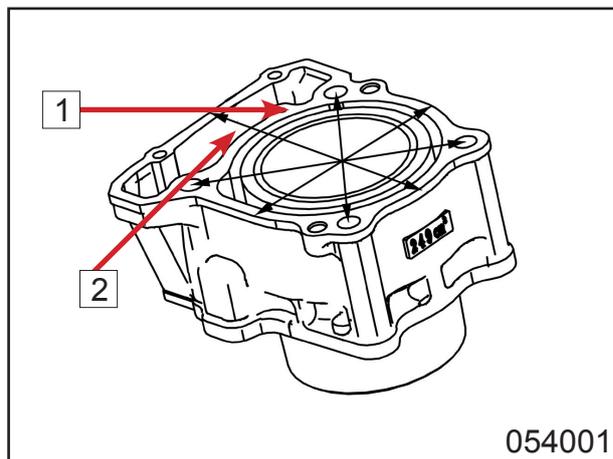
### Piston Ring and Piston Ring Groove Fit Clearance Measurement

Measure the clearance between 1 ring and 2 ring with feeler gauge (1). Replace piston and piston rings at the same time if out of limit.

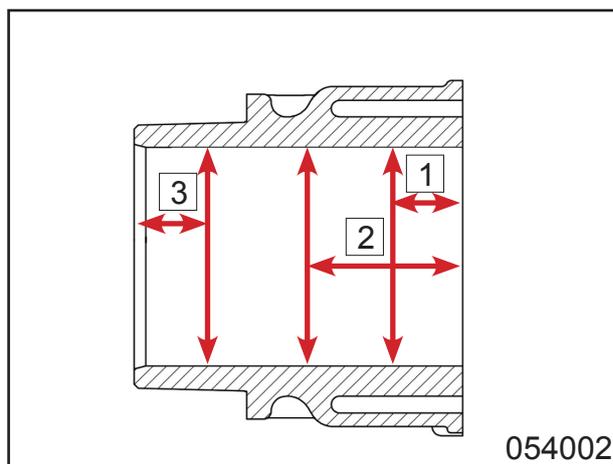
**Service limit:**

**1 ring: 0.17mm**

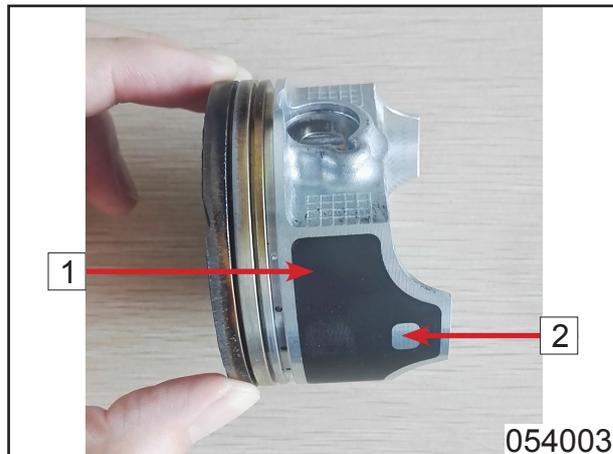
**2 ring: 0.17mm**



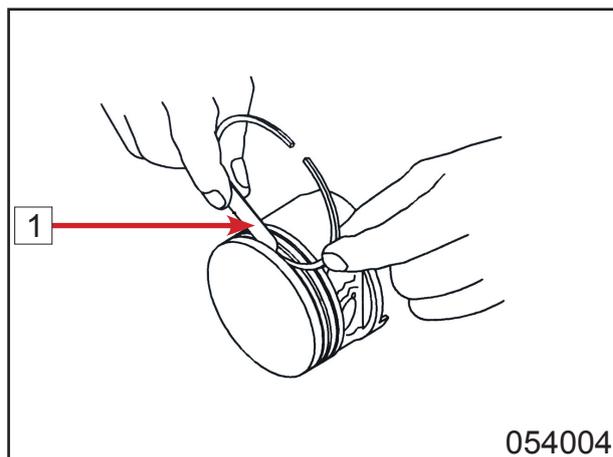
054001



054002



054003



054004

## Piston Ring Groove Width Measurement

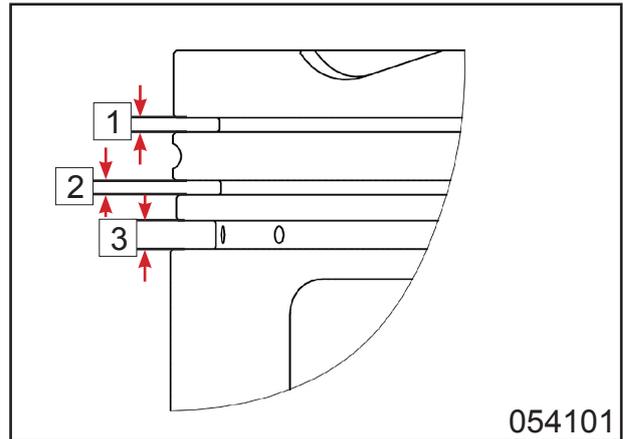
Clean up piston ring groove;  
Measure 1 ring (1), 2 ring (2) and oil ring (3) groove width. Replace new piston if out of limit;

**Service limit:**

**1 ring: 1.12mm**

**2 ring: 1.12mm**

**Oil ring: 2.11mm**



054101

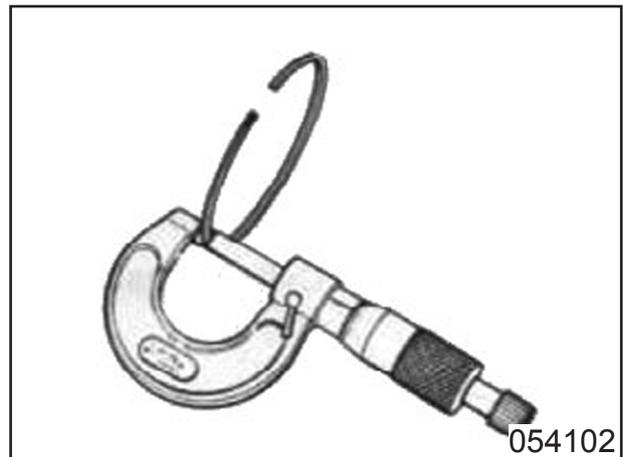
## Piston Ring Thickness Measurement

Measure 1 ring, 2 ring thickness with micrometer. Replace new piston rings if out of limit;

**Service limit:**

**1 ring: 0.9mm**

**2 ring: 0.9mm**



054102

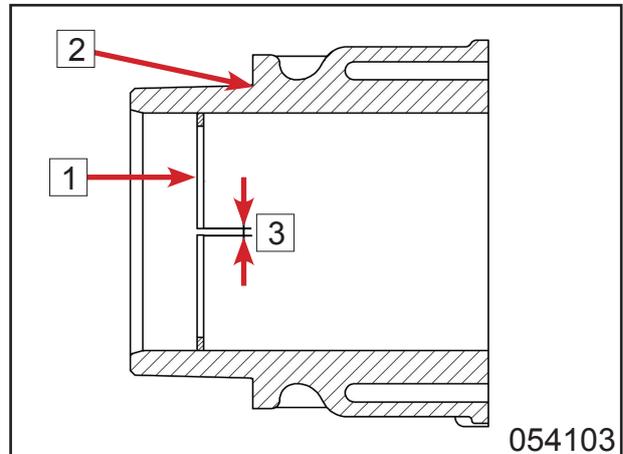
## Piston Ring End Gap Measurement

Place piston ring (1) perpendicularly to cylinder body (2) bore. Use feeler gauge to measure piston ring end gap clearance (3). Replace new piston rings if out of limit;

**Service limit:**

**1 ring: 0.55mm**

**2 ring: 0.55mm**



054103

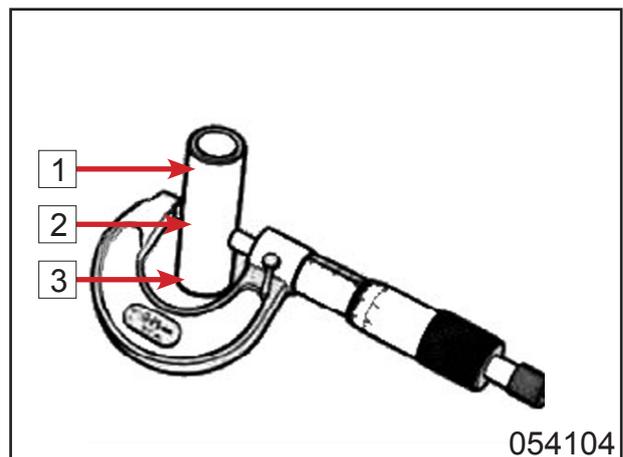
## Piston Pin Outer Diameter Measurement

Inspect piston pin surface for wear. Replace if wore severely;

Use micrometer to measure piston pin outer diameter at three positions as picture shows. Replace if out of specification;

**Piston Pin Specification:**

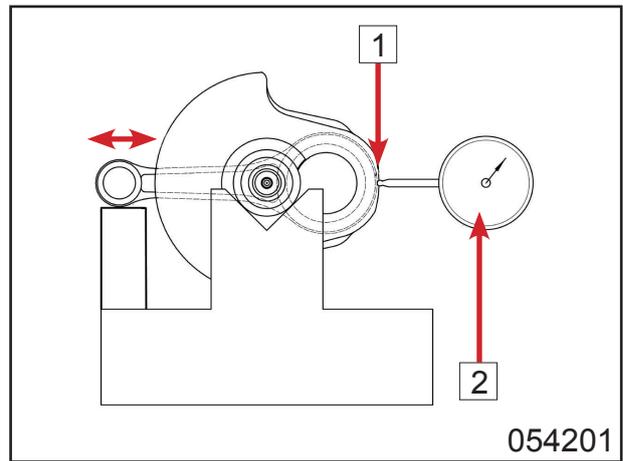
**16.995mm ~ 17mm**



054104

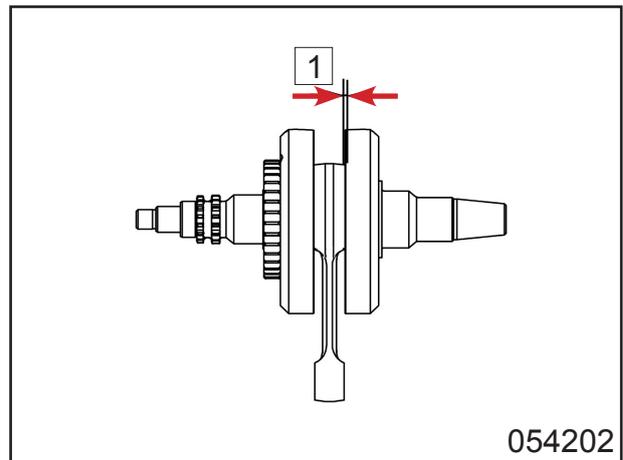
## Crankshaft Rod Big End Radial Clearance Measurement

Place crankshaft horizontally on V-type testing tool. Measure radial clearance with dial gauge (2) at crankshaft rod big end (1); Pull crankshaft small rod horizontally at the direction of arrow and read the clearance value. Replace new crankshaft if out of limit:  
**Service limit: 0.07mm**



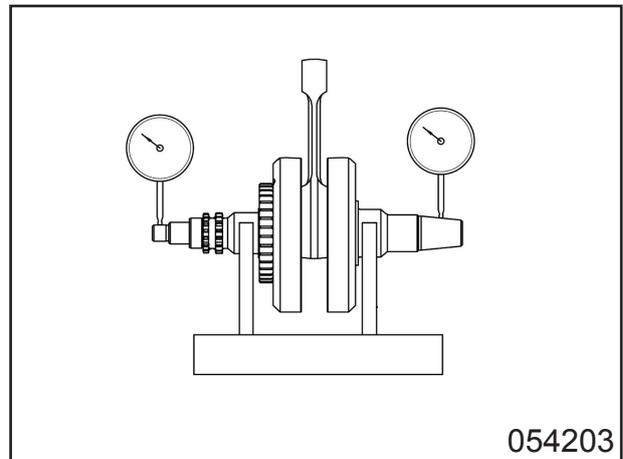
## Crankshaft Rod Big End Side Clearance Measurement

Measure crankshaft rod big end side clearance (1) with feeler gauge. Replace new crankshaft if out of limit:  
**Service limit: 0.65mm**



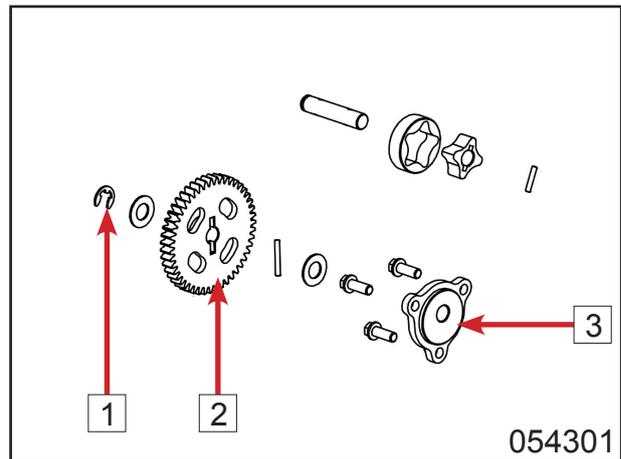
## Crankshaft Jump Inspection

Use dial gauge to measure crankshaft jump value. Replace new crankshaft if out of limit:  
**Service limit: 0.08mm**



## 5.3.7 Oil Pump Inspection and Installation

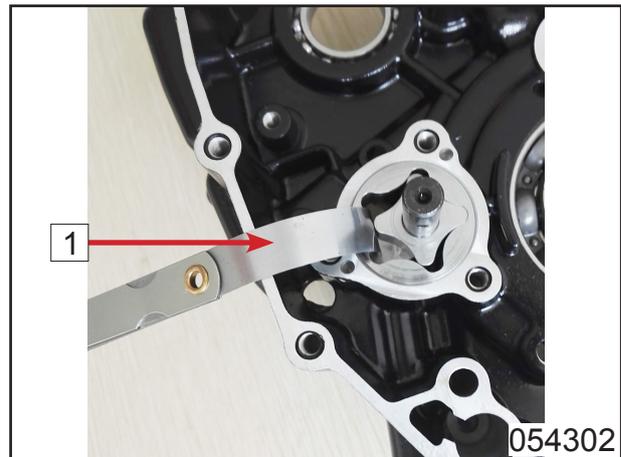
8 retainer (1) can not be reused;  
 Inspect oil pump gear (2). Replace if damaged or broken;  
 Inspect oil pump cover (3) hole and fitting surface for wear. Replace if wore severely;



## Oil Pump Inner Rotor and Outer Rotor Fit Clearance Measurement

Measure inner rotor and outer rotor fit clearance with feeler gauge (1). Replace if out of limit:

**Service limit: 0.07mm~0.15mm**

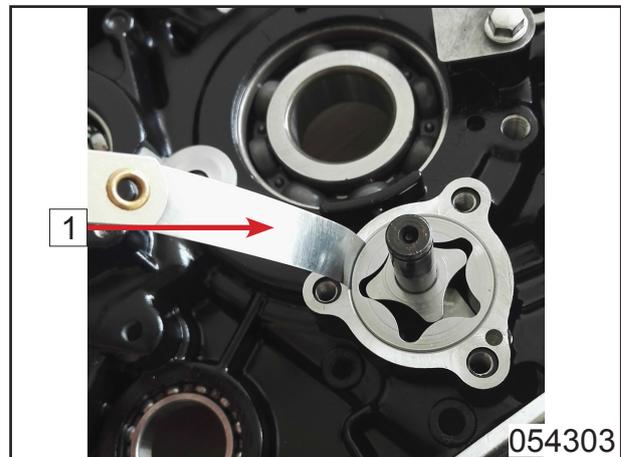


## Oil Pump Outer Rotor and Oil Pump Fit Clearance Measurement

Measure outer rotor and oil pump fit clearance with feeler gauge (1). Replace if out of limit:

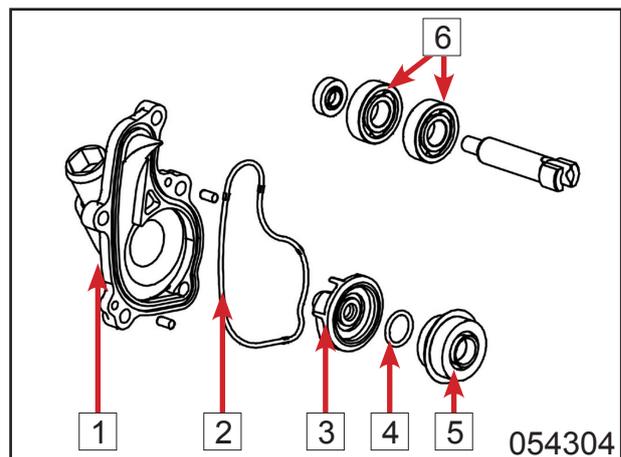
**Service limit: 0.12mm~0.184mm**

Measure outer rotor outer diameter. Replace new outer rotor if wore severely;  
 Measure oil pump. Replace new crankcase if wore severely;



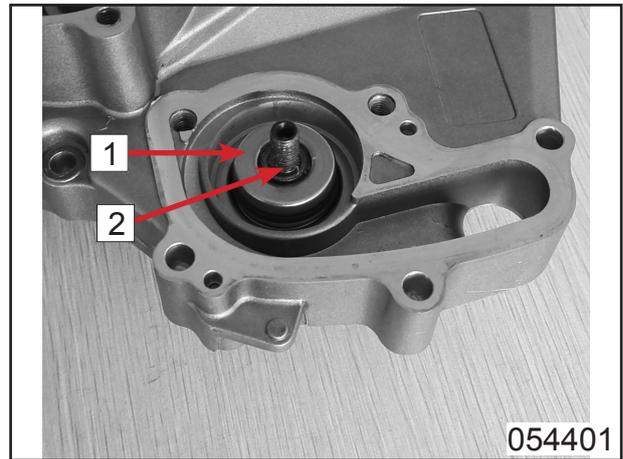
## 5.3.8 Water Pump Inspection and Installation

Inspect water pump cover (1) for damage. Replace if damaged;  
 Inspect water pump cover seal ring (2) for deformation. Replace if deforms;  
 Inspect water pump impeller (3) for damage. Replace if damaged;  
 Inspect 13×2 O-ring (4) for deformation. Replace if deforms;  
 Inspect water seal (5) for efficacy. Replace if loses efficacy;  
 Inspect 6001 bearing (6) whether it works smoothly. Replace if not.



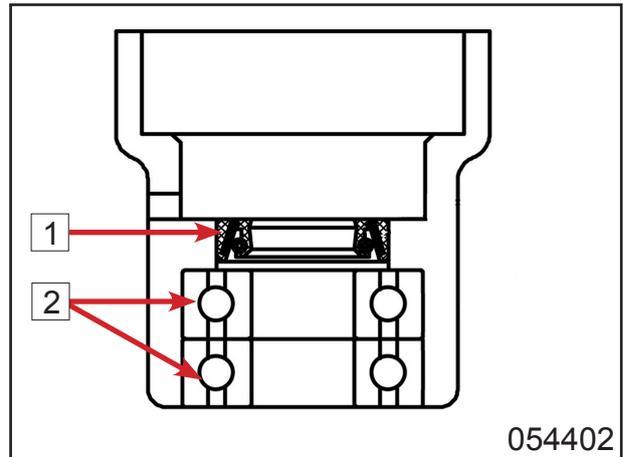
## Water Seal Removal

Press out water pump shaft (2) to check.  
Replace if damaged;  
Pry off water seal (1) and discard it.



## 6001 Bearing and 12×20×5 Oil Seal Removal

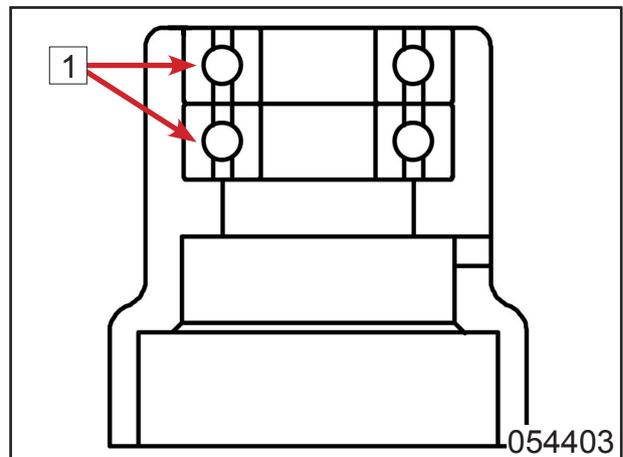
Pry off 12×20×5 oil seal (1) and discard it;  
Press out two 6001 bearings (2);



## Water Pump Installation

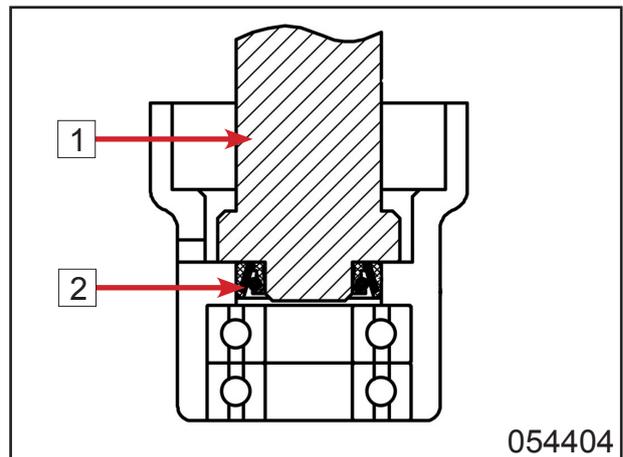
The picture shows how to press 6001 bearings (1);  
Press two 6001 bearings (1) in turn into bearing hole;  
Apply engine oil on outer ring of the bearing.  
The side with words faces outside.

**⚠ Note: When pressing bearings, the press tool must press on the outer rings of the bearings. Or bearings will get damaged if pressed on the inner rings.**



The right picture shows how to press 12×20×5 oil seal (2).  
Insert into bearing hole ;  
Use press tool (1) to install 12×20×5 oil seal (2) in place with lip facing inside;

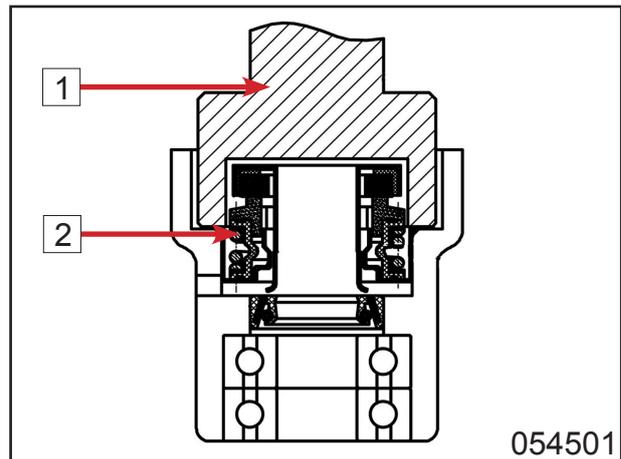
**⚠ Note: Apply 648 locking glue on the external circular surface of the oil seal. After installing in place, apply grease on oil seal lip.**



The picture shows how to press water seal (2);

Replace new water seal (2);

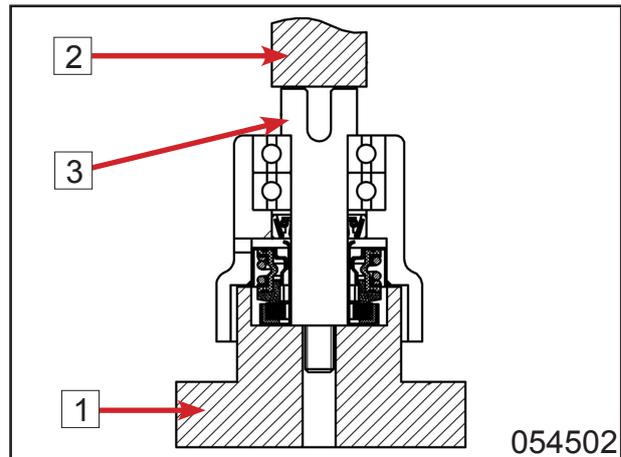
Use press tool (1) to install water seal (2) in place;



The picture shows how to press water pump shaft (3);

Place support block (1) at the back side of bearing hole. Use press tool (2) to install water pump shaft (3) in place;

Apply engine oil on surface of water pump shaft.



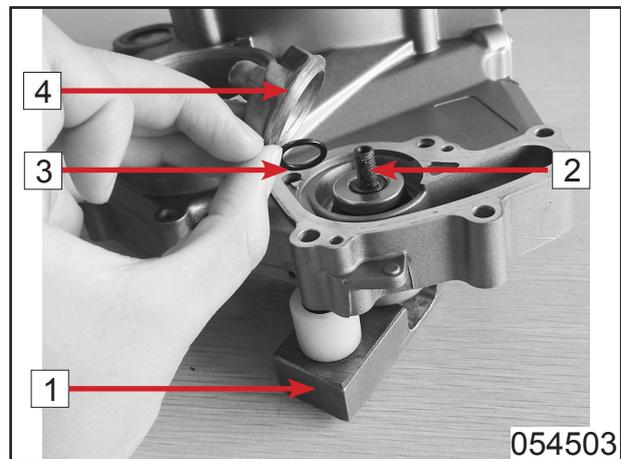
### Water Pump Impeller Installation

Install special tool (1) on water pump shaft (2) drive end;

Apply grease on 13×2 O-ring (3) and install it in the seal groove of water pump impeller (4);

Install water pump impeller.

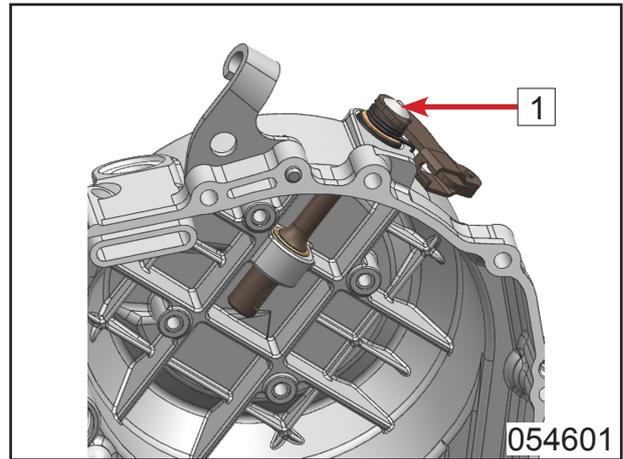
Tighten torque: 10 N·m



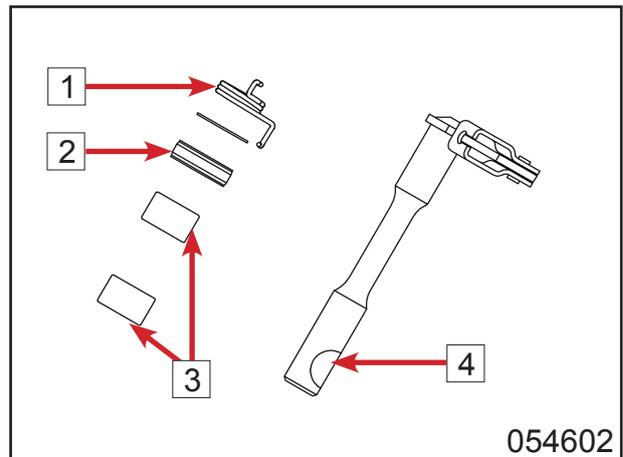
**⚠ Note: After installation, the water pump shaft should rotate smoothly and the bearing should not be stuck. If above problems occur, inspect and maintain again.**

## 5.3.9 Clutch Release Shaft Inspection and Installation

Inspect clutch release shaft (1) whether it rotates smoothly. If stuck, disassemble and check it;

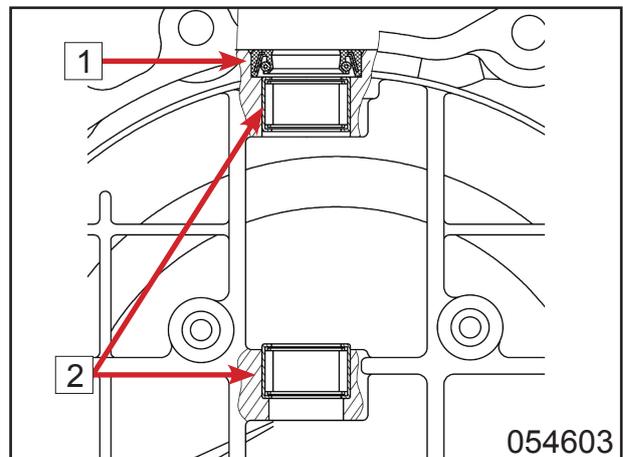


Inspect clutch release shaft (4) whether work place damages. Replace if damaged;  
Inspect return spring (1) for damage. Replace if damaged;  
Inspect oil seal (2) for leak. Replace if leaks;  
Inspect needle bearing (3) for damage. Replace if damaged;



## 12×20×5 Oil Seal and HK1210 Needle Bearing Removal

Pry out 12×20×5 oil seal (1) and discard it;  
Use special tool to pull out two HK1210 needle bearings (2);

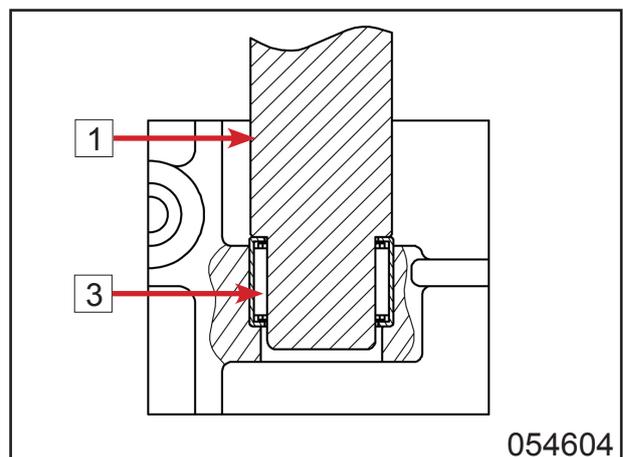


## 12×20×5 Oil Seal and HK1210 Needle Bearing Installation

The picture shows how to press HK1210 needle bearing

Use special tool (1) to install HK1210 needle bearing (2) in place;

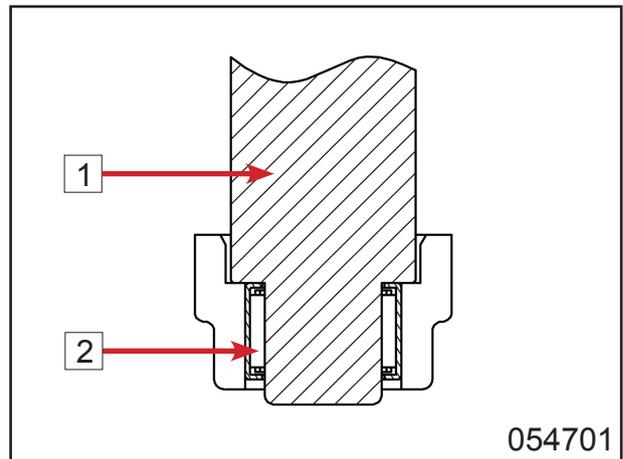
**Apply engine oil on outer ring of the bearing;**



The picture shows how to press HK1210 needle bearing

Use special tool (1) to install HK1210 needle bearing (2) in place;

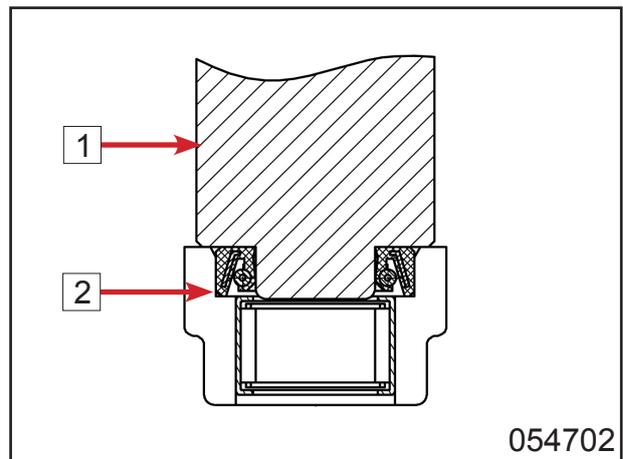
Apply engine oil on outer ring of the bearing



The picture shows how to press 12×20×5 oil seal (2)

Use special tool (1) to install 12×20×5 oil seal (2) in place with lip facing inside;

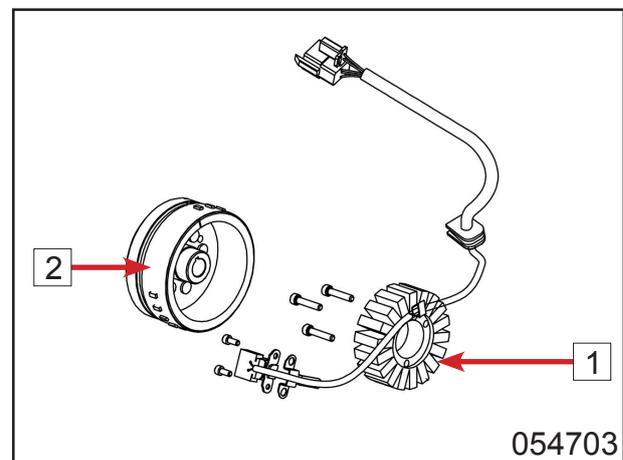
**⚠ Note:** Apply 648 locking glue on the external circular surface of the oil seal. After installing in place, apply grease on oil seal lip.



### 5.3.10 Magneto Inspection and Installation

Inspect magneto stator (1) for damage. Replace if damaged;

Inspect magneto rotor (2) for damage. Replace if damaged;

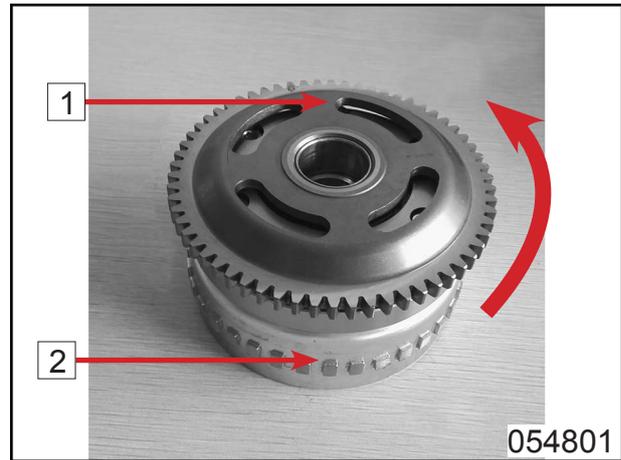


## Overriding Clutch Inspection

Turn starter big gear counterclockwise to screw in overriding clutch. Do not vertically install it;

Turn starter big gear clockwise to inspect its lockout. Replace new one if it can not be locked;

Turn starter big gear counterclockwise to inspect its rotating situation. Replace new one if it is stuck;



## Overriding Clutch Removal and Installation

Removal

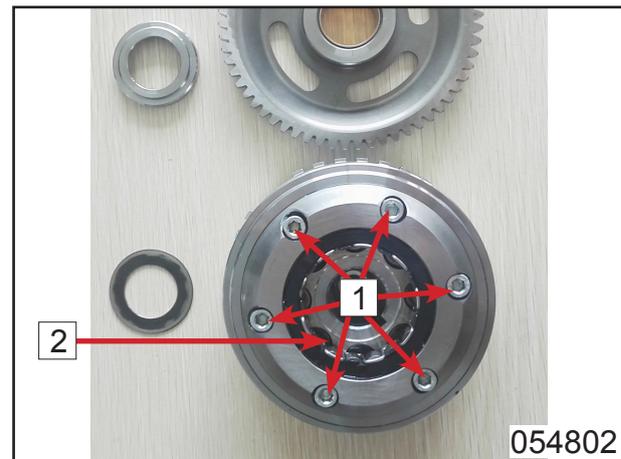
Remove six M6×16 screws (1) and remove overriding clutch (2);

Installation

Replace new overriding clutch;

Install six M6×16 screws (1) with 243 thread locker;

**Tighten M6×16 screws diagonal cross twice, tighten torque: 10N·m**

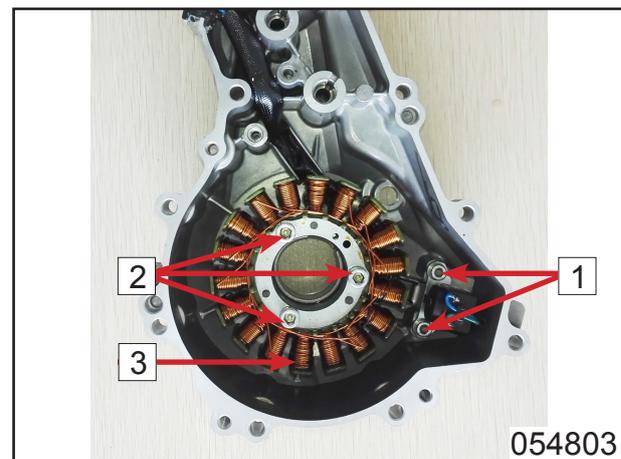


## Magneto Stator Installation

Install pick up harness fixing plate, pick up assembly, two M5×12 screws (1) with 243 thread locker, tighten torque: **8N·m**;

Place harness along left cover groove. Install magneto stator (3) and three M6×30 screws (2) with 243 thread locker, tighten torque: **15 N·m**;

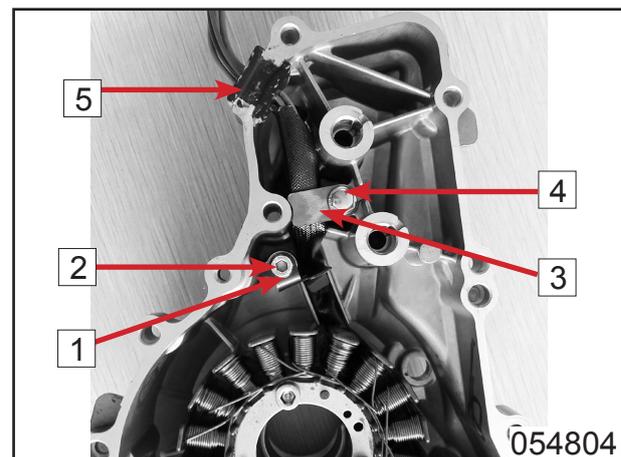
**⚠ Note: After installation, the clearance between pick up assembly and magneto stator should be within 0.7mm~0.9mm.**



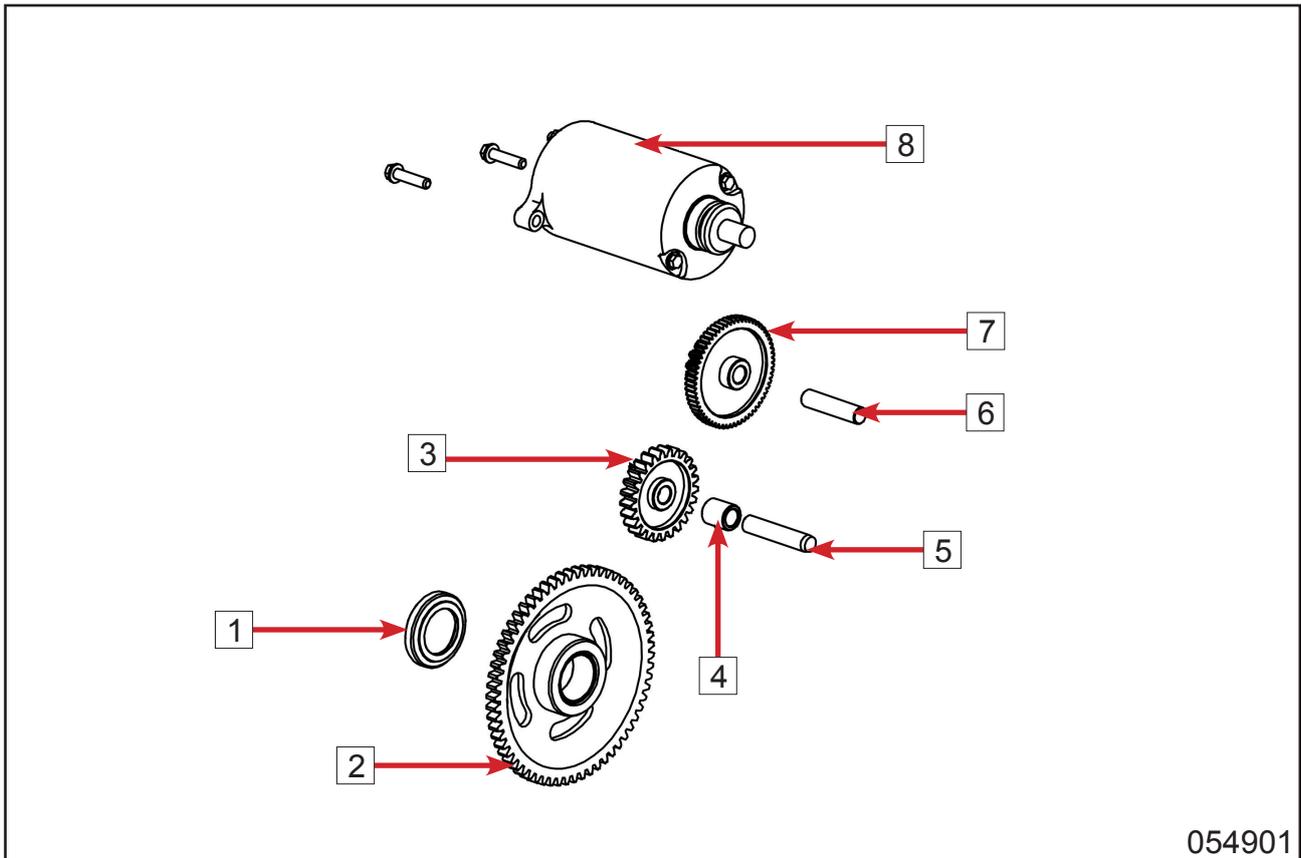
Install harness press plate (1), M5×12 screw (2); **tighten torque: 8 N·m**;

Install harness press plate (3), M6×12 screw (4); **tighten torque: 10 N·m**;

Install wiring block (5) into groove;

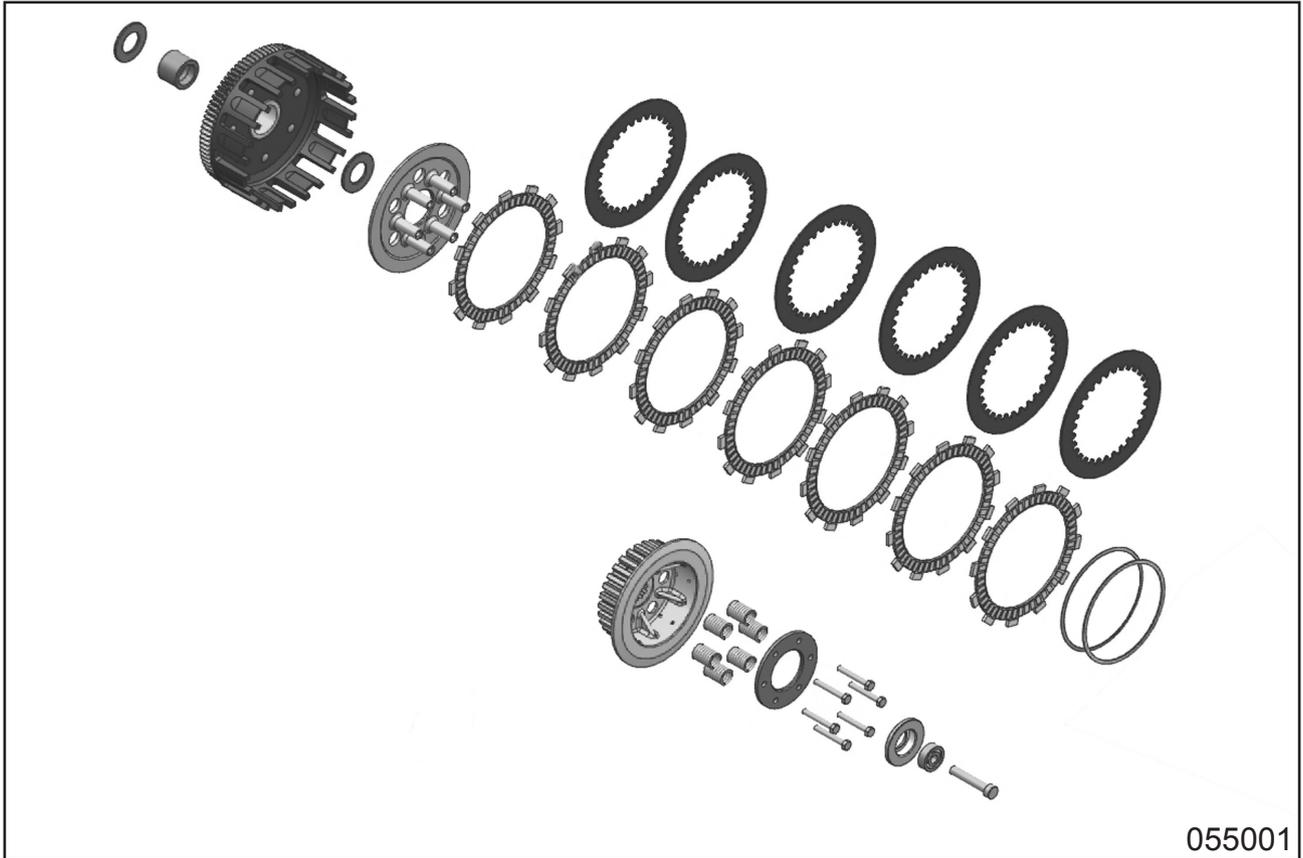


## 5.3.11 Start System Inspection and Installation



- Inspect spacer ring (1) for damage. Replace if damaged;
- Inspect starter big gear (2) for wear or damages. Replace if damaged;
- Inspect starter middle gear (3) for wear or damages. Replace if damaged;
- Inspect middle gear sleeve (4) for wear or damages. Replace if damaged;
- Inspect breather shaft (5) for wear or damages. Replace if damaged;
- Inspect dual gear shaft(6) for wear or damages. Replace if damaged;
- Inspect dual gear (7) for wear or damages. Replace if damaged;
- Inspect starting motor (8):
- Inspect starting motor gear for wear or damages. Replace if damaged;
  - Inspect 25×3 O-ring for deformation. Replace if deforms;
  - Inspect starting motor: connect the negative pole of 12V power supply to the starting motor housing, and briefly connect the power positive electrode. If the starting motor does not work, replace a new one.

## 5.3.12 Clutch Inspection and Installation



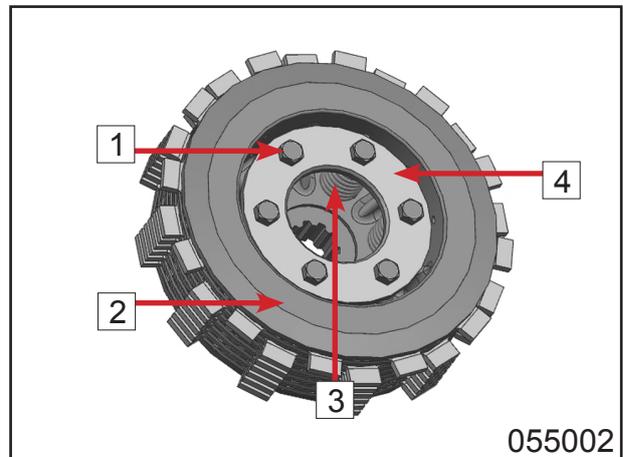
055001

### Central Sleeve Disassembly and Inspection

Remove six M5×35 bolts (1), lift slab (4) and press springs (3);

Remove pressure plate, driven pad I, driven pad II, brake pad, disc spring and spring seat;

Remove central sleeve (2);



055002

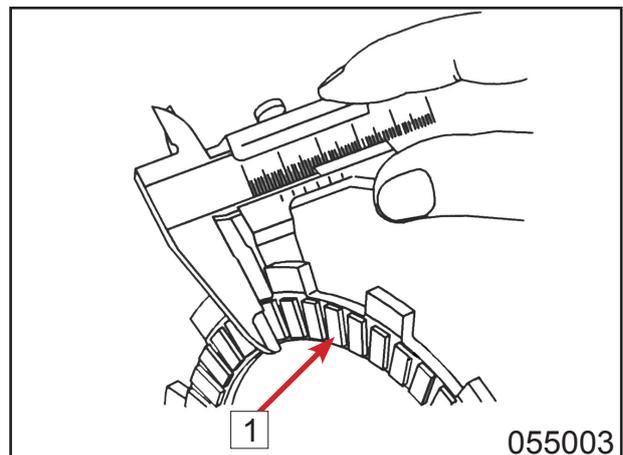
### Brake Pad Inspection

Inspect brake pad (1) for burnt color or severe wear. Replace if necessary;

Measure brake pad (1) thickness. Replace if out of limit;

**Service limit: 2.7mm**

**⚠ Note: New brake pads should be soaked into 10W/40 grease for about 24 hours before installation.**



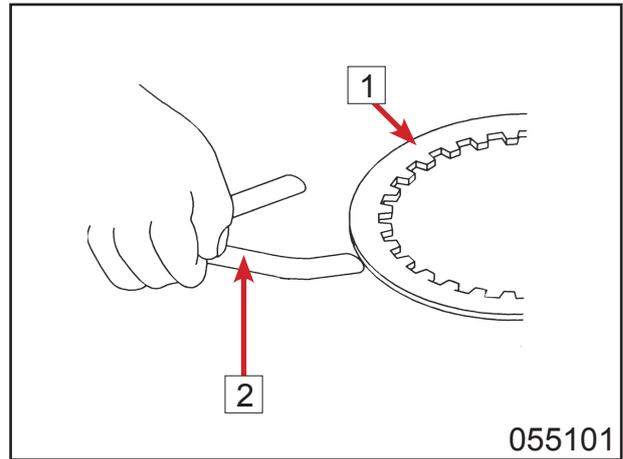
055003

## Driven Pad Torsion Inspection

Use feeler gauge to measure driven pad torsion value. Replace if out of service limit.  
Service limit:

**Driven pad I : 0.3mm**

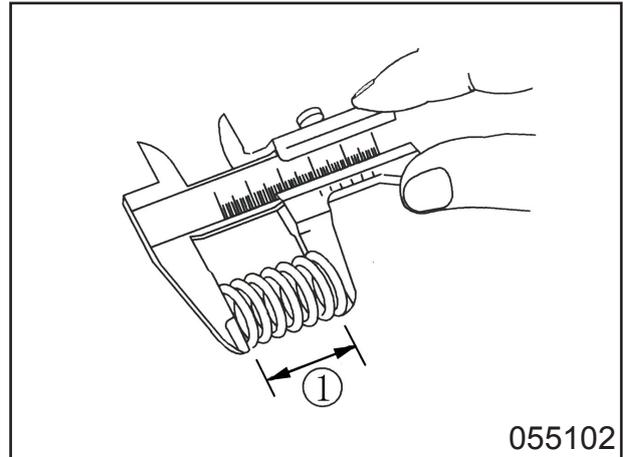
**Driven pad II : 0.3mm**



## Press Spring Inspection

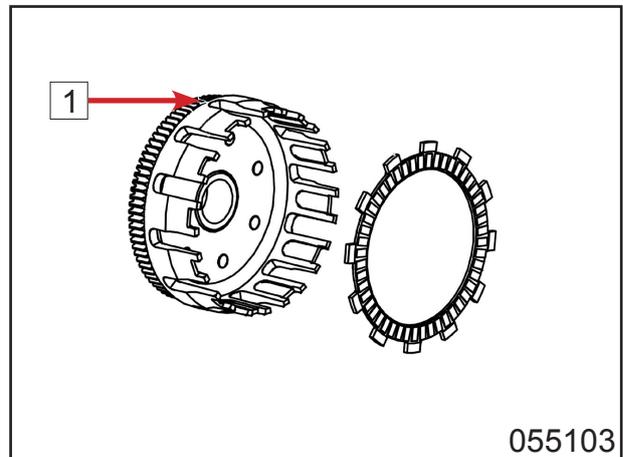
Inspect press spring for free length. Replace if out of service limit.

**Service limit: 34.5mm**



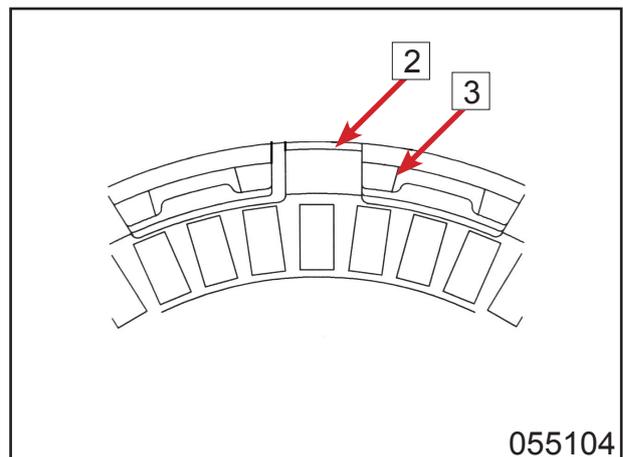
## Clutch Housing and Brake Pad Outer Tooth Fit Clearance Measurement

Inspect driven gear (1) for severe wear or damage. Replace if damaged;  
Inspect driven gear housing for severe wear or damage. Replace if damaged;



Measure brake pad outer tooth(2) and driven gear housing groove (3) fit clearance. Replace if out of service limit;

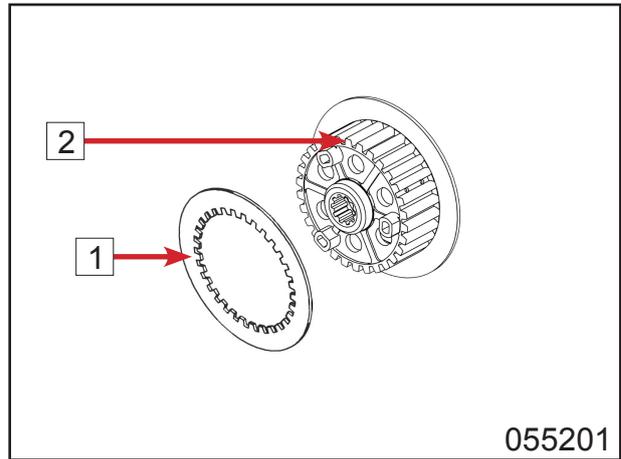
**Service limit: 0.95mm**



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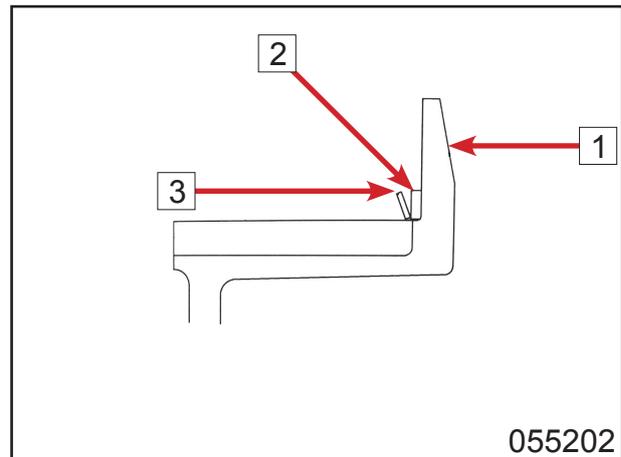
## Driven Pad and Central Sleeve Fit Tooth ring Inspection

Inspect driven gear inner tooth for damages.  
 Replace if damaged;  
 Inspect central sleeve outer tooth for damages. Replace if damaged;



## Central Sleeve Installation

Install spring seat (2) and disc spring (3) on central sleeve (1) in turn;



Install brake pads (5), driven pad II (6) and driven pads I (7) on central sleeve (1) in turn;

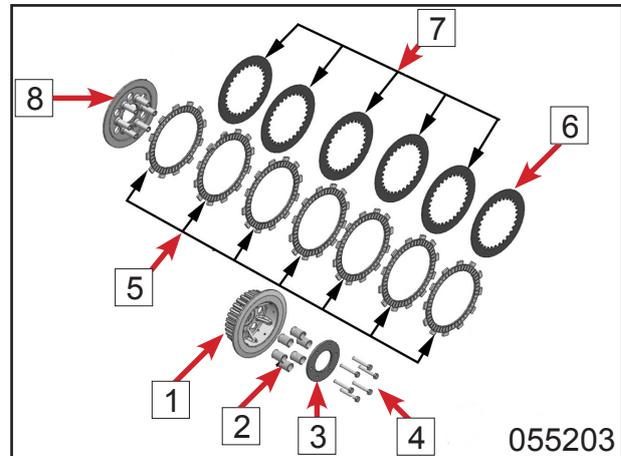
Install press plate (8);

Install six press springs (2);

Install lift slab (3) with the chamfers facing outside;

Install six M5×35 bolts (4) and tighten them in criss-cross way, **tighten torque: 6 N·m~9 N·m**;

**⚠ Note: Do not mistake the installation order of driven pads I (7) and driven pad II (6).**



## Central Sleeve Brake Pad Thickness Measurement

Measure the total thickness of brake pads. Replace **driven pad I (5)** to adjust if out of specification;

Brake pads total thickness specification: 30.28mm~31.02mm

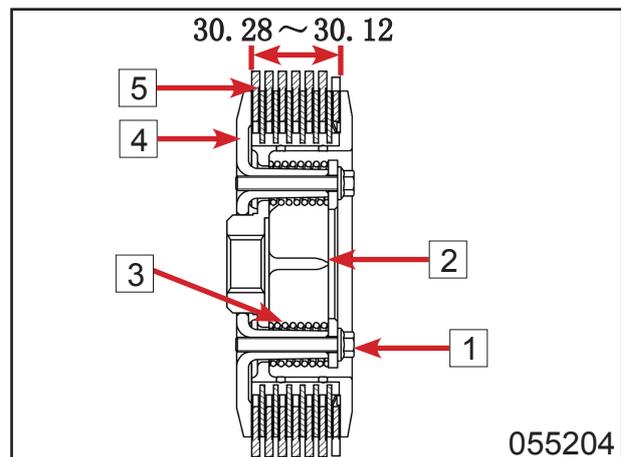
Remove M5×30 bolt (5), lift slab (2), press spring (3) and press plate (4). Replace **driven pad I (5)** to adjust total thickness:

**Driven pad I** thickness specification:

1. red: 1.15mm~1.25mm

2. uncolored: 1.55mm~1.65mm (standard)

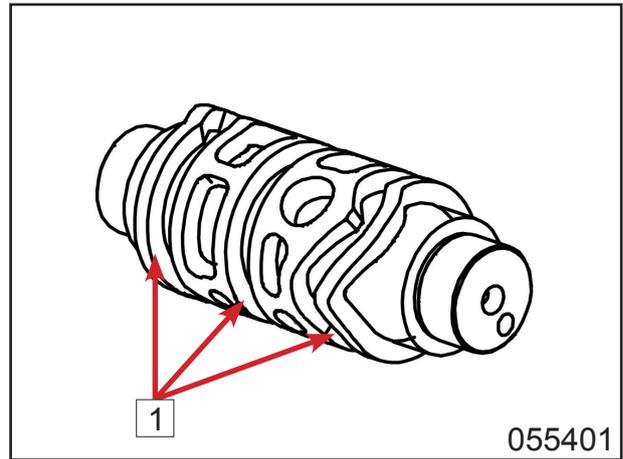
3. green: 1.95mm~2.05mm





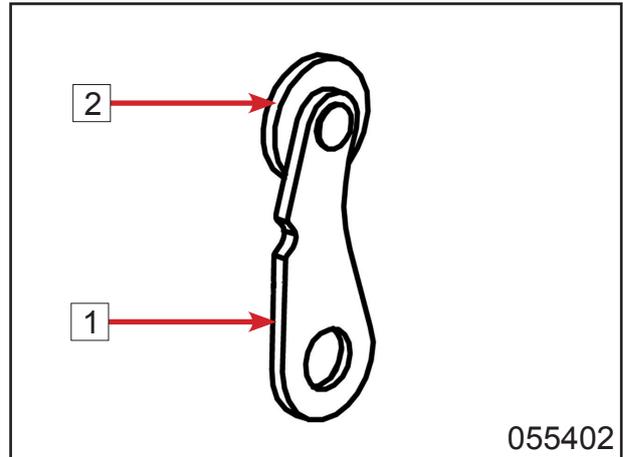
## Gearshift Drum Inspection

Measure gearshift drum groove width.  
Replace if out of service limit;  
**Service limit: 7.2mm**



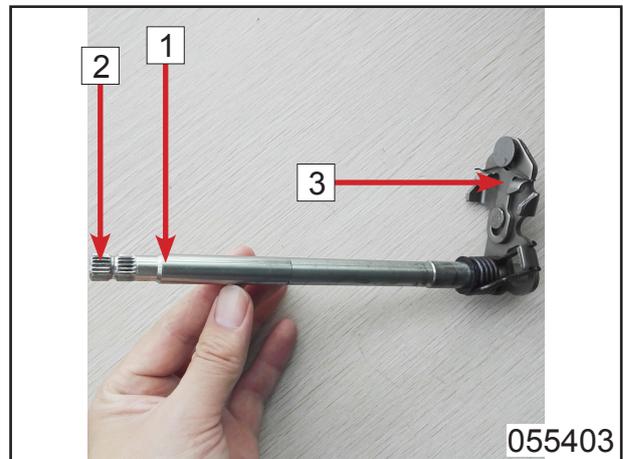
## Gearshift Swing Arm Inspection

Inspect gearshift swing arm (1) for bend.  
Replace if bended;  
Inspect positioning wheel (2) for smooth play. Replace if stuck;



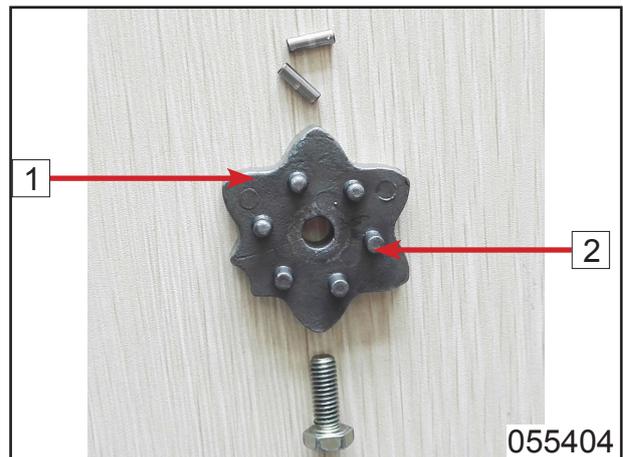
## Gearshift Lever Inspection

Inspect gearshift lever spline (2) for wear or damages. Replace new shift lever (1) if severe damaged;  
Inspect shift pusher dog (3) for wear or damage. Replace new shift lever (1) if severe damaged;  
Inspect shift pusher dog (3) for smooth play. Replace new shift lever (1) if stuck;



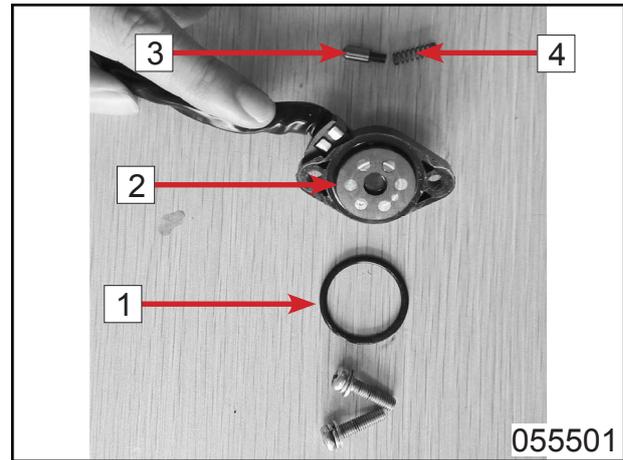
## Shift Drum Cam Inspection

Inspect shift drum cam (1) positioning tooth for wear. Replace if severely worn;  
Inspect shift drum cam pusher dog shaft (2) for wear. Replace if severely worn;

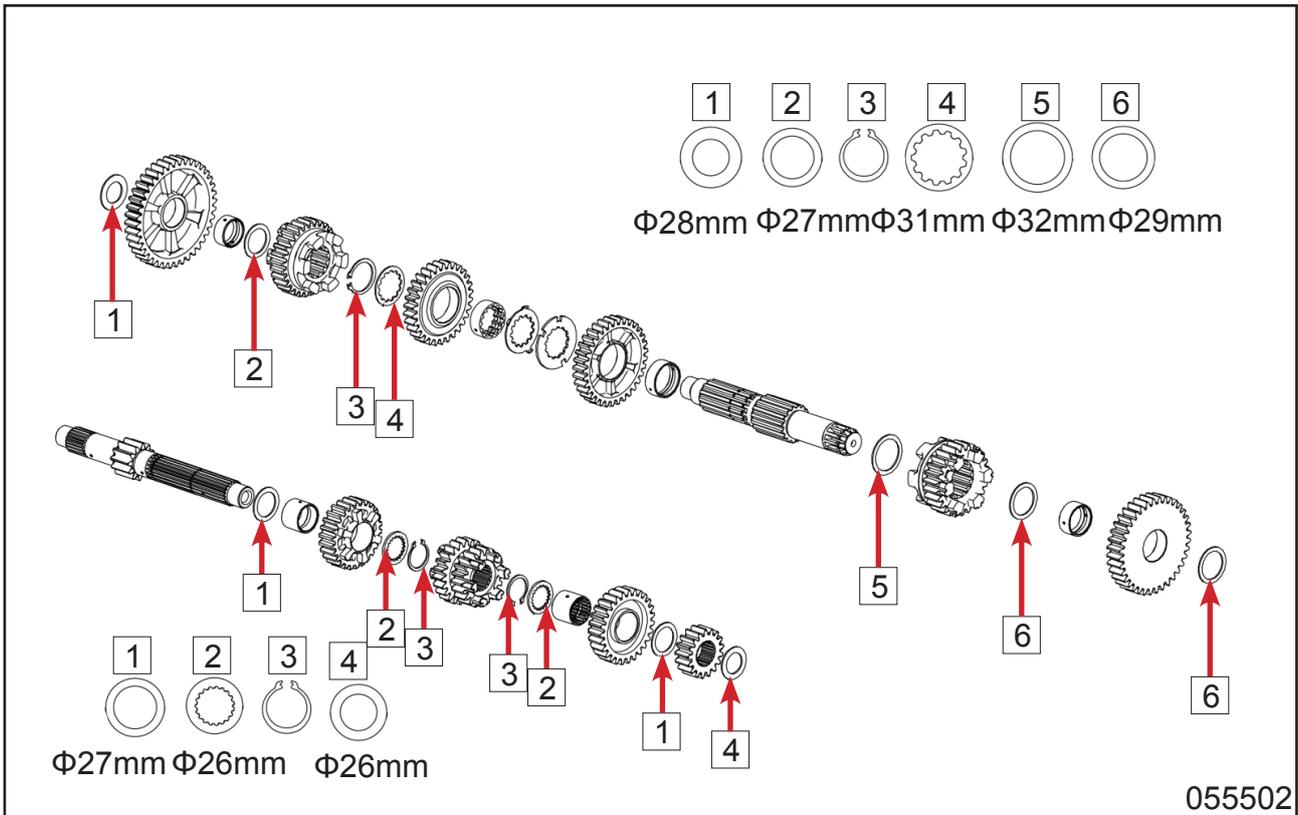


## Gear Contactor, Gear Switch Connector and Other Parts Inspection

Inspect 26.2×2.4 O-ring (1) for deformation. Replace if deforms;  
 Inspect gear contactor (2) for damage. Replace if damaged;  
 Inspect gear switch connector (3) for wear. Replace if severely worn;  
 Inspect contact spring (4) for efficacy. Replace if loses efficacy.



## 5.3.14 Main Shaft, Counter Shaft Inspection and Installation

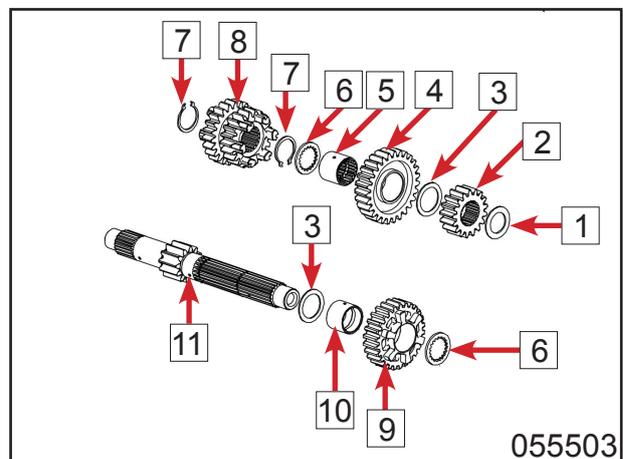


## Main Shaft Disassembly and Inspection

Remove 17×26×1 washer (1), second drive gear (2), 20×27×1 washer (3), sixth drive gear (4), 23 splined hub (5) and 20×26×1.6 washer (6);

Remove 20 circlip (7), third/forth drive gear (8), 20 circlip (7), 20×26×1.6 washer (6), fifth drive gear (9), 20×23×17.2 sleeve (10) and 20×27×1 washer (3). Then remove main shaft (11).

**⚠ Caution: 20 circlips can not be reused. Discard it after removal.**



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## Second drive gear, sixth drive gear and other parts Inspection

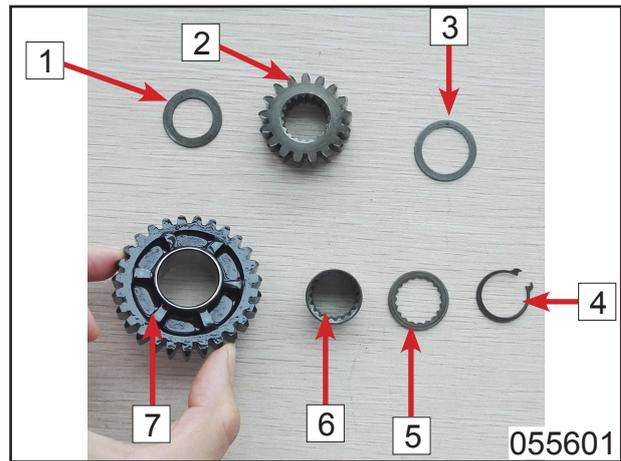
Inspect 17×26×1 washer (1), 20×27×1 washer (3) and 20×26×1.6 washer (5) for deformation. Replace if deformed;

20 circlip (4) has to be replaced when installing;

Inspect 23 splined hub (6) for wear or damage. Replace if damaged;

Inspect second drive gear (2) for wear or damage. Replace if damaged;

Inspect sixth drive gear (7) for wear or damage. Replace if damaged;

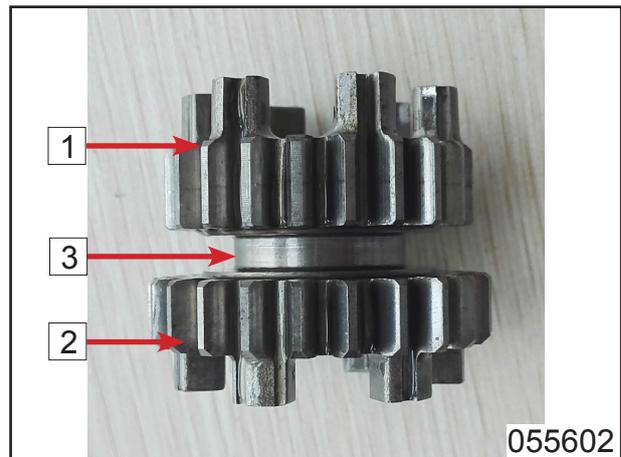


## Third drive gear and fourth drive gear inspection

Inspect third drive gear (1) and fourth drive gear (2) for wear or damage. Replace if damaged;

Measure drive gear fork groove (3) width. Replace if out of limit value;

**Limit value: 5.22mm**



## Fifth drive gear, main shaft and other parts inspection

Inspect 20×26×1.6 washer (1) and 20×27×1 washer (4) for deformation. Replace if deformed;

Inspect fifth drive gear (2) for wear or damage. Replace if damaged;

Inspect 20×23×17.2 washer (3) for wear or damage. Replace if damaged;

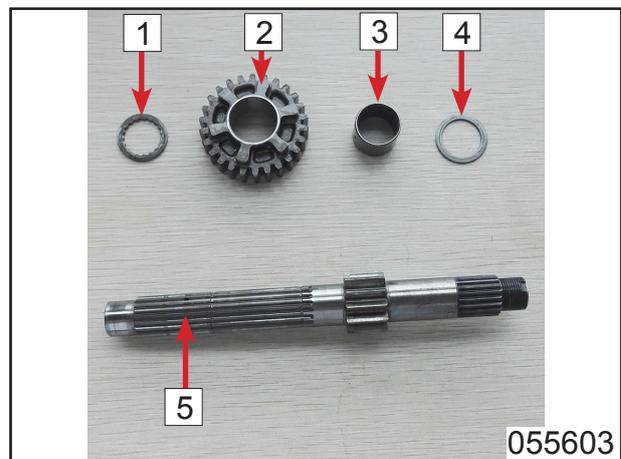
Inspect main shaft (5) for wear or damage. Replace if damaged;

### Main shaft Assembly

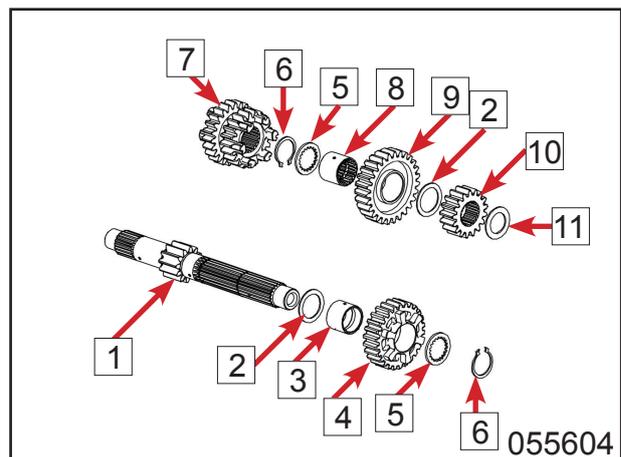
Clean up all parts before assembling;

Install 20×27×1 washer (2), 20×23×17.2 sleeve (3), fifth drive gear (4), 20×26×1.6 washer (5) and new 20 circlip (6) in turn on main shaft (1),

Install third/fourth drive gear (7), 20 circlip (6), 20×26×1.6 washer (5), 23 splined hub (8), sixth drive gear (9), 20×27×1 washer (2), second drive gear (10) and 17×26×1 washer (11);



**⚠ Note: 20×23×17.2 sleeve and 23 splined hub (8) have to be covered with MoS2 grease. The inner holes of fifth drive gear (4) and sixth drive gear (9) have to be covered with MoS2 grease.**



## Notice on 20 Circlip Installation

As right pictures shows, 20 circlip open end should align with main shaft spline; 20 circlip acute angle should face outside when pressed.

**⚠ Caution: 20 circlips can not be reused. Replace new one when installing.**

## Counter Shaft Disassembly and Inspection

Remove 17×28×1 washer (1), first driven gear (2), 20×23×10.5 sleeve (3), 20 thrust washer (4) and fifth driven gear (5);

Remove two 22×29×1 washer (15), second driven gear (16), 22×25×11 sleeve (17) and sixth driven gear (18);

Remove 25 circlip (6), 25×31×1 washer (7), fourth driven gear (8), 25×10 splined hub (9), 25 thrust washer (10), 25×42×1.6 washer (11), third driven gear (12), 25×28×10 sleeve (13) and 25×32×1 washer (14);  
Remove counter shaft.

**⚠ Caution: 26 circlips can not be reused. Discard them after removal.**

## First Driven Gear, Fifth Driven Gear and Other Parts Inspection

Inspect 17×28×1 washer (1) and 20 thrust washer (2) for deformation. Replace if deforms;

Inspect 20×23×10.5 sleeve (3) for wear or damages. Replace if damaged;

Inspect first driven gear (4) for wear or damages. Replace if damaged;

Inspect fifth driven gear (5) for wear or damages. Measure fork groove width. Replace if out of service limit;

**Service limit: 5.22mm**

## Second Driven Gear, Sixth Driven Gear and Other Parts Inspection

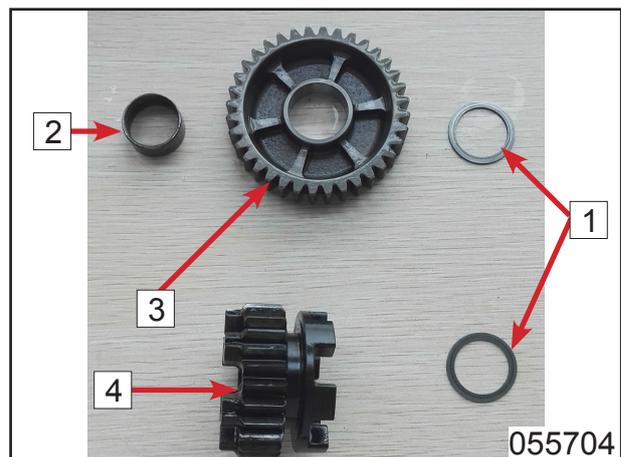
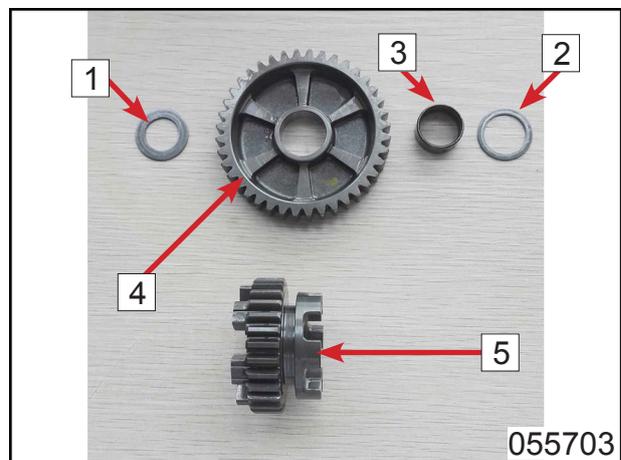
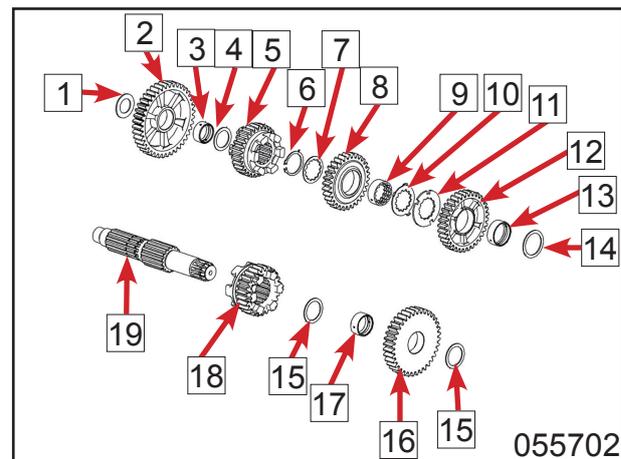
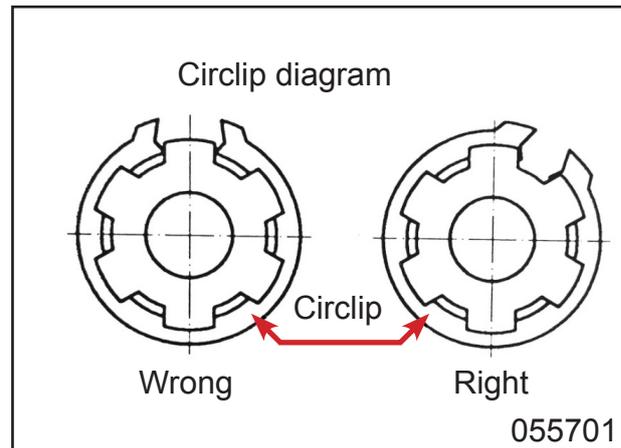
Inspect 22×29×1 washer (1) for bend. Replace if bent;

Inspect 22×25×11 sleeve (2) for wear or damages. Replace if damaged;

Inspect second driven gear (3) for wear or damages. Replace if damaged;

Inspect sixth driven gear (4) for wear or damages. Measure fork groove width. Replace if out of service limit;

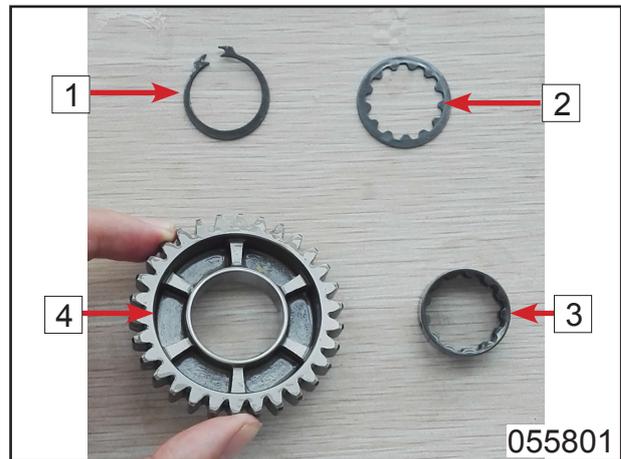
**Service limit: 5.22mm**



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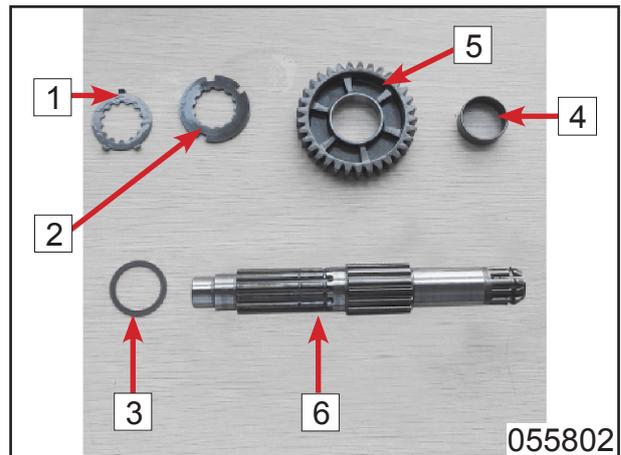
## Forth Driven Gear and Other Parts Inspection

Replace new 25 circlip (1) when installing;  
Inspect 25×31×1 washer (2) for bend.  
Replace if bent;  
Inspect 25×10 splined hub (3) for wear or damages. Replace if damaged;  
Inspect forth driven gear (4) for wear or damages. Replace if damaged;



## Third Driven Gear, Counter Shaft and Other Parts Inspection

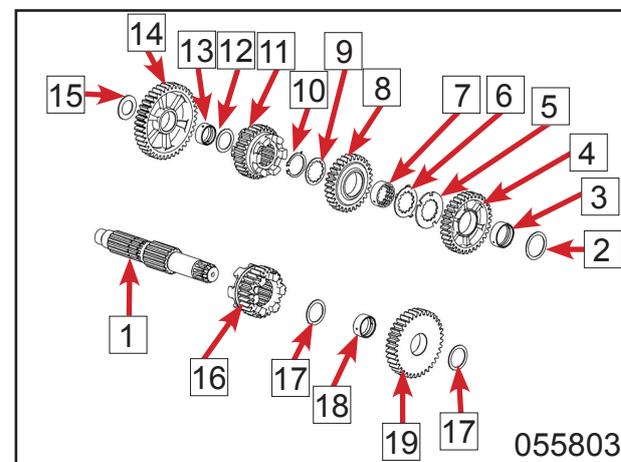
Inspect 25 washer (1), 25×42×1.6 washer (2) and 25×32×1 washer (3) for deformation. Replace if deformed;  
Inspect 25×28×10 sleeve (4) for wear or damages. Replace if damaged;  
Inspect third driven gear (5) for wear or damages. Replace if damaged;  
Inspect counter shaft (6) for wear or damages. Replace if damaged;



## Counter Shaft Assembly

Clean up all parts before assembly;  
Install 25×32×1 washer (2), 25×28×10 sleeve (3), third driven gear (4), 25×42×1.6 washer (5), 25 washer (6), 25×10 splined hub (7), forth driven gear (8), 25×31×1 washer (9), new 25 circlip (10), fifth driven gear (11), 20 thrust washer (12), 20×23×10.5 sleeve (13), first driven gear (14), 17×28×1 washer (15), sixth driven gear (16), two 22×29×1 washer (17), 22×25×11 sleeve (18) and second driven gear (19) in turn on counter shaft (1).

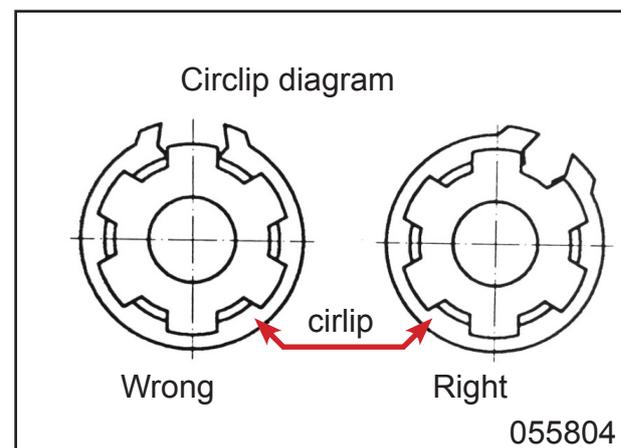
**⚠ Note: Part (3), part (7), part (13) and part (18) have to be covered with MoS2 grease when installing. And corresponding driven gear inner holes have to be covered with MoS2 grease as well.**



## Notice on 25 Circlip Installation

As right pictures shows, 25 circlip open end should align with main shaft spline;  
25 circlip acute angle side should face outside when installing.

**⚠ Caution: 20 circlips can not be reused. Replace new one when installing.**



## 5.4 Engine Assembly

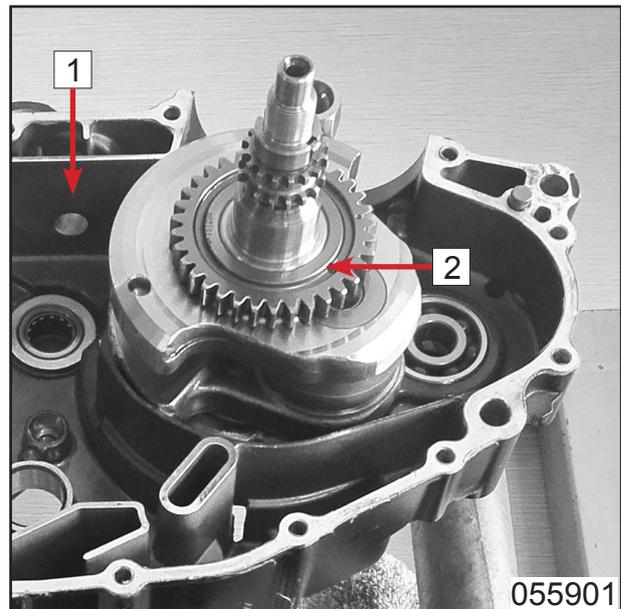
### 5.4.1 Preparation

Clean up all parts.

### 5.4.2 Crankshaft, Balance Shaft Assembly

Apply grease in bearing holes;

Install crankshaft (2) on left crankcase (1);



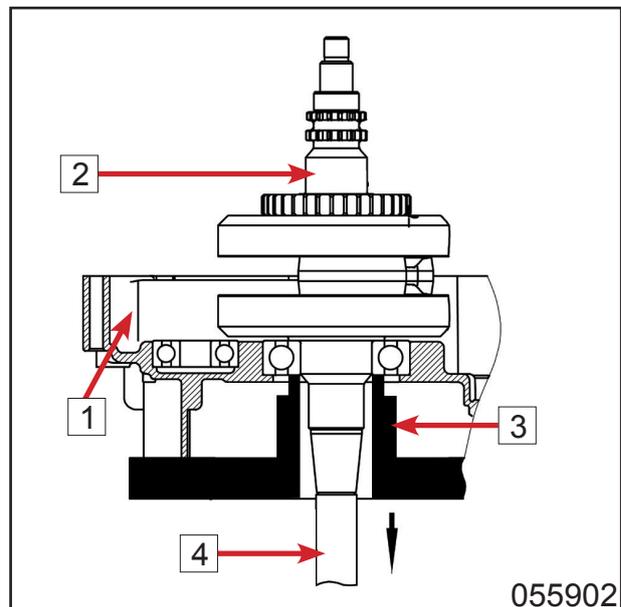
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Use special tool (3) to support left crankcase (1) bearing inner ring;

Use special tool (4) to rotate crankshaft (2) left crank hole. Install crankshaft (2) in the direction of arrow;

Remove special tool;

**⚠ Note: Apply grease on shaft neck when installing crankshaft.**



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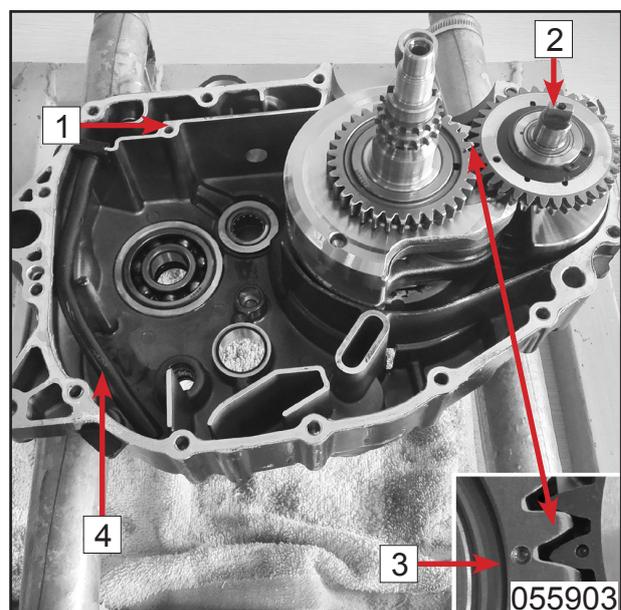
Apply grease in bearing holes;

Install balance shaft (2) on left crankcase (1);

Align balance shaft timing mark (3) with crankshaft timing mark (3);

Install oil return hose (4);

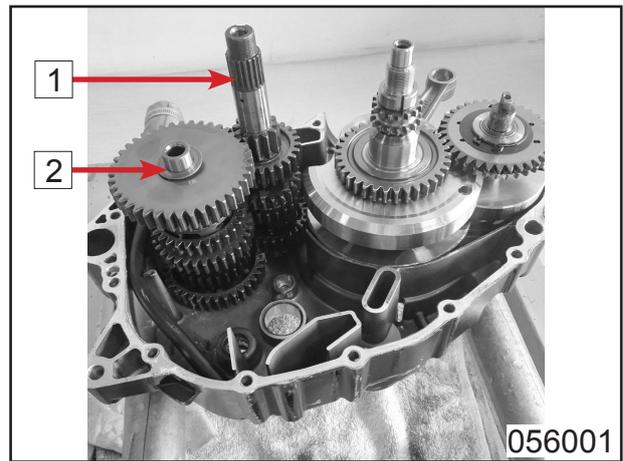
**⚠ Note: Apply grease on shaft neck when installing balance shaft.**



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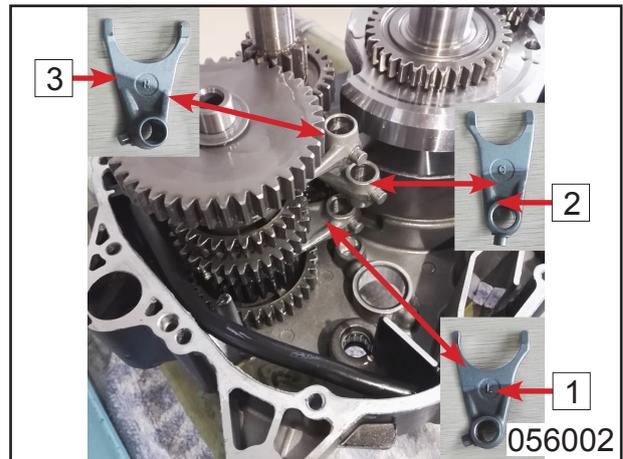
## 5.4.3 Main Shaft and Counter shaft Assembly

Apply grease in bearing holes, on main shaft neck and counter shaft neck;  
Install main shaft assembly (1) and counter shaft (2) into corresponding holes at the same time;

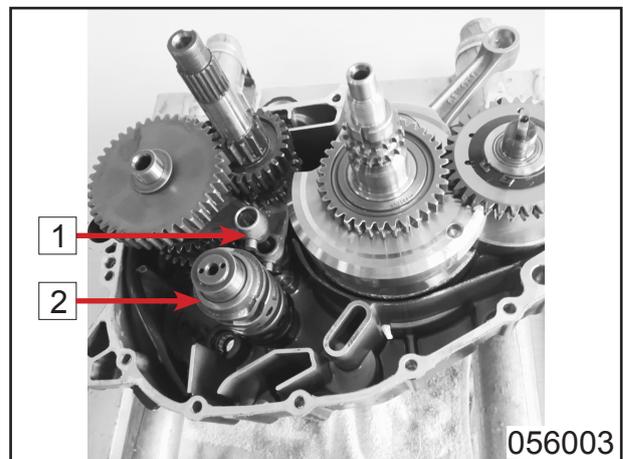


## 5.4.4 Shift Drum, Shift Fork and Shift Shaft Assembly

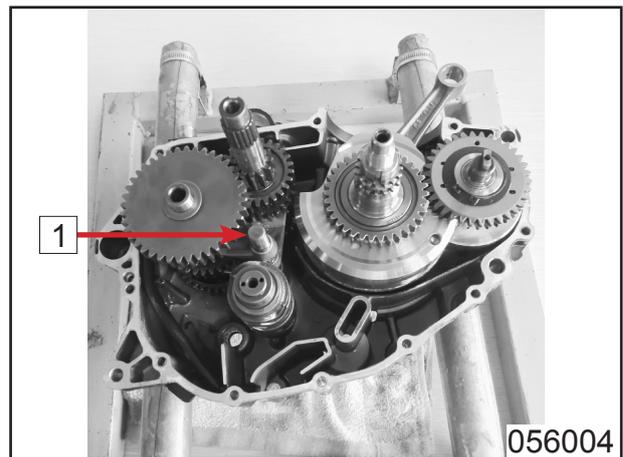
Install shift fork (1) with mark "L";  
Install shift fork (2) with mark "C";  
Install shift fork (3) with mark "R";;



Apply grease on both sides of shift drum (2);  
Install shift drum (2) into corresponding bearing holes;  
Adjust shift fork trolley (1) to the corresponding groove on shift drum (2);

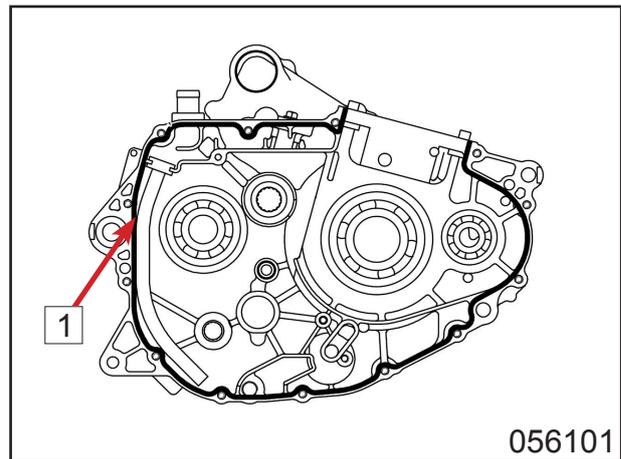


Apply grease on shift fork shaft (1);  
Apply grease in bearing hole;  
Install shift fork shaft (1);

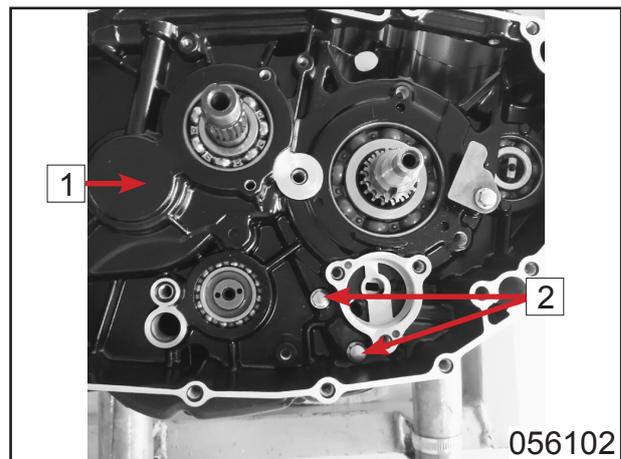


## 5.4.5 Right Crankcase Assembly

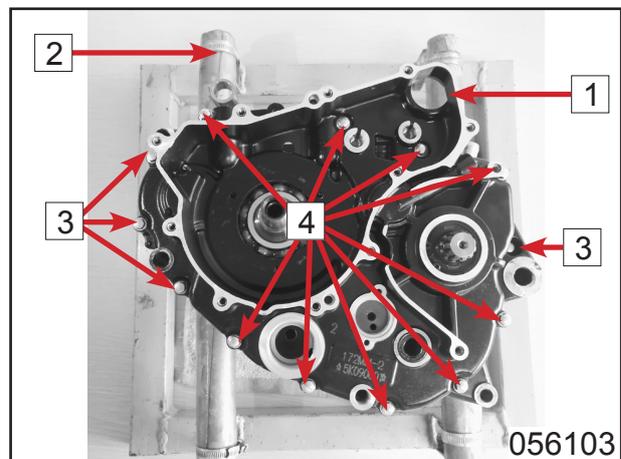
Clean up left crankcase remaining sealant;  
Apply sealant (1) on left crankcase junction surface as right picture shows;



Install two 8×12 dowel pins on left crankcase;  
Clean up right crankcase remaining sealant;  
Apply grease in bearing holes and shaft neck;  
Install right crankcase (1);  
Install two M6×70 bolts (2);  
**M6×70 bolt tighten torque: 6 N·m;**

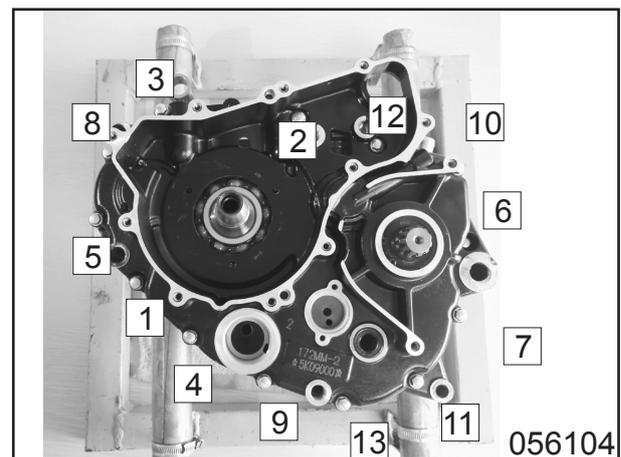


Place crankcase (1) up side down on support tool (2);  
Install four M6×50 bolts (3);  
Install nine M6×70 bolts (4);



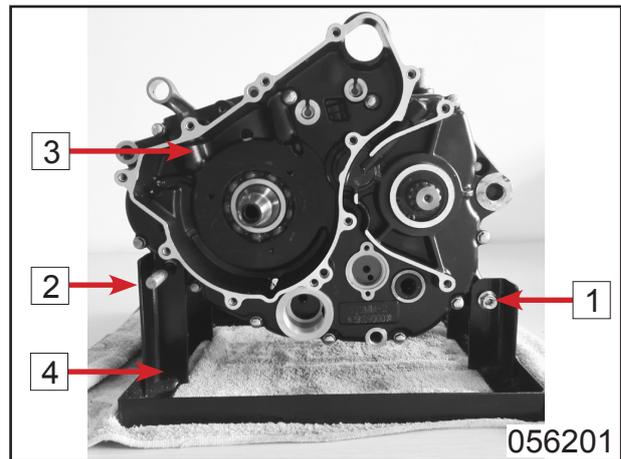
Tighten thirteen bolts following the order as picture show and make it twice;  
**Tighten Torque: 10 N·m;**

**⚠️ Note: Tighten two M6×70 bolts again on right crankcase, tighten torque: 10 N·m.**

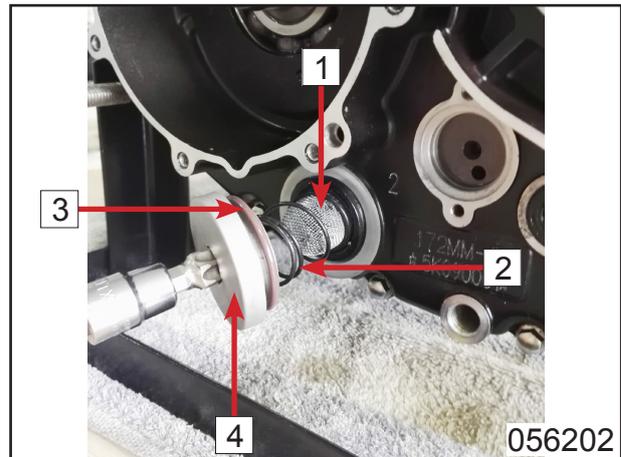


## 5.4.6 Oil Strainer, Gear Contactor and Speed Sensor Assembly

Place engine case (3) on support tool (4);  
Install  $\Phi 8 \times 100$  shaft (1),  $\Phi 9 \times 120$  shaft (2)  
or bolts of the same specifications;

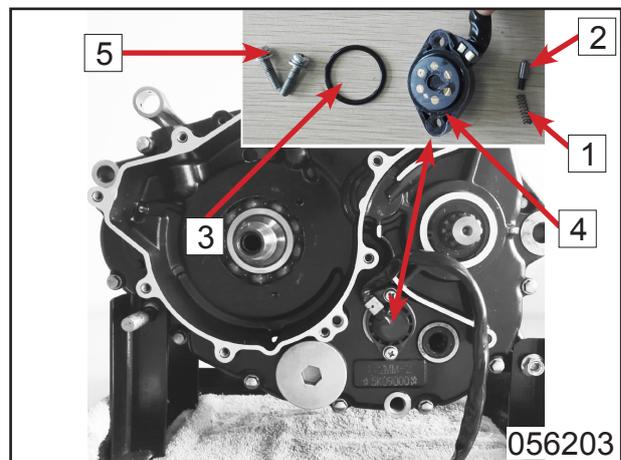


Apply grease on 35×3.5 O-ring (3);  
Install oil strainer (1), strainer press spring (2),  
35×3.5 O-ring (3) and strainer cover (4) in turn;

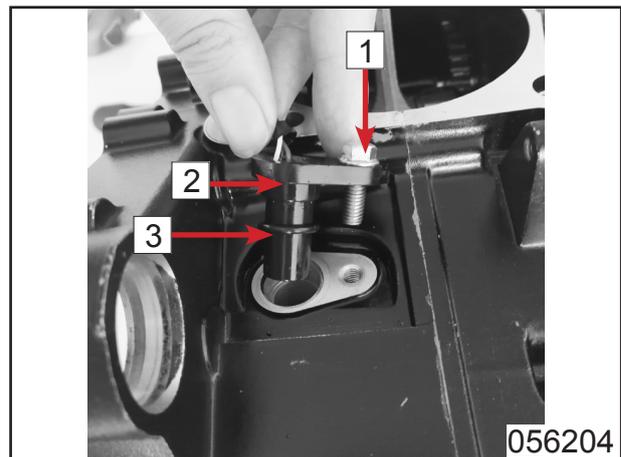


Apply grease on 26.2×2.4 washer (3);  
Install contact spring (1), gear switch  
connector (2), 26.2×2.4 O-ring (3) and gear  
contactor (4) in turn;  
Install two M5×25 screws (5);

**M5×25 screws with 243 thread locker,  
tighten torque: 5 N·m**



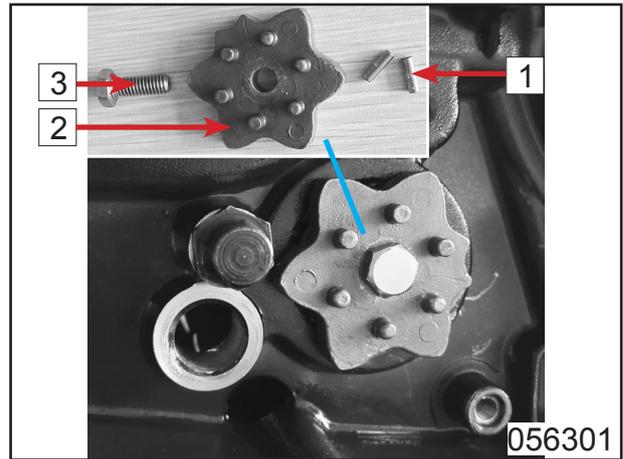
Apply grease on 13×2 O-ring (3);  
Install 13×2 O-ring (3), speed sensor (2) in  
turn;  
Install M6×16 bolt (1);  
**M6×16 bolt tighten torque: 10 N·m**



## 5.4.7 Gearshift Assembly

Install two P3×9.8 roller needles (1) on shift drum;  
Install shift drum cam (2) and M6×16 bolt (3);

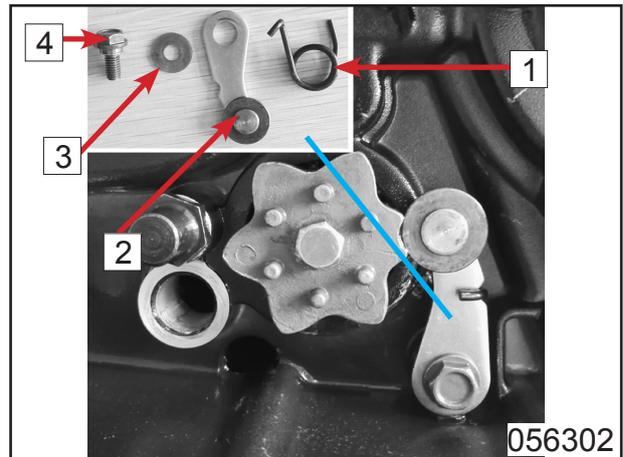
**M6×16 bolt with 243 thread locker, tighten torque: 10 N·m**



Install gearshift swing arm spring (1), 6.3×16.3×1.2 washer (3), no.3, gearshift swing arm (2) and gearshift cam bolt (4);

**Gearshift cam bolt with 243 thread locker, tighten torque: 10 N·m**

Install 14×20×1 washer (2) on gearshift lever (1);  
Install gearshift assembly (3);



**⚠ Note: Turn main shaft clockwise to check smooth gear shifting.**

## 5.4.8 Piston Assembly

Install oil ring steel rails (2), oil ring expander (3), second ring (4) and top ring (5) in turn;

Piston ring open end faces (7), exhaust side mark (1);

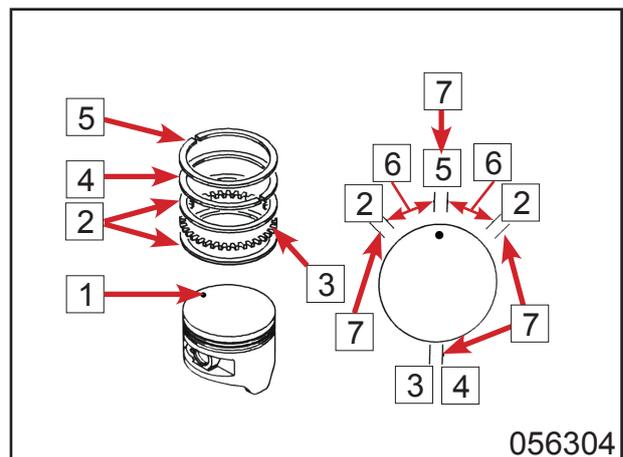
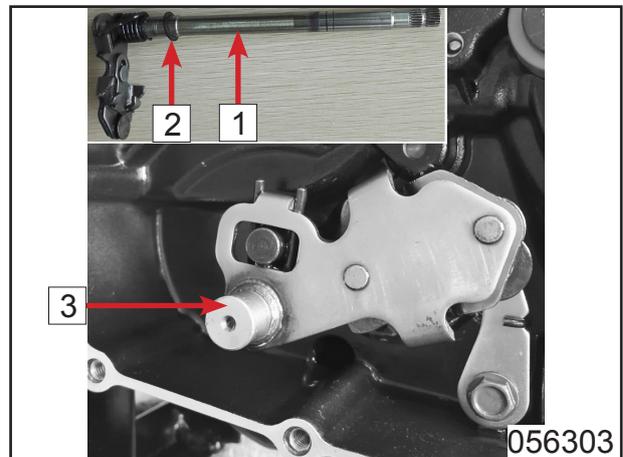
The staggered angle between two oil ring steel rails is 30°~45° (6);

Oil ring expander open end faces (3);

Second ring expander open end faces (4);

Top ring expander open end faces (5);

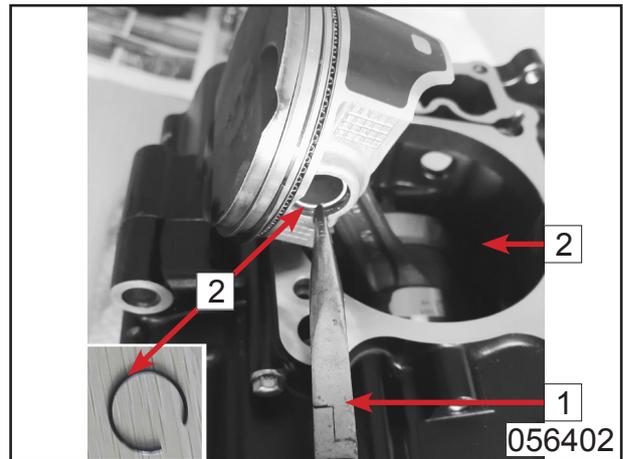
**⚠ Note: The side with marks of top ring and second ring faces upwards.**



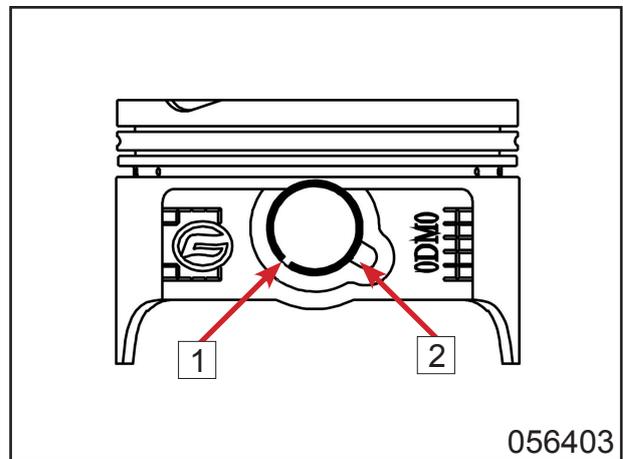
Apply grease on piston pin hole and piston pin;  
Install piston (2) and piston pin (1);



Place a clean cloth under piston (1) to avoid piston pin circlip (2) dropping into engine case;  
Install circlip (2) into the groove with nipper plier;

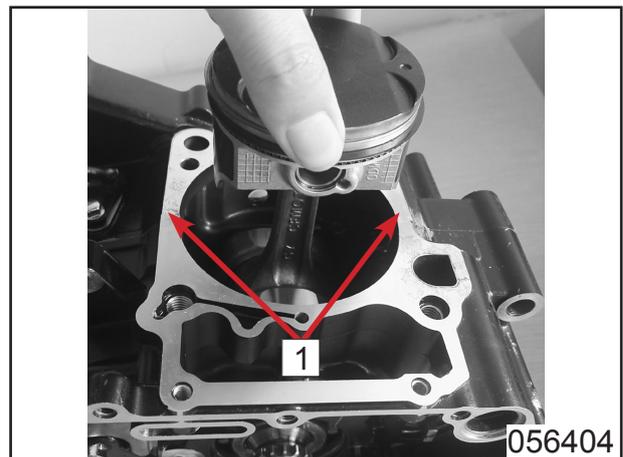


Piston circlip open end (1) should avoid overlapping the gap position (2) on piston;

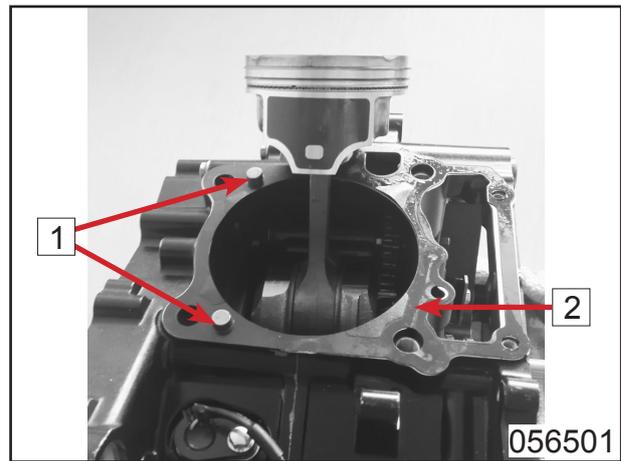


## 5.4.9 Cylinder Body Assembly

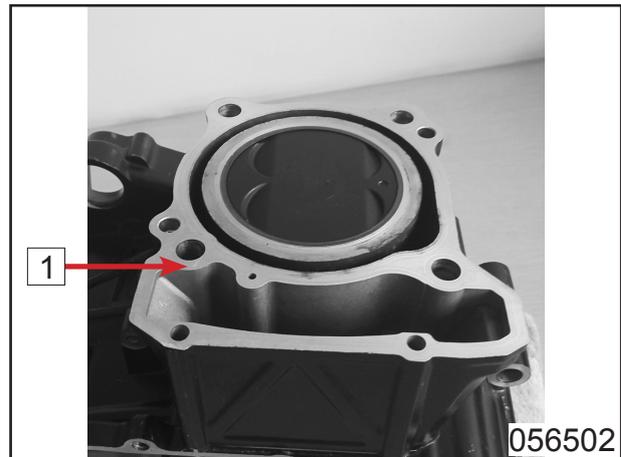
Apply sealant on LH/RH case junction surface (1);



Install two 8×12 dowel pins (1);  
Install new cylinder gasket (2);



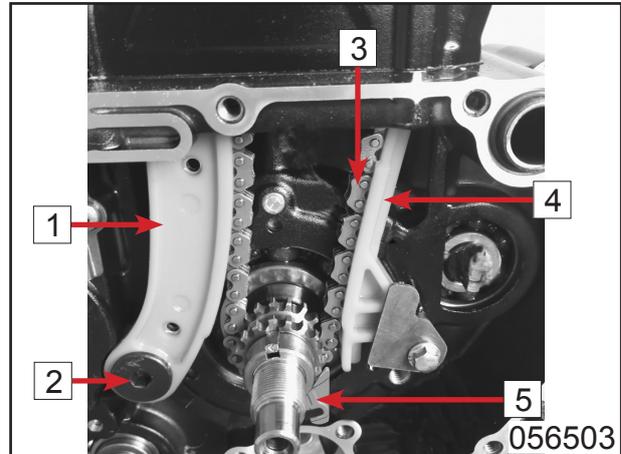
Install cylinder body (1);



### 5.4.10 Timing Chain, Chain Guide, Tensioner and Other Pars Assembly

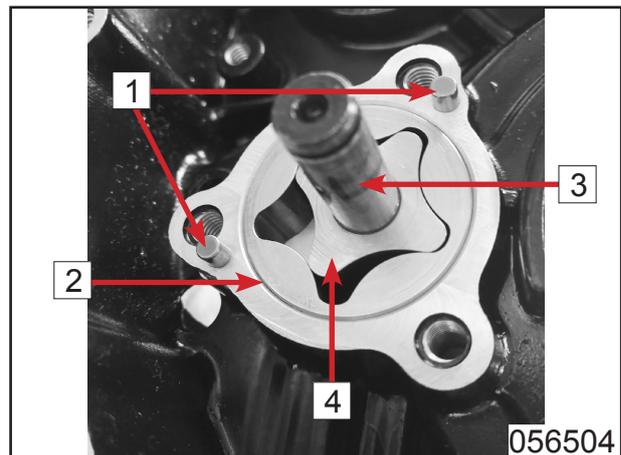
Install tension plate (1) and pin shaft (2);  
Install timing chain (3);  
Install chain guide (4);  
Install chain guard (5);

**Pin shaft with 243 thread locker, tighten torque; 24 N·m**



### 5.4.11 Oil Pump Assembly

Apply grease on oil pump outer rotor;  
Install two oil pump dowel pins (1);  
Install oil pump outer rotor(2);  
Install oil pump shaft (3), oil pump inner rotor (4) and P3×13.8 roller needle;



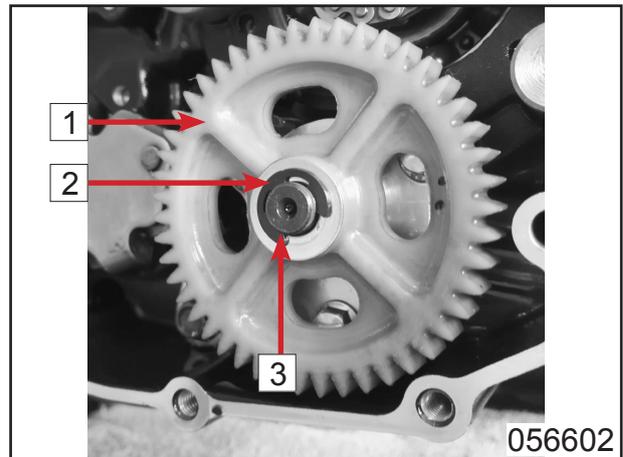
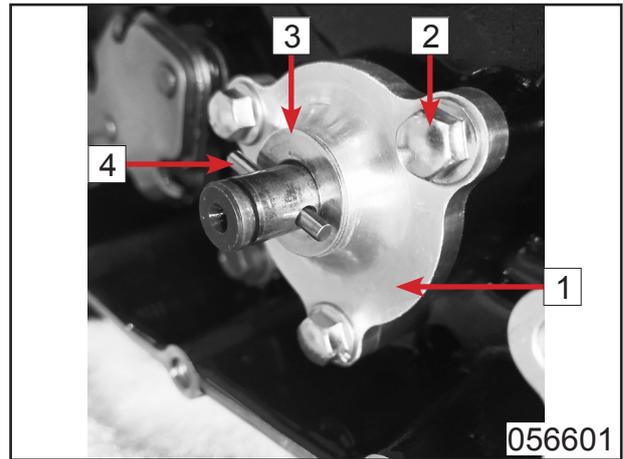
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Apply grease on oil pump cover (1);  
Install oil pump cover (1) and three M6×16 bolts (2);  
Install 10 washer (3) and P3×21.8 roller needle (4);

**M6×16 bolt (2) with 243 thread locker, tighten torque: 10 N·m**

Install oil pump gear (1) and 10 washer (2);  
Install 8 circlip (3);

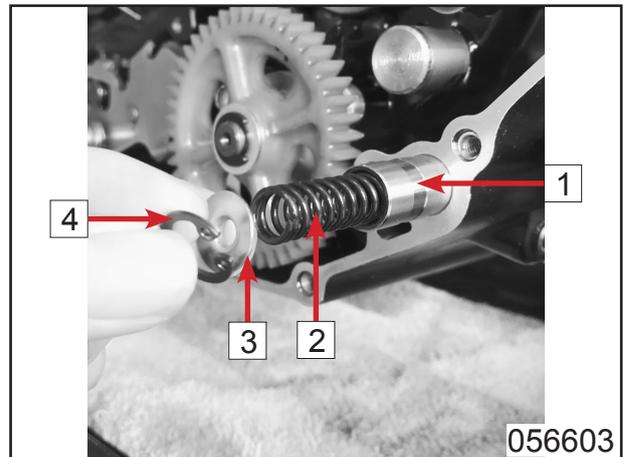
**⚠ Note: 8 circlip (3) acute angle side faces outside when installing.**



## 5.4.12 Relief Valve Assembly

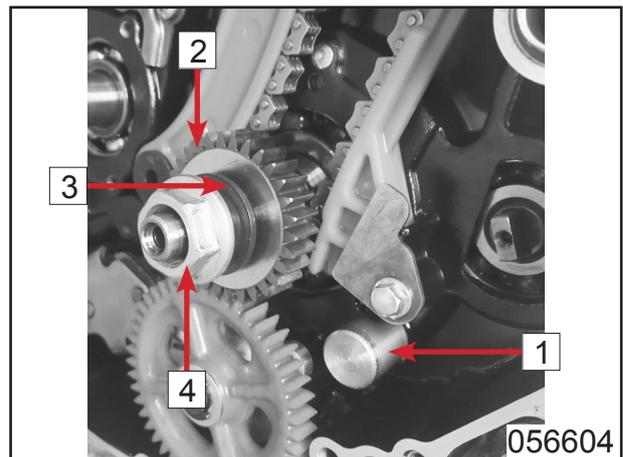
Apply grease on relief valve core (1);  
Install relief valve core (1), relief valve spring (2) and relief valve spring seat (3);  
Install 14 circlip (4);

**⚠ Note: 14 circlip (4) acute angle side faces outside when installing.**



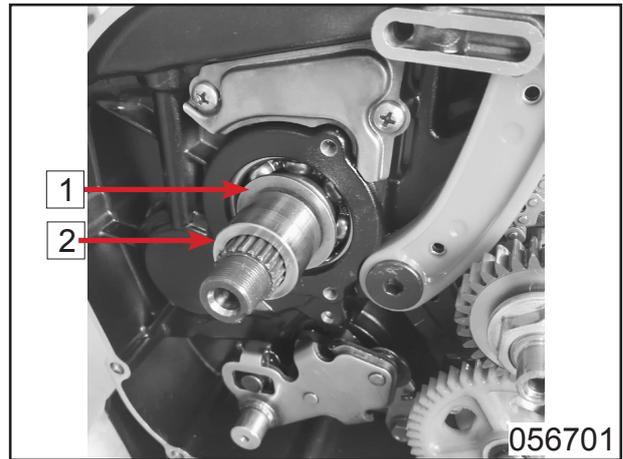
## 5.4.13 Output Gear Assembly

Install crankshaft fixing pin (1) to lock crankshaft;  
Install woodruff key, output gear (2) and 16 retainer (3);  
Install M16×1 nut (4);  
**M16×1 nut tighten torque: 100 N·m**

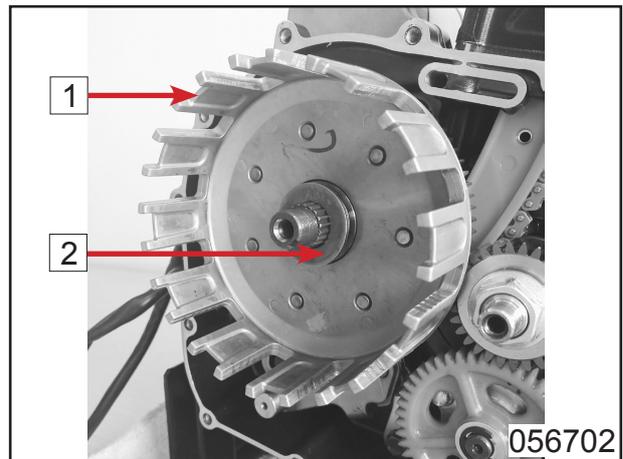


## 5.4.14 Clutch Assembly

Apply grease on sleeve (2) inner and outer surface;  
Install 20×37×2 washer (1) and sleeve (2);

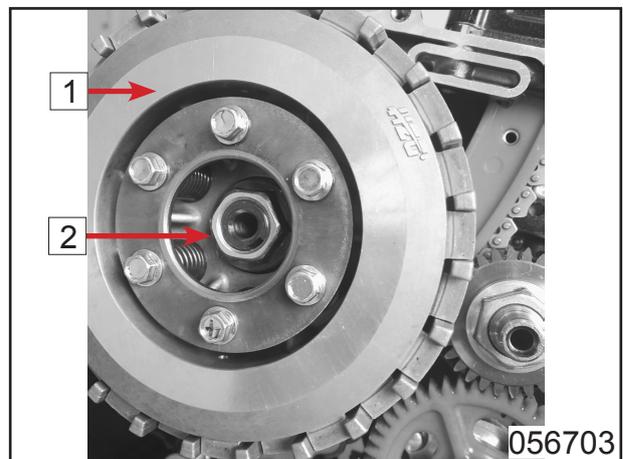


Apply grease on primary driven gear (1) shaft hole;  
Install primary driven gear (1) and 20×37×2 washer (2);

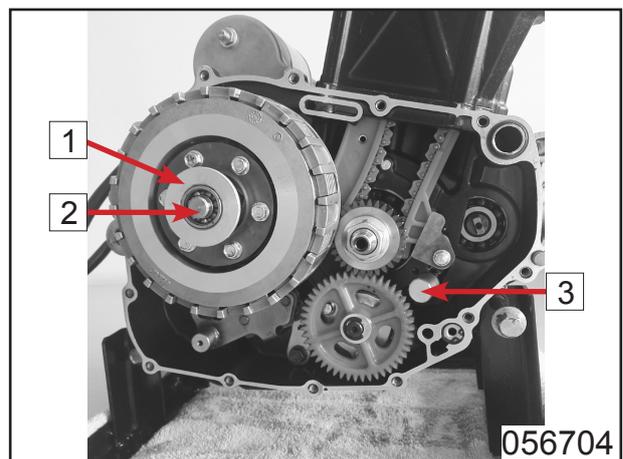


Install central sleeve (1);  
Install 16 retainer and M16×1 nut (2);

**M16×1 nut tighten torque: 100 N·m**



Install bearing seat, bearing (1) and damper rod (2);  
Remove crankshaft fixing pin (3);

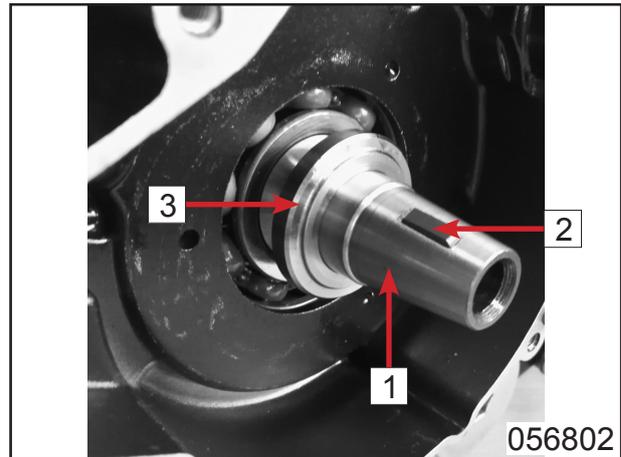


## 5.4.15 Magneto Rotor Assembly

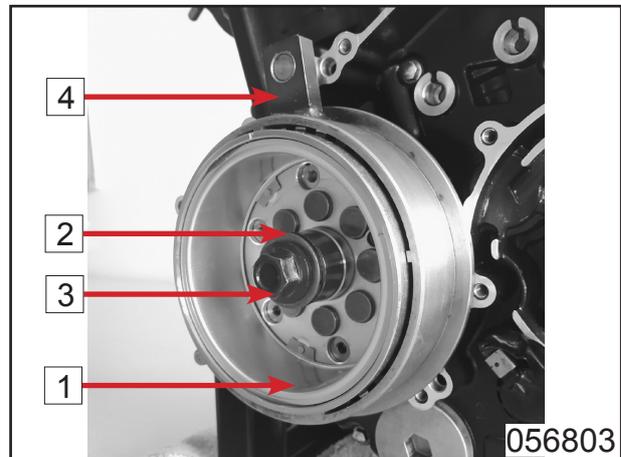
Clean magneto rotor (2) conical surface with alcohol-soaked non-woven fabrics;  
Install 27×44×1 washer and starter big gear (1) and magneto rotor (2);



Clean crankshaft left conical surface with alcohol-soaked non-woven fabrics;  
Install woodruff key (2);  
Install retainer (3);

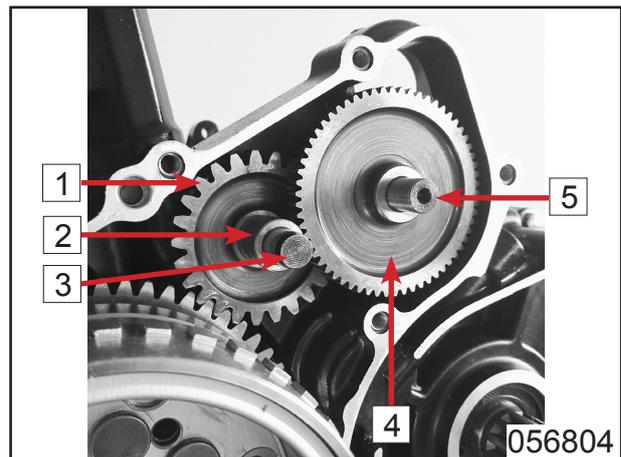


Install magneto rotor (1);  
Install 12.5×33×5 washer (2) and M12×1.25×45 bolt (3);  
Install stopper (4) on magneto rotor (1).  
Tighten M12×1.25×45 bolt (3);  
**M12×1.25×45 bolt (3) tighten torque: 120 N·m**



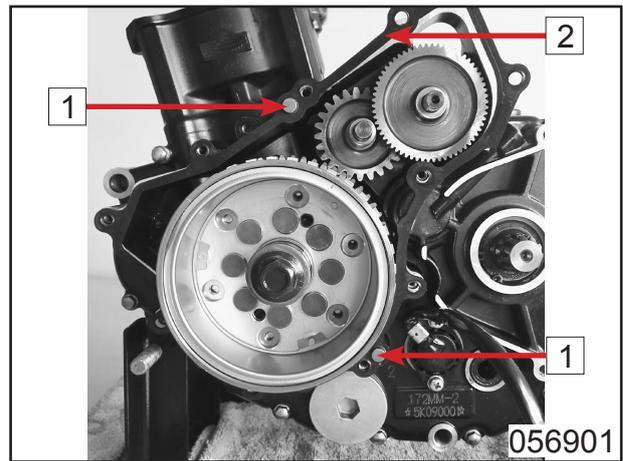
## 5.4.16 Dual Gear and Starter Middle Gear Assembly

Apply grease on breather shaft (3) and dual gear shaft (5);  
Install starter middle gear (1), middle gear sleeve (2) and shaft (3);  
Install dual gear (4) and dual gear shaft (5).

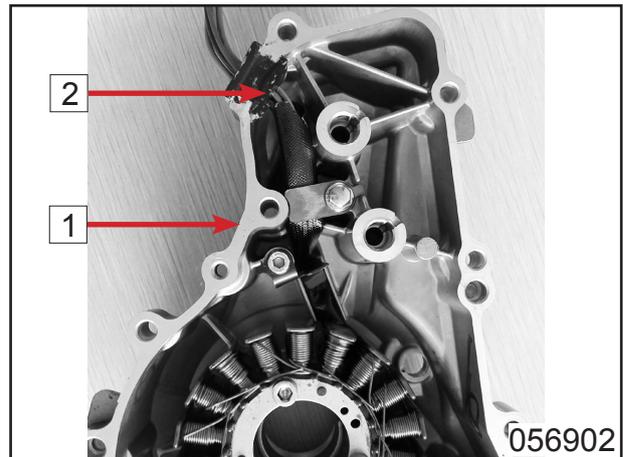


## 5.4.17 Left Side Cover Assembly

Install two 8×12 dowel pins (1);  
Install new left side cover gasket (2);

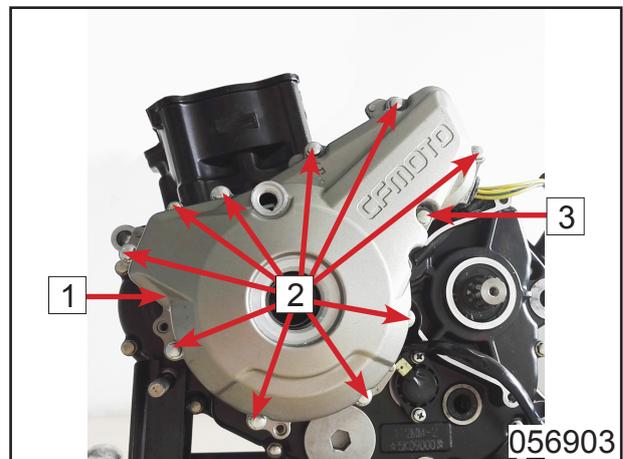


Clean up left side cover (1) sealing surface;  
Apply sealant on harness fixing block (2);



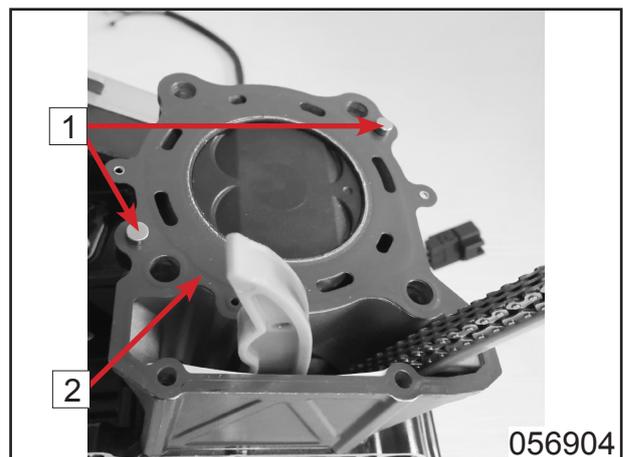
Install left side cover (1);  
Install nine M6×30 bolts (2) and one M6×50 bolt (3);

**Tighten bolts in criss-cross way and make it twice. Tighten torque : 10 N·m**



## 5.4.18 Cylinder Head Assembly

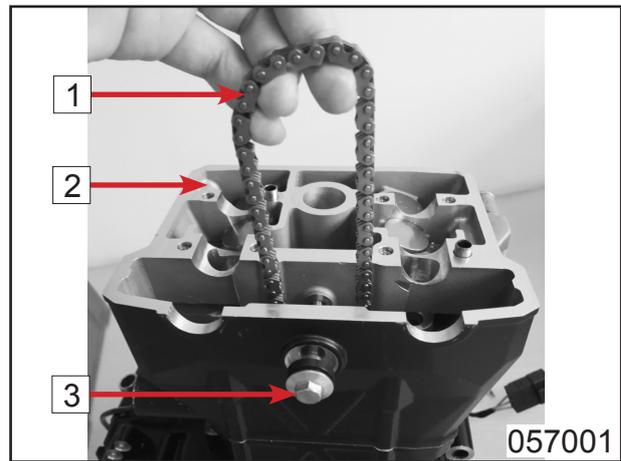
Piston is at TDC;  
Install two 8×12 dowel pins (1);  
Install new cylinder head gasket (2);



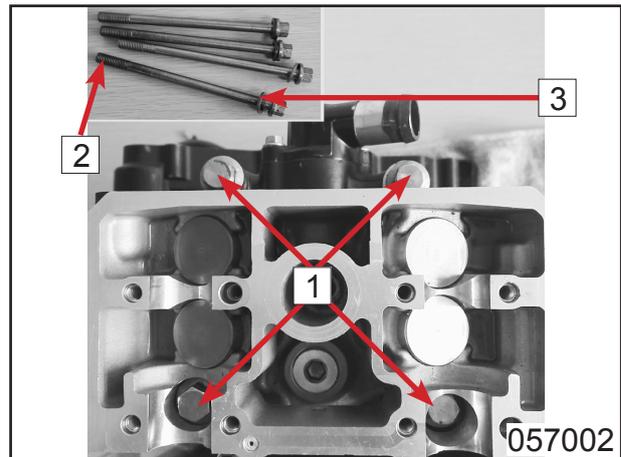
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Install cylinder head assembly (1);  
Lift timing chain (2);  
Install cylinder head bolt seal ring and  
cylinder head damping bolt (3);

**Cylinder head damping bolt tighten  
torque: 10 N·m**

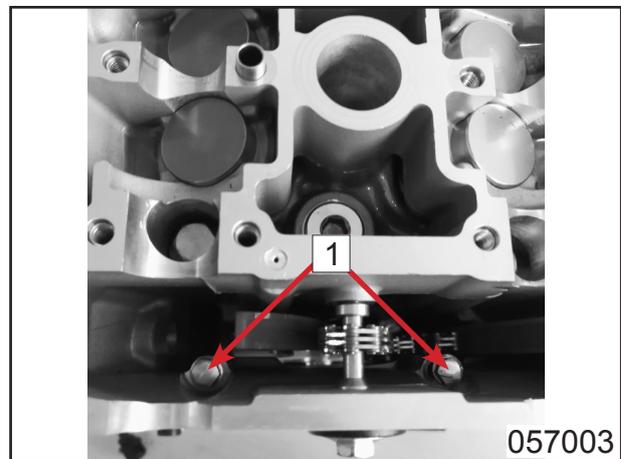


Apply MoS2 grease on M10×158 cylinder  
head bolt (2);  
Apply MoS2 grease on 10.5×19×2.3 washer  
(3);  
Install four 10.5×19×2.3 washers (3) and  
four M10×158 cylinder head bolts (1);  
**Tighten cylinder head bolts in criss-  
cross way and make it twice;**  
**Tighten torque:**  
**New cylinder head bolt: 54 N·m**  
**New cylinder old bolt: 49 N·m**

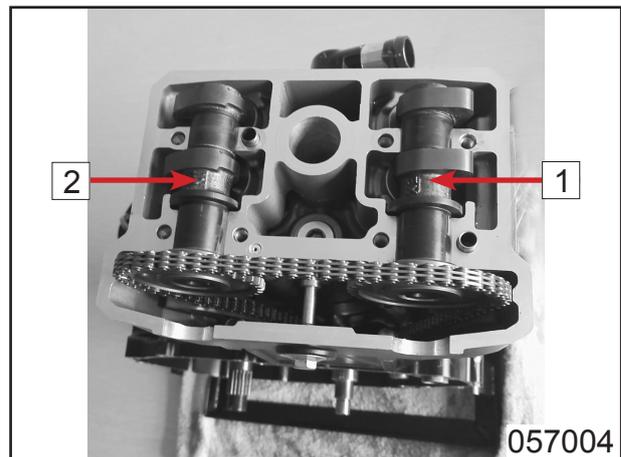


Install two M6×125 bolts (1);

**M6×125 bolt tighten torque: 10 N·m**

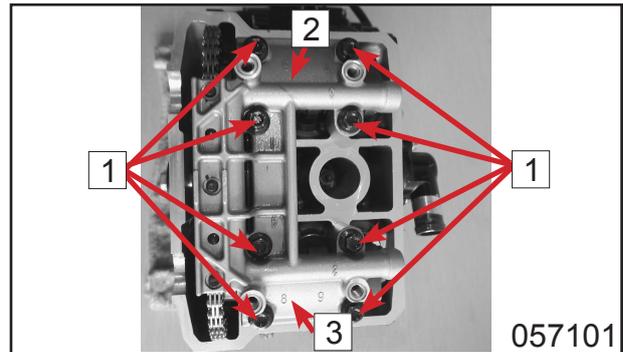


Apply grease on intake/exhaust camshaft  
neck;  
Install exhaust camshaft (1);  
Install intake camshaft (2);

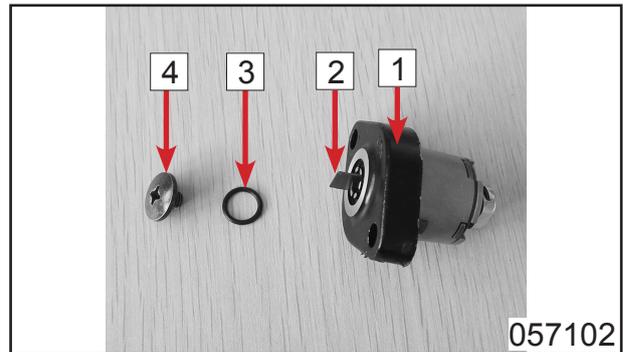


Install camshaft seat (2);  
 Install eight M6×45 hex flange bolts (1);  
 Apply MoS2 grease on M6×45 bolt (1).  
**Tighten it up three times. The tighten torque goes to 5N·m, 8N·m, 12N·m;**

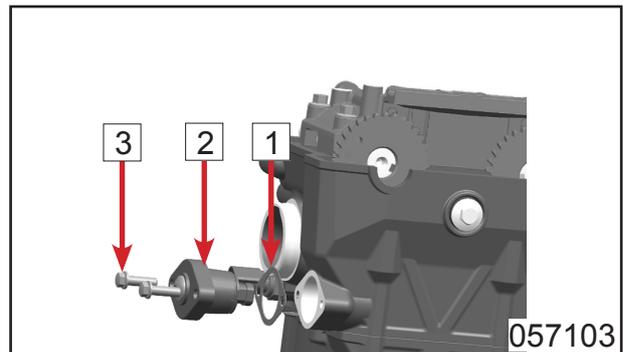
**⚠ Note: Follow the bolt tightening order mark (3) on camshaft seat to install bolts.**



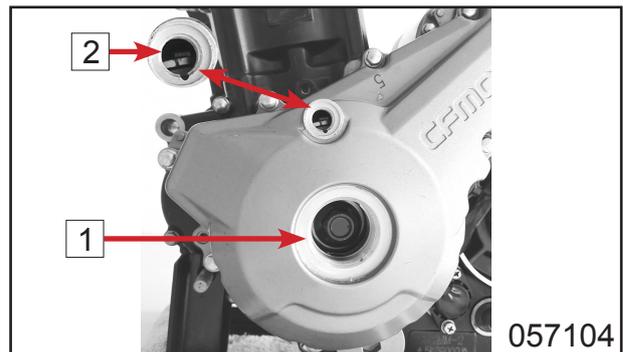
Use block pin (2) to rotate tensioner (1) to the original situation;  
 Install tensioner on cylinder head and then remove block pin away. Install 9.5×1.5 washer (3) M5×6 screw (4);



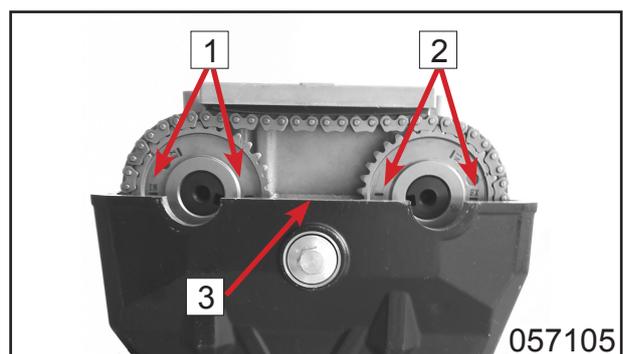
Install tensioner gasket (1), tensioner (2) and M6×22 bolt (3)  
**M6×22 tighten torque: 10 N·m**



**Inspect engine whether the timing is correct;**  
 Turn crankshaft (1) clockwise;  
 Align timing inspection hole marks (2);



Sprocket (IN) line (1) align with cylinder head upper plane (3);  
 Sprocket (EX) line (2) align with cylinder head upper plane (3).



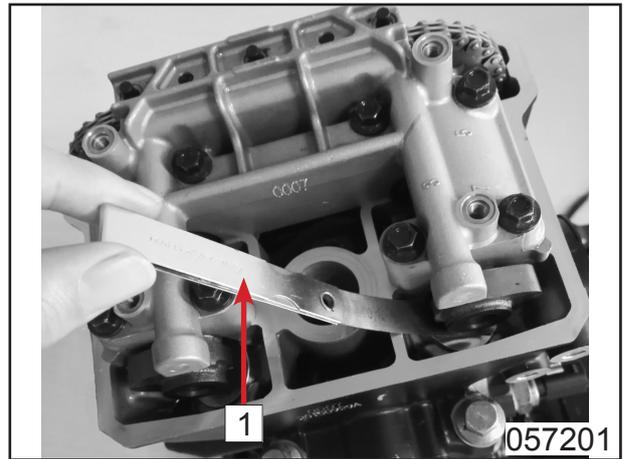
# CFMOTO

Measure valve clearance with feeler gauge (1);

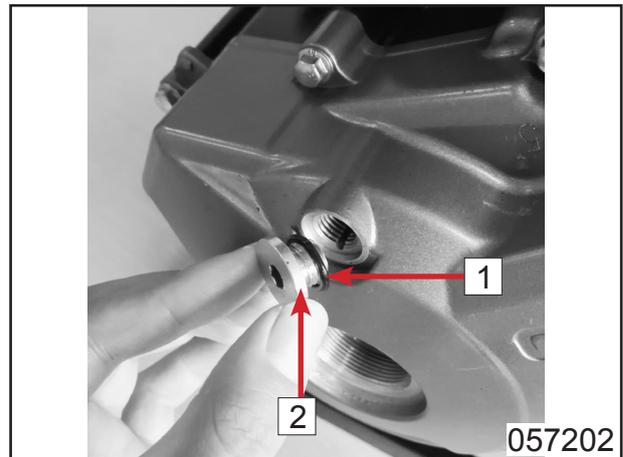
**Valve clearance when engine is cold:**

**Intake valve: 0.12mm ~ 0.17mm**

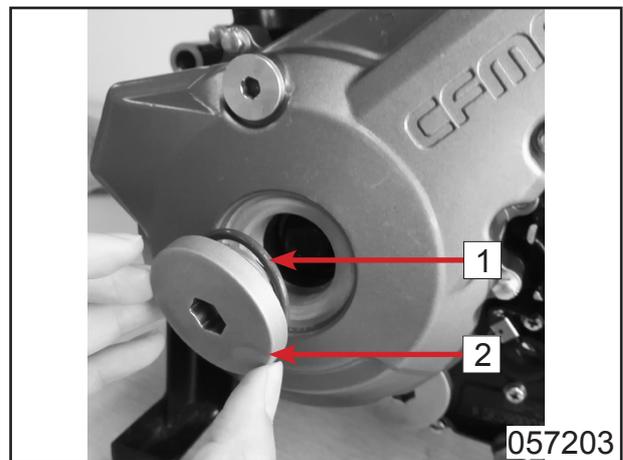
**Exhaust valve: 0.17mm ~ 0.22mm**



Apply grease on 13×2 O-ring (1);  
Install 13×2 O-ring (1) and timing inspection hole cap (2);



Apply grease on 35×3.5 O-ring (1);  
Install 35×3.5 O-ring (1) and strainer cover (2);

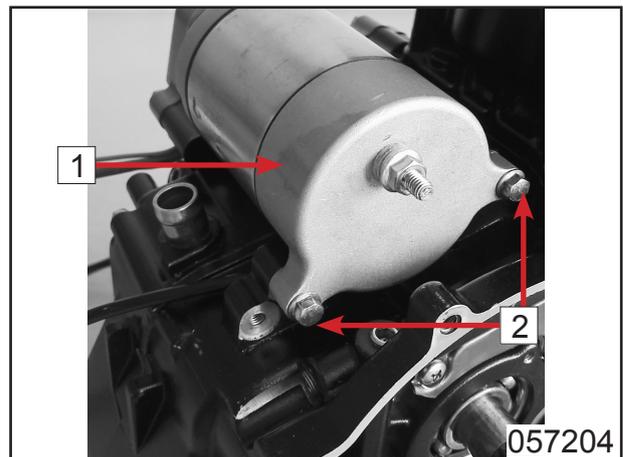


## 5.4.19 Starter Motor Assembly

Install starter motor (1);

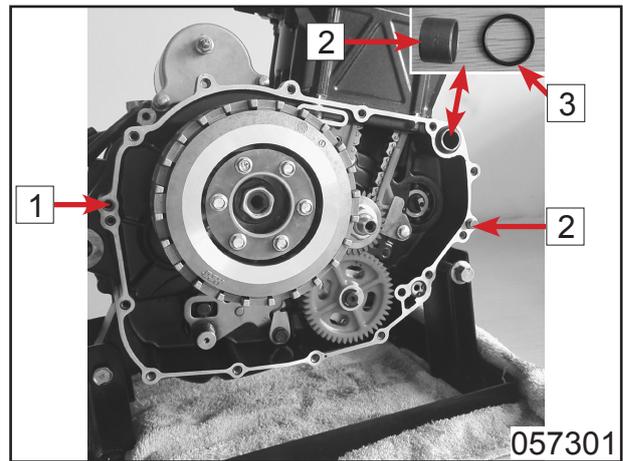
Install two M6×25 bolts (2);

**M6×25 bolt tighten torque: 10N·m**

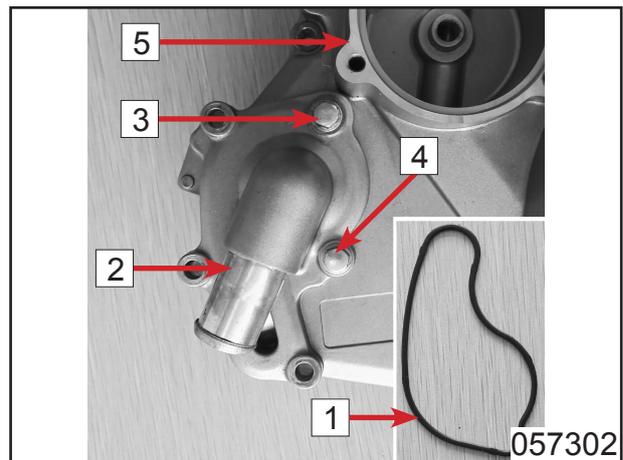


## 5.4.20 Right Side Cover Assembly

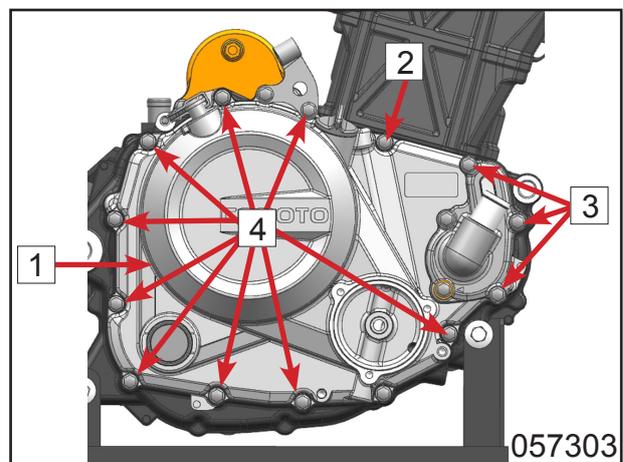
Apply grease on 18×1.8 O-ring (3);  
 Install 8×12 dowel pin (1);  
 Install new right side cover gasket;  
 Install water pipe (2) and 18×1.8 O-ring (3);



Apply grease on water pump seal ring (1);  
 Install water pump seal ring (1) and water pump cover (2) on right side cover (5);  
 Install M6×20 bolt (4);  
 Install washer and M6×20 bolt (3);

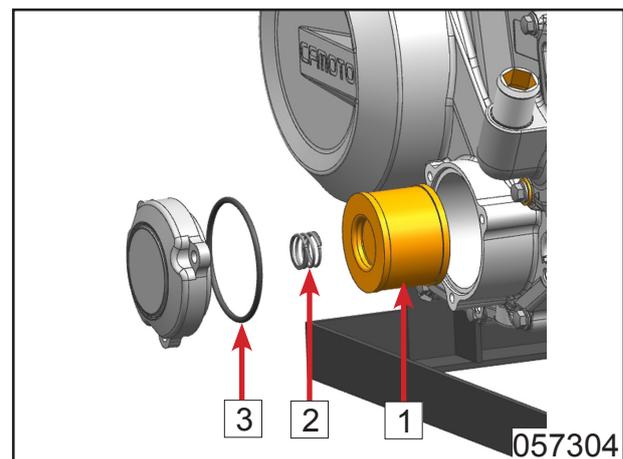


Install right side cover (1);  
 Install M6×30 bolt (2) and 5×2 O-ring;  
 Install three M6×45 bolts (3);  
 Install ten M6×30 bolts (4);  
**Tighten M6 bolts in criss-cross way and make it twice. Tighten torque: 10 N·m.**

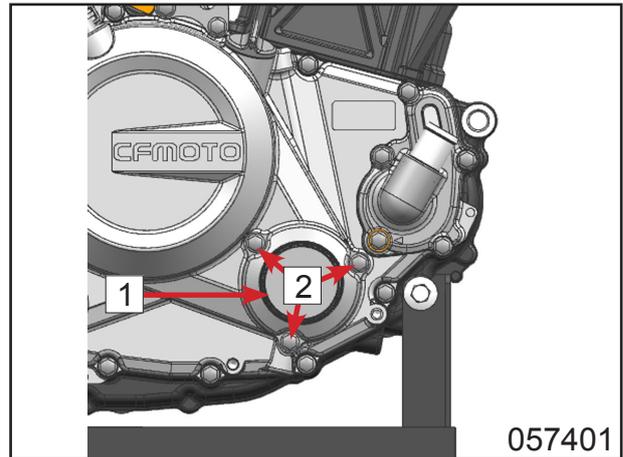


## 5.4.21 Oil Filter Assembly

Apply grease on 57×3 O-ring (3);  
 Install oil filter element (1), filter element spring (2) and 57×3 O-ring (3);

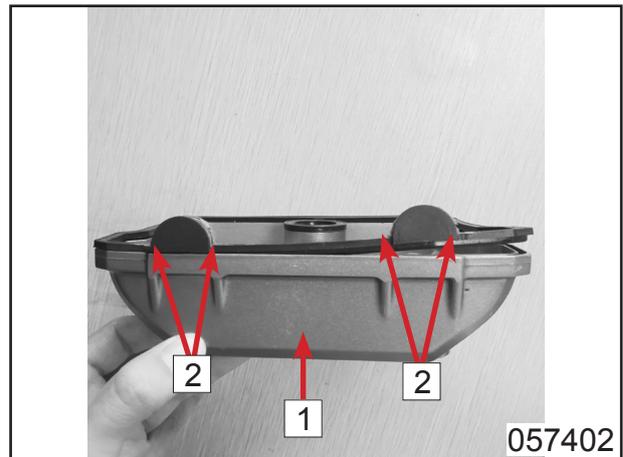


Install oil filter cover (1);  
Install three M6×20 bolts (2);  
**M6×20 tighten torque: 10 N·m.**

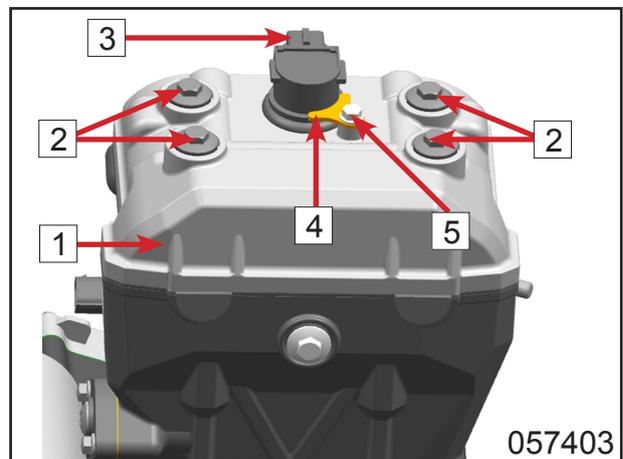


## 5.4.22 Cylinder Head Cover Assembly

Install seal rings on cylinder head cover (1)  
Apply some sealant on cylinder head cover seal rings;



Install cylinder head cover (1);  
Apply some sealant on cylinder head cover bolt seal rings;  
Install four cylinder head cover bolt seal rings and four cylinder head cover bolts (2);  
Install CR8EI spark plug, ignition coil (2), press plate (4) and M6×12 bolt (5);  
**Spark plug tighten torque: 18N·m.**  
**Tighten cylinder head cover bolts (2) in criss-cross way and make it twice, tighten torque: 10 N·m.**

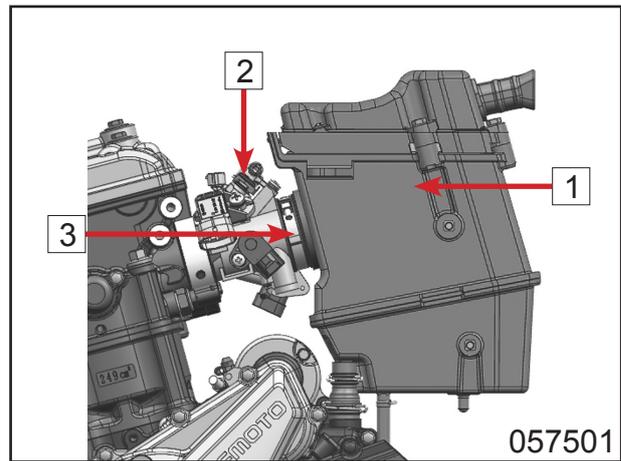


## 5.5 Air Intake System

### Air Filter Removal

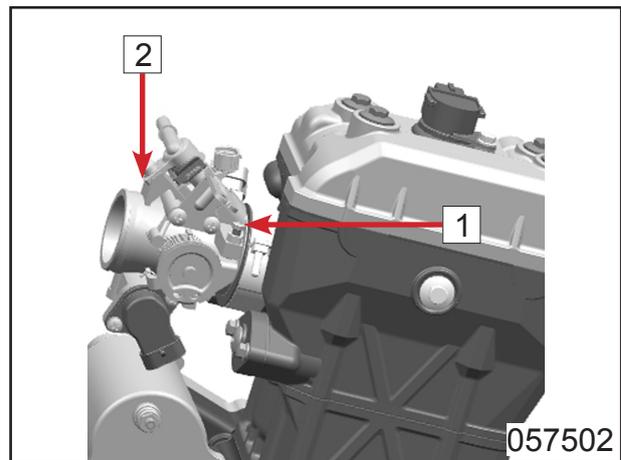
Remove throttle (2) connectors;  
Loose clamp (3);  
Remove air filter (1);

**⚠ Caution: Do the operation in a well ventilated place.**



### Throttle Body Removal

Loose connecting hose clamp (!);  
Remove throttle body (2);



### Air Filter Disassembly

Remove four M6×25 screws (1);  
Remove upper case (2);  
Remove paper filter element (3);

### Air Filter Inspection and Maintenance

Inspect paper filter element (3). If full of duct, clean with high pressed air. Replace if broken;

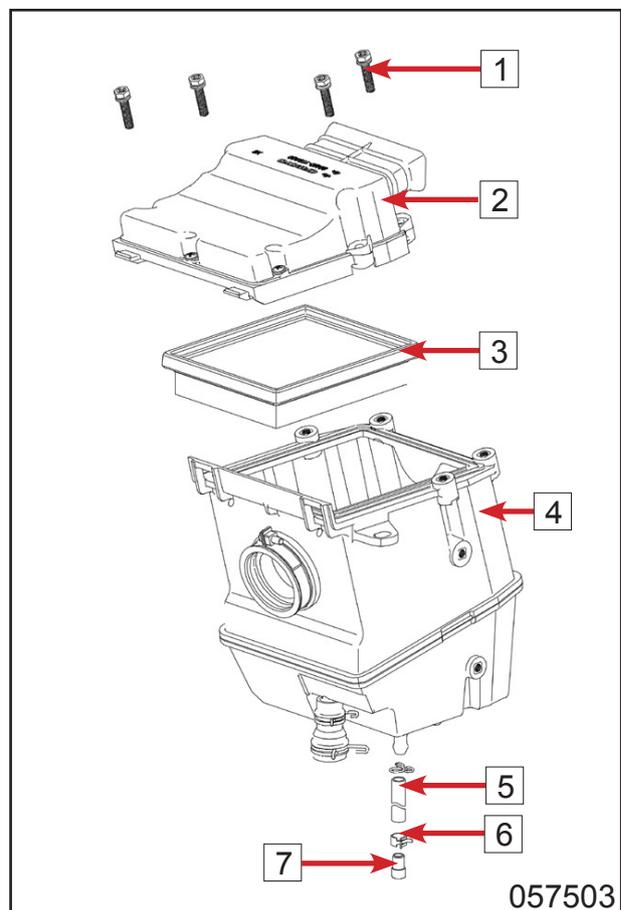
Inspect upper case (2) and lower case (4). Clean if dirty;

Inspect storage pipe (5) whether it has engine oil. If does, remove clamp (6) and plug (7) to clean it up.

**⚠ Note: Every 3000km, air filter element should be cleaned. If engine runs in dust or wet environment, do not maintain until required time arrives. Dusty filter element or incorrect installation may affect engine life and performance.**

### Air Filter Assembly

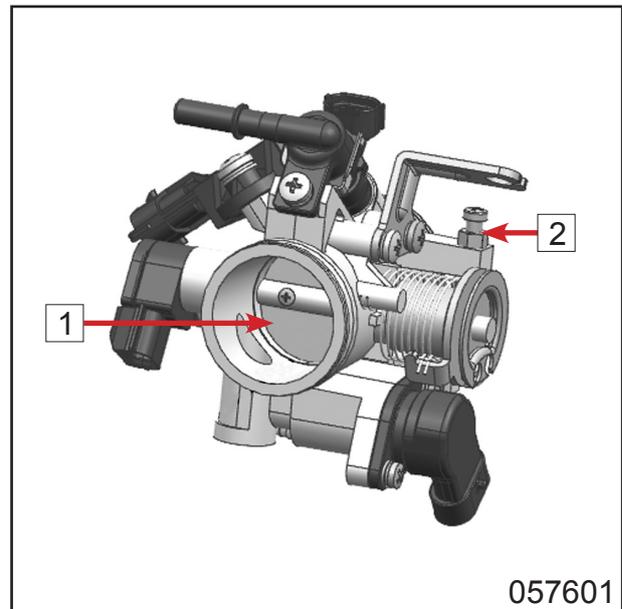
Reverse the disassembly procedures for assembly. Make sure filter installed in place and well-sealed.



## Throttle Body Inspection

Inspect throttle body (1) and idle bypass-valve for dust. Clean with specific cleaning agent if does;

Throttle body gas limit screw (2) can not be adjusted.



## Air Intake System Assembly

Install connecting pipe clamp (1);

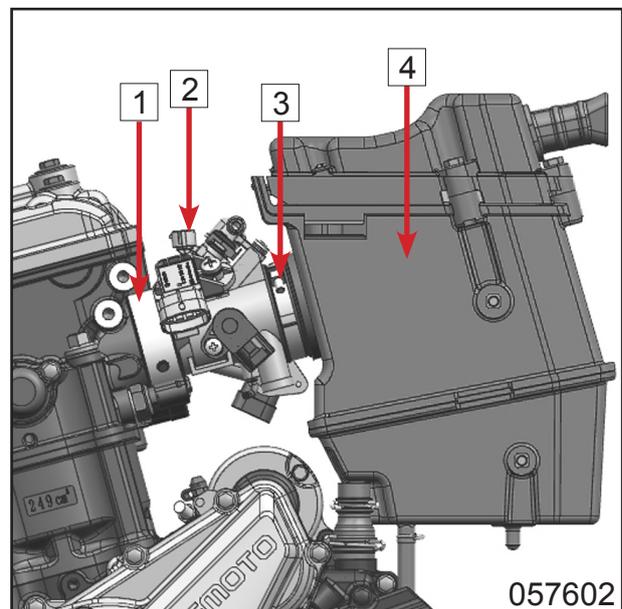
Install throttle body (2);

Install clamp (3);

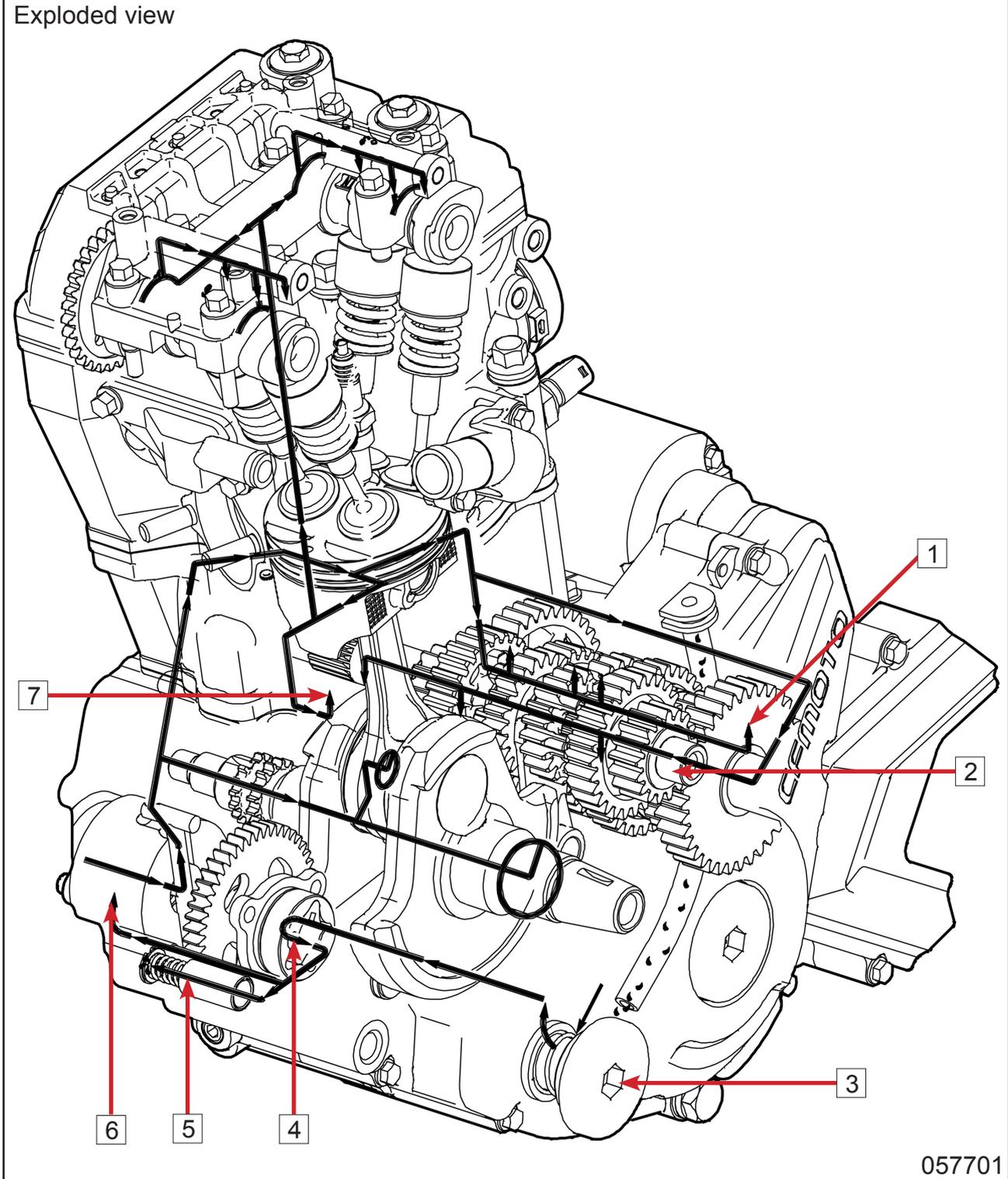
Install air filter (4);

Tighten connecting pipe clamp (1) and clamp (3), **tighten torque: 2 N·m~3 N·m**;

Install throttle body related connectors.



5.6 Lubrication System



**Engine Lubrication System Sequence Statement:**

1	Main Shaft	4	Oil Pump	7	Inject Cooling Plug
2	Counter Shaft	5	Relief Valve		
3	Oil Strainer	6	Oil Filter		

Many parts of the engine, such as piston, crankshaft assembly, camshaft, etc., need good lubrication. Good lubrication is the basis of normal engine work.

172MM-2/172MM-2A engine lubrication system adopts pressure and splash lubrication. Lubricating oil is sae10w-40 /SJ. Except for the function of lubrication, It is clean, anti-rust, and has function of sealing and cooling.

## 5.7 Engine Oil Addition and Oil Pressure Measurement

### Engine Oil Addition

Place engine on level ground;

Open up oil filling plug (1);

Add SAE10W-40/SJ engine oil, and then tighten oil filling plug;

### Oil filling capacity:

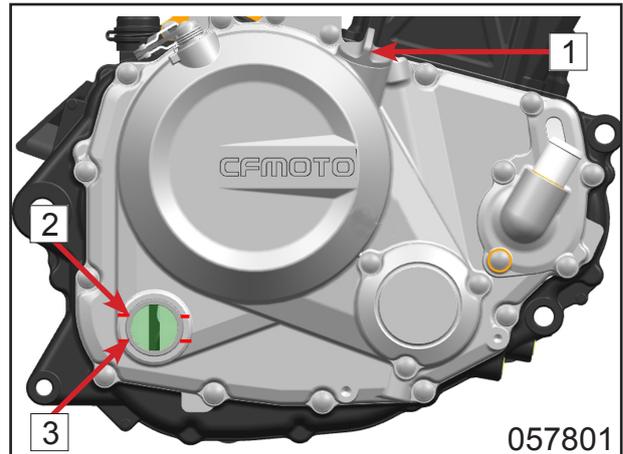
**only change engine oil: 1.3L**

**change oil and filter: 1.4L**

**engine oil capacity: 1.6L**

Start engine and make it idle running for about 30s;

Stop engine and wait for 1 minute. Watch oil level through oil level viewer. The level should be between upper line (2) and lower line (3). If oil level is below lower line (3), add some engine oil until it gets to the middle position;



### Engine Oil Pressure Measurement

Remove three M6×20 bolts (1);

Remove oil filter cover (2);

Install special oil filter cover (1) with oil pressure gauge;

Install three M6×20 bolts, **tighten torque:**

**10 N·m;**

Start engine and measure engine oil pressure (2);

Oil Temp. 90°C	≥0.07MPa
Engine RPM 1500rpm	≥0.07MPa
Oil Temp. 90°C	≥0.3MPa
Engine RPM 5000rpm	≥0.3MPa

If out of specification, inspect oil passage blocking or oil pump wear;

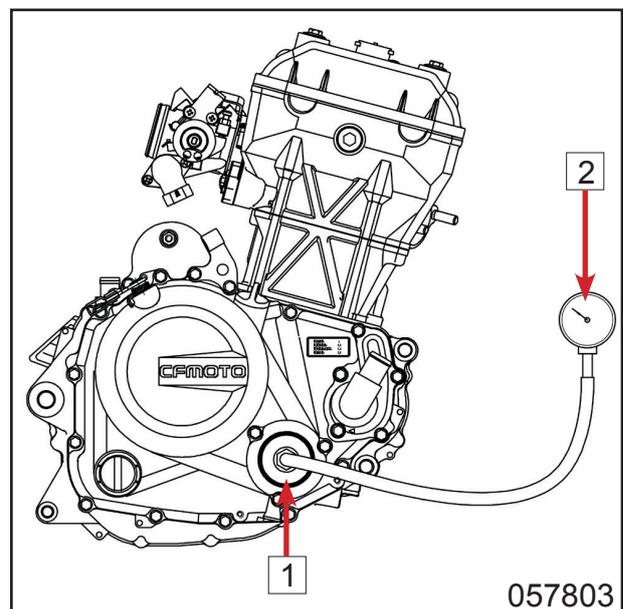
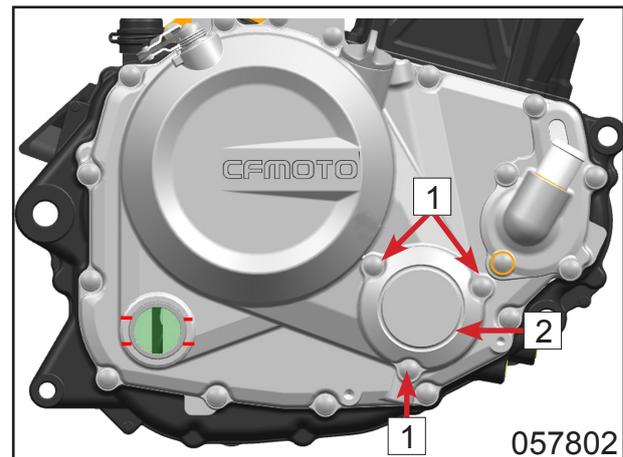
**⚠ Note: Engine is very hot after long time running. Protect yourself when operating in case of getting hurt.**

Remove special oil filter cover;

Install oil filter cover, three M6×20 bolts;

M6×20 bolt tighten torque: 10 N·m;

**⚠ Caution: Do the operation in a well ventilated place.**



# 06 Engine Removal and Installation

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6.1 Maintenance Information ..... 06-1  
6.2 Engine Disassembly..... 06-2  
6.3 Engine Installation..... 06-4

## 6.1 Maintenance Information

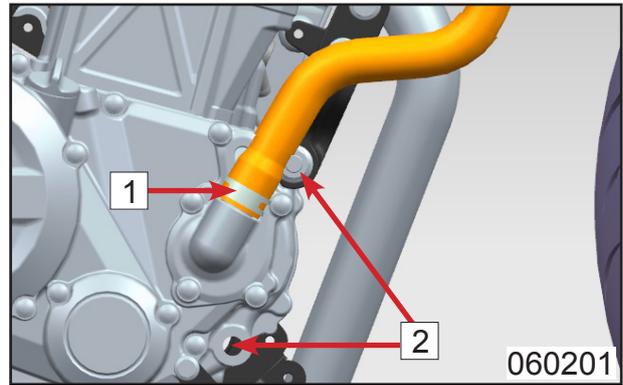
**⚠ Note: When disassembling the engine, an engine worktable and coolant tank are required. Be careful not to damage the frame, engine body, bolts, cables**

### Tighten torque

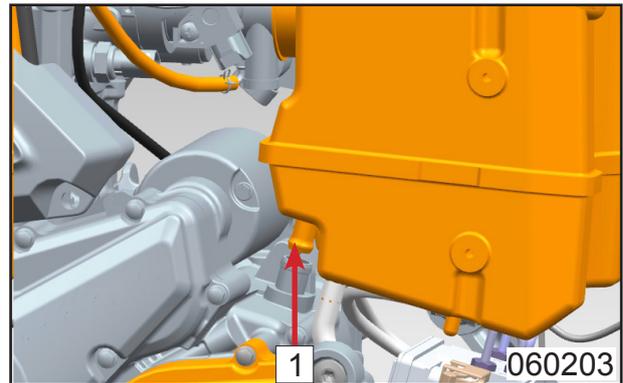
Engine suspension nut tighten torque	M8: 20 N·m~30 N·m
Swing arm shaft nut tighten torque	M10: 34 N·m~40 N·m
Rear axle nut tighten torque	M14: 50 N·m~80 N·m

## 6.2 Engine Disassembly

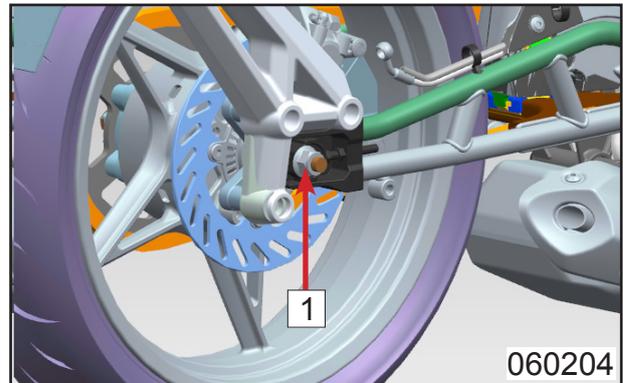
Lift up rear wheels off the ground with tool;  
Remove seat;  
Remove front LH/RH fender;  
Remove fuel tank;  
Remove water temperature sensor connecting hose;  
Remove harnesses that connect engine;  
Remove muffler;  
Remove water pipe clamp (1) and drain the coolant into coolant tank;  
Remove bolts (2) on engine;



Remove the exhaust pipe (1) between engine crankcase and air filter;  
Remove air filter;

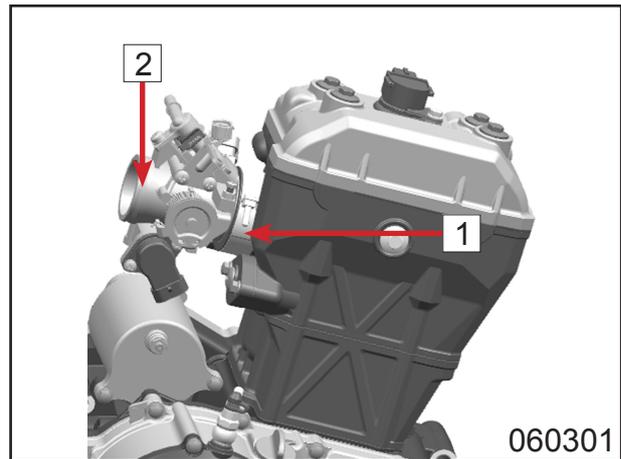


Loose chain regulator nut (1);  
Loose chain regulator bolt and rear wheel shaft nut;  
Loose chain clasp;  
Remove chain.

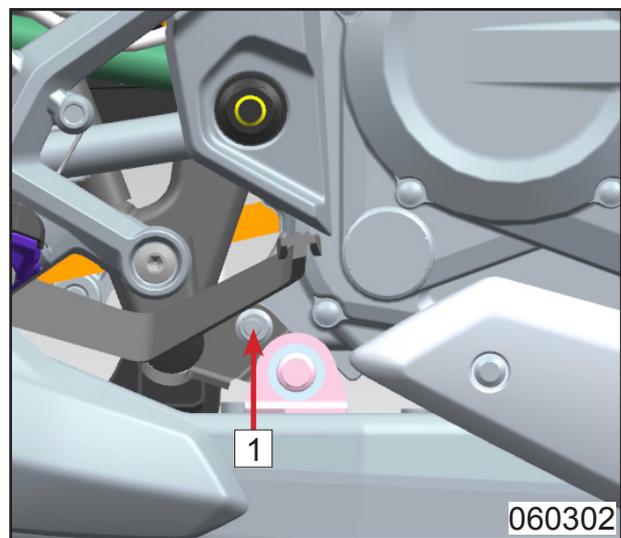


## 06 Engine Removal and Installation

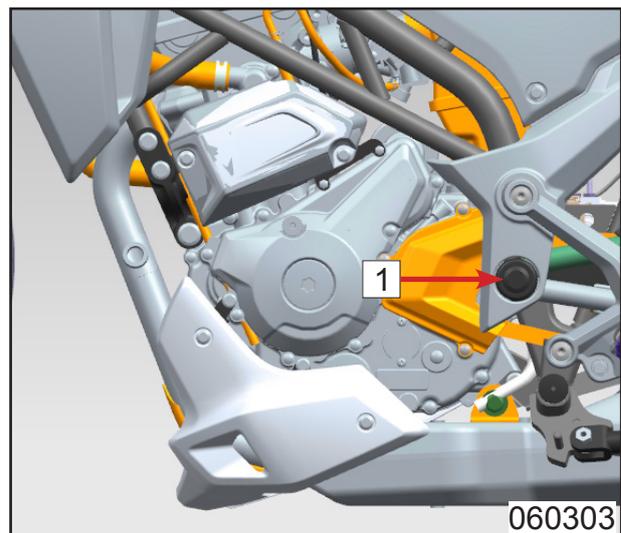
Remove throttle cable;  
Remove clutch;  
Remove rear swing arm shaft;  
Remove starting motor positive cable and negative cable;  
Loose clamp (1);  
Remove throttle assembly (2);



Loose engine rear lower mounting bolts/  
nuts (1);



Remove shift lever (1);  
Loose engine rear upper mounting bolts/  
nuts (1);  
Remove engine.



## 6.3 Engine Installation

Reverse the removal procedures for installation.

**⚠ Note:**

**Do not damage bolt thread, cables and shafts when installing engine on frame;  
The shift lever has to be installed to the suitable position when installing;  
Use specified coolant. Drain out air in coolant system;  
Check clutch and chain free stroke after installation;  
Engine installation reverse the removal procedures;  
Use lifting jack or other support tool to support engine. Take care to install engine;  
Add coolant before installing fuel tank. (Refer to 04 Cooling System)**

# 07 Front Wheel, Brake, Suspension and Steering

7.1 Maintenance Information .. 07-1	7.3 Handlebar ..... 07-3
7.1.1 Operation Attention .... 07-1	7.4 Front Wheel..... 07-5
7.1.2 Maintenance Standard 07-1	7.4.1 Front Wheel Inspection
7.1.3 Tighten Torque ..... 07-1	..... 07-5
7.2 Troubleshooting ..... 07-2	7.4.2 Front Rim Inspection.. 07-6
7.2.1 Heavy steering (steering	7.5 Front Shock Absorber..... 07-7
too tight) ..... 07-2	7.6 7 Steering Column ..... 07-8
7.2.2 Loosened Handlebar .. 07-2	7.7 Front Brake ..... 07-12
7.2.3 Front wheel wobbles .. 07-2	7.7.1 Front Brake Master pump
7.2.4 Front suspension too soft	Removal..... 07-12
..... 07-2	7.7.2 Front Brake Caliper
7.2.5 Front suspension too hard	Removal..... 07-12
..... 07-2	7.7.3 Front Brake Pump..... 07-12
7.2.6 Spongy brake lever..... 07-2	7.7.4 Brake Fluid Replacement
7.2.7 Poor brake ..... 07-2	and Air Drain ..... 07-13
7.2.8 Abnormal noise with disc	7.7.5 Brake System Air Drain 07-
brake ..... 07-2	13
7.2.9 Abnormal noise with Front	7.7.6 Brake Pad/Disc..... 07-14
absorber ..... 07-2	

## 7.1 Maintenance Information

### 7.1.1 Operation Attention

**▲ Note:**

Securely support the scooter when overhauling front wheel and suspension system.

- Do not overexert on the wheel. Avoid any damage to the wheels.
- When removing tire, use the special tire lever and rim protector.

### 7.1.2 Maintenance Standard

Item			Standard	Limit
Front Wheel	Camber of front wheel shaft		—	0.2mm
	Rim run-out	Longitudinal	0.6mm	0.8mm
		Horizontal	0.6mm	0.8mm
	Tire	Pattern deepness	—	0.8mm
Pressure			225kPa(2.25kgf/cm <sup>2</sup> )	—
Front Brake	Free play of brake lever		5mm ~ 20mm	—

### 7.1.3 Tighten Torque

Mounting nut, handlebar	10 N·m~14 N·m
Nut, front wheel shaft	50 N·m~80 N·m
Upper fixing nut, front shock absorber	10 N·m~14 N·m
Lower fixing bolt, front shock absorber	20 N·m~25 N·m

## 7.2 Troubleshooting

### 7.2.1 Heavy steering (steering too tight)

- Upper thread is over tightened.
- Steering bearing is damaged or worn out.
- Inner & outer bearing seats are damaged, worn out or stepped.
- Steering column is distorted
- Tire pressure is too low.
- Worn tire

### 7.2.2 Loosened Handlebar

- Front right and left shock absorbers are not matched.
- Front shock absorbers are distorted
- Front wheel shaft is distorted, wrong assembly of front wheel

### 7.2.3 Front wheel wobbles

- Deformed rim
- Faulty wheel bearing
- Faulty tire
- Improper tightening of wheel shaft

### 7.2.4 Front suspension too soft

- Loosened spring, front shock absorber
- Oil insufficiency, front shock absorber

### 7.2.5 Front suspension too hard

- Improper oil, front shock absorber
- Front shock absorber deformed
- Oil channel blocked, front shock absorber

### 7.2.6 Spongy brake lever

- Air enter into brake system
- Brake oil level too low
- Oil leakage in brake system

### 7.2.7 Poor brake

- Dirty brake disc
- Brake disc unparallel with wheels

### 7.2.8 Abnormal noise with disc brake

- Dirty brake disc
- Eccentric disc brake disc
- Disc brake pump wrong assembly
- Brake disc unparallel with wheels

### 7.2.9 Abnormal noise with Front absorber

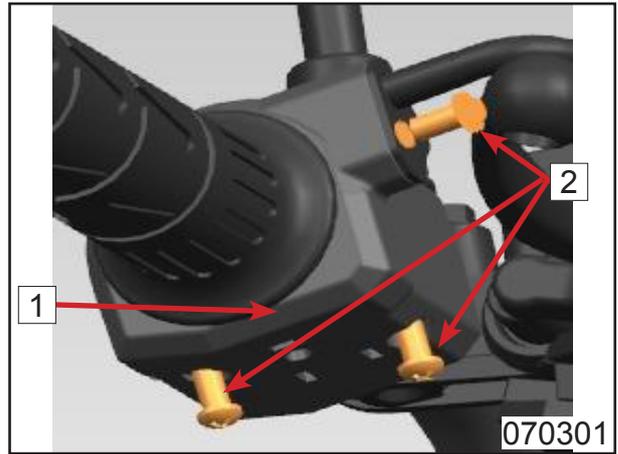
- Slipping parts distorted
- Front shock absorber not tighten enough
- Oil insufficiency, front shock absorber
- Steering bearing worn out
- Oil insufficiency, counter gear

# 07 Front Wheel, Brake, Suspension and Steering

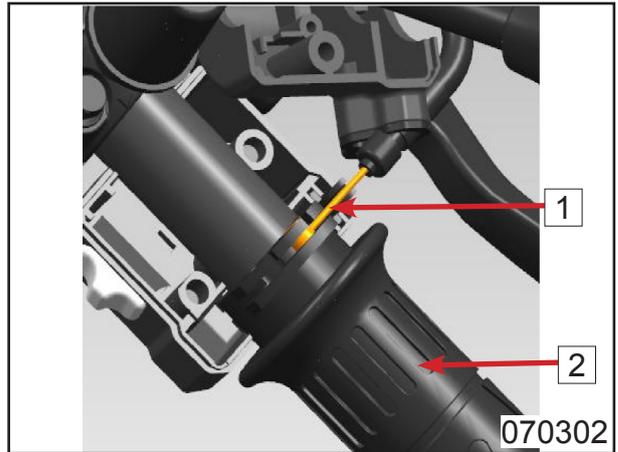
## 7.3 Handlebar

### Removal

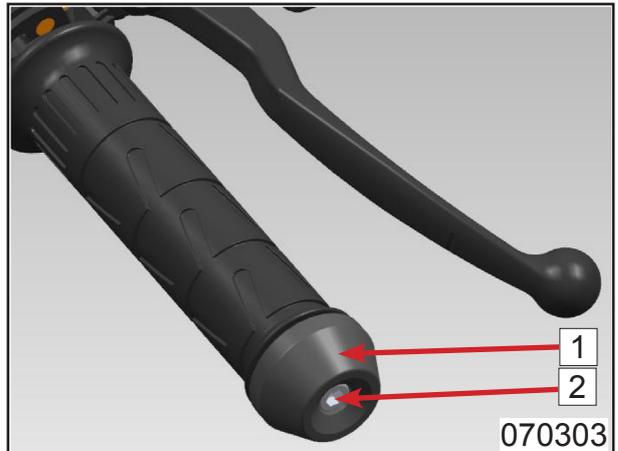
Remove three mounting screw (2) of right side handlebar (1).



Remove throttle cable and throttle grip (2);  
Remove right handlebar switch.



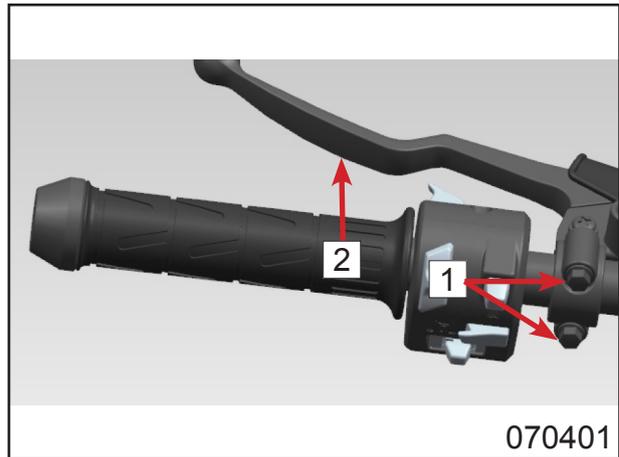
Loosen fixing screw (1) of balance block ;  
Remove balance block (2) and throttle grip.



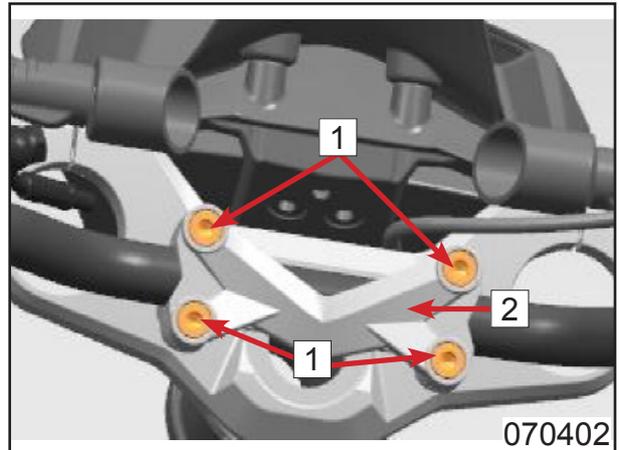
Remove two fixing seat screws (2) of front  
brake master pump;  
Remove front brake master pump(1).



Loosen two handlebar fixing screws (1), and remove clutch lever (2)



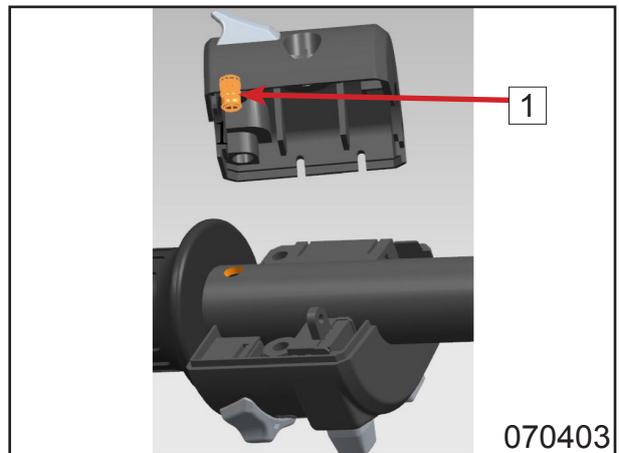
Remove four fixing screws (1), and remove handlebar (2);



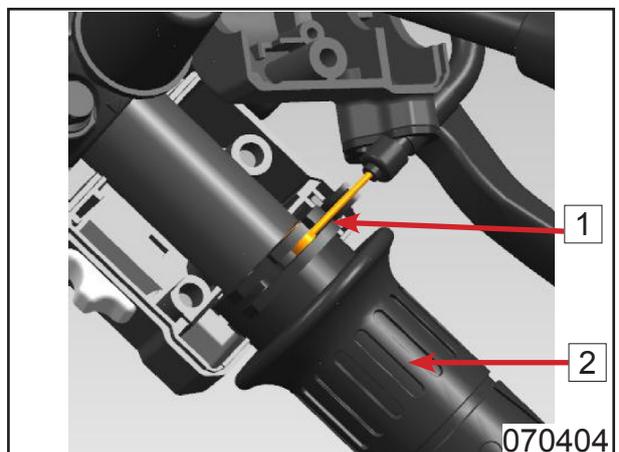
## Installation

Reverse the removal procedures for installation.

When installing left handlebar switch, insert dowel pin (1) into position hole;

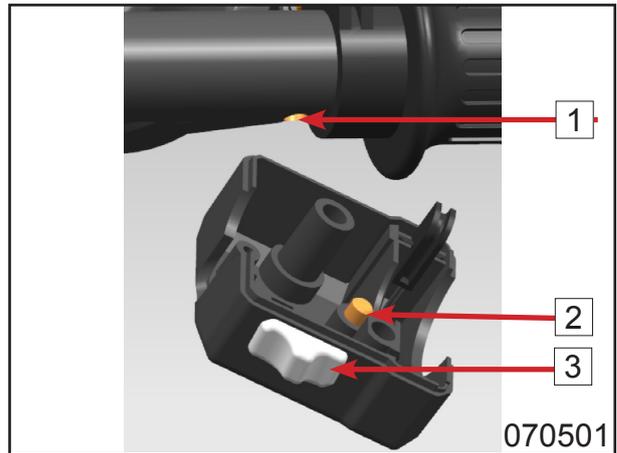


When installing right handlebar switch, insert throttle grip (2) into right handlebar, then install throttle cable (1).



## 07 Front Wheel, Brake, Suspension and Steering

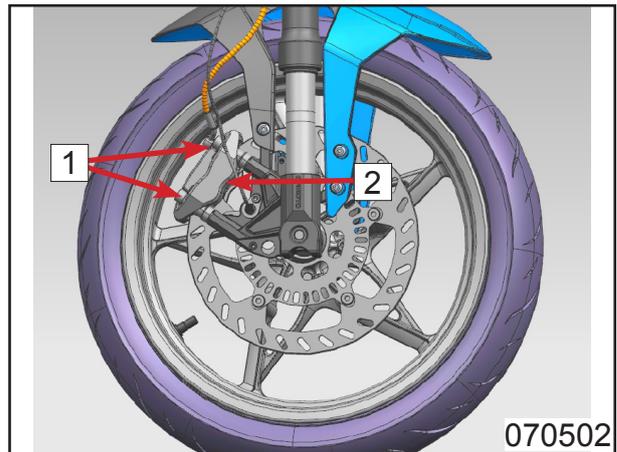
Insert right handlebar dowel pin (2) into position hole (1);  
Install right handlebar switch (3).



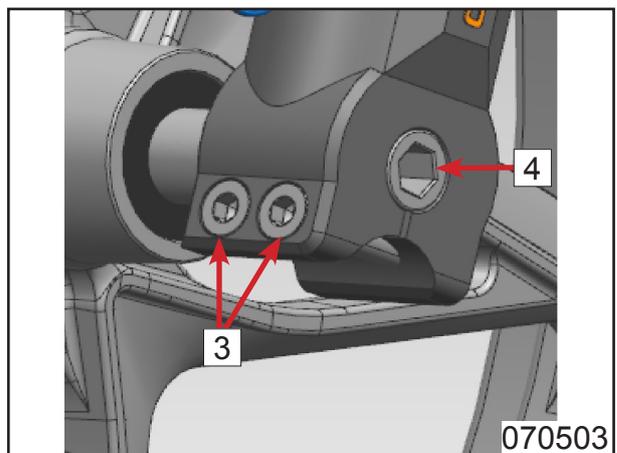
### 7.4 Front Wheel

Support main stand, put a jack under engine or put a heavy thing on rack, raise front wheel.

Loose caliper fixing nut (1);  
Remove caliper (2);



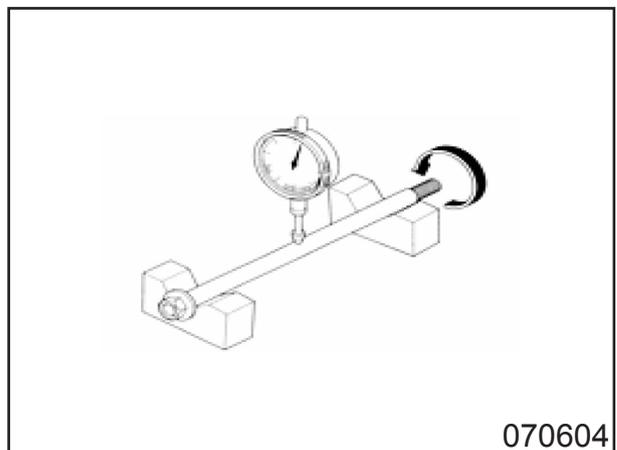
Loose shock absorber locking screw (3);  
Take out front wheel shaft (4);  
Remove front wheel.



#### 7.4.1 Front Wheel Inspection

Set shaft on a V-block, measure axle vibration with dial gauge.

**Service limit: 0.2mm**



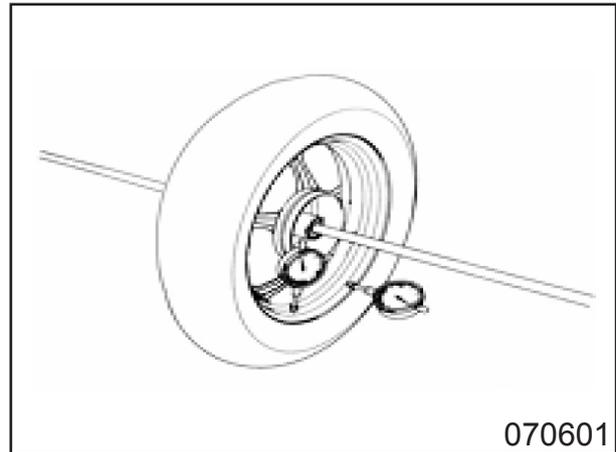
## 7.4.2 Front Rim Inspection

Put front wheel on turn table, turn wheel to check wheel beating with dial gauge..

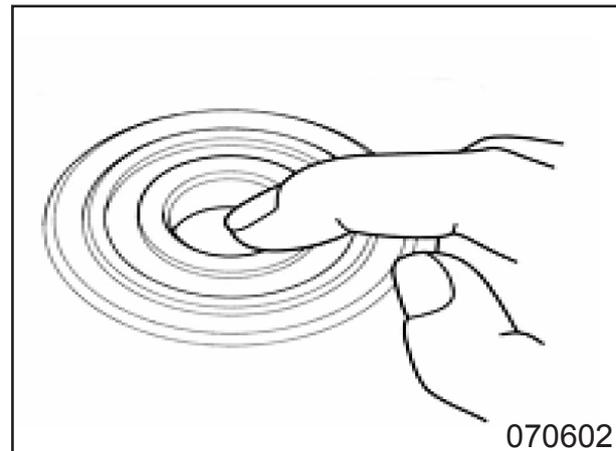
Service limit:

**Axial direction: 0.8 mm**

**Radial direction: 0.8 mm**

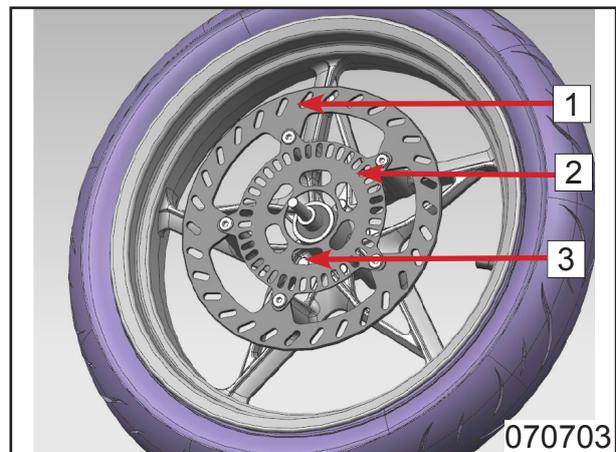


Check bearing for loosen;  
Check bearing for free play;  
Check bearing whether can be installed firmly on rim;  
Replace new bearing if not free play or loosen or have abnormal noise.



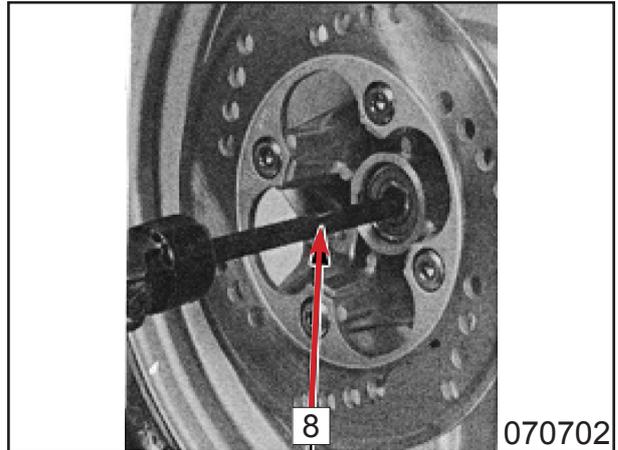
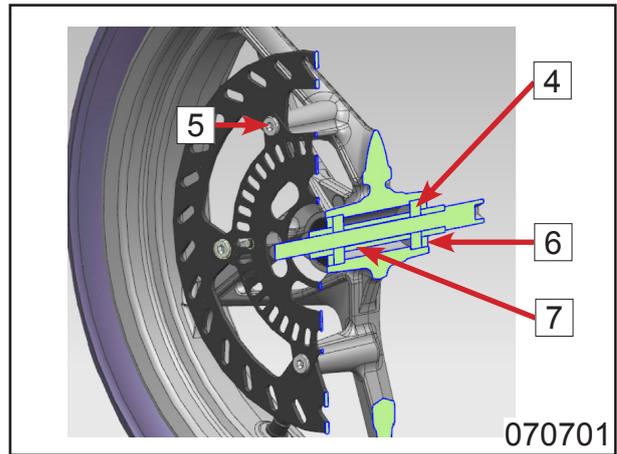
## Brake Disc Remocval

Remove front wheel;  
Remove brake disc locking screw (1);  
Remove counter induction disk (2);  
Remove brake disc (3).



## 07 Front Wheel, Brake, Suspension and Steering

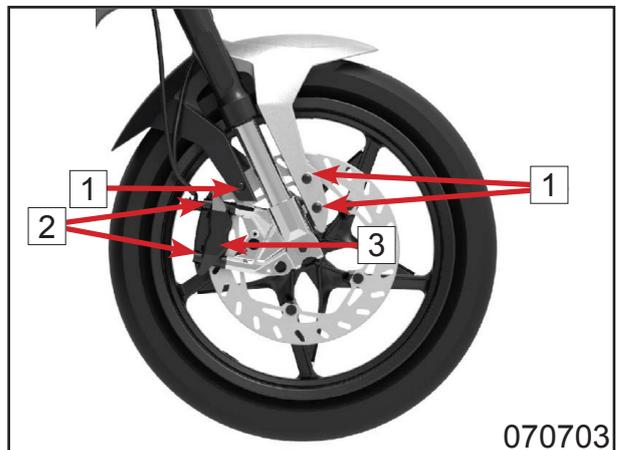
Remove dust oil seal (6);  
Use bearing remover to remove rim bearing (4);  
Remove front collar (7);  
Remove five brake disc fixing screws (5);  
Remove gear rings and brake disc;  
**Front brake disc service limit: 3mm.**



Bearing Remove Tool

### 7.5 Front Shock Absorber Removal

Remove six front fender inner hex bolts (1);  
Remove front fender;  
Remove two front brake lower pump inner hex bolts (2);  
Remove front brake lower pump (3).



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Loose front wheel shaft bolt (4);  
Rotate and take out front wheel shaft (3),  
and then remove front wheel (5);  
Remove inner hex bolts (1), and then  
remove front LH/RH shock absorbers (2).

## Inspection

Inspect shock absorber for leak, aging or  
damages. Replace if necessary.

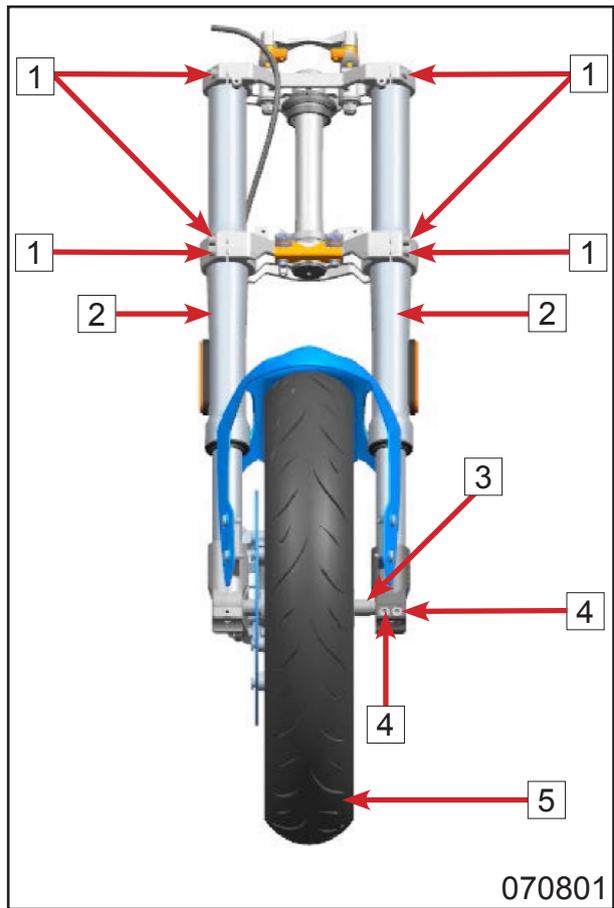
## Installation

Reverse the removal procedures for  
installation.

Front wheel shaft tighten torque: (50~80)  
N·m

Brake lower bump fixing bolt tighten  
torque: (30~40) N·m

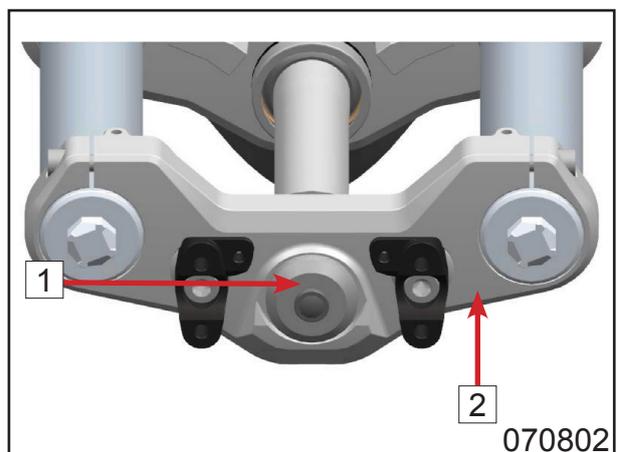
Upper/lower connecting plate fixing bolt (4)  
tighten torque: (20~30) N·m



## 7.6 7 Steering Column

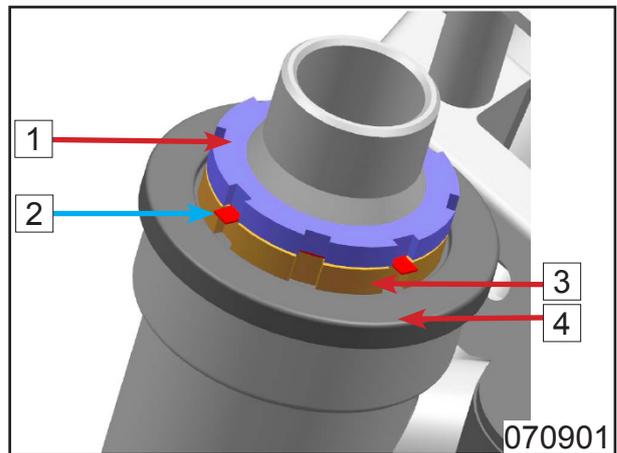
### Removal

Remove front fender;  
Remove front wheel, front shock absorber;  
Remove handlebar;  
Remove headlight cover;  
Remove dashboard;  
Remove locking bolt (1) and upper  
connecting plate(2).



## 07 Front Wheel, Brake, Suspension and Steering

Beat out thrust washer (2);  
Use lock wrench to loose locking nut (1)  
and (3);  
Remove dust sleeve (4) and front swing  
arm lower connecting plate;

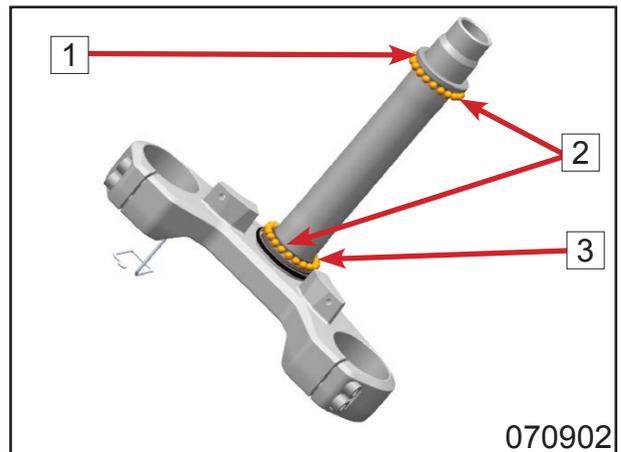


Remove upper bearing retainer (1), top  
ball and bottom ball (2);  
Use press tool to remove upper and lower  
bearing rages, retainer (3);

### Inspection

Inspect upper and lower bearing rages  
and retainer for cracks or wear. Replace if  
necessary.

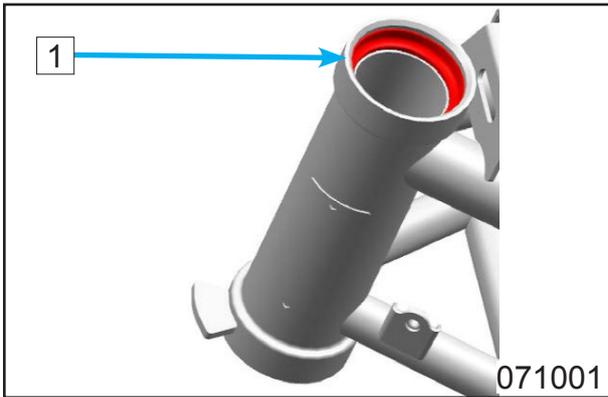
Inspect steel balls for missing or wear.  
Replace if necessary.



## Installation

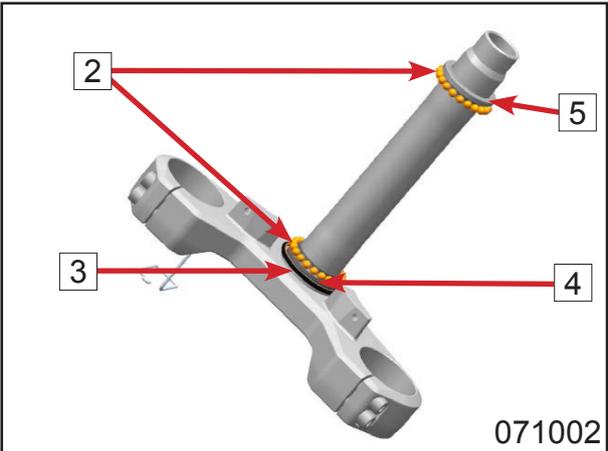
Use press tool to install upper and lower bearing rages (1) into frame pipe, and apply enough grease;

**⚠ Note: When pressing upper and lower bearing rages, they should be pressed to the vehicle. And keep the pipes bottoms balanced.**



Place steel ball bracket (2) on upper bearing rage;  
 Insert dust sleeve (3) on lower connecting plate;  
 Press lower bearing retainer (4) and install it in place;  
 Set in the steel ball bracket (2).

**⚠ Note: Steel ball bracket has to be in bearing rage pathway. Do not put it up side down. The upper and lower steel ball bracket are symmetrically installed. Do not let dust in.**

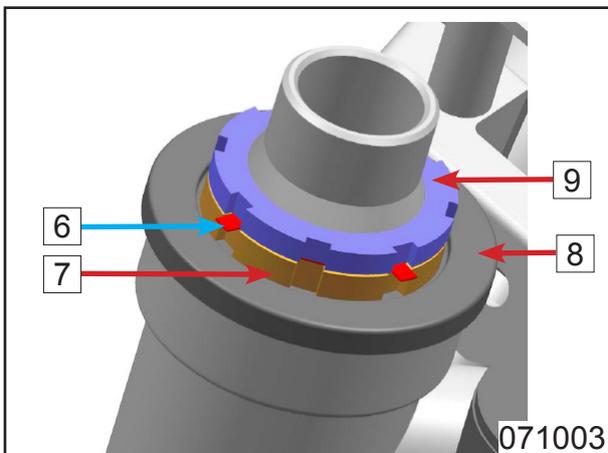


Place front swing arm lower connecting plate into frame pipe. Install bearing retainer (5) and dust cap (8);  
 Tighten locking nut (7) to lock front swing arm lower connecting plate to the suitable position. (Standard: Front swing arm can not move up down but can move around.)

**⚠ Note: Locking nut I (7) round side faces down and press upper bearing retainer.**

Install thrust washer (5);  
 Install locking nut (9);  
 Lock thrust washer.

**⚠ Note: The revers of thrust washer should be staggered to be locked. Locking nut II tighten torque: 60~90N·m**

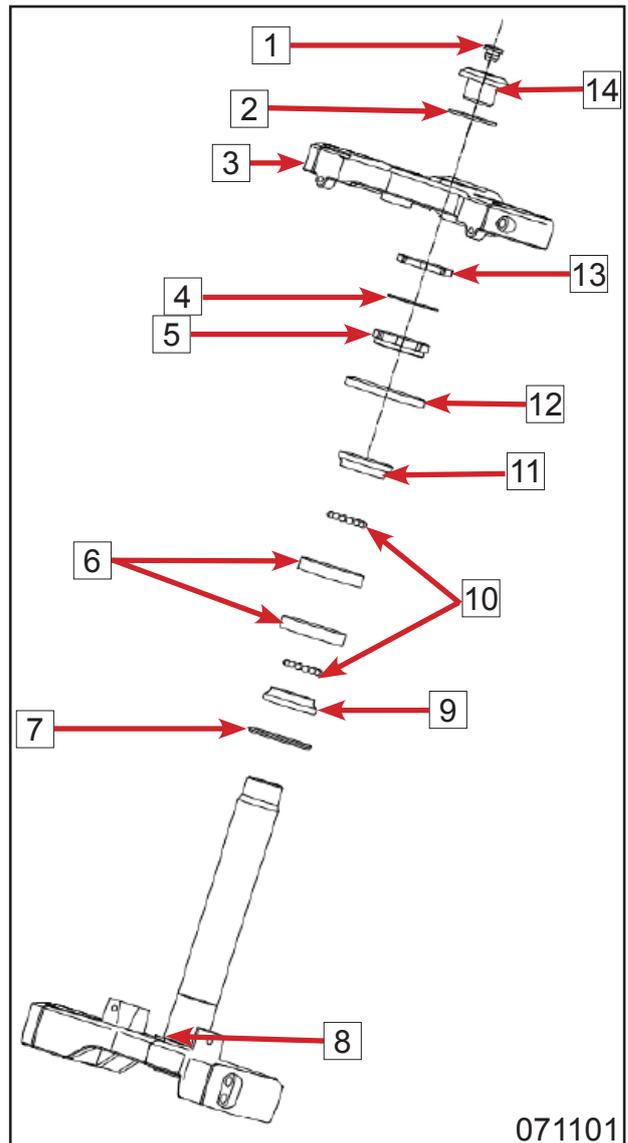


## 07 Front Wheel, Brake, Suspension and Steering

Install upper connecting plate (3);  
 Install washer (2);  
 Install upper connecting plate locking nut (14) to fix it;  
 Install rubber cap (1).

**Upper connecting plate locking bolt (14)  
 tighten torque: 60~90 N·m**

Install dashboard;  
 Install front shock absorber and front wheel;  
 Install front brake lower bump;  
 Install headlight cover;  
 Install front fender;  
 Install handlebar.



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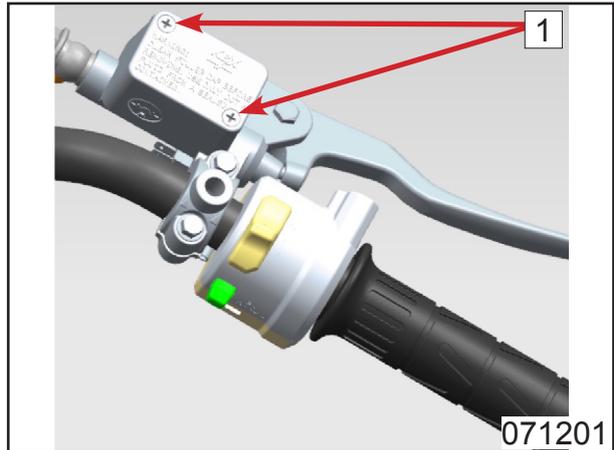
1	Rubber Cap
2	Washer
3	Upper Connecting Plate
4	Thrust Washer
5	Locking Nut
6	Bearing Cage
7	Dust Seal
8	Lower Connecting Plate
9	Lower Bearing Retainer
10	Steel Ball Bracket
11	Upper Bearing Retainer
12	Dust Cap
13	Locking Nut II
14	Upper Connecting Plate Locking Bolt

## 7.7 Front Brake

### 7.7.1 Front Brake Master pump Removal

Remove LH rear view mirror;  
Remove two fixed bolts (1);

**⚠ Note: Only to separate front master pump from handlebar. No need to remove master pump from handlebar without changing hydraulic brake pump.**

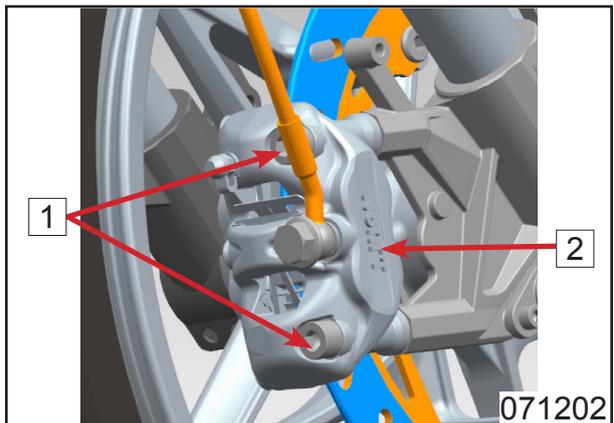


**⚠ Note: Do not hang brake pump on brake hose. Ensure the installation position and fix the direction in case air enters into hydraulic system. Keep the oil upper cap balance with ground.**

### 7.7.2 Front Brake Caliper Removal

Remove two mounting bolts (1);  
Separate front brake caliper (2) from front LH shock absorber along the direction of brake disc.

**⚠ Note: Do not pinch front brake lever when removing front brake caliper.**



### 7.7.3 Front Brake Pump

#### Installation

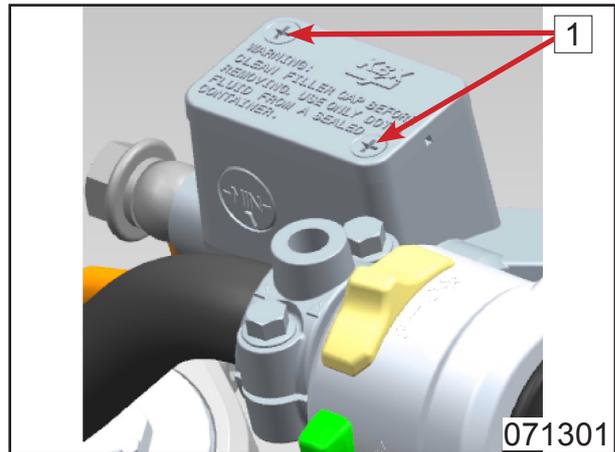
Reverse the removal procedures for installation.

## 07 Front Wheel, Brake, Suspension and Steering

### 7.7.4 Brake Fluid Replacement and Air Drain

Lift vehicle on level ground and swing the handle bar in the right direction;  
Remove two oil cap fixing bolts (1);  
Connect a transparent hose to brake caliper bleeder screw;  
Loose bleeder screw;  
Use injector to absorb the fluid. Keep the fluid level be between upper and lower limit when absorbing the fluid.

**⚠ Note: In case of brake fluid spilling on covering parts or plastic parts and corroding them. Cover other parts with fabric.**

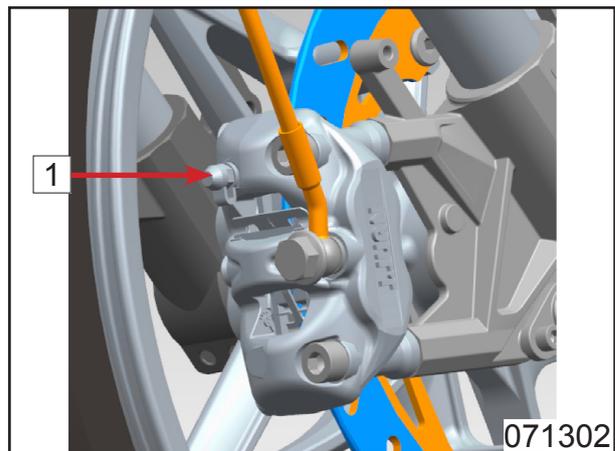


**⚠ Note: When absorbing the brake fluid with the injection syringe, the brake fluid level of the oil cup should be between upper and lower limit, to avoid the entrance of the air. Use only the recommended brake fluid (DOT4 non-petroleum based brake fluid).**

### 7.7.5 Brake System Air Drain

Grip handlebar repeatedly. Grip to the end until you feel heavy strength. Hold it and do not release handlebar;  
Loose bleeder screw (1) to drain air and then tighten it. Repeat above procedures until there is no air coming through bleeder screw.

**⚠ Note: Keep the fluid level between upper and lower limit when draining air.**



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## 7.7.6 Brake Pad/Disc

### 7.7.6.1 Brake Pad Replacement

#### Remove brake lower bump;

Brake Pad Removal:

Loose brake pad fixing bolt (1);

Take brake inner and outer pads from caliper;

Replace inner and outer pads (2);

#### Brake Pad Installation:

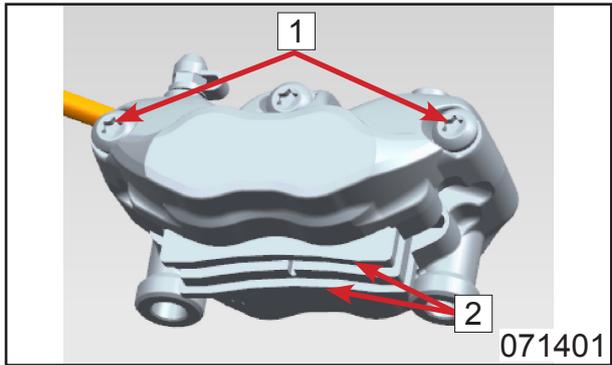
Put brake pad spring washers into right position;

Put inner and outer pads into brake caliper;

Put brake fixing bolts through the holes on brake caliper and inner/outer pads;

Tighten fixing bolts;

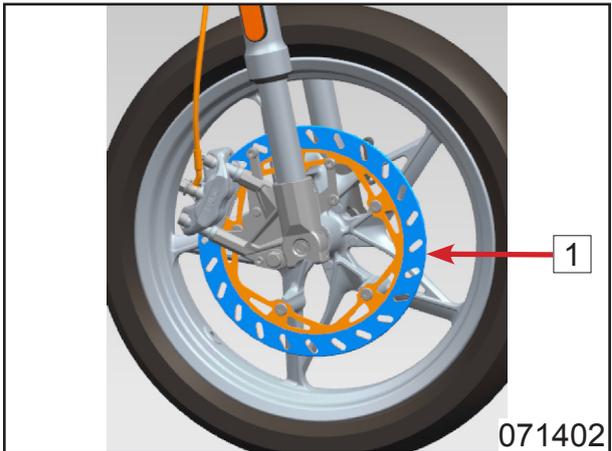
**⚠ Note: The brake pad spring washers have to be installed correctly. After brake caliper assembly installation, run the vehicle until brake test is qualified.**



### 7.7.6.2 Brake Disc Thickness Measurement

Use dial gauge latch to measure brake disc (1) thickness. Replace if out of limit.

**Service limit: 3mm**



# 08 Rear Wheel, Brake and Suspension

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## 8.1 Maintenance Information

### 8.1.1 Operation Attention

**▲ Note:**

- When installing driving chain connecting clasp, make the gap to the opposite way from the wheel.
- After adjusting the driving chain, double confirm the brake if need to do adjustment accordingly.

### 8.1.2 Maintenance Standard

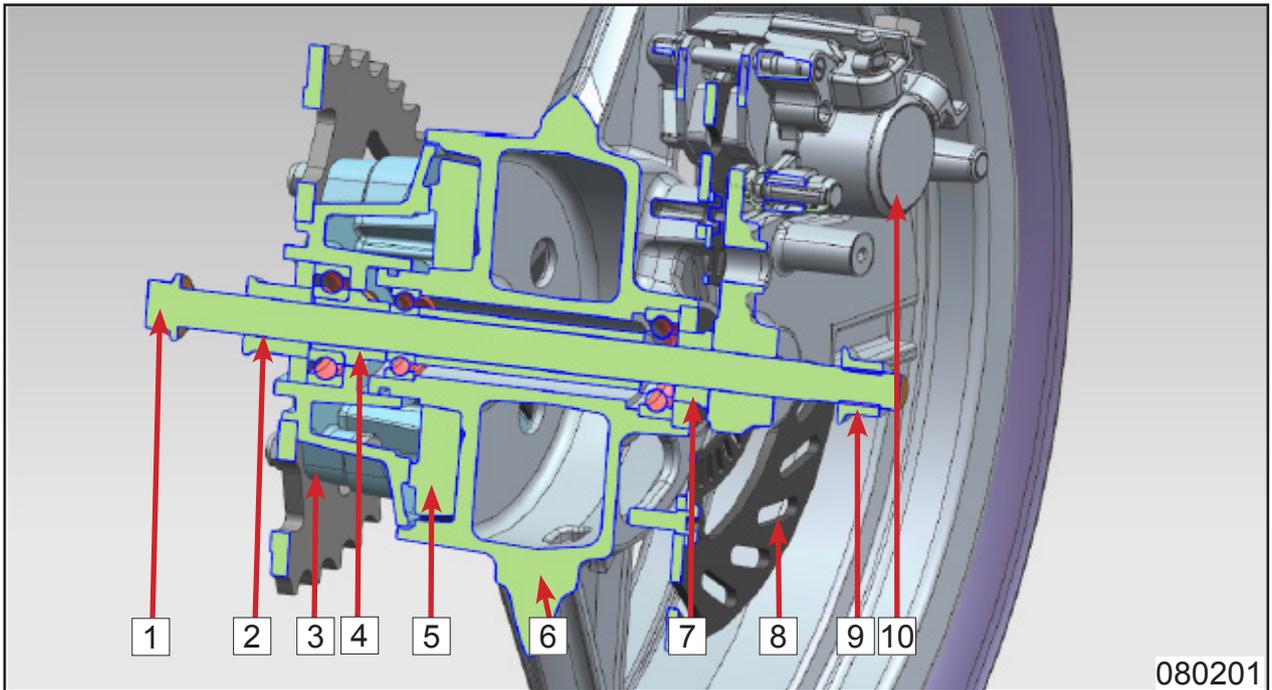
Item		Standard	Limit
Rear Wheel	Camber of rear wheel shaft	—	0.2mm
	Rim run-out	Longitudinal	0.6mm
		Horizontal	0.6mm
	Tire	Pattern deepness	—
Pressure		Single 225kPa (2.25kgf/cm <sup>2</sup> ) Pair 250kPa (2.50kgf/cm <sup>2</sup> )	—
Rear Brake	Thickness of rear brake disc	4mm	2.5mm

### 8.1.3 Tighten Torque

Swing arm shaft tighten nut tighten torque	50N·m ~ 80N·m
Damping nut tighten torque	35N·m ~ 45N·m
Rear wheel axle nut tighten torque	50N·m ~ 80N·m

## 8.2 Rear Wheel

### 8.2.1 Rear Wheel Removal

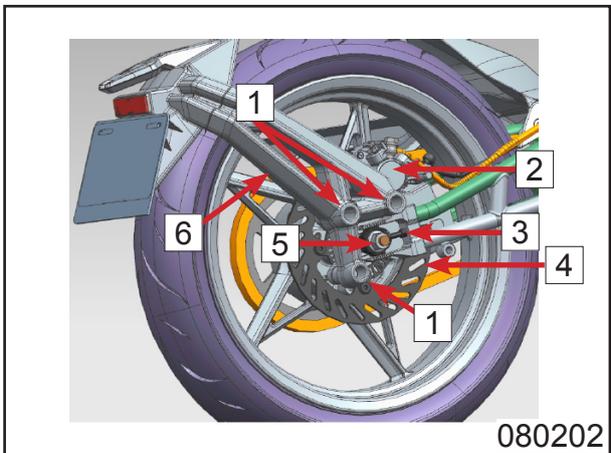


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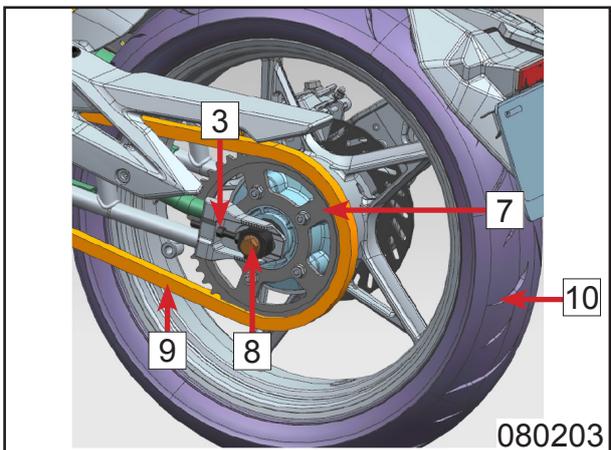
1	Rear Wheel Shaft	5	Rubber Damper	9	Nut, Rear Wheel Shaft
2	Left Collar	6	Rear Rim	10	Rear Brake
3	Sprocket	7	Right Collar		
4	Sprocket Seat Bushing	8	Brake Disc		

#### Removal

Support vehicle with jack;  
 Remove three bolts (1);  
 Remove rear lower fender assembly (6);  
 Remove rear wheel shaft nut (5);  
 Loose chain adjust nut (2);  
 Remove chain (9) from sprocket (7);  
 Take out rear wheel shaft (8);  
 Remove rear wheel assembly (10).



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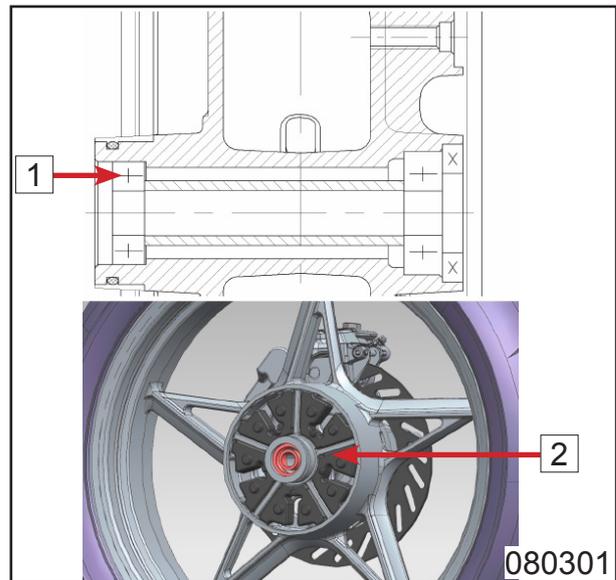
## 08 Rear Wheel, Brake and Suspension

Remove sprocket left collar (1);  
 Remove sprocket assembly;  
 Remove rear brake assembly. Inspect rear brake disc, the thickness should be no less than 3mm;

Remove rubber damper (2). Replace new one if aged and broken;

Inspect rear wheel bearing. Replace if the clearance is too big. Remove rear wheel shaft sleeve with special tool. Reverse the removal procedures for installation. Anti-dust oil seal has to be covered with grease when installing.

Rear wheel shaft nut tighten torque: 80N·m~100N·m



### Inspection

#### Rear Wheel Shaft

Set shaft on a V-block, measure axle vibration with dial gauge.

**Service limit: 0.2mm**

Place rear wheel on the rotating stage, check the rims vibration

**Service limit:**

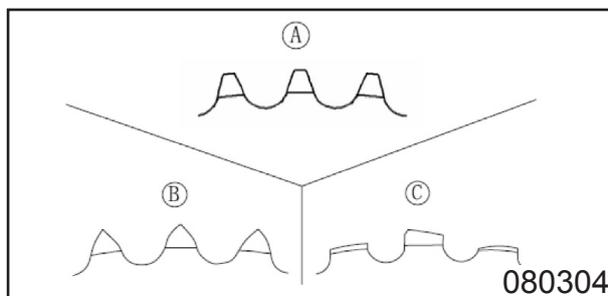
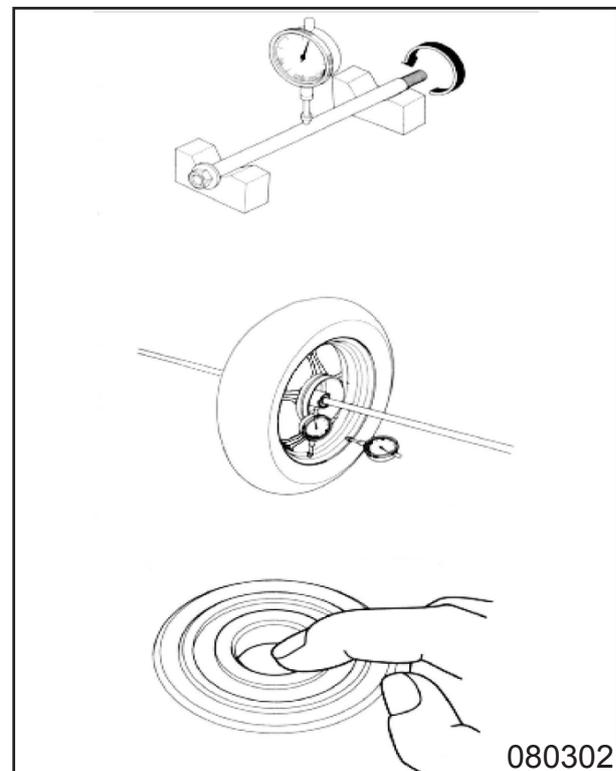
**Horizontal: 0.8mm Vertical: 0.8mm**

**The thickness of rear brake disc should no less than 3mm;**

Check rear axle clearance. Replace if clearance is too big.

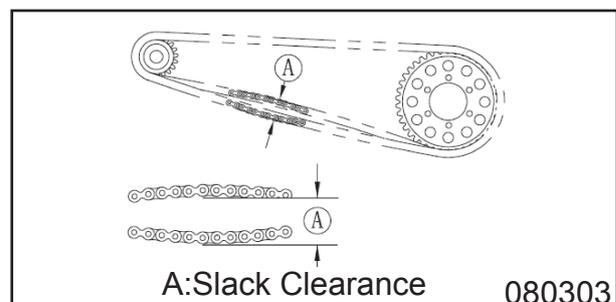
Check rear chain wheel, replace if worn.

Check driving chain, replace if necessary.



A. Standard B. Worn C. Damaged

Replace new chain or sprocket if B or C happens.



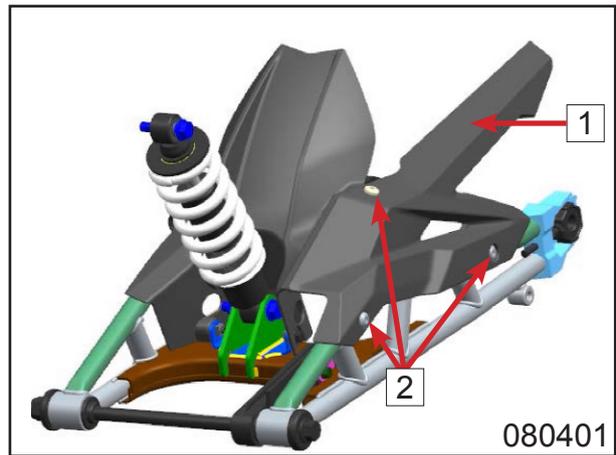
A: Slack Clearance

**A limit: 20mm~30mm**

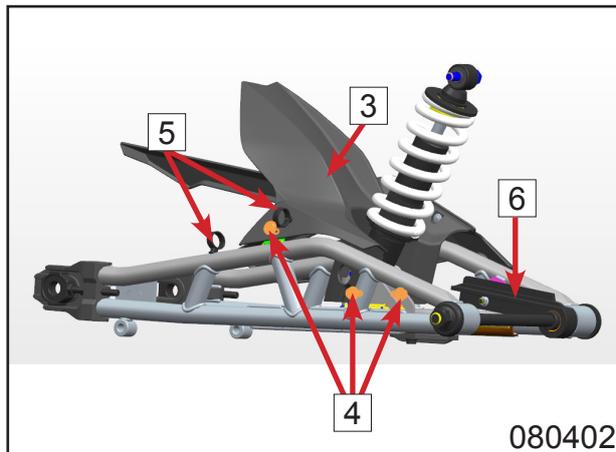
## 8.3 Rear Swing Arm(state 1)

### Removal

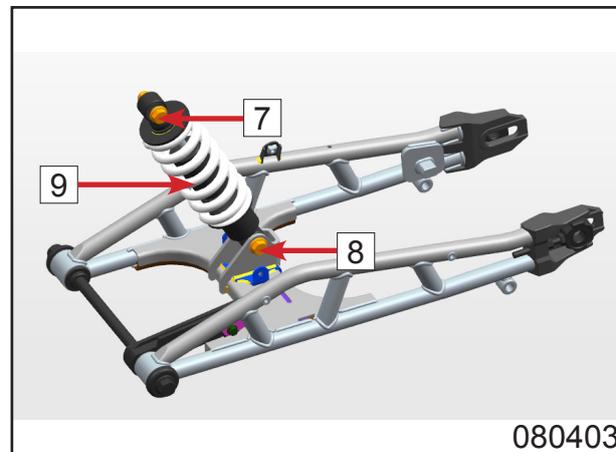
Remove rear wheel;  
Loose three inner hex bolts (2);  
Remove chain cover (1);



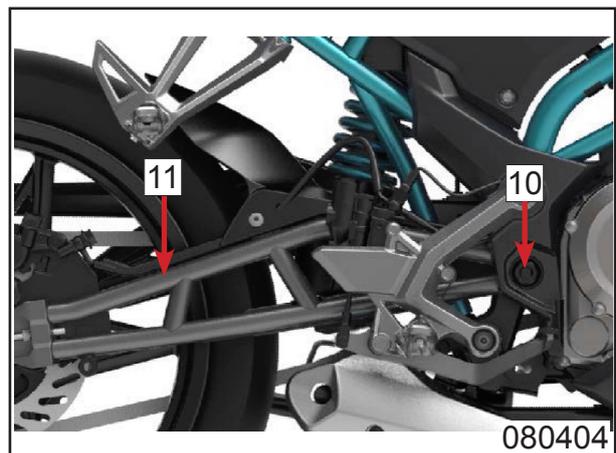
Loose three inner fender bolts (4);  
Remove rear inner fender (3);  
Remove rear swing arm brake clasp (5);  
Remove chain guide (6);



Remove rear shock absorber upper mounting bolt (7) and lower mounting bolt (8);  
Remove rear shock absorber (9);



Loosen rear swing arm lock nut (10);  
Remove rear swing arm shaft;  
Remove rear swing arm (11);

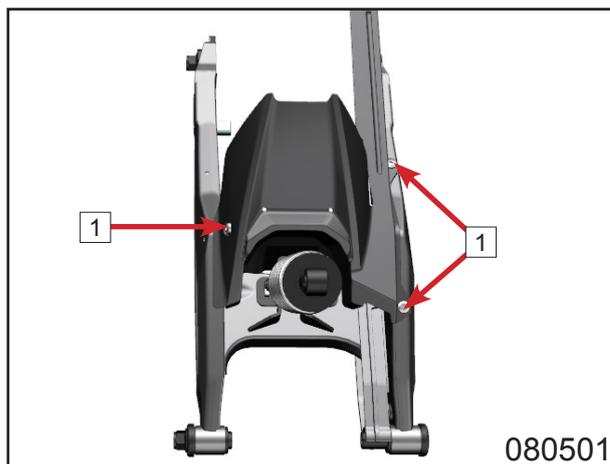


## 08 Rear Wheel, Brake and Suspension

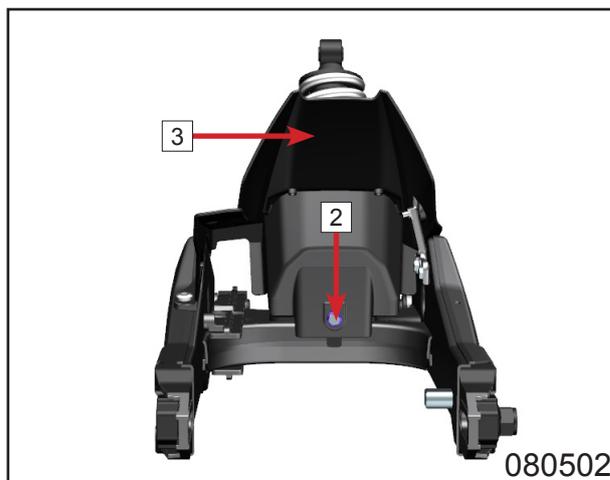
### 8.4 Rear Swing Arm(state 2)

#### Removal

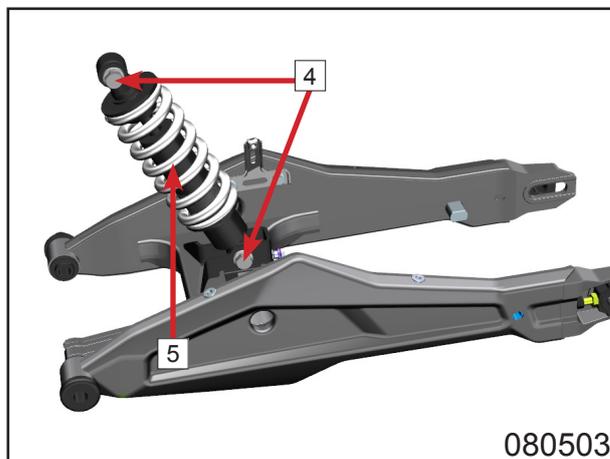
Remove rear wheel;  
Loose 3pcs of inner hexagonal bolt (1);



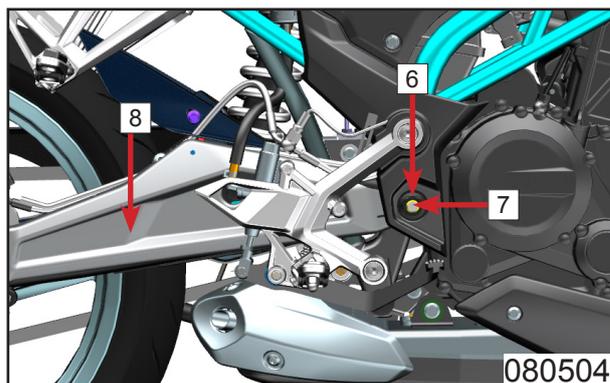
Loose bolt (2);  
Remove rear inner fender(3);



Remove rear absorber bolt (4);  
Remove rear absorber (5);



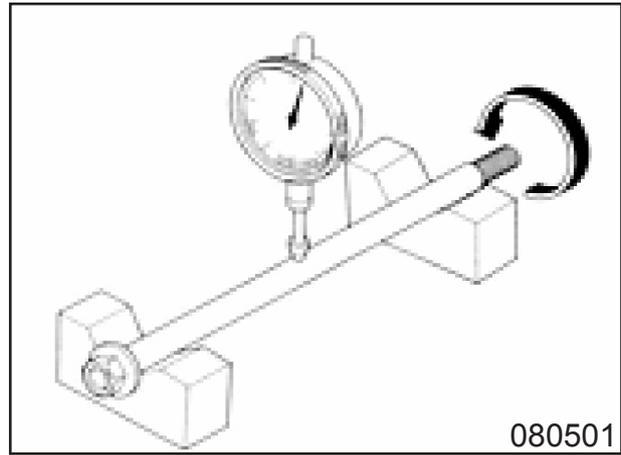
Loose the locking nut 6 for rear fork shaft;  
Take out rear fork shaft (7);  
Remove rear fork (8);



## Inspection

Inspect rear swing arm left and right collar (2) and (3) for free play. The clearance between collars should not be too big. Replace oil seal (1) if stuck or worn. Replace chain guide (8) if damaged. Set swing arm shaft on V block to measure vibration.

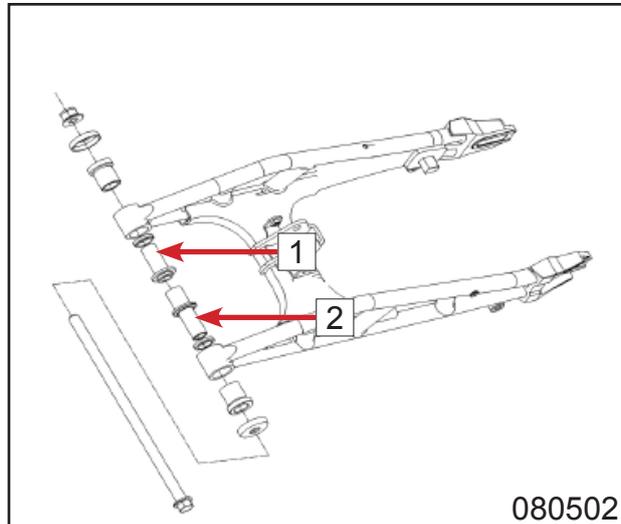
**Service limit: 0.2mm above replace**



## Installation

Reverse the removal procedures for installation.

**⚠ Note: Apply grease on left collar (1) and right collar (2), to avoid dust.**



Rear swing arm fixing nut:

**Tighten torque: (80~100) N·m;**

Rear shock absorber upper and lower mounting nut:

**Tighten torque: (30~40) N·m.**

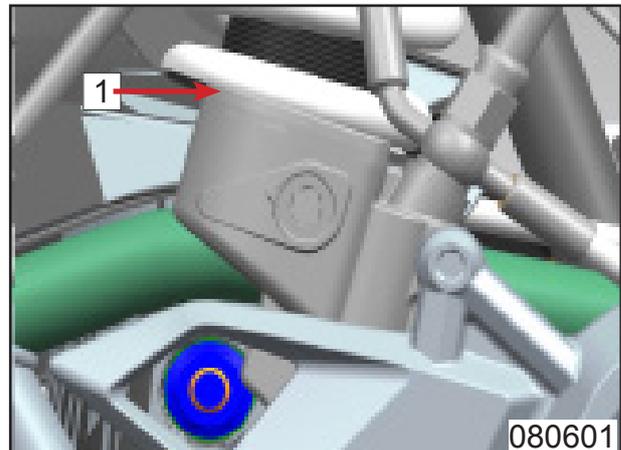
### 8.4 Rear Brake Inspection

Inspect rear brake disc thickness;  
When brake disc is worn to the mark, replace new brake disc.

### Brake Fluid Replacement and Air Drain

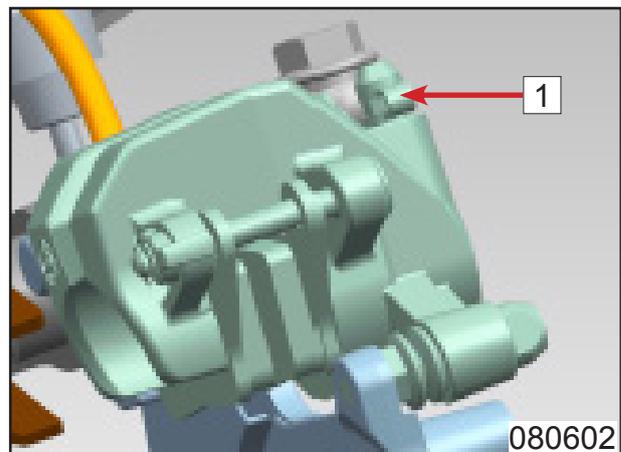
Lift vehicle on level ground and swing the handle bar in the right direction;  
Remove oil cap (1);  
Connect a transparent hose to brake caliper bleeder screw;  
Loose bleeder screw;  
Use injector to absorb the fluid. Keep the fluid level be between upper and lower limit when absorbing the fluid.

**⚠ Note: When absorbing the brake fluid with the injection syringe, the brake fluid level of the oil cup should be between upper and lower limit, to avoid the entrance of the air. Use only the recommended brake fluid (DOT4 non-petroleum based brake fluid).**



### Brake System Air Drain

Press rear brake pedal repeatedly. Press to the end until you feel heavy strength. Hold it and do not release pedal;  
Loose bleeder screw (1) to drain air and then tighten it. Repeat above procedures until there is no air coming through bleeder screw.

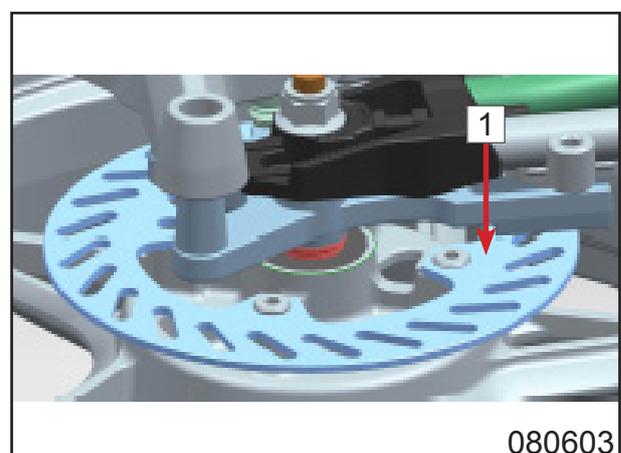


**⚠ Note: Keep the fluid level between upper and lower limit when draining air.**

### Brake Disc Thickness Measurement

Remove brake disc (1);  
Use dial gauge latch to measure brake disc (1) thickness. Replace if out of limit.

**Service limit: 3mm**



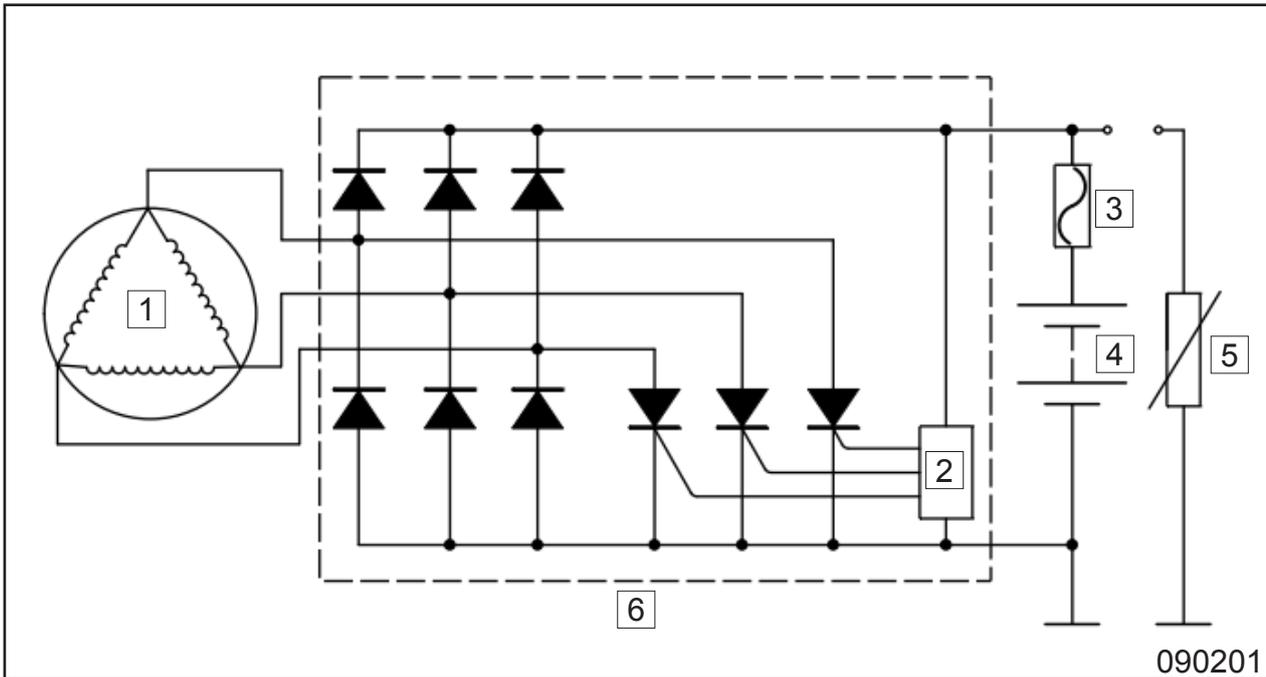
## 8.5 ABS Hydraulic Brake

**⚠ Note: If ABS hydraulic brake breaks down and affects on driving safety, please contact with nearby service station. Do not do maintaining without authorization.**

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## 9.1 Charging System

### 9.1.1 Charging Wiring Diagram



1	Magneto	3	Fuse	5	Load
2	Stable voltage	4	Battery	6	Regulator

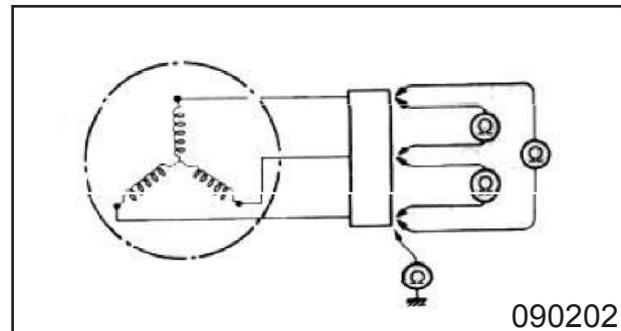
### 9.1.2 Magneto Coil Resistance

- Measure 3-phase magneto stator coil resistance;
- If the resistance is out of specification, replace with a new stator.
- Check for the insulation between stator coil and core.

MAG Coil Resistance:  $0.5\Omega \sim 1.5\Omega$  (Y-Y)

Resistance between Stator Coil and Core  $\infty\Omega$  (Y-G)

Turn multimeter to  $1 \times 10\Omega$



### 9.1.3 MAG Non-loaded Performance

- Start the engine and allow it run at 5000r/min;

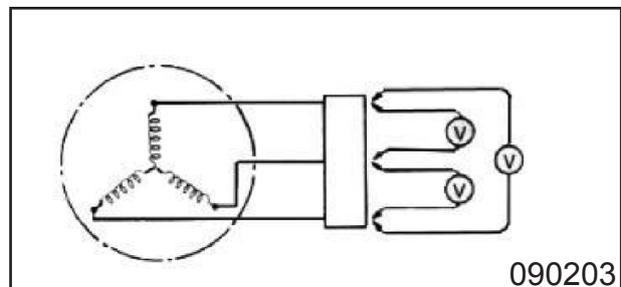
Use multimeter to measure the voltage between 3 output lines.

- If the reading is below specification, replace with a new magneto.

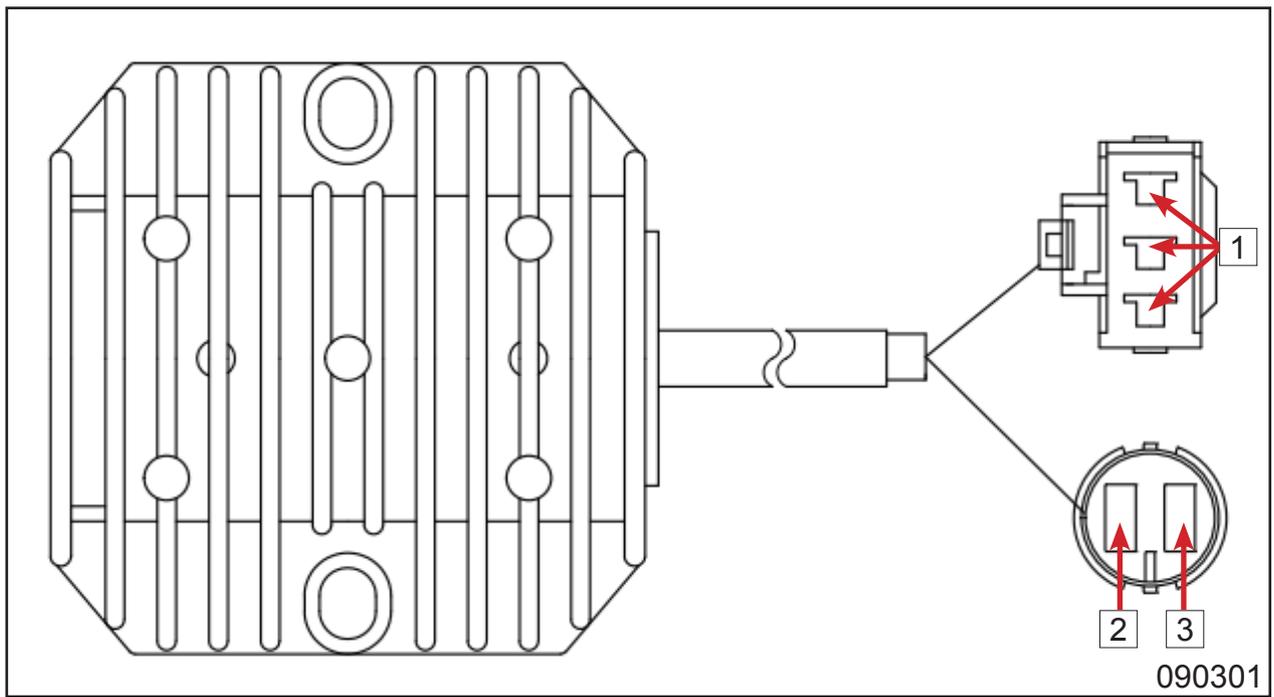
Voltage between Output Lines When MAG Non-loaded:

$>50V(AC)$  at 5000r/min

Turn Multimeter to  $V(AC)$



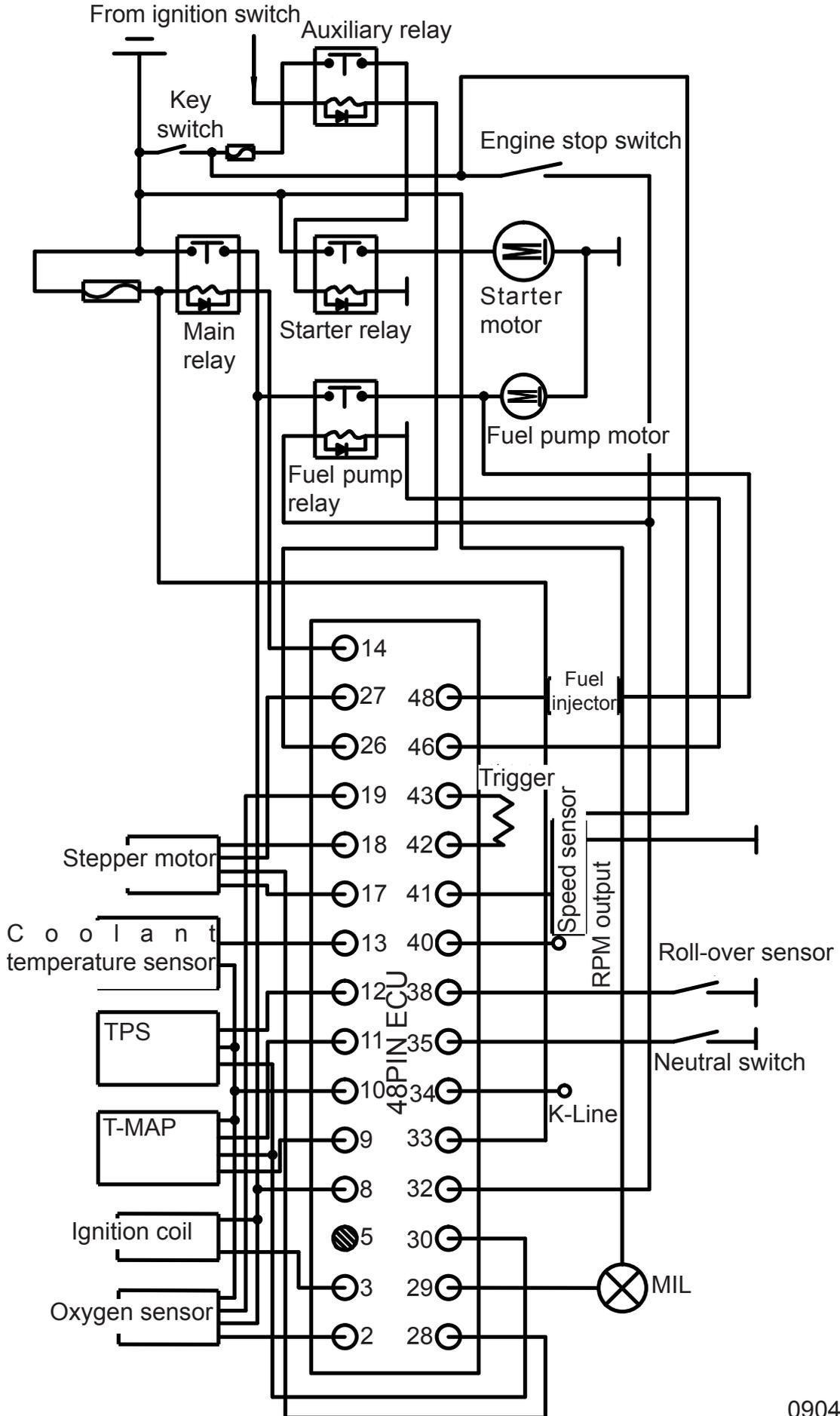
9.1.4 Voltage Regulator/Rectifier



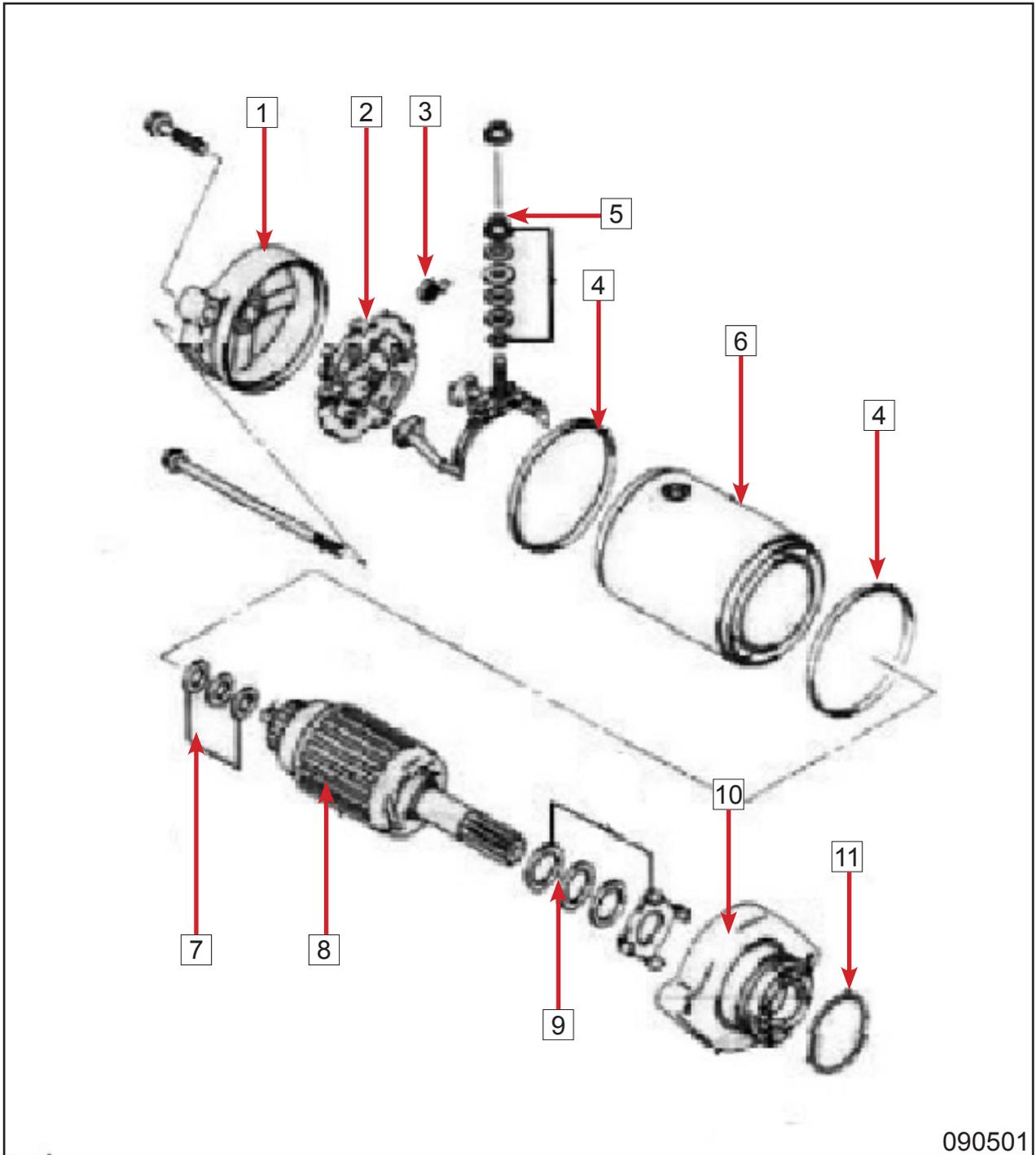
1	Yellow	2	Red	3	Green
---	--------	---	-----	---	-------

When engine running at 5000r/min and at the state of battery full charged, if the voltage between positive and negative terminal exceeds 15V or is lower 13.5V, replace with a new regulator.

## 9.2 Starting System



9.2.1 Starter Motor

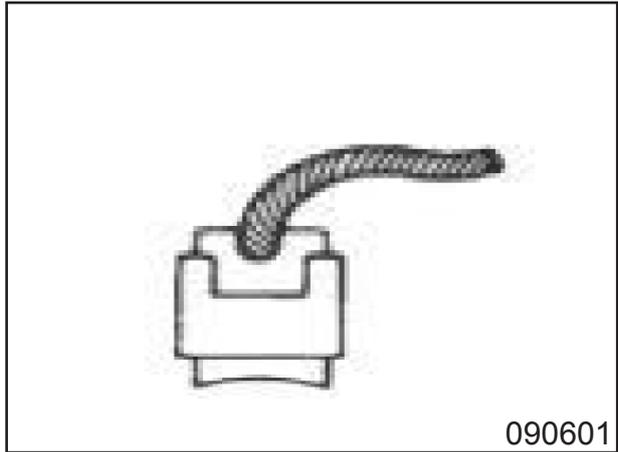


090501

1	Outer side cover	5	Brush connector	9	Washer
2	Brush bracket	6	Motor motor sleeve	10	Inner side cover
3	.Brush spring	7	Washer	11	O-ring
4	O-ring	8	armature		

## 9.2.2 Brush

- Check brush for damages, cracks or other troubles.
- If any damages, replace a new brush.

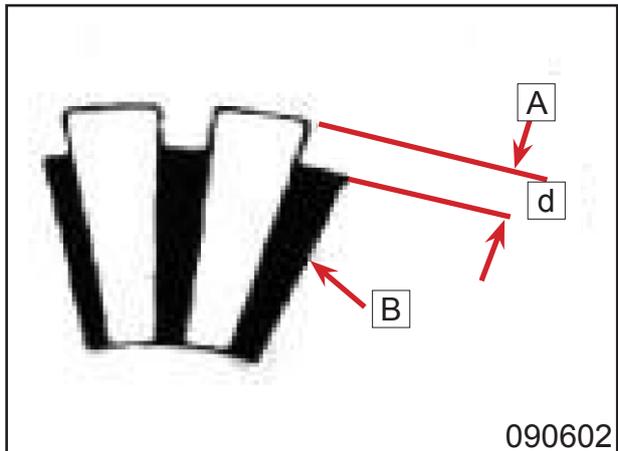


090601

## 9.2.3 Commutator

- Check for color change, damages and wear.
- If any damages, replace with a new commutator.
- If the color changes, polish the commutator surface with sand paper and wipe it up with a clean, dry cloth.
- If over wear, cut a part of insulator B and maintain the distance between A and B as d.

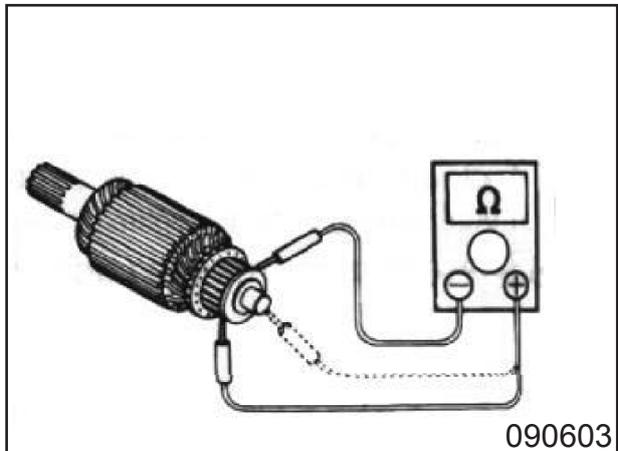
$$d \geq 1.5\text{mm}$$



090602

## 9.2.4 Armature

Use a multimeter to check the armature coil continuity and the one between coil and the shaft. If armature coil has no continuity or there is continuity between the coil and the shaft, replace the armature with a new one.



090603

## 9.2.5 Oil Seal

Check for damages or leaks. If damages or leaks, replace with a new starter motor.



090604

## 9.2.6 Starter Relay

- Put 12V between positive and negative terminal. Use multimeter to check if there is continuity between 2 contacts.
- If multimeter clicks, there is continuity between contacts.
- If 12V is removed, no continuity remains between contacts.
- If both above 2 items are in good condition, it indicates the replay is good. Turn multimeter to DIODE.

**⚠ Note: The voltage loaded between terminals can not exceed 2 mins, otherwise, starter relay may overheat or burn.**

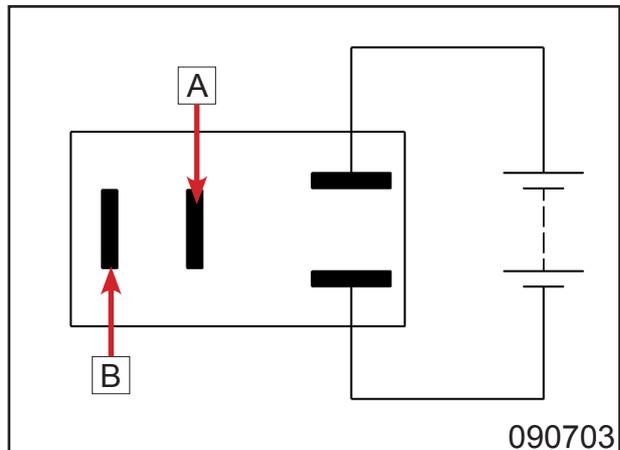
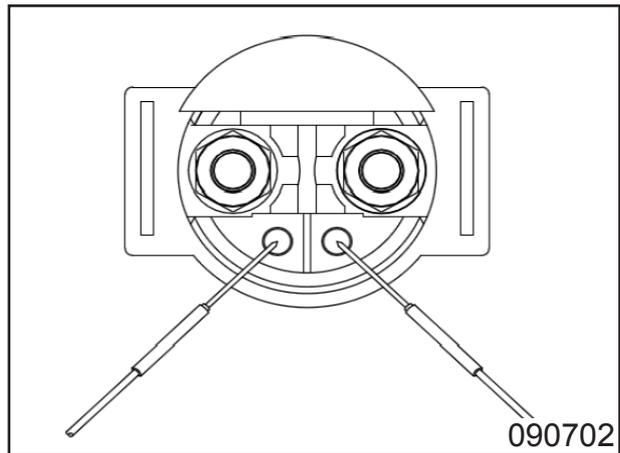
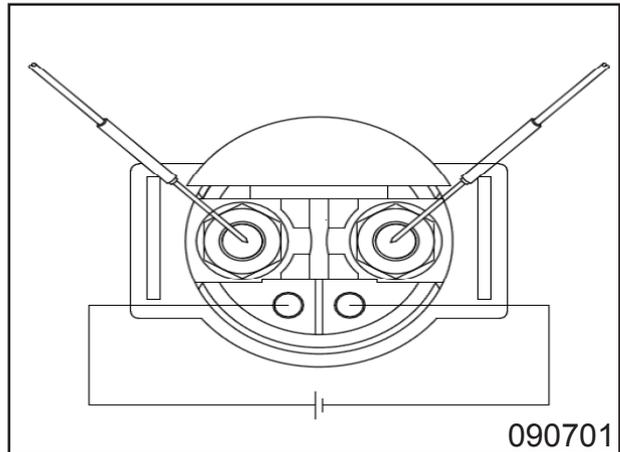
- Use multimeter to measure starter relay coil resistance, if the reading is out of specification, replace a new relay.
- Turn multimeter to  $1 \times 10\Omega$

Starter Relay Coil Resistance:  $3\Omega \sim 5\Omega$

## 9.2.7 Auxiliary Relay

- Put 12V between auxiliary starter relay positive and negative terminal; use multimeter to check the continuity between A and B.
- (Turn multimeter to DIODE)
- If multimeter clicks, it indicates there is continuity between A and B.
- If 12V is removed, no continuity remains between contacts.
- If both above 2 items are ok, it indicates the replay is ok.
- Turn multimeter to  $1 \times 100\Omega$  measure auxiliary starter relay resistance

**Auxiliary starter relay resistance:  $90\Omega \sim 100\Omega$**



## 9.2.8 Engine Starting Notice

- Properly route according to starting schematic diagram.
- Before starting, check if all parts are fitted correct; Regarding EFI components connection, refer to EFI section.
- Check air intake system.
- Check fuel supply system; ensure there is no block or leaks.
- Test fuel pressure with fuel pressure gauge.

Pressure in fuel pump outlet:

**( 0.33±0.01)Bar**

- Place the transmission in Neutral.
- Check EFI with PDA for fault; if there is any fault, eliminate the trouble according to DTC (Diagnostic Trouble Code).
- Close the throttle and turn the engine stop switch to OFF. Then push starter switch for 3~5s to run the engine.
- After starting, warm up until idle speed is stable and check it.

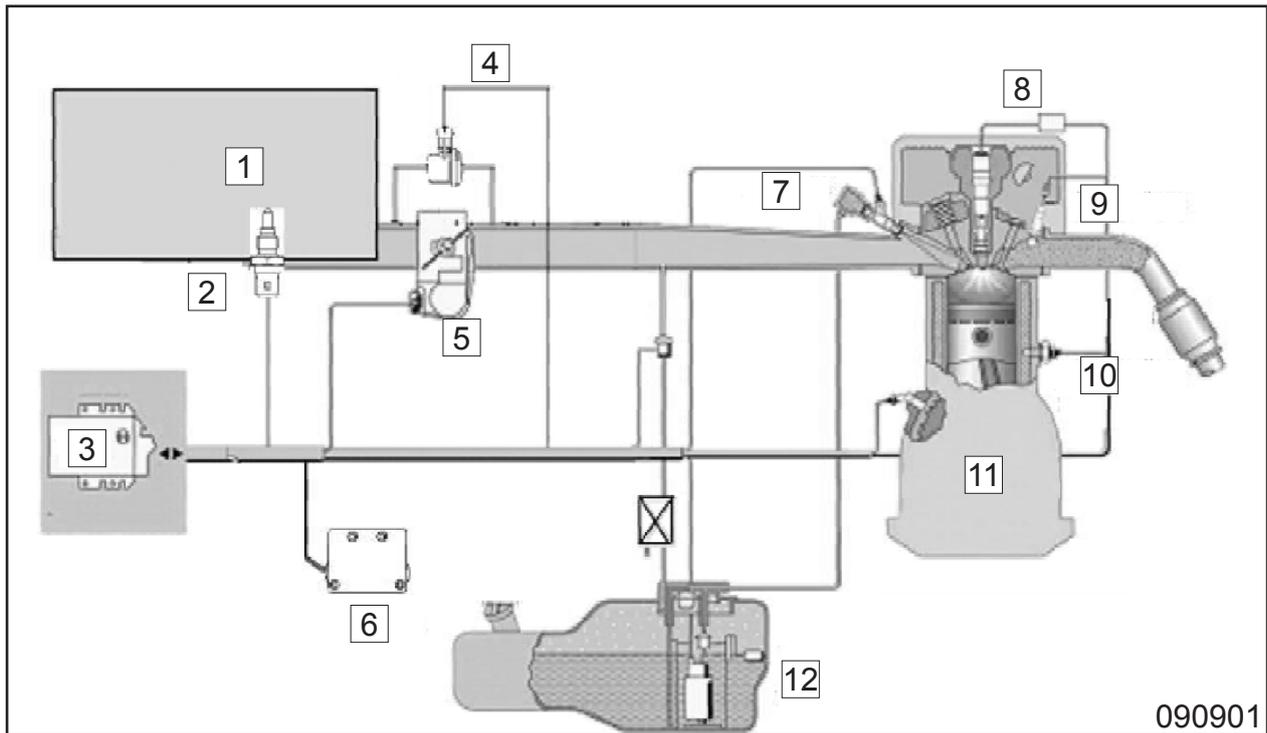
**Idle Speed:1500r/min±150r/min**



Fuel pressure gauge

9.3 EFI System

9.3.1 EFI Structure



090901

1	Air filter	4	Idle air control valve	7	Fuel injector	10	Coolant temperature sensor
2	Air inlet temperature sensor	5	Throttle assembly	8	Ignition coil	11	CPS
3	ECU	6	Roll-over sensor	9	Oxygen sensor	12	Fuel pump assembly

9.3.2 EFI system is composed of three sub-systems

9.3.2.1 Sensors

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. Sensors in EFI system include:

- Intake pressure sensor
- Intake temperature sensor
- TPS
- CPS
- Water temp sensor
- Gear sensor
- Mileage sensor
- Oxygen sensor
- 4WD-lock switch
- Overriding switch

9.3.2.2 ECU

Electronic Control Unit, the brain of EFI system, which determines the amount of fuel injection, ignition timing and other parameters a engine needs to keep running by calculating and analyzing values provided by sensors.

9.3.2.3 Actuator

Execute the EFI instruction. Main actuators include:

- Fuel pump
- Injector
- Ignition coil
- Idle air control valve

### 9.3.3 EFI System Maintenance Notice

- Always use genuine CFMOTO parts for maintenance, otherwise it can not assure a normal performance to EFI system.
- During the maintenance procedure, never try to disassemble the EFI components.
- In the course of maintenance, EFI parts must be handled carefully.
- Ignition switch must be shut off before connecting or disconnecting connectors, otherwise, it may cause the EFI parts damage.
- When removing fuel pump from fuel tank, do not energize the fuel pump, otherwise, a spark can cause a fire.
- Fuel pump is not allowed to operate in a dry environment or under water, otherwise, its life would be shortened. Besides, reverse connections between positive and negative terminal of fuel pump is prohibited.
- The fuel pressure in EFI fuel supply system is very high (about 330kPa), accordingly, all fuel lines are high pressure resisting. Even if the engine is not running, the fuel pressure is still high. Therefore, do not disassemble the fuel line unless it's necessary. When the fuel line needs to be repaired, release the fuel pressure as follows:
  - Remove fuel pump relay, start the engine and allow it to idle until the engine stalls automatically. Fuel line removal and fuel filter replacement should be practiced by a professional person in a well-ventilated place.
  - If possible, don't do the spark test. If spark test is done unavoidably, try to complete the test as soon as possible. Besides, don't open the throttle, otherwise, a large quantity of unburnt fuel would enter muffler, causing the catalytic converter damage.
  - Idle speed is controlled by ECU, so it's unadjustable. The throttle limiter screw has been adjusted by manufacturer before sale, therefore, it's not recommended to adjust it by the user.
- Don't reverse the battery cable connections. This may damage electrical components.
- Never remove the battery cables when the engine is running.
- Always remove cables and electrical control units which are connected with battery terminals.
- Never test the component input and output electric signal by piercing the cable plastic jacket.
- Respect the environment and dispose of the waste left during maintenance.

## 9.3.4 Service Tools

### PDA

**Function:**

Read/clear EFI system trouble codes, observe data stream.



### Digital Multimeter

**Function:**

Measure voltage, current and resistance and other parameters in EFI system.



## Vaccum Gauge

### Function:

Check the manifold for air pressure.



## Timing Light

### Function:

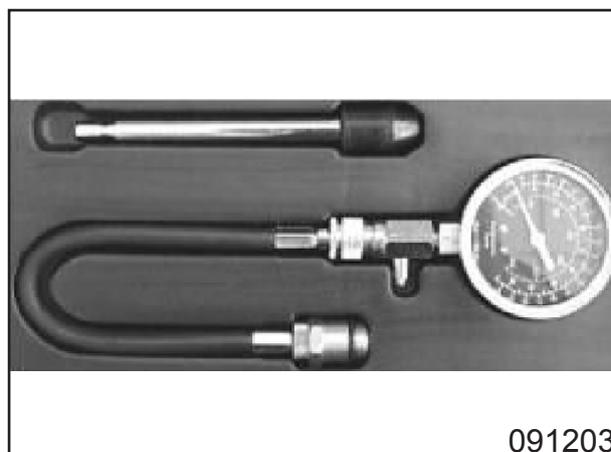
This light is used to check engine ignition timing.



## Compression Tester

### Function

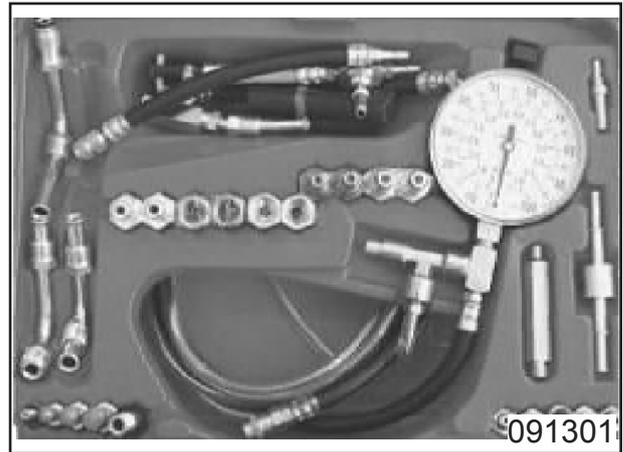
This tester is used to check cylinder compression,so as to determine if the rings or valves are bad and leaking pressure.



### Fuel Pressure Gauge

#### Function

This gauge is used to test the fuel pressure, so as to check fuel pump and fuel pressure regulator working conditions.



### Injector Cleaning Machine

#### Function:

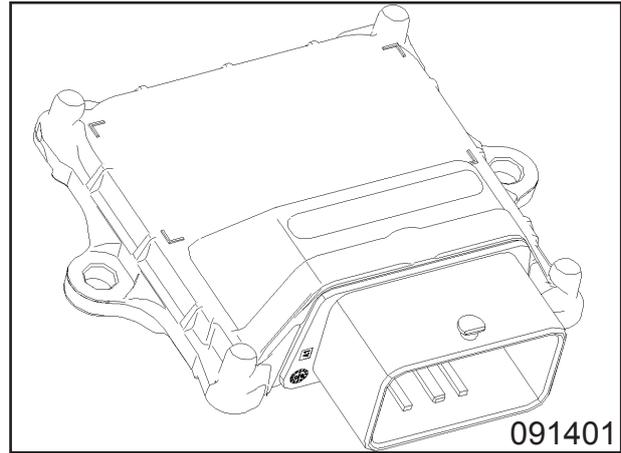
Clean fuel injector.



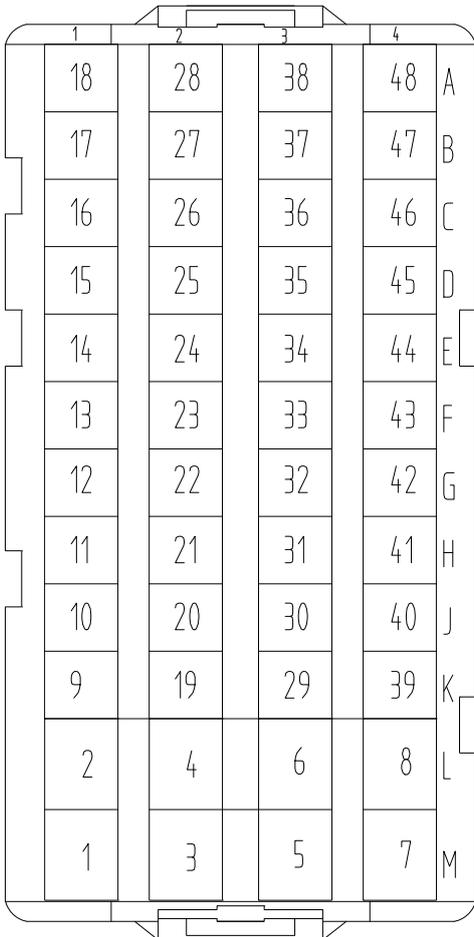
## 9.3.5 EFI Components and Function

### 9.3.5.1 ECU

Electronic Control Unit, the brain of EFI system, which determines the amount of fuel injection, ignition timing and other parameters a engine needs to keep running by calculating and analyzing values provided by sensors.



ECU



48-Pin ECU							
18	R/Gr «Stepping motor phase position D»	28	Lr/R «Stepping motor phase position B»	38	Gr/B «Roll-over switch»	48	Y/Br* «Fuel injector»
17	R/Br «Stepping motor phase position C»	27	R/Y «Stepping motor phase position A»	37		47	
16	Gr/W1 «CAN_H»	26	Gr/P «Starter Relay»	36		46	L/Y «Oil pump relay»
15	Y/W1 «CAN_L»	25		35	Y/W «Neutral switch»	45	B/R «Fan relay»
14	L/B «Main relay»	24		34	L/Gr «K-line»	44	
13	P/R «Engine water temperature»	23	Gr/B «Brace switch»	33	R/W «Continuous Power supply «Battery»»	43	Gr/W «Phase position sensor A»
12	B/L «Throttle position indicator»	22		32	Br/B «Ignition switch»	42	B/W «Phase position sensor B»
11	Y/Gr «Air inlet temperature sensor»	21	Gr/R «Clutch switch»	31		41	P/W «Speed sensor»
10	R/L «Sensor to ground»	20		30	P/B «+5V output»	40	W/P «Engine tachometer output»
9	O/R «Air inlet pressure sensor»	19	O/W «Upstream oxygen sensor»	29	Br/Gr «Engine MIL»	39	Gr/W «Mode switch-low voltage»
2	R/P* «Upstream oxygen sensor heating»	4		6		8	R/O «Non-continuous power supply» «Relay»
1		3	B/Y* «Ignition coil»	5	Gr2 <sup>□</sup> «Ignition coil to ground»	7	

091402

## Limit Data:

Item		Data			Unit
		Min	Standard	Max	
Battery volt	Running	9.0	14.0±0.1	16.0	V
	Limit	6.0~9.0		16.0~18.0	V
Maximum voltage and time	26.0V			5	min
Working temperature		-40		70	°C
Storage temperature		-40		90	°C

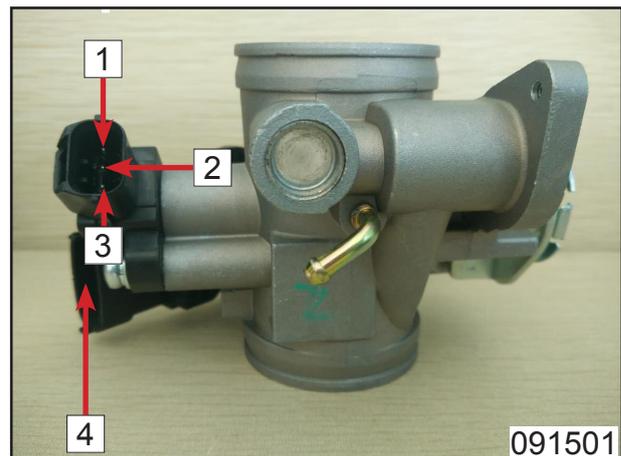
- It's not allowed to apply a heavy load on ECU housing, or it may deform and damage ECU.
- Always handle ECU gently. Never drop it, especially on a hard surface.

### 9.3.5.2 Throttle Body

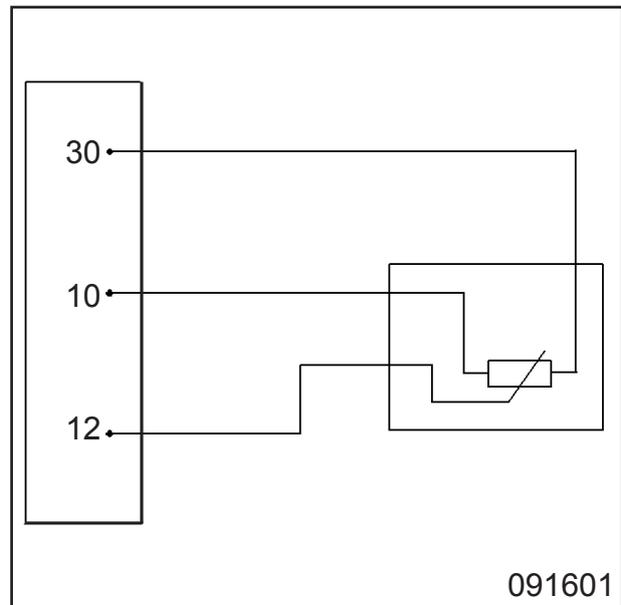
Connected between air filter and engine. When throttle lever is applied, the valve butterfly in throttle body would spin at a certain angle. TPS can monitor the position of valve butterfly and send the signal to ECU.

#### Pin function

1. To 5V power
2. Ground
3. Output voltage signal
4. T-MAP

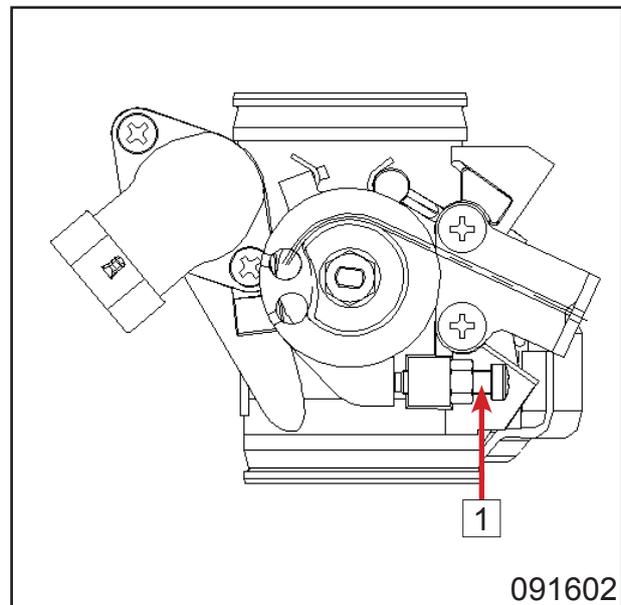


TPS connects with ECU:



Idle speed limiter screw (1) is not allowed to adjust.

**⚠ Idle speed is totally regulated by ECU. It is not allowed to adjust by hand.  
It's not allowed to apply a heavy load on its housing or cover, or may deform and damage it.  
Always handle it gently. Never drop it, especially on a hard surface.**



## 9.3.5.3 Air Intake Pressure Sensor

Measure the intake manifold pressure and give the signal to ECU.

### Pin function

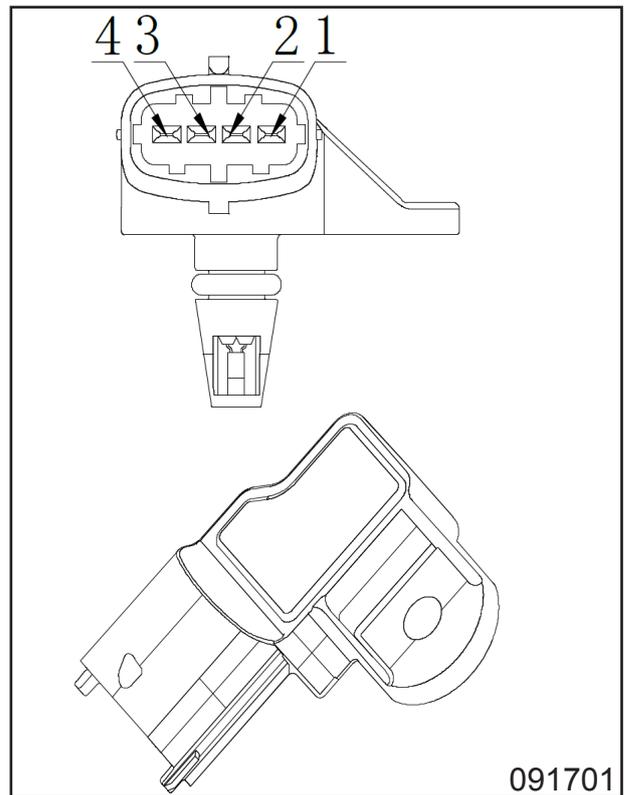
1. Output voltage signal
2. To 5V power
3. Ground

Intake pressure sensor connects with ECU:

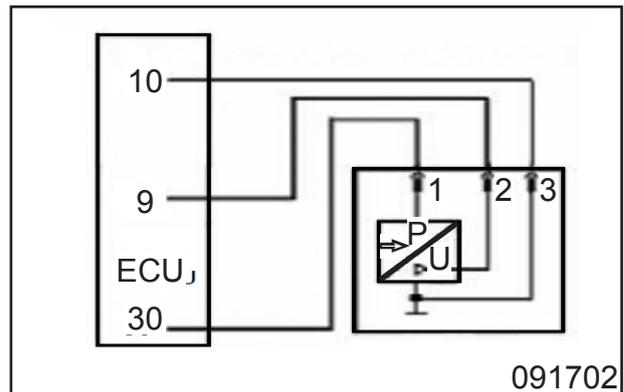
The right figure illustrates the allowed installation angle to avoid condensate water built up in T-MAP sensor. Because the condensate water will make pressure sensitive elements damage.

The following figure refers to output voltage pressure relation.

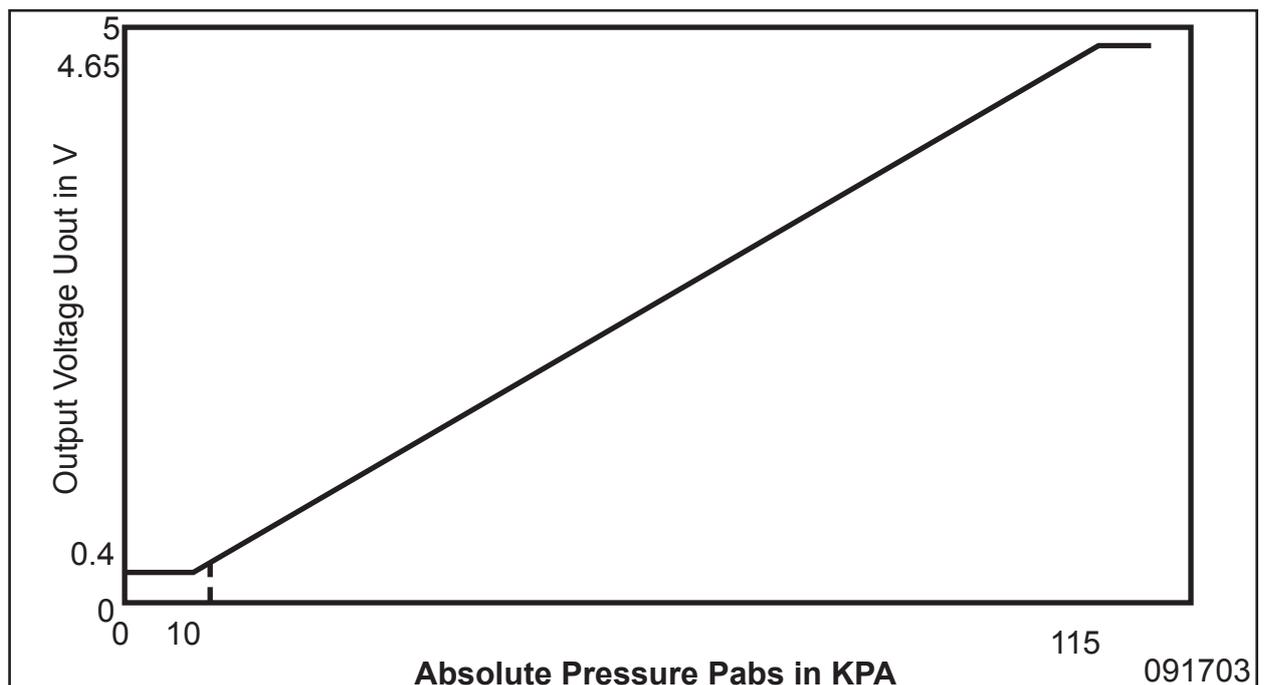
**Testing pressure range: 10kPa~115kPa**



091701



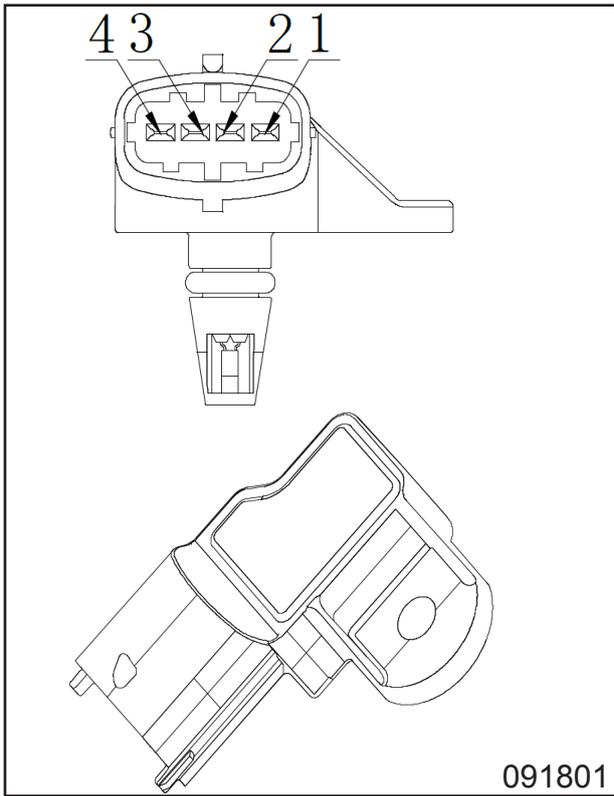
091702



091703

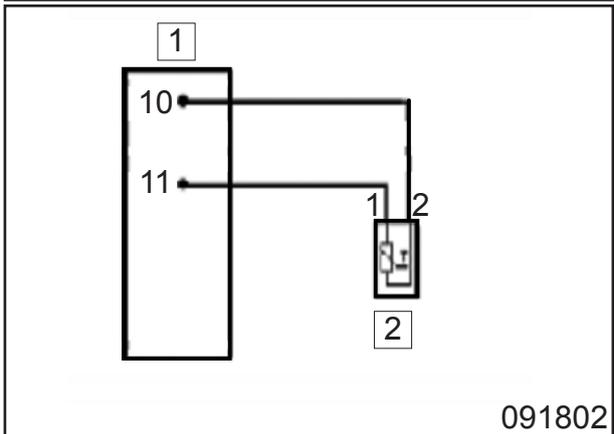
## 9.3.5.4 Air Intake Temperature Sensor

This sensor is an NTC thermo resistance. The resistance becomes lower when the air temperature becomes higher. But not linear relationship. Then temperature sensor assembled together with pressure sensor.



091801

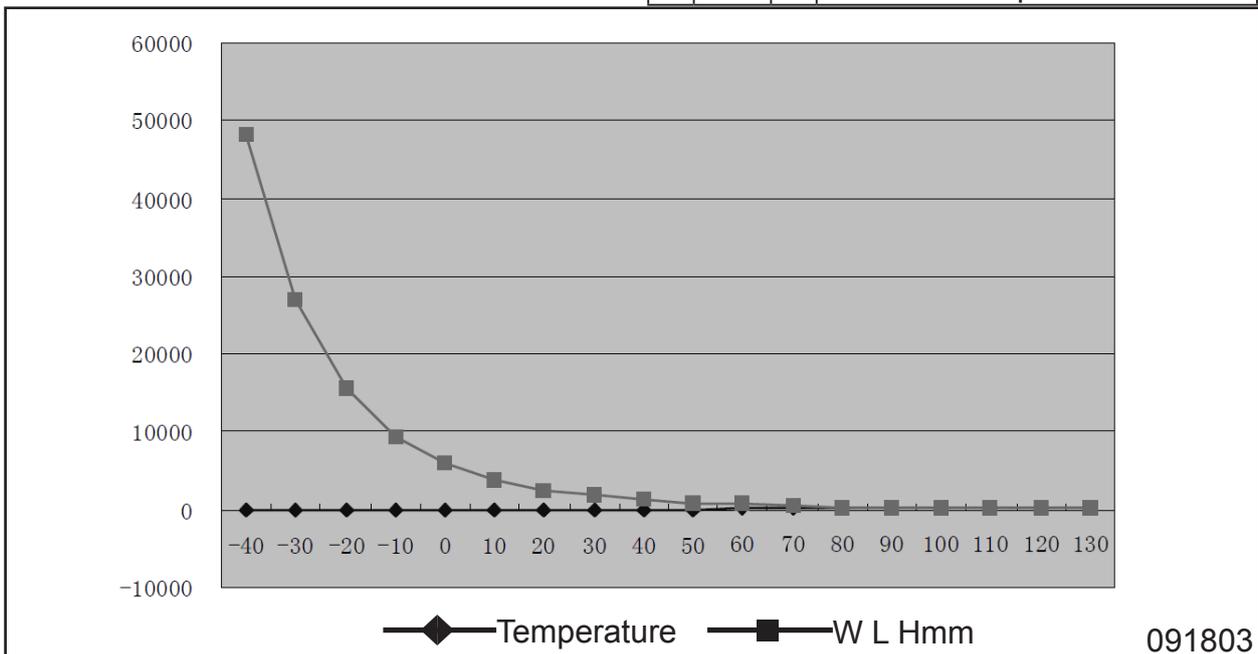
Air intake temperature sensor connects with ECU:



091802

The following chart explains resistance-temperature relation.

1 | ECU | 2 | Air intake temperature sensor



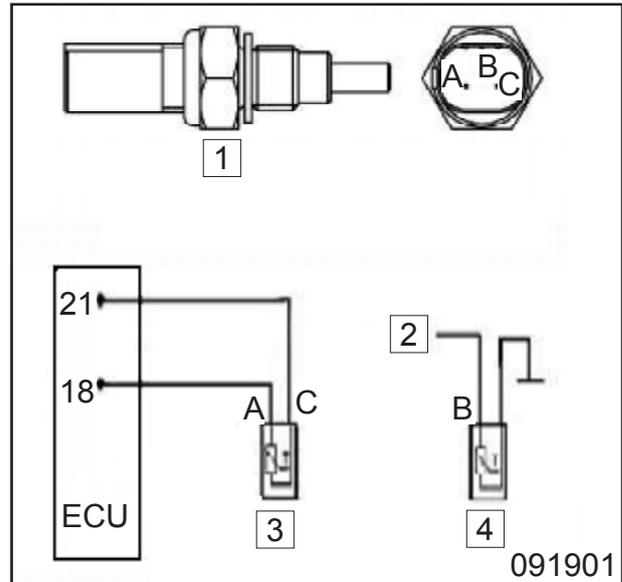
091803

## 9.3.5.5 Coolant Temperature Sensor

This sensor is a negative temperature coefficient (NTC) thermistance, whose resistance increases with the temperature of coolant decreases. It outputs 2 set of coefficients, one is for ECU to monitor the temperature of coolant, the other is for meter display.

A and C consists of one group, which provides signal for ECU.

B and threaded portion consists of one group, which provides signal for coolant temperature gauge.



Coolant temperature sensor connects with ECU:

1	Coolant temperature sensor	3	Sensor connects with ECU
2	Connects with dashboard	4	Sensor connects with dashboard

This form is B side to cover temperature chart. The signal is to the dashboard.

Temp(oC)	Resistance (B-outer housing) (Ω)
50±0.2	176~280
80±0.2	63.4~81.4
110±0.2	24.6~30.6

This right chart is A and C terminal temperature. The signal is to the ECU.

Temp(oC)	Resistance (B-outer housing)
- 20±0.1	13.71~16.94
25±0.1	1.825~2.155
80±0.1	0.303~0.326
110±0.1	0.1383~0.1451

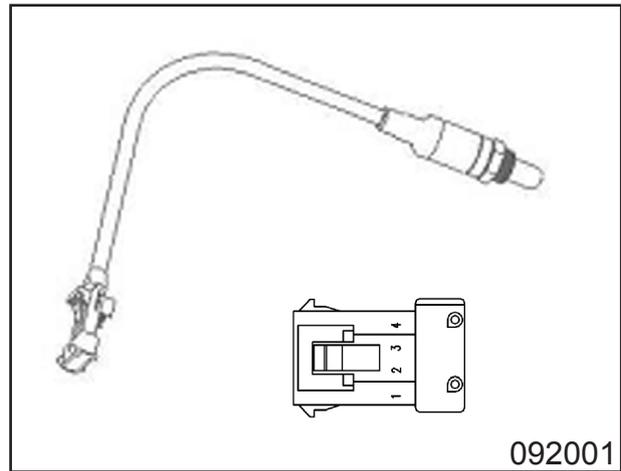
## 9.3.5.6 Oxygen Sensor

This sensor is used in closed-loop feedback-controlled fuel injection to improve the air-to-fuel ratio accuracy and control the emission.

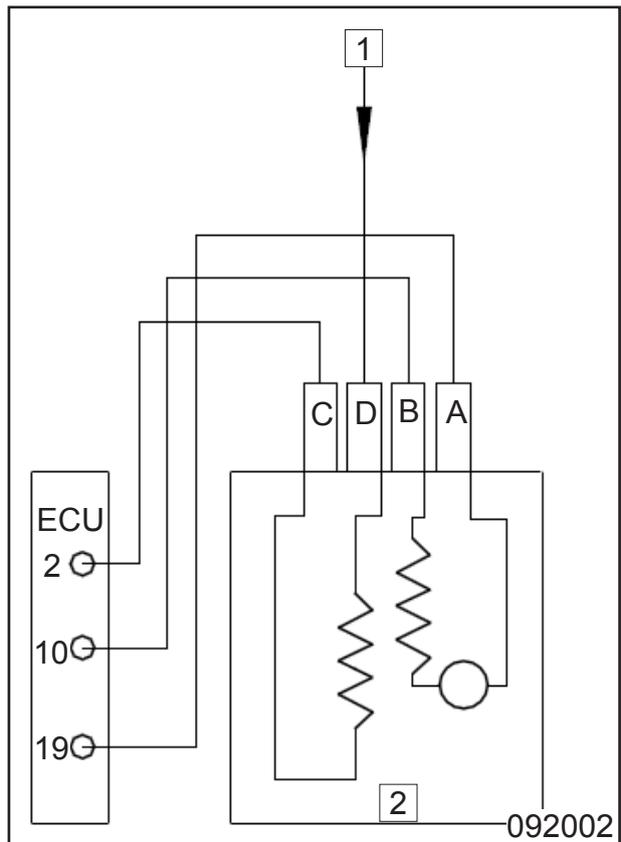
It's located in the exhaust stream to measure the amount of oxygen in exhaust and send the signal to ECU, which can revise the fuel injector output, so as to reduce the amounts of both unburnt fuel and oxides of nitrogen entering the atmosphere.

### Pins and Function

1. To heating power positive terminal (W)
2. To heating power negative terminal (W)
3. Output signal negative terminal (Gr)
4. Output signal positive terminal (B)



092001



092002

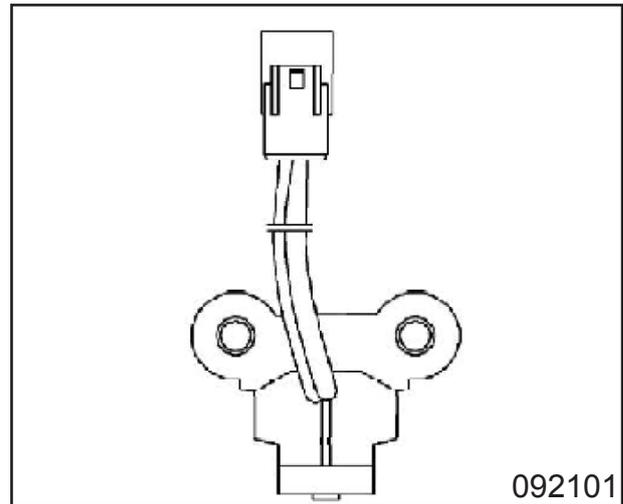
The following table explains the oxygen sensor working parameters.

1	From main relay	2	Oxygen sensor
---	-----------------	---	---------------

Parameter	New oxygen sensor		After 500 hours bench test	
"Exhaust temp. at a certain duty ratio" (°C)	350	850	350	850
"Sensor voltage (mV) when $\lambda=0.97$ ( $Co=1\%$ )"	840±70	710±70	840±80	710±70
"Sensor voltage (mV) when $\lambda=1.10$ "	20±50	55±30	20±50	40±40
Sensor inner resistance(kΩ)	≤1.0	≤0.1	≤1.5	≤0.3
"Response time(ms)(600mv-300mv)"	≤150	≤150	≤300	≤200
"Response time(ms)(300mv-600mv)"	≤150	≤150	≤300	≤200

## 9.3.5.7 Crankshaft Position Sensor (CPS)

Detects the rate at which the crankshaft is spinning and provides the signal for ECU to determine ignition and fuel injection.

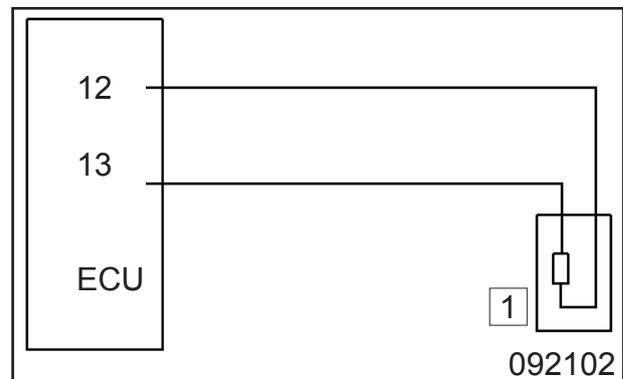


1 | CPS

CPS connects with ECU:

### CPS resistance measuring;

- Set the multimeter to  $1 \times 100k\Omega$   
CPS coil resistance:  $100\Omega \sim 160\Omega (20^\circ C)$
- If the CPS resistance reading is out of specification above, replace it.



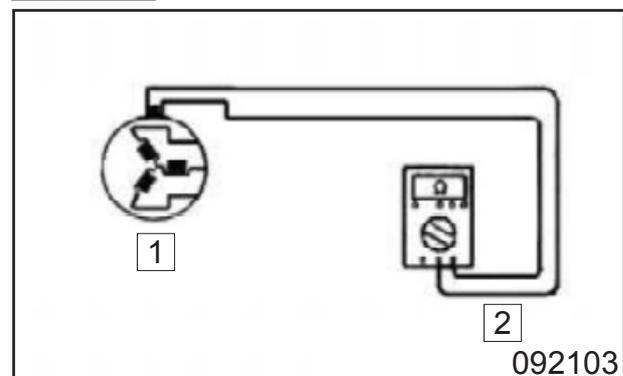
1 | CPS

### Test CPS Peak Voltage

- Connect multimeter and peak voltage adapter as right wiring diagram illustrates;
- + : Green (B) Lead
- : Blue (A) Lead

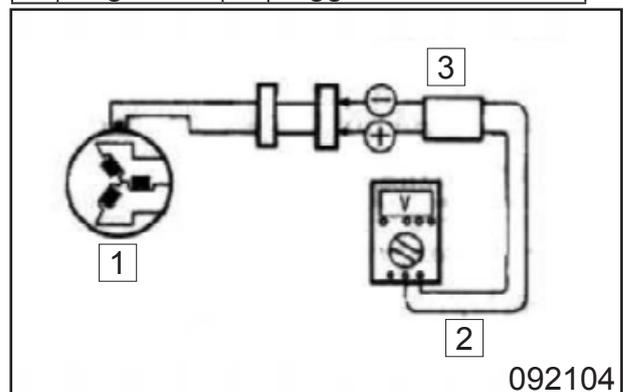
**⚠ NOTE:**

**When using peak voltage adapter, refer to Owner's Manual.**



1 | Magneto    2 | Trigger resistance

- Set multimeter to V(AC) range
- Place the transmission in N and turn the ignition switch to "ON",
- Push starter switch and allow the engine to run for seconds, then test CPS peak voltage
- Repeat above procedure and get the highest CPS peak voltage;  
CPS peak voltage:  $\geq 2V (300r/min)$
- If the CPS peak voltage reading is out of above specification, replace it.



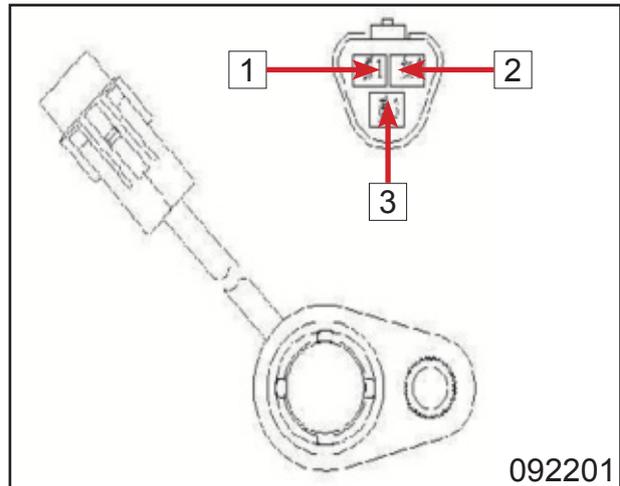
1 | Magneto    2 | Peak voltage meter    3 | P e a k voltage

## 9.3.5.8 Speed Sensor

This sensor is used to detect the rotating speed of the engine output shaft and provide the signal for ECU to determine the vehicle speed. It belongs to Hall effect sensor, that varies its output voltage in response to a magnetic field.

### Pins and Function

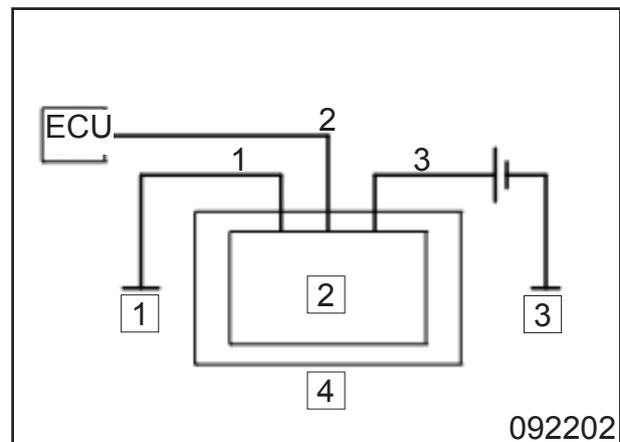
1. Ground (Black)
2. Power+DC12V (Red)
3. Output voltage signal (>80% input power voltage, yellow)



092201

Speed sensor

### Speed sensor connects with ECU:

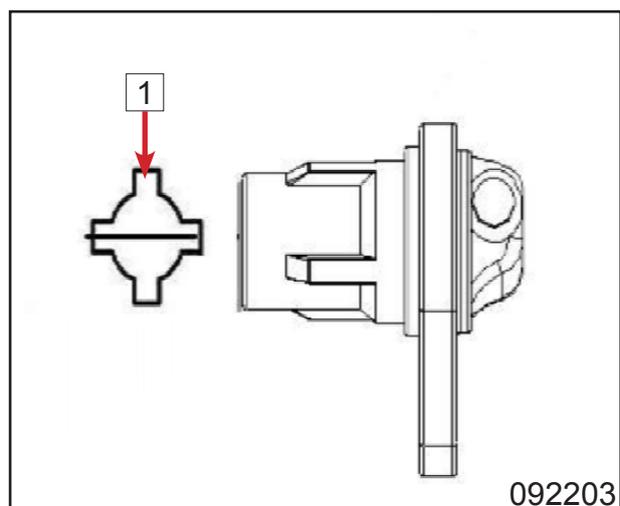


092202

### Speed sensor test

- Ground pin 1 and connect pin 3 with +12V power.
- Fix a gear 2.5mm away from a speed sensor as the right figure illustrates;
- Turn multimeter to DCV range
- Slowly turn the gear and measure the voltage between pin 2 and pin 3 to determine that if the reading varies from 0V~12V;
- If the reading doesn't vary, it indicates the sensor is defective and needs to be replaced.

1	Ground	3	+12V power
2	Hall switch	4	Speed sensor

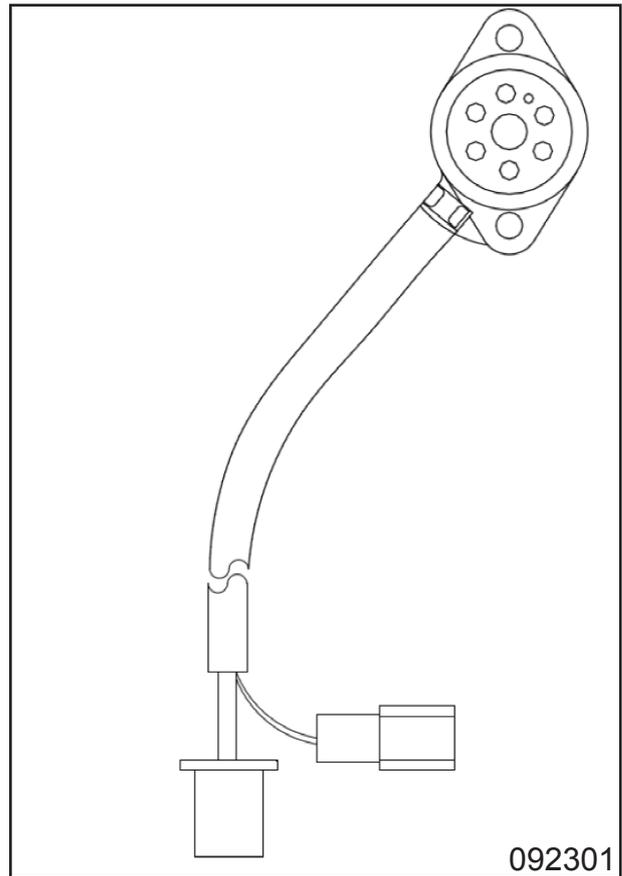


092203

1	Gear
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## 9.3.5.9 Gear Sensor

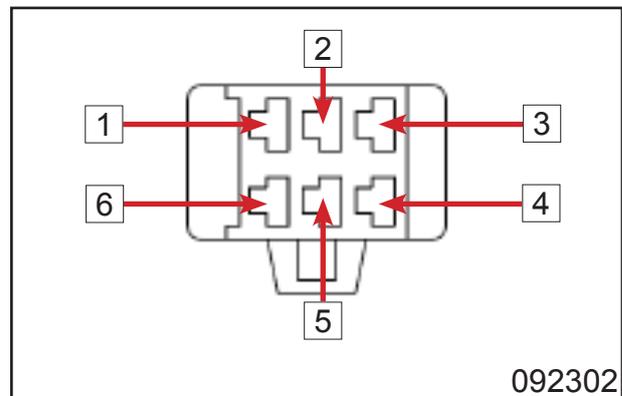
This sensor is used to provide the gear position signal for meter display.



092301

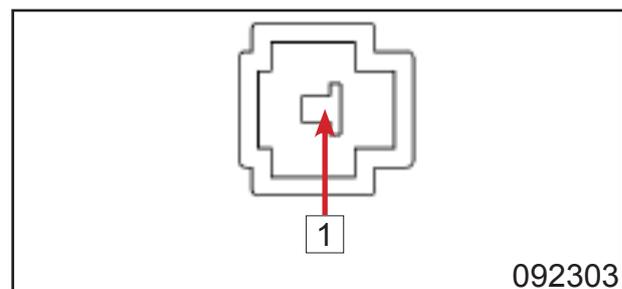
### Pins and Function:

White/Yellow(1st Gear)  
 Red/Black(2nd Gear)  
 Green/Blue(3rd Gear)  
 Yellow/Blue(4th Gear)  
 Brown/Red(5th Gear)  
 Green/Red(6th Gear)  
 Blue(Neutral)



092302

When each pin at a certain gear position, there is continuity between this pin and engine. Otherwise, no continuity.



092303

1 Neutral (Blue)

## 9.3.5.10 Fuel Pump

This fuel pump assembly includes fuel pump, plastic support, preliminary filter, fine filter and pressure regulator. It supplies fuel for engine under a certain pressure and flow.

### Pins and Function:

1. Ground (Blue)
2. To fuel pump relay output (Red)

### Parameters:

Pressure regulator opening pressure 0.33MPa±0.01MPa

Flow speed: more than 35L/h

- This fuel pump is located in fuel tank
- Don't operate the fuel pump in dry condition in order to prevent damage.
- Always handle the fuel pump gently. Never drop the fuel pump, especially on a hard surface. Such a shock to pump can damage it.

### Fuel Pressure Test

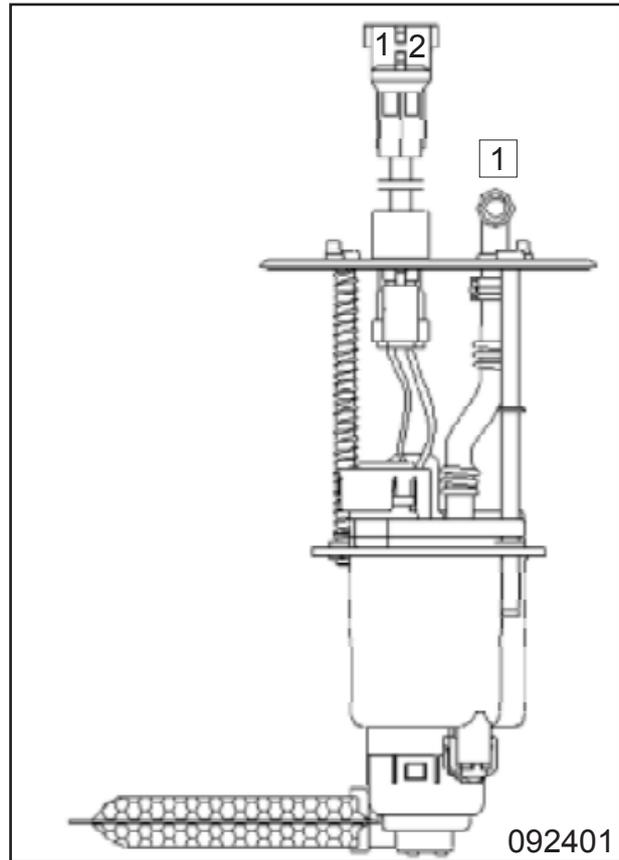
- Connect the fuel pressure gauge with fuel outlet and tighten the joint with a clamp to prevent fuel leaks;
- Route according to the right circuit
- Turn both ignition switch engine stop switch on;
- At this moment, fuel pump will operate for 5 seconds. After the fuel pump stops running, fuel pressure should be in specification, otherwise replace it;
- After the engine stops running, 0.25MPa fuel pressure should be kept for more than 5 minutes, otherwise replace the fuel pump;

### Pressure Relief in Fuel System:

In an EFI model, the pressure in fuel system is very high, so all the line is high pressure resistant. Even though the engine is not started, the pressure in fuel system remains high. Therefore, it's not recommended to remove fuel lines before pressure relief.

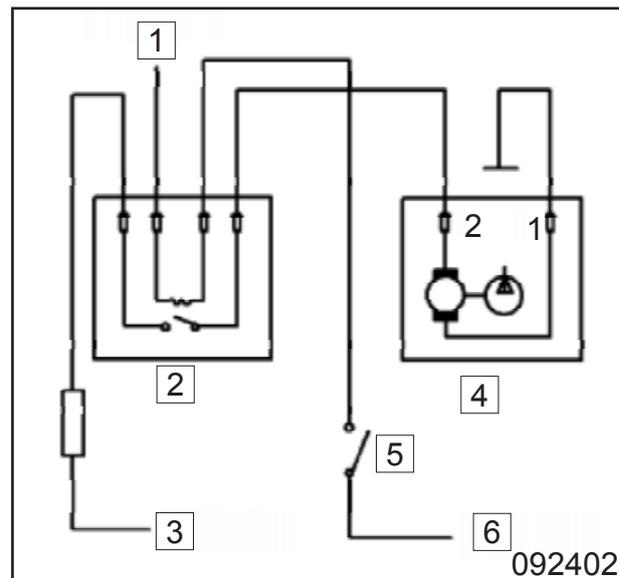
Follow the procedure below to perform pressure relief:

Remove fuel pump relay. Start the engine and allow it to idle until the engine stops automatically.



Fuel pump

- |   |                  |
|---|------------------|
| 1 | Fuel outlet port |
|---|------------------|



1	Connect with ECU pin 46	3	Positive terminal, battery	5	Engine stop switch
2	Fuel pump relay	4	Fuel pump assembly	6	Ignition switch

## 9.3.5.11 Fuel Injector

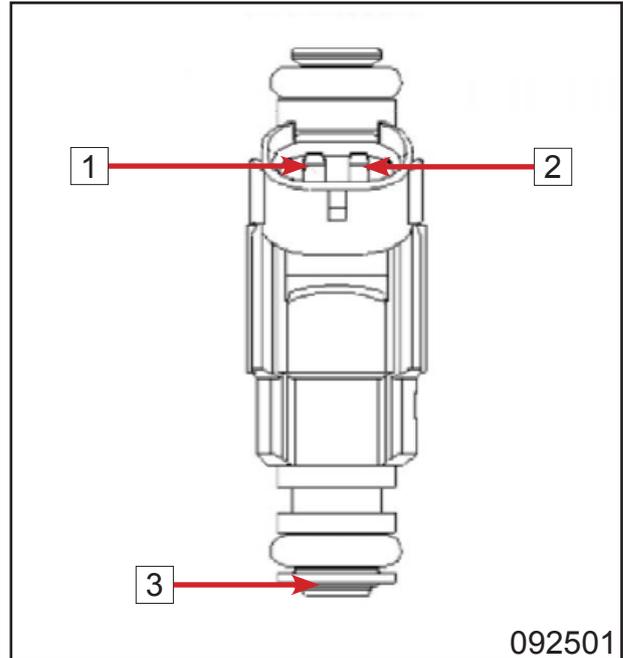
One end of fuel injector mounts into fuel injector seat, and the other end attaches to the injector cap, which connects with a fuel line. Fuel injector is controlled by ECU to inject fuel at stated time into the engine. This injector nozzle is a 4-hole style. Don't turn injector after the joint between injector and injector cap is installed.

### Pins and Function

+ connects with fuel pump relay output terminal

- connects with ECU pin 14

**Fuel Injector Resistance:  $12.5\Omega \pm 1\Omega (20^\circ\text{C})$**



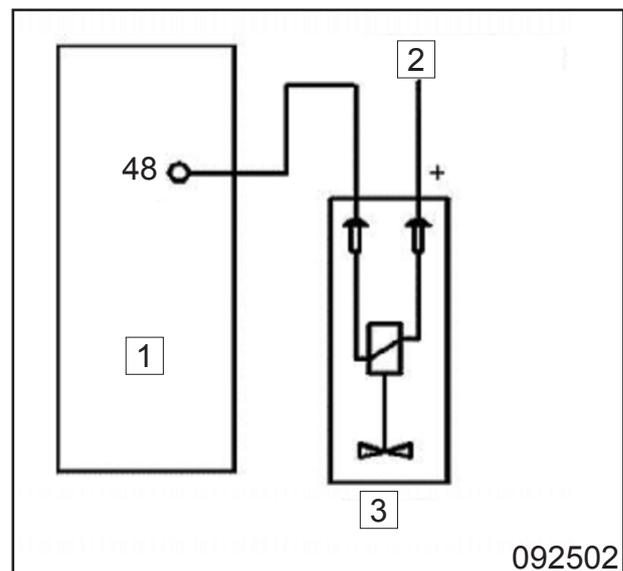
092501

1	+ connects with fuel pump relay	2	- connects with ECU	3	connects with injector seat
---	---------------------------------	---	---------------------	---	-----------------------------

### Fuel injector connects with ECU:

#### Fuel Injector Installation:

- Install fuel injector manually. Never knock fuel injector with a hammer.
- When removing and installing fuel injector, the o-rings on both ends must be replaced;
- Perform pressure relief before fuel injector removal if necessary;
- Test the fuel injector sealing after installation to ensure no leaks.



092502

1	ECU	2	Connects with fuel pump relay	3	Injector
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## 9.3.5.12 Idle Air Control Valve

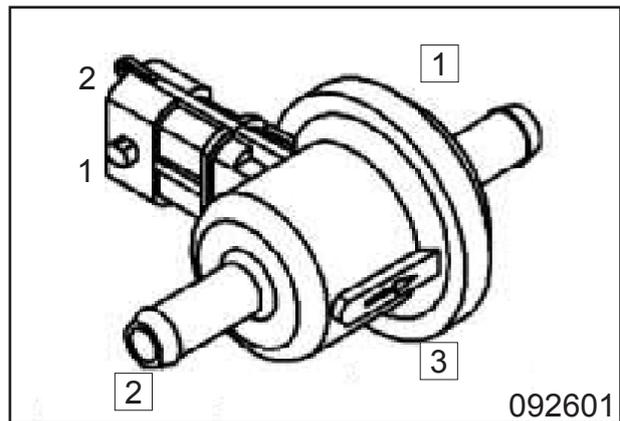
IACV is used to control the air flow of bypass. ECU calculates the engine load and controls IACV through electrical pulse duration and frequency (commonly known as duty ratio). IACV allows different air flows passed through under different pressure. Therefore, it should be connected properly. Otherwise, idle speed may be incorrect. When there is no electrical pulse, IACV would be closed.

### Pin function

1. Connect with ECU pin 46
2. Connect with fuel pump relay output terminal

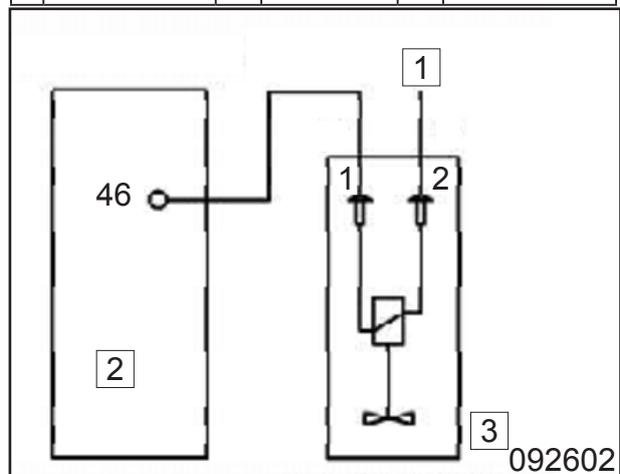
IACV connects with ECU:

- To avoid electronic component damages, please do not plummet the connector as right diagram when fixing the IACV.
- To avoid solid-borne sound transmission you can install the IACV suspended in the tube, or fix it on engine or frame by rubber boot.



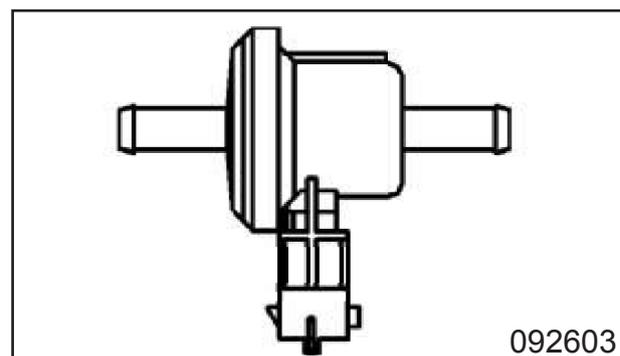
092601

1	Throttle body	2	Connect with air filter	3	Air flow direction
---	---------------	---	-------------------------	---	--------------------



092602

1	Connect with fuel pump relay output terminal	2	ECU	3	IACV
---	--	---	-----	---	------



092603

### Idle Air Control Valve Parameters:

Wrong installation

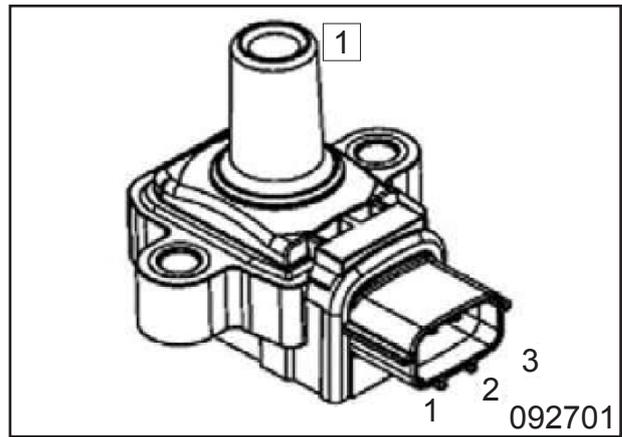
Item	Value			Unit
	Min	Standard	Max	
Rated voltage		13.5		V
Resistance ( + 20°C )		16		Ω
Rated current		0.85		A
Control Pulse Frequency			30	Hz
Standard Control Pulse Width		≈ 8		ms
Air Flow(When pressure difference = 700mbar, duty ratio=100%)		5		m <sup>3</sup> /h

## 9.3.5.13 Ignition Coil

Ignition coil transforms the low voltage of primary coil to high voltage of secondary coil needed to spark the spark plug and ignite the mixture of air and fuel in cylinder.

### Pins and Function:

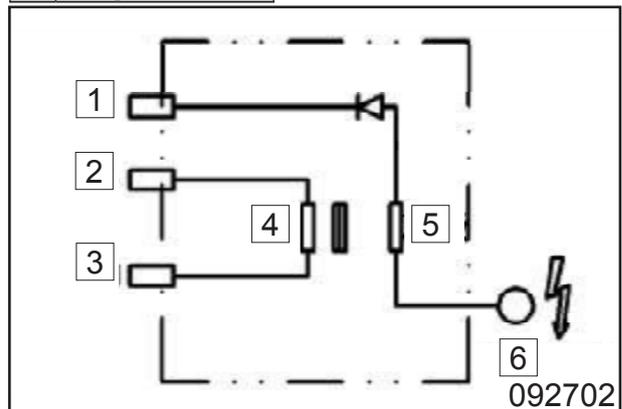
- 1. Ground;
- 2. Power +;
- 3. ECU pin 3



Ignition coil

1 To ignition line

Ignition coil connects with ECU:

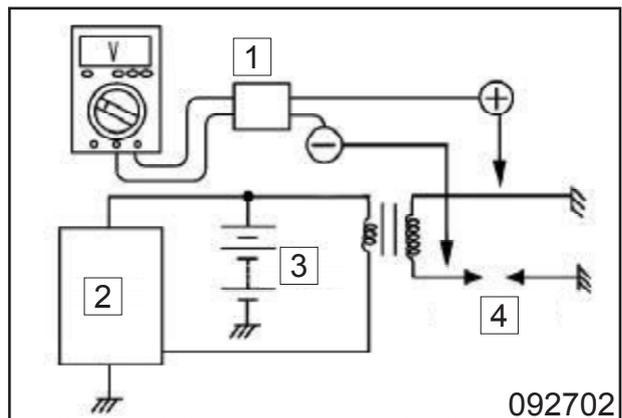


Ignition coil

1	Ground	3	ECU pin 1	5	Secondary
2	Power +	4	Primary	6	H i g h v o l t a g e o u t p u t

### Secondary Ignition Voltage Test:

- Connect the engine according to EFI wiring diagram;
- Connect the peak voltage tester according to the right diagram;
- Start the engine
- Secondary ignition voltage should be >15000V.



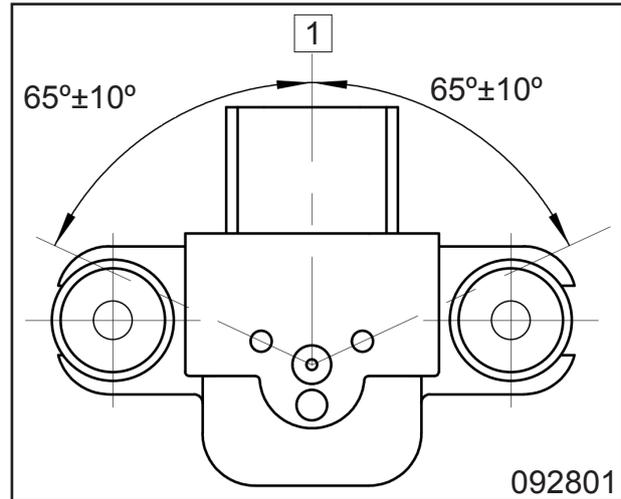
1	Peak voltage meter	3	Battery
2	ECU	4	Spark plug

### Ignition Coil Parameters

Item	Value			Unit	
	Min	Standard	Max		
Stated Voltage		14		V	
Operating Voltage	6		16.5	V	
"Resistance (20°C~25°C)	Primary Winding Resistance	0.74	0.7	0.78	Ω
	Secondary Winding Resistance	10.1	10.6	11.1	kΩ
Primary Current		7		A	

## 9.3.5.14 Roll-over Sensor

Roll-over sensor is used for preventing vehicle from tilting. When vehicle's tilt angle is larger than setted tilt angle, an "OUT" signal will be transferred to ECU. ECU will stop the engine.



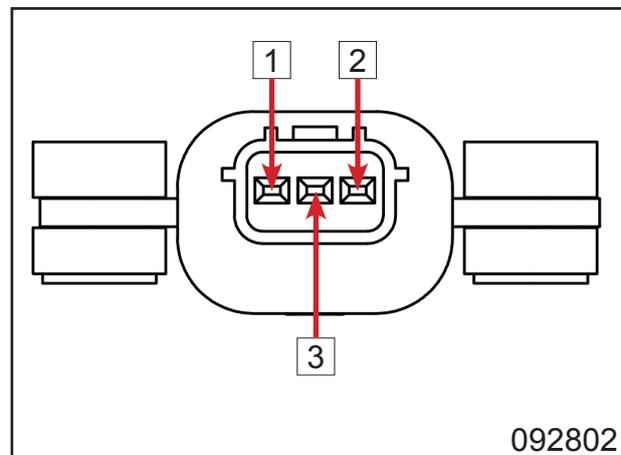
1 Tilt Angle

Pin function:

VCC: connect with +DC12V

OUT: connect with ECU pin 38

GND: Connect with ground



1 VCC 2 GND 3 OUT

## 9.3.6 EFI Self-Diagnosis

ECU constantly monitors sensors,actuators,circuits,MIL and battery voltage,etc,even itself. It also tests sensors output signal,actuator drive signal and inner signal(such as closed-loop control,coolant temp. signal, idle speed control and battery voltage control,etc for reliability ).If any malfunction or suspectable signal found, ECU would record the fault information in RAM.

Fault information comes in form of fault codes,which are then displayed on PDA, in sequence of which fault comes first.

Fualt can be divided into "steady fault"and "occasional fault"(such as a fault caused by harness short or loose connection.)

PDA or MIL can be used to locate the part in trouble immediately after fault happens.

### 9.3.6.1 MIL

MIL is a light-emitting diode and located on instrument panel.

It indicates different fault codes through the flashes in different frequency.

**MIL Circuit: The current in pin to, ECU pin 4 should be less than 0.5A.**

**MIL Flash Principles:**

**a: In flashing mode and no trouble in memory**

If the ECU shows MIL on flashing mode. The MIL indicator will flashing to shows the trouble in memory. MIL keeps on since the ECU format. If MIL keeps on for 4s, stop for 1s and then flash with 2Hz. And after 1 second interval, MIL flashes in 2 Hz flash frequency. It indicates trouble-free until engine start.

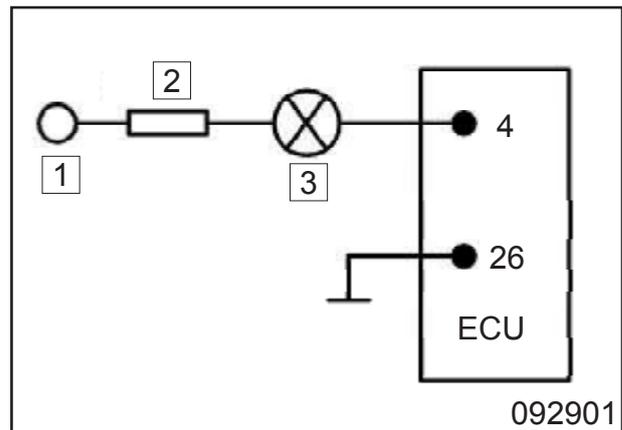
**b. In flash code model, trouble faulted in Trouble memory.**

When ECU monitors MIL in flash code model, MIL flashes to indicate a fault code according to the fault P-code from Trouble memory. From the beginning of ECU ignition, MIL lights up for 4 seconds. And after 1 second interval, MIL flashes to indicate P-code of memory. MIL lights up until exit the flash code model after indicate all of fault code entered into memory. Flash code model requires that cable K to ground.

**c. Read the troubles by flash code.**

Turn the ignition on, and K line to ground after 2.5 seconds. If ECU Trouble memory has fault code, the output code of engine MIL means P-code.

Take fault code P0203 for example: MIL lights flashes for 10 times-Interval- - flashes for 2 times-Interval- flashes for 10 times-Interval-flashes for 3 times.



1	+ 12V power	2	Limit resistance	3	Light diode
---	-------------	---	------------------	---	-------------

## 9.3.6.2 P D A

PDA has 3 pins, power, ground wire and data cable K. These pins are connected with related ECU pins. The right photo refers to operation panel of PDA. When it comes to detailed keys function, refer to PDA manual.

### Key function:

**LH Key:** Page up

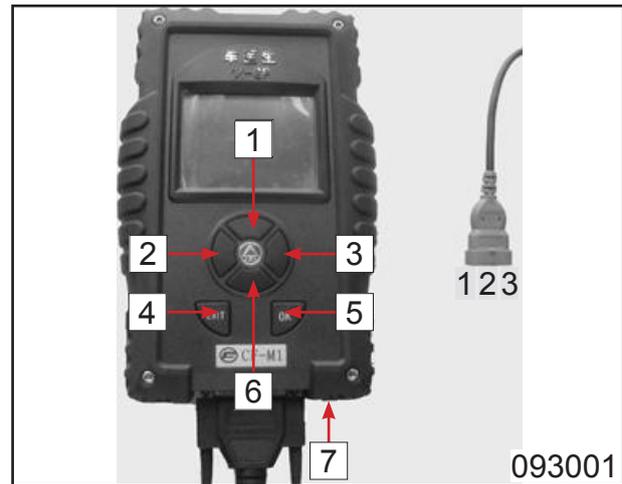
**UP Key:** Scroll Up

**RH Key:** Page Down

**Down Key:** Scroll Down

**OK Key:** Entrance

**EXIT Key:** Exit



1	UP Key	4	EXIT Key	7	Power switch
2	LH Key	5	OK Key		
3	RH Key	6	Down Key		

### Pins and Function:

1.Connect with ECU pin 34

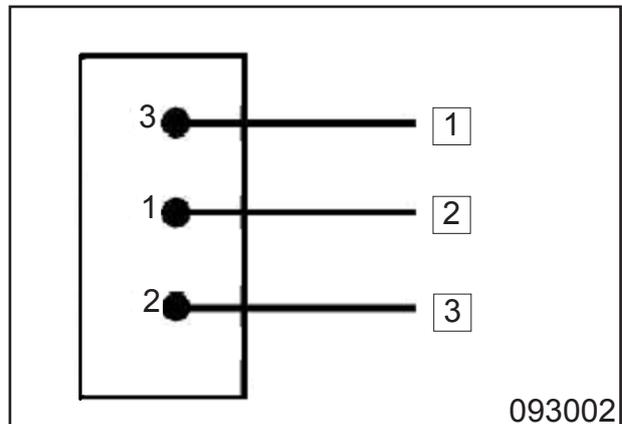
2.Ground

3.+12V power

### PDA Function:

#### (A) Version Information Display

PDA can display engine,ECU hardware and soft ware information.



1	+12V power	2	ECU pin 34	3	Ground
---	------------	---	------------	---	--------

#### (B) Fault Display

PDA monitors IAP sensor,IAT sensor,coolant temperature sensor,TPS,O2S,O2S heater circuit,air-to-fuel ratio revision,fuel injector,fuel pump relay,CPS,speed signal,idle speed,idle air control valve,system voltage, ECU,FI indicator and displays the fault code.

#### (C) Engine Data stream Display

PDA can display battery voltage,RPM,desired idle speed,vehicle speed,coolant temperature,coolant temperature sensor signal voltage,inlet air temperature,IAT sensor signal voltage,inlet air pressure,inlet air flow, IACV target position,TPS signal voltage,throttle body position,throttle body relative position,canister duty, charging time,FI pulse width,park advance angle,O2S voltage,engine relative load,canister load, IACV position,atmospheric pressure,altitude multiplier,engine operation time.

#### (D) EFI Status Display

Starter switch,main relay,fuel pump relay,idle speed,idle speed,full load status,deceleration activation, acceleration activation,FI close loop activation,lambd control activation,canister control valve activation, MIL status.

#### (E) Actuator Test Function

MIL, fuel pump, IACV, canister control valve,ignition,fuel injection.

**9.3.6.3 Fault Code Table**

<b>REF NO.</b>	<b>Fault code</b>	<b>Instruction</b>
1	P0030	Oxygen sensor heating control circuit open
2	P0031	Oxygen sensor heating control circuit short to ground
3	P0032	Oxygen sensor heating control circuit short to battery
4	P0107	Intake air pressure sensor short to ground
5	P0108	Intake air pressure sensor short to battery
6	P0112	Intake air temp.sensor low voltage
7	P0113	Intake air temp.sensor high voltage
8	P0117	Engine water temp.sensro circuit voltage too low
9	P0118	Engine water temp.sensro circuit voltage too high
10	P0122	TPS circuit voltage lower than min.voltage
11	P0123	TPS circuit voltage higher than max. voltage
12	P0130	Oxygen sensor singal improper
13	P0131	Oxygen sensor circuit voltage too low
14	P0132	Oxygen sensor circuit voltage too high
15	P0134	Oxygen sensor signal malfunction
16	P0201	Injector control circuit open
17	P0261	Injector control circuit short to ground
18	P0262	Injector control circuit short to battery
19	P0321	RPM signal reference point malfunction
20	P0322	No pick-up(speed) pulse signal (open or short)
21	P0501	Speed sensor singal improper
22	P0560	Battery voltage signal improper
23	P0562	Battery voltage too low
24	P0563	Battery voltage too high
25	P0627	Fuel pump relay control circuit open
26	P0628	Fuel pump relay control circuit short to ground
27	P0629	Fuel pump relay control circuit short to battery
28	P0650	MIL circuit malfunction
29	P0691	Fan control circuit short to ground
30	P0692	Fan control circuit short to battery

# 10 Lights, Dashboard and Switches

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10.1.2 Standard Value .....	10-1
10.2 Headlight .....	10-2
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## 10.1 Maintenance Information

### 10.1.1 Operation Instructions

**⚠ Warning:**

- If the inspection should be done with battery, then check if the battery is normal first;
- Inspection of switch continuity can be done without removing the switches from the vehicle;
- After the inspecting and overhauling of each part, cables and wires should be routed properly

### 10.1.2 Standard Value

		Item	Standard
Fuse		Main Fuse	30A
		Auxiliary Fuse	10A×2, 15A×4
Lights		Headlight (High-beam/Low-beam/Position Light)	LED 12V 11W/7.5W/2.7W
		Front/Rear Turning Light	LED 13.5V 1.5W
		Brake Light/Tail Light	LED 12V 4W/0.5W
		License Light	LED 12V 0.2W

## 10.2 Headlight

### Removal

Remove bolt (1);

Remove screw (2);

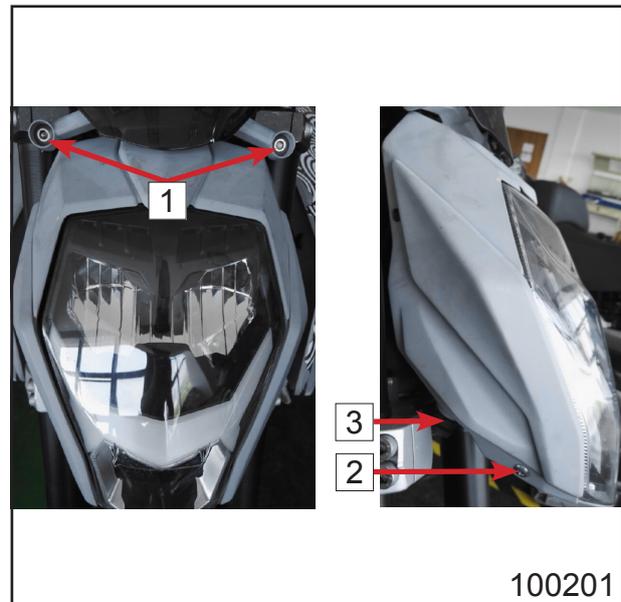
Disconnect the connector between headlight assembly cable and main cable;

Pull out headlight assembly from rubber sleeve;

**⚠ Note: In the process of pulling out, please be gentle to prevent mushroom head broken.**

### Installation

Reverse the removal procedures for installation.



### 10.2.1 Troubleshooting

Headlight cannot turn on, no reaction on Hi/Lo switch

#### Possible causes:

- Blown fuse
- Switch damaged
- Burnt bulb
- Battery bad connection or no battery power
- Wire connector loosen

## 10.3 Dashboard - Low configuration

### Removal

Remove front bolt of headlight assembly.

Remove front nut (2) of dashboard bracket.

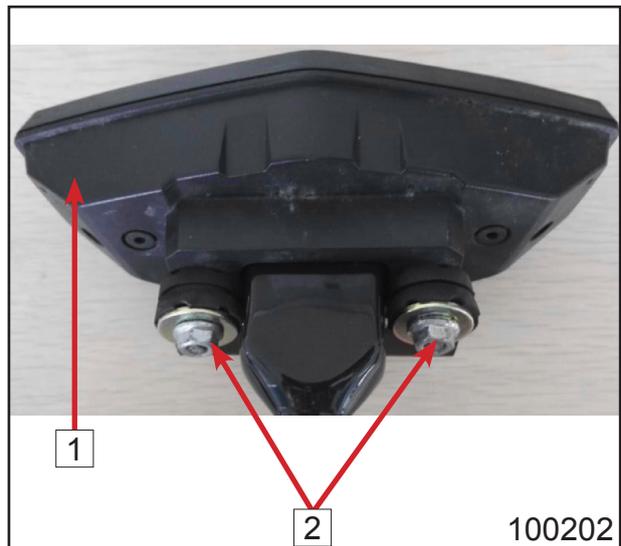
Disconnect the connector between dashboard cable and main cable.

Take out the bracket from dashboard (1).

### Installation

Reverse the removal procedures for installation.

**⚠ Note: Replace a new part if there is any abnormal situation.**



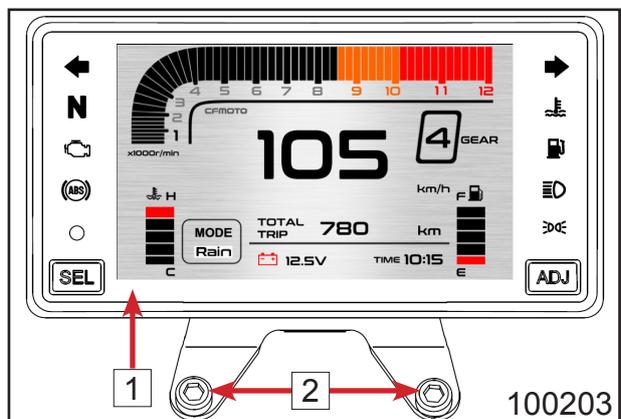
## 10.4 Dashboard - High configuration

### Removal

Remove front bolt of headlight assembly.

Remove four bolts and press cover of handlebar.

Remove two nut (2) of dashboard bracket.



# 10 Lights, Dashboard and Switches

Disconnect the connector between dashboard cable and main cable.  
Take out dashboard (1).

## Installation

Reverse the removal procedures for installation.

**⚠️ Note: Replace a new part if there is any abnormal situation.**

## 10.5 Turning Light

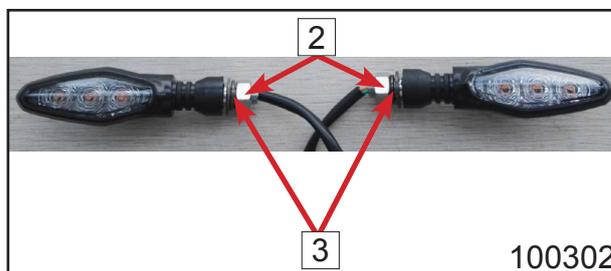
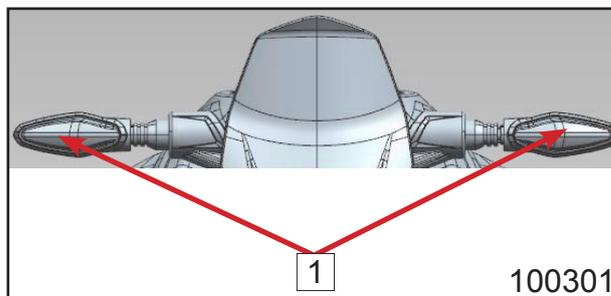
### Removal

Remove nut (2) and washer (3).  
Disconnect the connector between turning light cable and main cable.  
Remove turning light (1).

### Installation

Reverse the removal procedures for installation.

**⚠️ Note: The turning lights are an LED structure, which cannot be repaired if damaged or failed. The entire assembly must be replaced.**



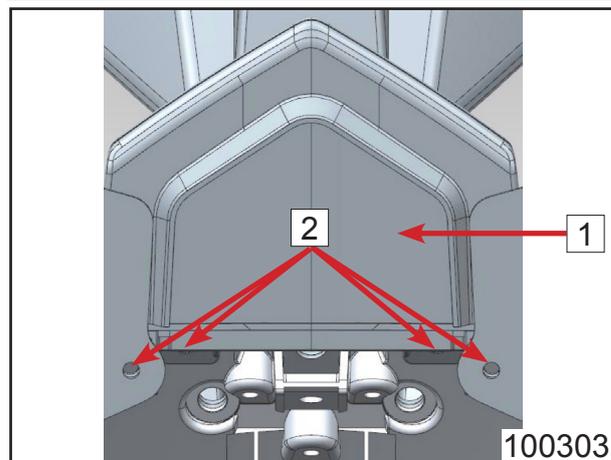
## 10.6 Tail Light/Brake Light

### Removal

Open the rear seat.  
Remove screw (2).  
Remove rear deco plate.  
Disconnect the connector between tail light cable and main cable.  
Remove tail light (1).

### Installation

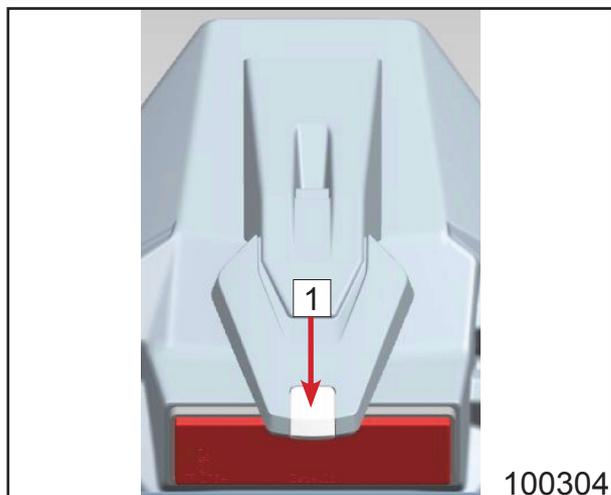
Reverse the removal procedures for installation.



## 10.7 Rear License Light

### Removal

Take out rear license light seat from the side of rear wheel.  
Remove rear license light (1).  
Check the license light for damage.  
Replace a new part if damaged.  
Rear license light bulb: LED



1 License Light

## 10.8 Ignition Switch

### Removal

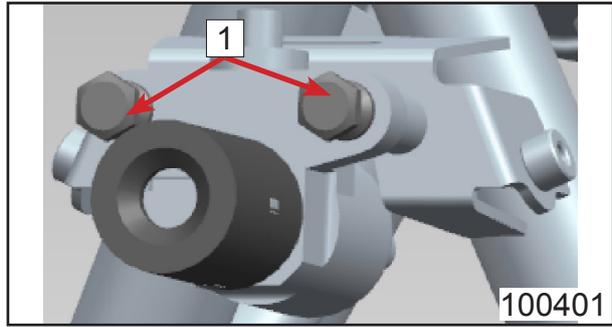
Remove two bolts (1).  
Disconnect the connector between ignition switch cable and main cable;

### Installation

Reverse the removal procedures for installation.

### Inspection

Check the connection among all cables.



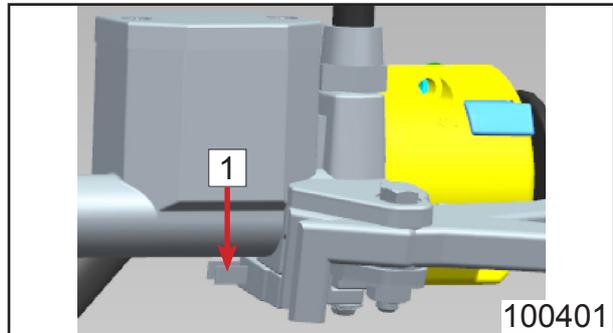
Ignition switch			
Gear/Color	Red	Black	Can the lock column be extended
	●	●	No
			No
			Yes

## 10.9 Front Brake Switch

Check the connection of front brake switch connector.

Check front brake switch (1).

- 1) Apply front brake switch: brake light is on.
- 2) Release front brake switch: brake light is off.



## 10.10 Rear Brake Switch

Check the connector connection between rear brake switch cable and main cable.

Check rear brake switch (1).

- 1) Apply rear brake switch: brake light is on.
- 2) Release rear brake switch: brake light is off.



# 10 Lights, Dashboard and Switches

## 10.11 Handlebar Switch, LH

Disconnect the connector between left handlebar switch cable and main cable. Check each switch.

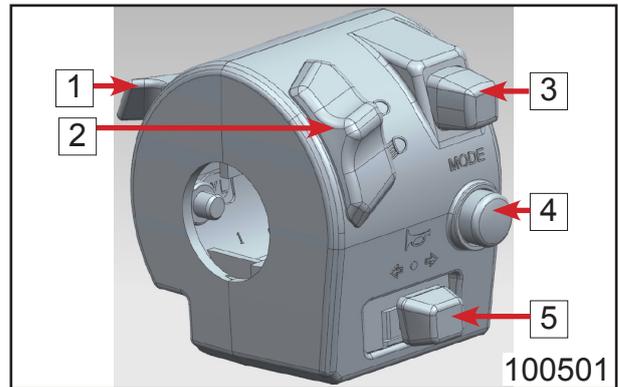
Turning light					
Color/function	O	Gr	SB	Br	G
MODE	●	●		●	●
MODE		●	●	●	●

Dimmer switch					
Color/function	W/L	L	W	Br	G
	●	●		●	●
	●		●	●	●

Mode button				
Color/function	Gr/W	G	Br	G
MODE	●	●	●	●
MODE			●	●

Horn button				
Color/function	B/Br	LG	Br	G
	●	●	●	●

Override button				
Color/function	B/Br	L	Br	G
	●	●	●	●



1	Override button	2	Hi/lo beam light switch	3	Mode button
4	Horn button	5	Turning light switch		

## 10.12 Handlebar Switch, RH

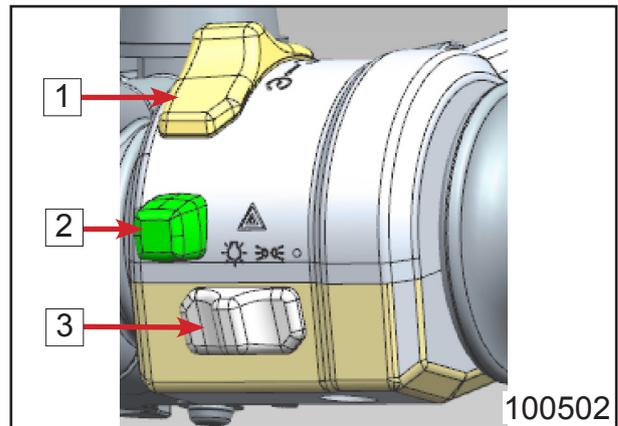
Disconnect the connector between right handlebar switch cable and main cable. Check each switch.

Light switch					
Color/function	Br	W/G	W/L	Br	G
●				●	●
	●	●		●	●
	●	●	●	●	●

Alarm button					
Color/function	O	Gr	SB	Br	G
	●	●	●	●	●
				●	●

Engine stop switch				
Color/function	Br/B	B/Br	Br	G
			●	●
	●	●	●	●

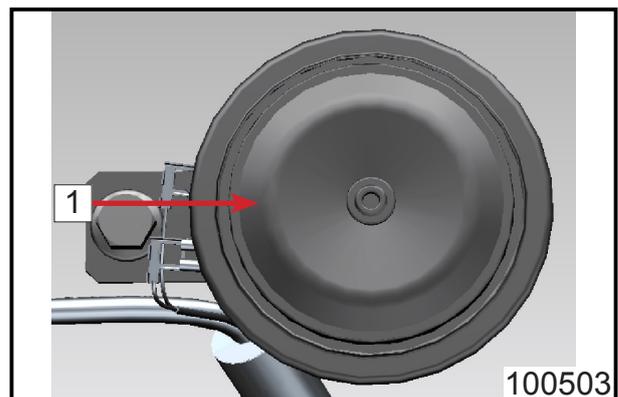
Starter switch				
Color/function	Br/B	Y/R	Br	G
	●	●	●	●



1	Engine stop/Starter switch	2	Alarm switch
3	Position light/headlight switch		

## 10.13 Horn

Disconnect the connector between horn cable and main cable, connect with 12V battery and check if the horn can make sounds dumb, replace the horn with a new one. If sounds bad, turn the adjusting screw to adjust the sound quality.



## 10.14 Fuel Level Sensor

### Removal

Remove the fuel tank from frame.  
 Remove four nut (1) of fuel level sensor.  
 Remove fuel level sensor (2) front fuel tank.

### Installation

Reverse the removal procedures for installation.

### Inspection

Replace a new seal of fuel sensor if it is buckled, damaged or sclerotic.  
 Inspect fuel sensor's resistance when it is at high and low point:

Inspect fuel sensor's resistance when it is at high and low point:

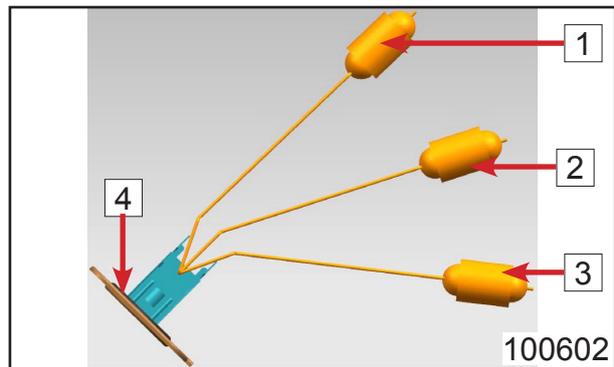
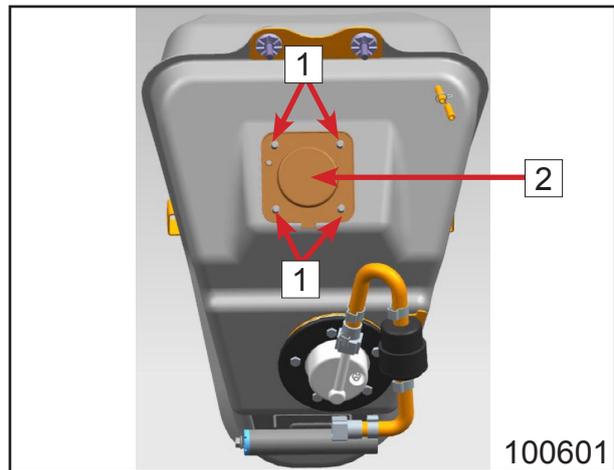
1) High Point:  $4\Omega \sim 10\Omega$

2) Low Point:  $90\Omega \sim 100\Omega$

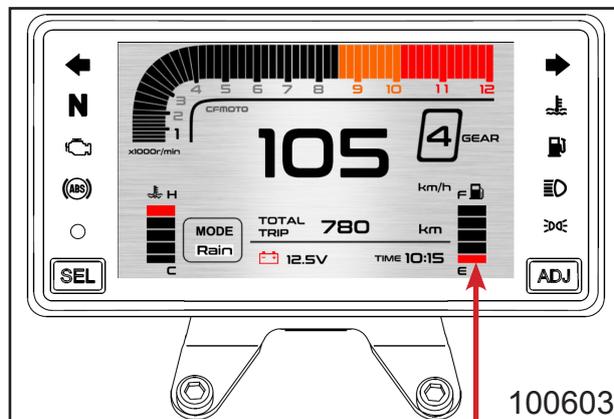
Connect fuel level sensor with main cable.  
 Turn on ignition switch. Swing the floater slowly, and check the needle on the fuel gauge:

(1) If the needle can not reach to F or E point, inspect or replace a new fuel sensor or gauge.

(2) If the needle swings instability, inspect or replace a new fuel sensor.

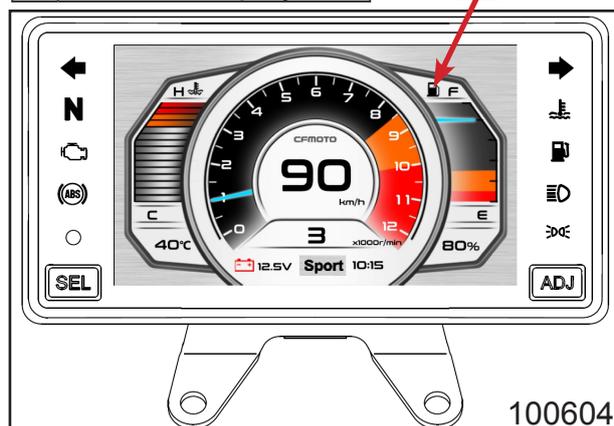


1	High Point	2	Middle Point	3	Low Point
4	Seal ring				



1 Rest fuel display

**⚠ Caution:**  
 There should be no fuel leakage after fuel level sensor installed.



11.1 Engine Body.....	11-2
11.2 Diagnose In Accordance With Engine Error .....	11-4

## 11.1 Engine Body

Trouble	Reason	Solution
High RPM unstable	1. Valve spring getting weak	Replace
	2. Camshaft weak	Replace
	3. Spark plug dirty	Clean or replace
	4. Spark plug gap too narrow	Adjust or replace
	5. Valve timing incorrect	Adjust
	6. Ignition coil failure	Replace
	7. Air filter too dirty	Clean or replace
	8. Fuel injector blocked	Replace
	9. Clutch wear	Replace
	10. Air inlet pipe leaks	Tighten or replace
Blue or black exhaust gas	1. Too much lubricant	Check oil level and drain the excessive oil
	2. Piston ring worn	Replace
	3. Valve guide pipe worn	Replace
	4. Cylinder worn or scraped	Replace
	5. Valve stem worn	Replace
	6. Oil seal of valve stem damaged	Replace
Engine power is not enough	1. Improper valve clearance	Adjust
	2. Valve spring getting weak	Replace
	3. Valve timing incorrect	Adjust
	4. Cylinder worn	Replace
	5. Piston ring worn	Replace
	6. Improper valve seat	Repair or replace
	7. Spark plug dirty	Clean or replace
	8. Improper spark plug gap	Clean or replace
	9. Injector blocked	Replace
	10. Insufficient pressure of oil pump	Clean or replace
	11. Rocker arm or camshaft worn	Replace
	12. Air leakage of inlet pipe	Tighten or replace
	13. Too much lubricant	Check oil level and drain the excessive oil
	14. Bad quality of fuel	Replace
	15. Too much or small clearance of trigger	Adjust
	16. Clutch wear	Replace
	17. Carbon deposit in combustion chamber	Clean
Engine Overheating	1. Carbon deposit in combustion chamber	Clean
	2. Engine oil is too less or too much	Check drain or fill
	3. Oil hose blocked	Clean
	4. Air leakage of inlet pipe	Tighten or replace
	5. Incorrect valve timing	Adjust
	6. Too much or small clearance of trigger	Adjust

# 11 Troubleshooting

Trouble	Reason	Solution	
Engine noise	Cylinder head noise	1. Valve clearance is too big	Adjust
		2. Valve spring wear	Replace
		3. Valve camshaft wear	Replace
		4. Valve sear ring wear	Replace
		5. Camshaft wear	Replace
	Piston abnormal noise	1. Piston worn	Replace
		2. Cylinder worn	Replace
		3. Carbon deposit inside combustion chamber	Clean
		4. Piston pin or pin hole worn	Replace
		5. Piston ring or groove worn	Replace
		6. Bad fuel quality	Replace fuel
		7. Incorrect valve timing	Adjust
	Timing chain abnormal noise	1. Chain stretched out	Replace
		2. Chain sprocket worn	Replace
		3. Tensioner failure	Repair or replace
		4. Chain tension plate damaged	Replace
		5. Chain guide plate wear	Replace
	Crankshaft abnormal noise	1. Bearing wear	Replace
		2. Crankshaft pin bearing wear	Replace
		3. Clearance is too big	Replace
Clutch abnormal noise	1. Clutch gear worn or damaged	Replace	
	2. Cushion rubber aging or damaged	Replace	
	3. Pad wear	Replace	
	4. Clutch rivet loosen	Replace	
Gear abnormal noise	1. Gear worn or damaged	Replace	
	2. Too much or too less gear clearance	Replace	
	3. Main shaft or secondary shaft wear	Replace	
	4. Bearing wear	Replace	

## Ignition system:

Trouble	Reason	Solution
No spark or spark too weak	1. Ignition fault	Replace
	2. Spark plug ablation	Replace
	3. Too much or less spark clearance	Adjust
	4. Carbon deposit of spark plug	Clean
	5. Magneto fault	Replace
	6. Battery voltage fail	Charge or replace
	7. Ignition coil fail	Replace
	8. Trigger coil fail	Replace
	9. Too much or less trigger clearance	Adjust
	10. Other wires fault	Inspect

## 11.2 Diagnose In Accordance With Engine Error

**Prior to diagnosing failures according to engine error, preliminarily inspection should be carried out:**

1. Make sure engine MIL works normally.
2. Connect PDA, make sure no error record exists.
3. Confirm there's really trouble existing complained by end-users.

**Then check the following points.**

- (1) Check fuel hoses if any fuel leakage;
- (2) Check vacuum pipes if any broken, twist or improper connection;
- (3) Check intake manifold if any blocked, air leakage or damaged;
- (4) Check high-tension cable if any damaged, aging; or ignition order is correct.
- (5) Check wiring close to ground if it's clean and firm;
- (6) Check connector of all sensors and actuator if any loose or improper connection.

**Note:** In case there're some problems as above-mentioned, then removal work should be done firstly, then go to next diagnosis.

Diagnosis helps:

1. Confirm engine without any trouble record;
2. Confirm there's really trouble existing;
3. During checking, do not neglect vehicle periodic maintenance, cylinder pressure, valve timing, fuel supply and so on;
4. Replace ECU to test.

In case trouble disappears, then it's a problem of ECU. If trouble still exists, then assemble original ECU and check other points.

Frequent troubles list:

- When starting engine, engine cannot rotate or rotate slowly.
- When starting engine, starter motor can rotate but cannot start engine.
- Difficult to start warm or hot engine
- Difficult to start cold engine
- RPM is ok, but difficult to start engine.
- Starting is ok, but idle speed is unstable at any time.
- Starting is ok, but idle speed is unstable during engine warm-up period.
- Starting is ok, but idle speed is unstable after engine warm-up.
- Starting is ok, idle speed is unstable or engine stop when switch on some lights or other electric components.
- Starting is ok, but too high idle speed.
- RPM cannot go up or engine stop when acceleration.
- Slow acceleration.
- Insufficient power and bad performance when acceleration.

## 1) Starting Failure/Hard Starting

**Possible defective parts: 1. Battery; 2. Starter motor; 3. Wirings harness or ignition switch; 4. Engine mechanism part.**

**General diagnosis procedures:**

Item	Procedures	Results	Next
1	Use multi-meter to check battery voltage if voltage is between 8~12V or not when engine starts.	YES	Next Step
		NO	Replace battery
2	Turn on ignition switch, engine stop switch, side stand switch and check the battery of if it is 12V.	YES	Next Step
		NO	Repair switches or change harness
3	Keep ignition switch "on", use multi-meter to check if voltage of starting motor anode is over 8V.	YES	Next Step
		NO	Repair switches or change harness
4	Disassemble starting motor and check its working status, especially whether there was broken circuit or jammed by bad lubrication.	YES	Repair or replace starting motor
		NO	Next Step
5	If error only occur in Winter, check if starting motor resistance is too big caused by improper oil used.	YES	Change to proper lubricant
		NO	Next Step
6	Check if mechanical resistance is too big inside engine.	YES	Check resistance inside engine
		NO	Repeat above procedures

## (2) When starting, engine can rotate but cannot start

**Possible defective parts: 1. No fuel; 2. Fuel pump; 3. Pick up; 4. Ignition coil; 5. Mechanical parts of engine**

**General diagnosis procedures:**

Item	Procedures	Results	Next
1	Connect fuel pressure gauge, turn on ignition switch or start engine, check if fuel pressure is around 300kPa.	YES	Next Step
		NO	Repair fuel supply system
2	Connect PDA, check if there's signal of RPM data after starting engine.	YES	Next Step
		NO	Check and repair RPM sensor circuit
3	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next Step
		NO	Check and repair ignition system
4	Test cylinder pressure and check if pressure is enough.	YES	Eliminate engine mechanical failures
		NO	Next step
5	Connect the EFI system connector and turn the ignition switch on. Check the pin 1 and 21 of the ECU to test the power supply. And test the pin 2 and 17 to see it is normal to the ground or not.	YES	Use PDA to check
		NO	Repair related circuit

### (3) Difficult to start hot engine

**General failure part:** 1. Water in fuel tank; 2. Fuel pump; 3. Water temperature sensor; 4. Ignition coil.

**General diagnosis procedures:**

Item	Procedures	Results	Next
1	Connect fuel pump gauge, start engine, check if pressure is around 300kPa.	YES	Next step
		NO	Repair fuel supply system
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Repair ignition system
3	Disconnect water temperature sensor connector and start engine to check if engine can start. (or use one 300ohm resistance to replace water temperature sensor).	YES	Repair wiring or replace sensor
		NO	Next step
4	Check whether the failure happens right after filling fuel oil.	YES	Change fuel
		NO	Next step
5	Connect PDA , turn on ignition switch, check if power supply of ECU pin 1 and pin 21 is normal; And test the pin 2 and 17 to see it is normal to the ground or not.	YES	Use PDA to check
		NO	Repair related circuit

### (4)Difficult to start cold engine.

**General failure part:** 1. Water in fuel tank; 2; Fuel pump; 3. Engine temperature sensor; 4. Injector; 5. Ignition coil; 6. Throttle body and by-pass; 7. Mechanical parts of engine

**General diagnosis procedures:**

Item	Procedures	Results	Next
1	Connect fuel pump gauge ,start engine, check if pressure is around 300kPa.	YES	Next step
		NO	Repair fuel supply system
2	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Repair ignition system
3	Disconnect water temperature sensor connector and start engine to check if engine can start.(or use one 2500ohm resistance to replace water temperature sensor).	YES	Repair circuit or replace sensor
		NO	Next step
4	Slightly draw throttle cable and check if engine could start easily.	YES	Clean throttle body and by-pass
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage or block.	YES	Replace injector
		NO	Next step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate engine mechanic failures
		NO	Next step

## (5) Difficult to start in any conditions.

**General failure part:** 1. Water in fuel tank; 2. Fuel pump; 3. Water temperature sensor; 4. Injector; 5. Ignition coil; 6. Throttle body and by-pass; 7. Air intake pipe; 8. Ignition timing; 9. Spark plug; 10. Mechanical part of engine.

### General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Repair air intake system
		NO	Next step
2	Connect fuel pump gauge, start engine, check if pressure is around 330kPa.	YES	Next step
		NO	Repair fuel supply system
3	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if blue and white spark appears.	YES	Next step
		NO	Repair ignition system
4	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next step
		NO	Adjust or replace
5	Disconnect water temperature sensor connector and start engine to check if engine can start.	YES	Repair circuit or replace sensor
		NO	Next step
6	Slightly draw throttle cable and check if engine could start easily.	YES	Clean throttle body and bypass
		NO	Next step
7	Disassemble injector and use special tool to check if there is leakage or blocked.	YES	Replace injector
		NO	Next step
8	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
9	Check if cylinder pressure is insufficient.	YES	Eliminate mechanical failures
		NO	Next step

## (6) Normal starting, but unstable idle speed

**General failure part:** 1. Water in fuel tank; 2. Injector; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Ignition timing; 8. Spark plug; 9. Mechanism

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks.	YES	Repair air intake system
		NO	Next step
2	Check if air control valve is blocked.	YES	Clean or replace
		NO	Next step
3	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next step
		NO	Adjust or replace
4	Check if there is carbon deposit inside throttle body and air control valve.	YES	Clean
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate mechanical failures
		NO	Next step

# CFMOTO

8	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Repair ignition timing

## (7) Normal starting, but unstable idle speed during engine warming

**General failure part:** 1. Water in fuel tank; 2. Injector; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Mechanical part of engine

### General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks	YES	Repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement (including its type and clearance)	YES	Next step
		NO	Adjust or replace
3	Check if there is carbon deposit inside throttle body and air control valve	YES	Clean
		NO	Next step
4	Disconnect water temperature sensor connector and start engine to check idle speed is stable or not.	YES	Repair circuit or replace sensor
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient.	YES	Eliminate mechanical failures
		NO	Next step

## (8) Normal starting, but unstable idle speed after engine warming

**General failure part:** 1. Water in fuel tank; 2. Injector; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Mechanical part of engine

### General diagnosis procedures:

Item	Procedures	Results	Next
1	Check if air filter is blocked or air intake pipe leaks	YES	Repair air intake system
		NO	Next step
2	Check if spark plug is suitable for requirement. (including its type and clearance)	YES	Next step
		NO	Adjust or replace
3	Check if there is carbon deposit inside throttle body and air control valve.	YES	Clean
		NO	Next step
4	Disconnect water temperature sensor connector and start engine to check idle speed is stable or not.	YES	Repair circuit or replace sensor
		NO	Next step
5	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	YES	Replace
		NO	Next step
6	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
7	Check if cylinder pressure is insufficient	YES	E l i m i n a t e mechanical failures
		NO	Next step

# 11 Troubleshooting

**(9) Normal starting,unstable idle speed or engine stop when it is electronic loaded (e.g. headlight is on)**

**General failure part: 1. Air control valve; 2. Injector.**

**General diagnosis procedures:**

Item	Procedures	Results	Next
1	Disassemble air control valve and check if there is carbon deposit inside throttle body, idle adjustment and by-pass.	YES	Clean related parts
		NO	Next step
2	Check if output power increases when lighting, by using PDA to test if ignition advance angle, fuel spray and air intake volume is normal.	YES	To steep 4
		NO	Next step
3	Disassemble injector and use special tool to check if there is leakage or blocked or wrong fuel flow.	NO	Repair air intake System
		YES	" R e p l a c e injector"
		NO	Next step

**(10) Engine starts normally, but idle speed is too high**

**General failure part: 1. Throttle body and by-pass; 2. Injector seat; 3. Air control valve; 4. Water temperature sensor; 5. Ignition timing.**

**General diagnosis procedures:**

Item	Procedures	Results	Next
1	Check if throttle cable is jammed or too tight.	YES	Adjust
		NO	Next step
2	Check if there's leakage between air intake pipe and injector seat.	YES	Repair air intake system
		NO	Next step
3	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean related parts
		NO	Next step
4	Remove water temperature sensor connector, start engine to check if idle speed is too high.	YES	Repair wiring or replace sensor
		NO	Next step
5	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Repair ignition timing

**(11) Low acceleration**

**General failure part; 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Throttle body and by-pass; 5. Air intake pipe; 6. Air control valve; 7. Injector; 8. Ignition timing; 9. Exhaust pipe**

**General diagnosis procedures:**

Item	Procedures	Results	Next
1	Check if air filter is blocked.	YES	Repair air intake system
		NO	Next step
2	Connect fuel pressure gauge, start engine to check if pressure is around 300kPa at idle.	YES	Next step
		NO	Repair fuel supply system
3	Check if spark plug is suitable for requirement (including its type and clearance)	YES	Next step
		NO	Adjust or replace

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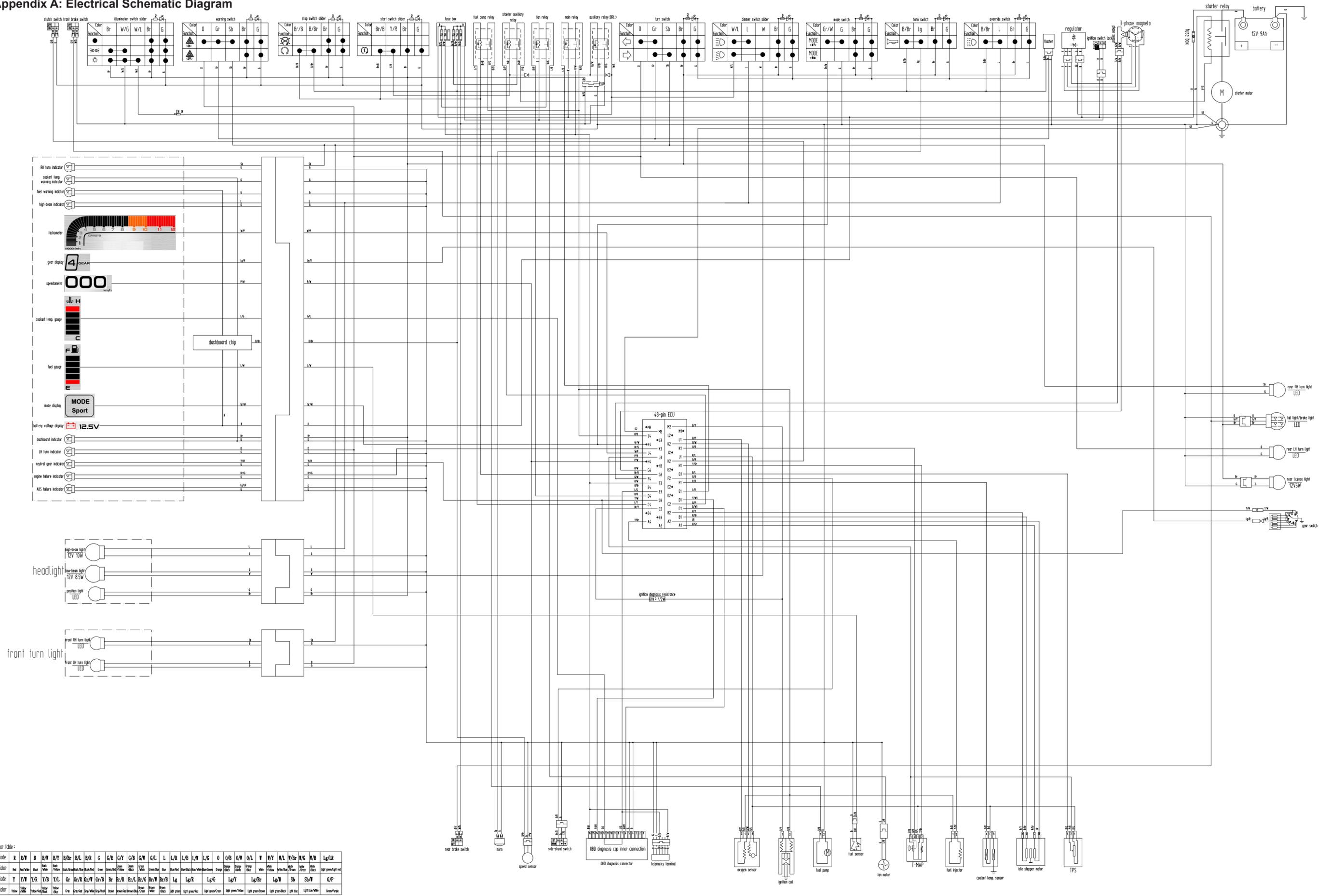
Item	Procedures	Results	Next
4	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean related parts
		NO	Next step
5	Check if TPS and its circuit is normal.	YES	Next step
		NO	Repair circuit or replace TPS
6	Disassemble injector and use special tool to check if there is leakage or blocked.	YES	Replace
		NO	Next step
7	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
8	Check if ignition timing and timing order comply with standard regulation.	YES	Next step
		NO	Adjust ignition timing
9	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace exhaust pipe

### (13) Difficult to accelerate and bad performance

**General failure part; 1. Water in fuel tank; 2. TPS; 3. Spark plug; 4. Ignition coil; 5 . Throttle body and by-pass; 6. Air intake pipe; 7. Air control valve; 8. Injector; 9. Ignition timing; 10. Exhaust pipe**

Item	Procedures	Results	Next
1	Check if clutch sliding, low tire pressure, bad brake or wrong tire size.	YES	Repair
		NO	Next step
2	Check if air filter is blocked.	YES	Repair air intake system
		NO	Next step
3	Connect fuel pressure gauge, start engine to check if pressure is around 300kPa at idle.	YES	Next step
		NO	Repair fuel supply system
4	Disconnect high-tension cable, connect spark plug and set its electrode 5mm to engine body, then start engine to check if spark is strong enough.	YES	Next step
		NO	Repair ignition system
5	Check if spark plug is suitable for requirement (including its type and clearance).	YES	Next step
		NO	Adjust or replace
6	Remove air control valve and check if there is carbon deposit inside throttle body, air control valve and by-pass.	YES	Clean related part
		NO	Next step
7	Check if TPS and its circuit is normal.	YES	Next step
		NO	Repair circuit or replace sensor
8	Disassemble injector and use special tool to check if there is leakage or blocked.	YES	Replace
		NO	Next step
9	Check whether the failure happens right after filling fuel.	YES	Change fuel
		NO	Next step
10	Check if ignition timing complies with standard regulation.	YES	Next step
		NO	Repair ignition timing
11	Check if exhaust gas exhale smoothly.	YES	Next step
		NO	Repair or replace

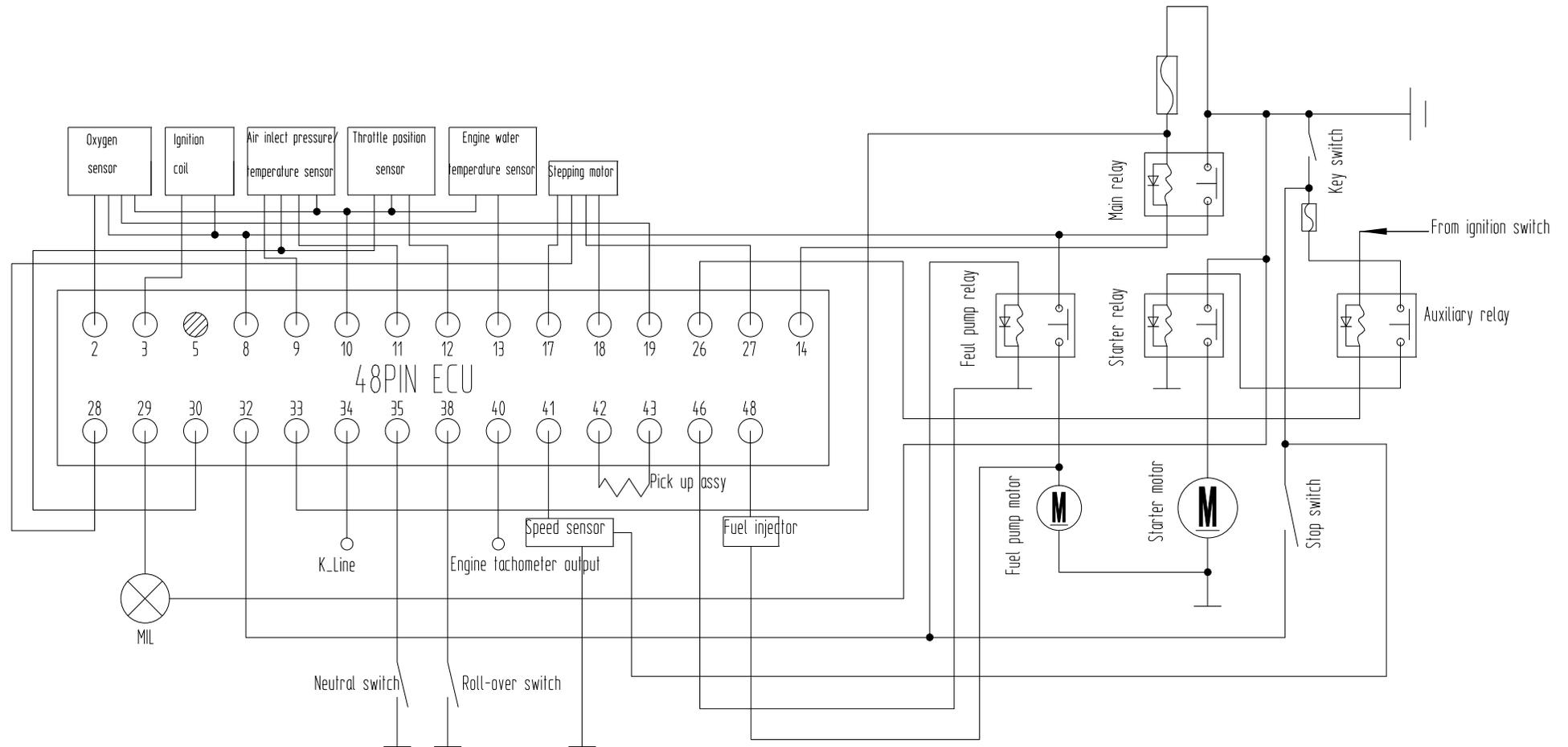
Appendix A: Electrical Schematic Diagram



Color table:

Code	R	R/W	B	B/Y	B/R	B/L	B/R	G	G/R	G/Y	G/B	G/L	L	L/R	L/B	L/Y	L/G	O	O/B	O/W	O/L	W	W/Y	W/L	W/R	W/G	W/B	Lg/LR
Color	Red	Red/White	Blue	Blue/Yellow	Blue/Red	Blue/Black	Blue/Black	Green	Green/Red	Green/Yellow	Green/Black	Green/Black	Light Green	Light Green/Red	Light Green/Black	Light Green/Black	Light Green/Black	Orange	Orange/Black	Orange/Black	Orange/Black	White	White/Yellow	White/Red	White/Black	White/Black	White/Black	Light green/light red
Code	Y	Y/W	Y/R	Y/L	Gr	Gr/R	Gr/W	Gr/B	Br	Br/R	Br/G	Br/B	Lg	Lg/R	Lg/G	Lg/Y	Lg/Bc	Lg/B	Sb	Sb/W	G/P							
Color	Yellow	Yellow/White	Yellow/Red	Yellow/Black	Grey	Grey/Red	Grey/White	Grey/Black	Brown	Brown/Red	Brown/Black	Brown/Black	Light green	Light green/Red	Light green/Black	Light green/Black	Light green/Black	Light green/Black	Light blue	Light blue/White	Green/Black							

## Appendix B: Starting Diagram



Appendix C

# EFI Diagram

